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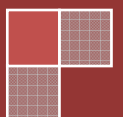
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Message from the Editor-in-Chief

Dear Colleagues,

The Turkish Online Journal of Educational Technology, AECT, Governors State University, Sakarya University, Ohio University and other international universities will organize 17th International Educational Technology Conference (IETC-2017) on September 06-08, 2017 at Harvard University Faculty Club, in Cambridge, MA, USA (www.ietc-c.net). IETC series is an international educational activity for academics, teachers and educators. This conference is now a well known educational technology event. It promotes the development and dissemination of theoretical knowledge, conceptual research, and professional knowledge through conference activities. Its focus is to create and disseminate knowledge about the use of instructional technology for learning and teaching in education.

TOJET is interested in academic articles on the issues of educational technology. The articles should talk about using educational technology in classroom, how educational technology impacts learning, and the perspectives of students, teachers, school administrators and communities on educational technology. These articles will help researchers to increase the quality of both theory and practice in the field of educational technology.

Call for Papers

TOJET invites article contributions. Submitted articles should be about all aspects of educational technology and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET.

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Achieving Better Learning Performance through the Discussion Activity in Facebook

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ABSTRACT

This study was conducted to see the effectiveness of using Facebook for expressing opinions on given topics to improve students' oral proficiency and critical thinking skills in an English class at a private university. The participants were 80 students enrolled in a course which emphasized the use of English for expressing ideas. Three research questions were formulated to evaluate the effectiveness of teaching and learning. Data were collected by two small group discussion tests, a questionnaire and postings in Facebook. The results indicated that students achieved better performance in the second small group discussion test. There were positive correlations between students' final score and their participation while satisfaction was not found to be correlated to both final score and number of postings. Also, they had a high level of satisfaction with the discussion activity they did in Facebook. The findings suggest that different learning activities be included in future courses to allow students to practice more on discussion, making them improve not only their critical thinking, but language skills as well, and in evaluating those activities, we need to take students' participation into consideration.

Keywords: oral proficiency, Facebook, critical thinking, social media, language teaching

INTRODUCTION

The ability to think critically features prominently in terms of education. Lang (2000) defines it as a process that results in rational and substantiated comprehension of a subject matter. People with critical thinking abilities thoroughly analyze and augment their thoughts, present them with graphically and convincingly, and scrutinize and dare to contradict other people's ideas. According to Paul and Elder (2008), people with critical thinking abilities are those who pose significant questions in a well-defined and unambiguous manner, collect and apply abstract ideas to evaluate the information in order to reach well-thought-out deductions. They check the accuracy and validity of the deductions, consider other relevant ways of thinking, acknowledge suppositions and outcomes, and interact well with other people.

Even though students are able to learn and practice how to utilize the ability to think critically in various different situations, it is still necessary to instill into them the attitude that there is always a risk of errors and that they should learn from those errors and failures (Nelson, 2005). The teacher may have the students discuss a particular topic among team members so as to reach a definite solution to that issue. This will broaden their thinking approaches and provide an opportunity for other team members to carefully examine or analyze each other's way of thinking (Sweet & Michaelsen, 2012). Today, acquisition of knowledge is no more the sole objective of education. Other skills such as interpersonal relationships and the ability to think critically have become vitally important. Yet honing the critical thinking abilities visa classroom activities takes up a lot of class time. On top of that, as students have the four basic skills to master, the teacher can ill afford to spend class time on other skills.

Using Technologies to Promote Critical Thinking

At present the popularity of technology has rendered it an efficient instrument to develop the skills to think critically. Interrelation characterizes today's society, and cooperation and the skills to think critically, which greatly help with online learning, have undeniably become significant (Nagi & Vate U-Lan, 2009). According to Maurino (2006-2007), since online communication allows students more time to read, think, form ideas, analyze, and comment, they are more likely to produce considerably better analytical comments online than they tend to in a classroom learning environment. Ladyshevsky (2006) also points out that another added benefit is that different learners may adopt different approaches to a particular issue, thus creating varied reactions and

feedback. Chen, Liu, Shih, Wu, and Yuan (2011) propose that a learner who has posted an idea or a comment receives a number of responses or comments from other learners or instructors, and this shows the social impacts of online communication. Online team interaction can also help shy students or team members who rarely speak up in the class or discussion activities (Chang, Chen, & Hsu, 2011). Many studies have shown that many instructors incorporate and encourage learning via online conversation (Baran & Correia, 2009; Barnett-Queen, Blair, & Merrick, 2005; Thormann, 2008). There are quite a few ways (for example discussion forums) to carry out online discussion, and researches on critical thinking have proved that online discussion are conducive to honing the abilities to think critically, resolve problems, and to contribution and involvement (Al-Fadhli & Khalfan, 2009; Ekahitanond, 2013). Online forums are another main source where researches on critical thinking can be found. Ekahitanond (2013) and Kitchakarn (2013) found that the websites, applications and activities on the Internet create positive ways of thinking about learning in the students.

The Use of Facebook as a Learning Tool

Social media provides ample room and leeway for learners to form their own learning groups, with Facebook at the forefront. Facebook serves as a platform for college students to air opinions and share pictures with other people. According to Jones and Fox (2009), around 85-99 per cent of college students are on Facebook. Given its decided popularity, Facebook is fast becoming another channel for learning. Wang, Lin, Yu and Wu (2012) had been successful with the use of Facebook as a learning tool, resulting in the learners' eager participation, higher academic achievements, and contentment with their learning. According to Kaliban, Almad, and Zainol (2010), students were convinced that Facebook could make it easier to learn English. DeSchryver, Mishra, Koehler and Francis (2009) noted that it was agreeable for students to use Facebook as a learning tool in class. Pascarella and Terenzini (2005) support that environments that emphasize close interactions between faculty and students are related to improved critical thinking, knowledge acquisition, analytic competencies, and intellectual development. Therefore, social media can serve as a venue for learners to hone their ability to think critically through conducting "small group discussion", which serves as an incentive and a vehicle for learning. Students learn how to carry out small group discussion, express their personal opinions, work with theories and premises and resolve problems by discussing, arguing, brainstorming, and adjusting the input. One thing teachers should do to help guide the learners is to show how to utilize the materials for discussion. The learners' level of success largely depends on clearness, actual exercise, and teachers' guidance. One major limitation is that the larger a class, the less time and attention a teacher can devote to each group. In that case, group leaders play a vital role in conducting the discussion, particularly where complex and creative issues are involved. As such, the current study employed social media as a platform for students to do the activity.

Learners' Participation

Facebook is one of the best ways of promoting peer interaction and collaborative learning. As Miyazoe and Anderson (2010) put up, constructivism and knowledge building, involving reflective and collaborative learning supported by scaffolding can make a quality online learning environment. That is, peer interaction can build a quality discussion learning experience. In this sense, it is necessary that the problems of student isolation and disconnection in online learning be solved to actively promote participation. Rovai (2007) suggests that courses need to be well-designed so that they provide motivation for students to engage in productive discussions. This productive and effective engagement can be ensured by identifying what is expected from students, and one of the key ways is a discussion rubric (Rovai, 2007). Likewise, Gikandi, Morrow and Davis (2011) found formative feedback and authentic assessment to be excellent ways to encourage quality participation and interaction that facilitates the sharing of knowledge and creates a community of inquiry. A previous study revealed a positive correlation between students' visible learning behaviors, such as participating in online activities, and their learning outcomes (Wang, 2004). Another study conducted by Cheng, Paré, Collimore and Joordens (2011) found students who voluntarily engage in online discussion forums achieve better examination results than those who do not. The results suggest that if students actively engage in discussing with their peers, they will gain a lot of benefits. On the contrary, those who do not participate in an online learning environment may be missing a good opportunity for quality interaction with their peers.

Learners' Satisfaction

This study set a premium on satisfaction as the key aspect. The level of a learner's satisfaction is directly proportional to the level of participation. The more satisfied students are, the more willing they are to learn, and they stand a better chance to succeed (Allen et al. 2007; Puziffero 2008). Palmer and Holt (2009) found that the more students participate frequently online, the more satisfied they feel with online courses. Satisfaction is described as the students' impression that their learning process proved advantageous to them. It is also indicative of how effective the learning process was. Students' comments and criticisms can reflect and decide what adjustments should be made so that class time and online time are well-proportioned. Such feedback from students together with their course assessments provides a great deal of help to people who make decisions about

how each course should be planned and conducted (Wong & Yeung, 2003). According to Pena and Yenug (2011), conducting surveys is a major tool used to find out the level of learners’ satisfaction with a certain course, which is one of the crucial ingredients of course assessments. In their research, Xie, Durrington, and Yen (2011) find that the close correlation between how motivated a student is and how actively involved that student is online is that one is proportionate to the other.

Based on the principle that students can hone the ability to think critically even via online education through the student-centered approach, this study incorporated Facebook, arguably the most widely used site of its kind, into the learning process so that students were able to improve their critical thinking skills. The purposes of the study were to examine how students’ oral proficiency and critical thinking skills were affected by the debates and discussions in Facebook, how they felt about small group discussions in terms of satisfaction and what factors are related to their learning performance. Although students tend to discuss and express ideas more openly when they interact with other students (Seo, 2007), in this study students had an opportunity to interact with other students as well as with instructors because instructors are better able to put in order, clarify, and integrate all the information (Wang, 2009). Three research questions were addressed as follows:

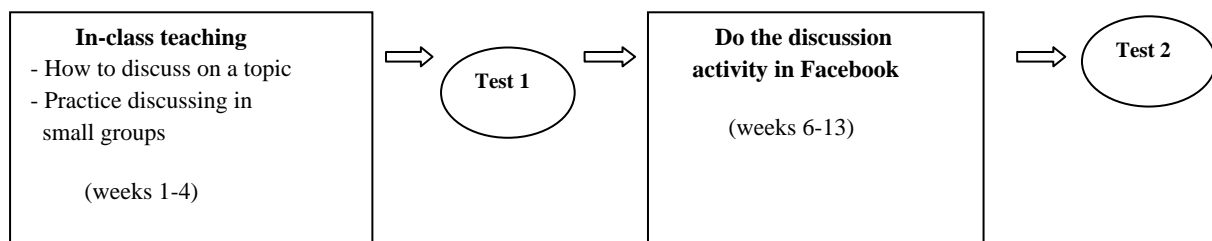
- Research Question 1: To what extent do the students improve critical thinking skills and language proficiency after joining the discussion activity in Facebook?
- Research Question 2: What is the students’ satisfaction with the discussion activity in Facebook?
- Research question 3: Are there any relationships among the frequency of students’ postings, satisfaction and their final score?

METHODOLOGY

The participants in the research were 82 students who registered for English for Expressing Ideas in semester 1 of the academic year 2014. They were from two sections. The course carried 3 credits and lasted 14 weeks. The class met 2 periods a week (140 minutes). The participants also had to attend a one-period (70 minutes) language lab each week for listening and speaking. This course required students to perform many tasks and tests. One of the tasks they had to perform was small group discussion.

The ability being a stated goal of the course, it therefore integrated Facebook as a platform for discussion in order to enhance the students’ oral proficiency and critical thinking abilities. This English course took advantage of it as a platform for students to practice their critical thinking skills. This activity is called the “discussion activity.” Students formed their own groups (5 in each group) to discuss certain topics. They made use of various techniques to express their opinions. For instance, they described, elaborated, and showed whether they were in favor of or against what other students had posted. The students took part in the activity by discussing and giving their opinions on the topics posted by the teacher on Facebook. They were to conduct discussions in such a way that they encouraged more discussions from other students. The expressed ideas, opinions or discussions by the students should reflect their ability to think critically. The role of the teacher was to oversee the activity, to read the discussions and offer comments and advice, and to make sure that the discussion went on smoothly. This activity allowed students to know what “good input” is through their reflections by describing, explaining, expressing their likes or dislikes of what others had posted, interpreting, and showing their agreement or disagreement with other students’ thoughts.

Figure 1: Stages of the Experiment



The first instrument was two discussion tests assessing students’ performance which focused on both oral proficiency and critical thinking skills. One test was given as the pre-test and the second one as the post-test. As a performance-based assessment of speaking and critical thinking ability, students in groups of 5 conducted a 5-10 minute discussion on a controversial topic of their interest. Teachers gave marks using scoring rubrics. The small group discussion assessment was conducted two times, each worth 10 points. A list of controversial topics for the tests was given on the test date.

Topics for the First Test

- What is more desirable - love marriage or arranged marriage?
- Corruption will never disappear from Thai society.
- Life is not easy when there is no money.
- Plastic surgery is the best way to beauty.
- Parents should not allow their kids to play computer games.

Topics for the Second Test

- Forgiveness is better than anger.
- Skipping classes is not always a bad thing.
- Actions speak louder than words.
- It is not good to have a boyfriend or girlfriend when you are studying.
- Which is the most valuable – love, friendship, and good health?

After they chose the topic they preferred, they had ten minutes to prepare with the team members. The scoring rubric was used to grade students' performance as follows:

| Criteria | 0 point | 1 points | 2 points | 3 points |
|---------------------------------|---|--|--|---|
| Fluency | Speak slowly with long pauses and/or a lot of incomplete thought | Speak with frequent pauses, a few incomplete thoughts | Speak with frequent pauses, no incomplete thought | Speak continuously with a few pauses or stumbling |
| Discussion Ability | The student does not participate in the discussion. | The student participates by answering discussion questions with limited details. The student agrees/disagrees with something said, but offers no additional new information regarding the topic. | The student participates in each discussion question. The student follows the directions for making sure everyone participates fairly. | The student fully participates in each discussion question and adds additional insight to prompt further discussion amongst the members of the group. |
| Reflection of Creative Thinking | There is no attempt at reflection, or only superficial comments apparent. | The student makes a few substantive reflective statements. | The student comments in a structured and insightful way. | |
| Logical Ideas | Few ideas are presented, and they are not logical. | Some logical ideas are presented. | Adequate logical ideas are presented. | |

The second instrument was a questionnaire which was designed to assess students' satisfaction with the discussion activity in Facebook. They were asked to fill out a 10-item questionnaire, whose validness had been certified by three experts. This questionnaire was used to find out the students' acceptance of the activity by asking how satisfied they were with the activity they did in Facebook. It was in a form of Likert five-rating scale. The acceptable IOC index for each item was above 0.6. In order to ascertain that the questionnaire was reliable, it had been tried out by 40 students from semester one of the 2014 academic year who had taken part in a trial study course for six weeks. Cronbach's Coefficient Alpha was applied and the values were 0.86 for the first part, and 0.82 for the second part. In addition, the current study placed a lot of importance on joining the activity in Facebook, so it is necessary to investigate how much students joined the activity in Facebook. Since they were required to post their opinions on the topics provided, participation was, therefore, measured by the number of their posts on Facebook.

DATA ANALYSIS

The sources of data were the students' posts, evaluations of their performance and the questionnaires. The students' involvement with the activity was measured by the number of their postings. The students'

performances in both tests were compared using a paired-samples t-test. The satisfaction with doing the discussion activity in Facebook was evaluated by means and standard deviations. A mean score of 1-1.50 indicates having satisfaction at a very low level, 1.51-2.50 at a low level, 2.51-3.50 at a moderate level, 3.51-4.50 at a high level, and 4.51-5.00 at a very high level. The relatedness of the students’ final marks, frequency of their postings and satisfaction was scrutinized with Pearson Correlation Coefficients.

RESEARCH RESULTS

Research Question 1: To what extent do the students improve critical thinking skills and language proficiency after joining the discussion activity in Facebook?

Table 1 shows that the pre-test mean score was 6.63 and the post-test mean score was 7.93. The result from the one-tailed test revealed that the mean score of the post-test was significantly higher than that of the pre-test. This means that the discussion activity was most likely to improve the students’ thinking skills and language proficiency.

Table 1: Mean Scores of the Pre-Test and Post-Test of the Students

| Score | Mean | S.D. | df | t | p |
|-------------------|------|------|----|-------|------|
| Discussion Test 1 | 6.63 | 1.13 | 81 | 12.94 | .000 |
| Discussion Test 2 | 7.93 | 1.03 | | | |

Research Question 2: What is the students’ satisfaction with the discussion activity in Facebook?

Table 2 showed that the overall mean scores of satisfaction with the discussion activity in Facebook were at a high level ($\bar{X} = 3.76$). Nearly all of the items were also rated at high levels except item no.2 and no.9. The three highest mean scores fell on item no. 1 (having more motivation to learn/ $\bar{X} = 4.09$), followed by item no. 10 (having a good learning experience/ $\bar{X} = 4.01$), and item no. 6 (having efficient communication and interaction with peers/ $\bar{X} = 3.84$). Meanwhile, item no. 9 was rated the least (increasing learning autonomy / $\bar{X} = 3.33$).

Table 2: Students’ Satisfaction with the Discussion Activity in Facebook

| Statement | Mean | SD | Level |
|--|-------------|------------|-------------|
| 1. With this activity, I am more motivated to learn than usual. | 4.09 | .78 | high |
| 2. I can improve my oral proficiency through the discussion activity in Facebook. | 3.41 | .67 | moderate |
| 3. The discussion activity in Facebook enhances my critical thinking skills. | 3.54 | .74 | high |
| 4. During the discussions in Facebook, I discover faults in what I had previously believed to be right. | 3.72 | .71 | high |
| 5. The discussion activity in Facebook helps me explore issues, take and discuss positions in an argumentative format. | 3.67 | .67 | high |
| 6. The discussion activity in Facebook allows efficient communication and interaction with peers. | 3.84 | .76 | high |
| 7. I find the discussion activity in Facebook very useful. | 3.79 | .70 | high |
| 8. The discussion activity in Facebook facilitates active learning. | 3.71 | .82 | high |
| 9. The discussion activity in Facebook increases learning autonomy. | 3.33 | .79 | moderate |
| 10. The discussion activity in Facebook provides a good learning experience. | 4.01 | .68 | high |
| Total | 3.76 | .31 | high |

Research question 3: Are there any relationships among the frequency of students’ postings, satisfaction and their final score?

Data of final score were derived from the post-test of small group discussion, while participation was calculated based on the number of posted messages in Facebook. The primary purpose of this study was to examine the relationship among three factors to see the effectiveness of the activity that was deployed. A Pearson product-moment correlation was computed to determine the relationship between the students’ number of postings and their final results. As indicated in Table 3, there was a positive, medium correlation between postings and results, which was mildly statistically significant ($r = .455, n = 82, p < .001$). That is, the more students participated in the activity, the higher their learning performance was. However, satisfaction was not found to be correlated to both final score and number of postings.

Table 3: Intercorrelations among Final Score, Number of Postings and Satisfaction

| | No. of postings | Satisfaction |
|-----------------|-------------------|-----------------|
| Final score | .455*** (.000) | .101 (.368) |
| No. of postings | | -.014 (.902) |

*** Correlation is significant at the 0.001 level (2-tailed)

DISCUSSION

The first discussion point is that learners accomplish more in terms of language learning. The study results point out that discussion among group members is conducive to enhancing learners' language proficiency and ability to think critically due to the fact that they have an opportunity to learn to communicate their personal ideas and thoughts. Sweet and Michaelsen (2012) indicate that learners can enrich and expand the scope of their thoughts and study and evaluate what other group members have put forward and their thought processes when they debate a certain problem in order to find how best to resolve it. This also corresponds with the statement of Pascarella and Terenzini (2005) that learning surroundings that encourage interrelation between instructors and learners are closely linked with learners' increased ability to think critically, to learn, to analyze, and to improve themselves intellectually.

Social networking sites are advantageous in that they provide learners with opportunity and space for expression. Students learn collectively via these websites when their ideas or thoughts are analyzed and commented on by others. Unlike a normal classroom where students feel restricted and withdrawn, these websites serve as a place where they feel free and unafraid to air what they think (Cheung, Chiu & Lee, 2011). Estus (2010) points out the effectiveness of learning through Facebook when he shows that students feel more comfortable expressing what they think about various issues on Facebook. This accords with the finding that Facebook has effectively served as a platform for debate (Khalfan, 2009; Estus, 2010; Selwyn, 2009; Schroeder & Greenbowe, 2009). These study results help to substantiate other study results concerning the ability to think critically and social networking sites as an avenue to improving the ability to think critically, resolving problems, and encouraging team involvement (Al-Fadhli & Khalfan, 2009; Ekahitanond, 2013; Marra, Moore, & Klimczak, 2004).

The second point to be discussed is students' satisfaction with the discussion activity on Facebook. One essential aspect is that not only does it reinforce students' learning, but it also brings about a high level of satisfaction. Students showed that they were highly satisfied with the activity overall and with each item. Therefore, it can be concluded that students perceive the online activity as an effective or satisfactory way of learning. One of the reasons may have been the use of Facebook, which is undeniably the most popular social networking site they use in daily life. As a result, they find it rather easy to communicate with one another on Facebook. Apart from that, there are many other elements of the learning context involved that they may consider such as subject content, communication, and learning tasks. This is in accordance with previous studies (Ekahitanond, 2013; Kitchakarn, 2012) in that students had positive attitudes toward learning with online tools.

The next discussion point concerns frequency of participation in this course. It is noticed that most students intended to participate in the discussion activity because they wanted to improve their skills in expressing their ideas, thoughts, and good reasons to convince others. For them, unless there is much practice, group discussion proves to be rather difficult. The results clearly showed that their post-test performance was related to the amount of participation. The reason might be that the course allowed the flexibility and efficiency of the online environment. The activity offers students an opportunity to practice discussion and they can choose to access the activity at their own convenience. In this way, the blending of face-to-face and technology-supported out-of-class activities becomes a "mechanism through which students engage in existing effective educational practices" (Laird & Kuh, 2005).

Based on the finding, there was a positive, medium correlation between postings and the final score, which was mildly statistically significant ($r = .455$, $n = 82$, $p < .001$). This shows that the more students participated in the activity, the higher their learning performance was. This might be because the discussing activity allowed them to know what "good input" is through their reflections by describing, explaining, expressing their likes or dislikes of what others had posted, interpreting, and showing their agreement or disagreement with other students' thoughts. The finding reveals that participation is an important variable to be considered, so there should be a strategy to motivate students to participate more in the activity. For example, the more they

contribute to the activity, the more they will get the extra points. The current study was consistent with one study which revealed a positive correlation between students' learning behaviors, such as participating in online activities, and their learning outcomes (Wang, 2004). Another study conducted by Cheng, Paré, Collimore and Joordens (2011) also asserted that students who participated in discussion activity outdid those who did not in terms of examination results. Students gained a lot of benefits if they actively engaged in discussion activity with their peers.

The last discussion point is that there was no relationship between satisfaction and participation. This is probably because they knew that participation in discussion activity was part of the course requirement. Even though some students were not satisfied with taking time in doing the activity, they were able to complete it in a given time. One of the reasons used to support their willingness to participate in it was a group activity. When discussing a given topic, all of them had to express ideas. They did not want to disappoint their peers. However, the finding of this study was contradictory to previous studies by Allen et al. (2007) and Puziffero (2008), where the level of a learner's satisfaction was found to be directly proportional to the level of participation. The more satisfied the students were, the more willing they were to learn and they stood a better chance to succeed.

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An Exploration of Higher Education Teaching in Second Life in the Context of Blended Learning

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ABSTRACT

This study explores teaching experiences of educators within the virtual world of Second Life (SL) and pedagogical practices adopted. A blended approach is applied by using physical classrooms, Blackboard™, web-based resources, and the virtual world of SL in an Information Literacy (IL) class for 1st year undergraduate students at an institution in the UK. A Case study was employed as well as a parallel qualitative component, interviews, was added to the study that provided another source of insights to articulate perspectives of educators in teaching within VWs. In reflecting and evaluating the teaching experiences, evidence is drawn from observations, semi structured interviews, chat logs, snapshots, and field notes. A thematic approach is used to analyse the data. The findings from the data analysis are presented in terms of seven themes: cybergogy, creativity, trial and error, wow moment, uncertainty, experiential learning, and dynamic relationship.

Keywords: improving classroom teaching; virtual worlds; teaching/learning strategies; virtual reality.

INTRODUCTION

Over the last decades, HE has seen significant changes with the penetration of the Internet and ubiquitous technologies in individuals' lives (Bates 2011). There is little doubt that the Internet has considerably influenced the ways in which individuals across the world communicate, share ideas, interact with each other, and express themselves. Along with this remarkable spread, ICTs have played an important role not only in designing, developing and delivering educational courses but also in enhancing and enriching the quality of teaching and learning experiences (Oliver 2002). Therefore, numerous educational institutions, mostly in developed and industrialised countries, have adopted the use of ICTs so as to enhance the quality of teaching and learning processes. As a consequence of rapid developments in ICTs, VWs have become the focus of interest and have brought new opportunities for educators. SL was chosen for this research since a great numbers of institutions, companies, and individuals embrace it as well as it is the virtual environment in which most educational events are happening. The decision to undertake this scoping study is therefore in part motivated by the level of interest in SL within the HE settings in the UK at the time of commencing the study.

However, despite growing interest in such environments for HE, only 1% of academicians in UK institutions are actively using SL (Kirriemuir 2009). This indicates that very small numbers of educators in each institution actively use virtual worlds (VWs) for teaching or research. More importantly, Kuksa & Childs (2014, p.102) state that the implementation of VWs in teaching is often due to the personal interest of an educator rather than being part of an institutional strategy. At this stage, it has not been conclusively demonstrated that a VW environment such as SL has a considerable impact on the teaching and learning process (Herold 2010, p.792). Herold further argues that what seems missing is how SL is supposed to be integrated into classroom teaching within HE settings (ibid). Therefore, it can be argued that the links between pedagogy and practices in VWs need deeper scrutiny and consideration. Therefore, to guide this research, this review leads to the following questions:

RQ1. How did educators teach in SL and f2f contexts?

RQ2. Did teaching in SL give educators any insights to improve their classroom pedagogy?

RQ3. How did educators learn how to approach teaching in SL?

RQ4. How did educators overcome challenges such as learners' anxiety towards VWs?

In recent years, there has been a growing body of studies examining the effect of VWs on students' learning and achievement across different disciplines such as language (Atkins & Gaukrodger 2011), healthcare (Wiecha et al. 2010; Rogers 2011), architecture (Rodrigues & Magalhães 2010), business (Bonsu & Darmody 2008), and literacy (Merchant 2010). The findings of these studies encourage the idea that VWs can be used as an

environment in which students are engaged in learning experiences. On the other side, there seems to be less literature providing guidance on how to make essential pedagogical use of VWs. Therefore, it is important to understand how VWs may be beneficial for the design of enriching learning experiences, the identification of pedagogical activities, and to determine the ways to prepare educators for these sorts of immersive experience (Savin-Baden et al. 2010; De Freitas et al. 2009). However, this study does not simply attempt to concentrate on how to teach within VWs, but also to consider how educators' teaching strategies are affected in classroom pedagogies. It is a new niche that leads to consideration of educators' ways of thinking about teaching. The driving factors for compiling this study thus are new teaching ideas and the sheer potential VWs may offer.

THEORETICAL FRAMEWORK: PEDAGOGICAL PRACTICES WITHIN SECOND LIFE

A description such as social constructivism is the prevalent theoretical framework embraced within VWs (Minocha & Reeves 2010; Duncan et al. 2012). Within the social constructivism paradigm, situated cognition, experiential learning, problem based learning (PBL), and inquiry based learning (IBL) are the emerging pedagogical approaches in SL. Situated cognition is clearly in line with constructivist propositions and basically integration learning and doing. From the situated cognition perspective individuals learn through experiences. Therefore situated cognition can be considered experiential. In this sense, Nelson & Ketelhut (2007, p.269) emphasise that “educational MUVes have emerged in recent years as a form of socio-constructivist and situated cognition-based educational software.” Participants can practice and interact with others and objects into VWs which may be impossible or tremendously costly to simulate in real life. To support this aspect, VWs can be adopted to implement authentic learning activities described by Lombardi & Oblinger (2007, p.2) as “authentic learning typically focuses on real-world, complex problems and their solutions, using role-playing exercises, problem-based activities, case studies, and participating in virtual communities of practice.” In this regard, VWs may offer a social model of learning, including the ability for learners to repeat activities in a simulated and safe environment.

Within the context of VWs, immersive experiences of the learners, their use of multiple media, and activities between peers lead to “transactional” learning (Barton & Maharg 2007) that is learning based upon transactions, i.e. tasks, activities. It is from this perspective that VWs are a good example of providing an environment wherein the tutors could configure the environment to augment existing (generic) teaching practice, i.e. lectures, with the ability to foster optimum learning process. To support this idea, for example according to White (2008) teaching and learning in VWs is “an experience”. Teaching in these contexts provides less emphasis upon the schedule of the module and more emphasis upon sequencing the learning experience, meta-reflection, peer assessment and group work (De Freitas & Neumann 2009, p.343). It is therefore the task of the tutors to equip the students with the necessary skills to develop an understanding of their knowledge based on personal experience and through experimentation. Such pedagogic approaches might all justifiably be considered with disciplinary ways of teaching. In PBL, students are encouraged to learn by addressing authentic and open-ended problems and reflecting on their experiences (Hmelo-Silver 2004). A typical PBL context incubates an experiential, social and active aspect of learning to enhance students' skills of critical thinking. In this sense, educators take experiential learning further and provide opportunities for learners to identify a problem, suggest possible solutions, test them and observe outcomes. This encourages students to think critically, evaluate solutions and analyse options as well as cooperate in teams to negotiate and analyse real-life problems.

Framing the problem can be enhanced in several ways in VWs. First, VWs allow diverse groups of students and experts in a problem-based scenario to come together without needing to organise a physical location. Further, VWs allow the use of multiple media sources such as audio, video, and printed materials. Providing a robust representation of a problem within an enriched environment can benefit students to comprehend the scenario and see the relevance of various contextual elements. In addition to helping students to have experiences similar to those in real-life contexts, VWs provide enhanced opportunities for educators to establish ill-defined problems where students work through situations that might not be achievable in the classroom due to time, safety or logistics. In the context of PBL activities in VWs, students have a shared persistent space where they can also perform self-directed learning in order to discuss the design problem. PBL is a recognised approach within different disciplines, and the various aspects of PBL are explored in depth and eventually adopted in VWs. To give a few examples, Good et al. (2008) take PBL as a framing pedagogy to organise students to work in teams to design and build a learning experience in SL. Parson & Simon (2011) use PBL for teaching Psychology utilising VWs within avatar-driven or information-driven scenarios. It is evidently characterised in their study that PBL is an ideal approach within immersive experiences. In the study of Esteves et al. (2011), students develop a project within SL through the use of LSL in combination with collaborative pair work to learn computer programming.

The main characteristic feature of IBL approach is identified by Kahn & Rourke (2005) as involving the students

with their discipline through self-directed inquiries in a collaborative and engaging way. In essence, it is learning and teaching approaches that are based on student-led inquiry and on deepening students' engagement with the discipline. With this approach, the students are expected to learn and build knowledge through guided exploration and investigation of the questions or problems that are established with the open ended nature either by the tutor, the student, or by negotiation among them. Unlike PBL, students or educators are expected to establish questions or problems. Students then draw on their existing knowledge and decide on the direction and methods of their inquiry with support mainly from their tutors. Within this process, students explore evidence or conduct experiments interacting with a variety of sources. Similar to other learning pedagogies, students reflect, discuss critique, analyse, conceptualise, synthesise, and receive feedback. The basis of IBL suggests involving uncertainty and critiquing assumptions where students draw on their existing knowledge. Levy (2008) identifies two main conceptual frames in seeking students' experience of inquiry, based upon a study of first year undergraduates from the Faculties of Arts and Social Sciences at Sheffield University, which are "exploring and acquiring existing disciplinary knowledge" and "participating in building disciplinary knowledge". Levy's frames focus on the way in which students are engaged with disciplinary knowledge. In the context of these frames, students explore questions, problems, or scenarios through existing knowledge or they produce new insights to create new disciplinary knowledge. Experiencing IBL in this way can help to scaffold students' skills and understanding. The application of IBL can be, for instance, shaped by exploring the knowledge base of the discipline through design questions within VWs (Webber & Nahl 2011). More specifically, the work of Papamichail et al. (2010) suggests that employing an IBL approach in SL evidently stimulates active engagement and boosts students' self-confidence. For instance, the study of Webber (2010) identifies that experiencing IBL within SL helps to scaffold students' skills and understanding of the subject. The value is located to provide insights into how students encounter and navigate different sources of information (Webber, 2013).

By this point, an innovative culture of teaching and learning within VWs is emphasised, which evoke paradigms such as learner-centred, self-directed, power and responsibility, immersiveness, embodied presence, social and peer-to-peer, networked, inquiry-based, collaborative, and co-learning. To amplify this point, Warburton (2009) suggests that SL can involve both formal and informal education with its affordances to encourage productive interaction, visualisation and contextualization, authentic content and culture, identity play, immersion, simulation, presence, and content production. At this point, the central obstacle for educators when they consider teaching VWs is perhaps their preconceptions that they carry with them. Accordingly, the concepts of "pedagogy of uncertainty" (Barnett 2007, p.36) and "cybergogy" (Scopes 2011; Chase & Scopes 2012) that can be brought with immersive experience are discussed to challenge embedded assumptions within teaching and learning experiences.

The idea of "pedagogy of uncertainty" is well explained by Barnett and key to understanding this concept is the idea that genuine HE helps students to live "purposively with anxiety" and able to involve and practise terms such as "risk", "anxiety", "disorientation", "thresholds", "liminality", and "uncertainty". At this point, Bayne (2008) describes VWs as "uncanny space", which might not be necessarily comfortable, where the students might reflect in an unpredictable way. Bayne asserts that anxiety-provoking and the characteristic of uncertainty in the environment might provoke new and potentially uncertain teaching and learning experiences with the willingness to open to different ways of thinking. For Bayne, this is a new metaphor in which teaching practices are refreshed and often productive with the strange act of teaching. Bayne (2008, p.8) suggests that VWs "materialise this uncertainty in new ways by defamiliarising our sense of selfhood and our being together within the pedagogical context". For White & Le Cornu (2010, pp.193–195) this nature of in-world culture enables "disjuncture" to occur which could open out teaching opportunities to harness the students' learning processes. Disjuncture is an essential dimension of learning through VWs where learners are confronted with an experience, which challenges their understanding of concepts that they have developed up to that point. This highlights the idea of Falconer (2011) in which she refers to the metaphor of "metaxis" to describe the condition of "in-betweenness", the sense of being both in the physical world and the virtual world simultaneously. Bigger (2009) describes this in-between character of VWs as "liminal" to explain the intertwined state of mind since residents are present in the embodiment of their avatar in VWs and they are situated in the physical world in which they see their avatars projected on the display. Falconer (2011) describes this way of learning as "learning in two places at once". According to Falconer, the notion of in-betweenness, or metaxis particularly becomes significant when educators adopt VWs for their teaching. This experience concurs with the idea of "fuzziness" or "vagueness", and "uncertainty" concepts which value the idea that learning occurs in messy sets of ways and VWs enable students to learn in the mess. There is an argument that although the attractiveness and complexity of the innovative environment might distract students from the learning outcomes, certain academics (e.g. Bayne 2008; Savin-Baden 2010) suggest that VWs seem to inhere troublesomeness and disquiet aspects which accommodate powerful pedagogical possibilities. Their positive feeling of the idea that VWs defamiliarise our

sense of selfhood and being together within an uncomfortable and anxiety-inducing way has a profound pedagogical value. This idea is well framed with the conception of the cybergogy model (Scopes 2011; Chase & Scopes 2012), which is based upon the social, cognitive, dexterous and emotional aspects of learning aligned with the revised version of Bloom’s Taxonomy of Learning Outcomes (Anderson & Krathwohl 2001). Chase & Scopes (2012) state two core components of this model that are “learning archetypes” and “learning domains”. Learning archetypes are categories of learning activities include *role-play*; where learners can immerse within an alternative form and explore different aspects of the self, *simulations*; where learners can explore and experience activities that could be considered dangerous, difficult or expensive when conducted in the physical world, *peregrination*; where learners can travel to various locations of their interest, *meshed*; where learners can work in collaboration and exchange their ideas for desired learning outcomes, *assessment*; where learners get feedback and support in different forms. This model of cybergogy offers opportunities to combine VW affordances in conjunction with real-life learning within each domain, at all levels of implementation. However, the main concern in terms of designing teaching within VWs is to ensure that the designed learning activity is the finest choice for the desired learning outcomes. Scopes (2011, p.14) indicates three essential principles to consider the whole effectiveness of teaching content within SL, which are: if the use of SL is necessary, if the activity is sustainable and manageable in the environment, and if the learning activity produces the desired learning outcomes in a timely, economic and effective manner. Likewise, learners are expected to act and interact toward the desired goal, fail, and try again in a different way to demonstrate the optimum learning experience that occurs within VWs. In essence, adherence to these principles requires ensuring that the learning intervention is addressing the most effective and efficient value of pedagogical need. Once it is satisfied that designing a context within VWs is optimally suited, the next step is allow learners to experience and internalise the learning objectives.

Discussion now turns to the form of the context in which this study is conducted and presents its implications over the teaching strategies taken in this research. This is primarily because of the fact that instructional practices and strategies can easily be dominated and directed by technology (Hussain 2009, p.71). Further, there appears to be great value in combining f2f teaching and other online applications with the pedagogical affordances of VWs (Salt et al. 2008), and this study is contextualised within the blend of face-to-face (f2f), Web 2.0 applications and SL. In addition, the function of educators in facilitating the learning process of students appears to be in line with the concept of teaching in HE within the implementation of the blended approach.

The Context of Blended Learning

Although the term “blended” is widely and differently used within the context of teaching and learning, it has been defined as a mixture of online and f2f learning using a variety of resources and communication options available to students and educators (Harding et al. 2005, p.56). Blended learning is defined by Chew et al. (2010) as a “combination of face-to-face learning and teaching mediated by technology”. It is therefore a practice within the learning environment that combines both online and f2f approach. The fundamental pedagogical aspect behind this is that ICTs are widely perceived as a catalyst by bringing benefits to learners and educators within shared learning environments. Furthermore, a blended learning approach facilitates the development of digital literacy skills by its characteristics, directing individuals to operate in digital environments. A blended learning approach therefore is essential to understanding the skills necessary for the students. The term “blended” within educational concepts also suggests combining pedagogical approaches to produce optimum learning outcomes, but it is being used in this study to refer to the combination of online forms of instructional technologies with f2f teaching, often in the form of lectures. Oliver & Trigwell (2005) criticise descriptions of blended learning as involving a mix of online and f2f teaching, a mix of media or a mix of contexts. The important point of their critique is that there is nothing particularly special about learning online, exploring the mixing of medium, or blending contexts. This highlights the question of whether the mix is essential to describe this way of practicing teaching in HE. Their suggestion for blended learning is upon the perspectives of learners and they argue that ‘actual blended learning would involve students learning through experiencing variation aspects of what it is that they are studying’ (ibid, p.22), referring to “variation theory” (Pang 2003). For Oliver & Trigwell, it is the relation between variation theory and course design that leads to actual blended learning. That is, students experience certain patterns of variation in the object of learning in various blended learning contexts. The variation theory of learning is based on the concept that students learn by discerning the aspects of the variation as a phenomenon during their learning experiences (Marton & Tsui 2004). In other words, furnishing variety in the ways in which students experience learning is recognised as being crucial. One example of an attempt to do this, blends of e-learning with other media such as VWs, may help students experience the variation in different aspects of the subject being learned. Another example is to recognise students’ existing learning experiences and allow them the opportunity to draw on previous experiences. The nature of this study offers online forms in the sense that VW practices and supplementary resources for the subject matter through an institutional VLE, instead of other forms of learning at a distance. Building teaching methods upon the concept of blended learning

with considerations of Oliver & Trigwell (2005), Sharpe et al. (2006) shift the emphasis from educators to learners, and from content to experience. Arguably, this position suggests that certain patterns of the variation in the experience of the learning of students in the blended learning context are the key to be considered by educators. From this point of view, educators design a space for learning where a range of variations is presented to experience the object of learning. One way of doing that is blending for variation by using a mix of media including VWs. The idea of experiences of variation also appears to encourage educators to reflect and engage with new teaching ideas and experiences, which may occur across the boundaries. Rather than focusing solely on learners' experiences of blended learning, educators can situate their learning by exploring differences in practice across the forms of teaching such as a classroom and a virtual world of SL experiences. In applying this theoretical perspective to educators' learning, they encounter experiences of variation that may lead to changes in practice as a result of using blended learning. This also includes recognising the informal and incidental learning by sharing their teaching practices with their colleagues in their offline as well as online communities (Mackey 2008).

RESEARCH DESIGN

Case studies allow examining the phenomena within its real life context by enabling the researcher to employ diverse methods that produce various sorts of data such as narrative, text or numerical. In this context, a case study was chosen to investigate educators' experiences of VWs in their teaching and to elicit theoretical and pragmatic insights in their teaching strategies in blended situations. Case studies can have multiple complementary units of analysis, i.e. "embedded subcases" (Yin, 2012, p. 8) within an overall holistic case. Within this perspective, the holistic case was about an exploration of teaching in the context of blended learning. This included teaching experiences of educators as one unit of analysis and educators' perceptions in the context of their teaching in SL as another unit of analysis, which together form an embedded, single-case study. Furthermore, a case study was chosen as the case involved perceptions and teaching experiences of the tutors, but the case could not be considered without the context, the classroom and VLE, and more specifically the virtual setting of SL. It was in these settings that teaching experiences and strategies were developed and utilised. It would have been impossible for me to have a holistic picture of experiences of the tutors without considering the context within which it occurred. As I deal with the educators' teaching pedagogies within SL in blended situations, particularly their experience of the teaching in which they take part in SL, a case study is capable of consolidating my understanding of the study, by putting a greater emphasis on the phenomena under study with its depth and intensity principles. The case study method is thereby a highly convenient approach to investigate and infer the ways in which tutors implement teaching in blended situations.

Selecting the Module

This unit of analysis focused on educators' experiences of IL in the context of their teaching. Theoretically, this embedded subcase contributed to the achievement of the purpose of this study in a couple of ways. Firstly, I specified the tutor of the class who was actively involved in SL for both personal interests and educational aims. The module coordinator has a deep knowledge of the competencies to employ SL in her teaching. As one indicator, the institution has its own island that was founded in 2007 and the educator has been teaching within SL since then. Another is that the module coordinator maintains several blogs and other social network accounts such as YouTube, and Flickr where she reflects on and shares her experiences within SL. Secondly, the module coordinator has broad experiences of developing and delivering the module within a blended form. That is, the context and nature of the module is shaped around f2f contact with their tutors and peers, wide range of generic and subject relevant resources to accomplish their learning tasks and the virtual world of SL. Such learning and teaching experiences enable me to identify the scope of the study. Thirdly, the environment is also seen as a means to maintain improving skills and keeping up-to-date with developments related to educators' professional lives. One of the good indicators is that the island holds monthly journal discussion events where participants share their conceptions and learn from each other which also could lead to developing a feeling of solidarity and inspiration amongst participants. This allows the environment to be recognised by others and makes me feel more enabled to scrutinise the island.

The module was a core part of the level one-year of an Information Management (IM) degree offered at the Information School in the university each year. For the academic year of 2011/12, the class was primarily led by the module coordinator (MC), and two teaching assistants of whom I was one. I assisted purely with in-world sessions. My role was to assist the students with their learning activities that took place in-world and to answer their questions to provide support to minimize potential chaotic preliminary experiences within SL. In addition, there was one internal tutor (TutorN) who covered the topics of "information" and "information behaviour" and 2 librarians who work in the same institution and a librarian (TutorP) who was geographically remote and worked in a different institution in the UK. The class consisted of 43 students of whom 22 were originally from outside the UK; 19 were female and 24 were male.

The primary aim of the module was to enhance the information behaviour skills of the students and to help them to become information literate by focusing on both practice and theory of IL and information behaviour. The goals of the module were outlined by the module coordinator in the course material as:

- To enable students to analyse their own information behaviour and identify the ways they become more information literate.
- To be aware of some key IL models and theories.
- To develop some strategies for seeking and searching information.
- To be able to apply an evaluation framework to information resources.
- To be able to interact with others to explore their information behaviour and needs.

The module assessment was entirely based on the coursework with 50% involving students’ research interviews in SL, analysis of their performance as interviewers and analysis of transcripts in relation to research.

The module structure comprised:

- An introductory session consisting of an outline of the module and its mode of working.
- SL tutorial sessions in which students explore the island, practice moving, communicating, manipulating their avatars’ outfits, and playing with objects.
- Further SL skills development (including taking pictures of their avatar to share) and information behaviour exercises in SL and preparing their group activities which form the basis of the exhibits, mini islands, in SL.
- Practising interview techniques both in the classroom and SL and conducting interviews in SL.
- A plenary session in which the students take part in an information behaviour analysis workshop and compile an e-portfolio.

The module components were presented in Figure 1 in a non-sequential way.

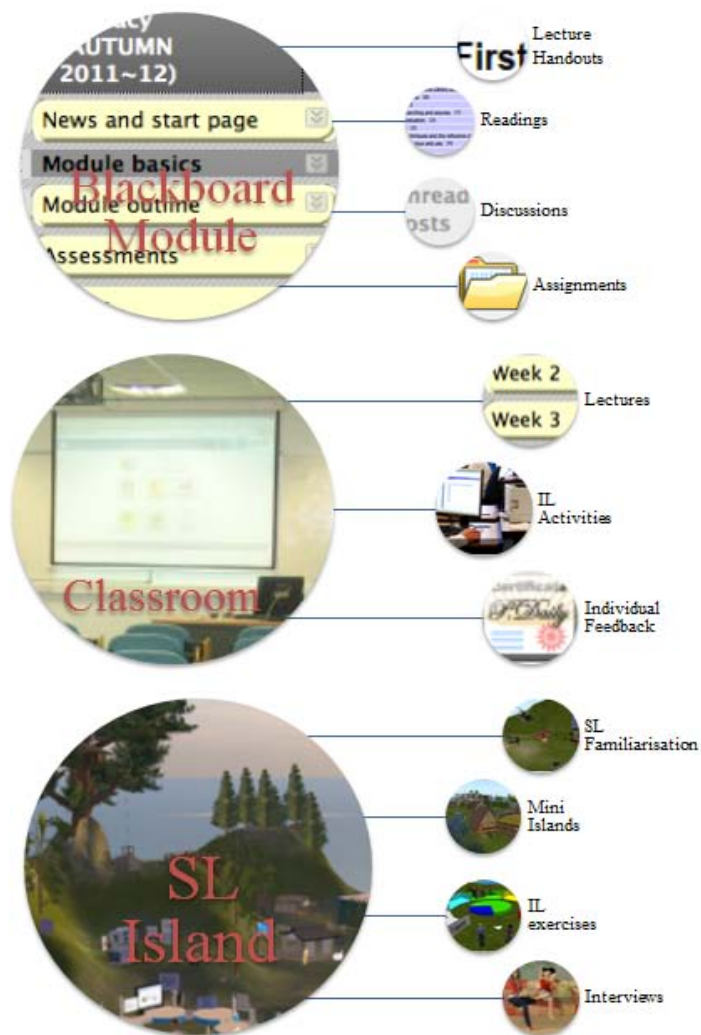


Figure 1: The Module Components.

Instrumentation

Participant observations, semi-structured interviews were conducted as the methods to gather teachers’ perceptions and experiences on the use of SL in their teaching. Additionally, an elicitation interview was conducted with core module tutors later in SL, in an attempt to articulate their experiences and various aspects of their involvement in the module after the individual interviews. Thus I prepared some picture boards with snapshots from the IL module in SL in order to trigger participants’ memories and remind them what had been done. I then attached notecards to these picture boards, which involved a certain chunk of conversations with regard to activities that take place in SL. To better understand the methodological niche which the elicitation interview holds, this gave an opportunity to ask specific questions that I was not able to find out with individual interviews and allowed eliciting diverse opinions amongst the informants.

For the main body of the interviews, semi-structured interviews were set up with the educators in the SL environment from different disciplines, institutions and countries. Educator participants were self-selected on the basis of who was available and accessible at the time of the data collecting process. They were all active and had experience teaching in VWs. I questioned interviewees who taught both in the classroom and SL and utilised VWs as an integral part of the course. Participants were identified from Virtual Worlds Education Roundtable (VWER) community and its Facebook Group Page. Nineteen participants from seven different counties agreed to contribute to this study. These individuals might not necessarily represent a sample that generated statistical inferences to the population; rather, it was an intentional sample of individuals who best informed regarding RQs under investigation. After the analysis process, educators in the class indicated that they prefer to be identified with their SL identity in this study, so in this case their SL names were used where appropriate. The overall design of the research was shown in Figure 2.

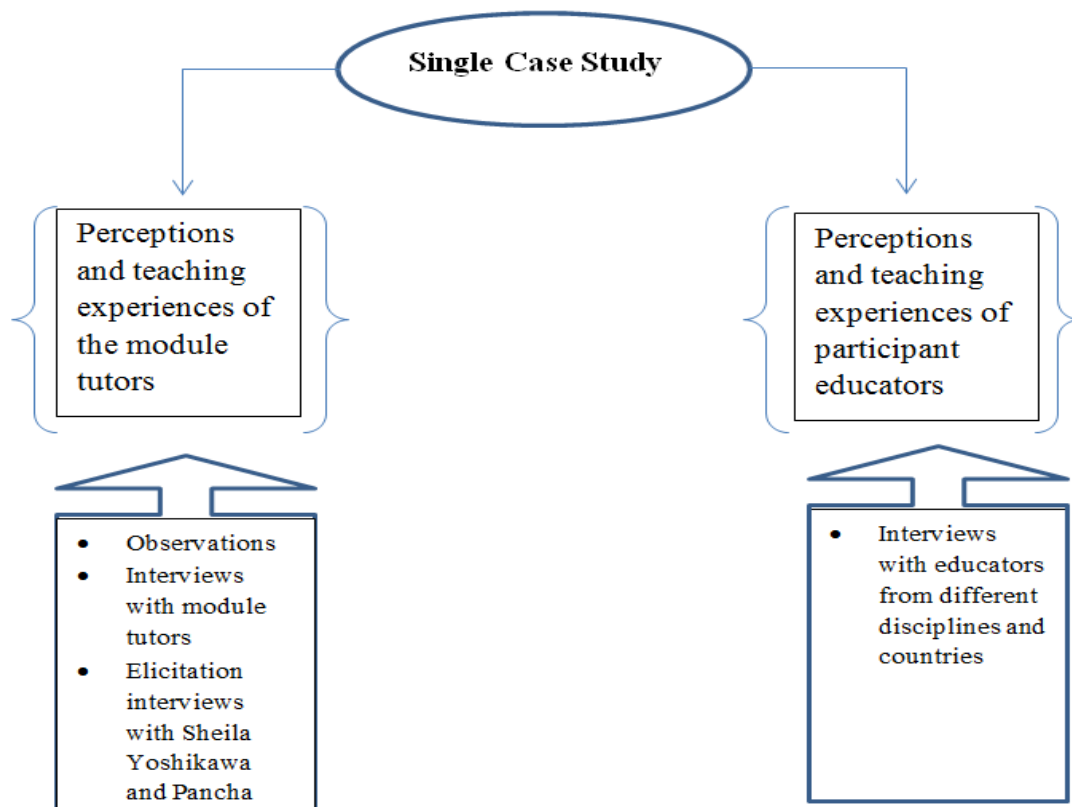


Figure 2: The Overall Design of the Research.

I adapt and follow the case study structure of Guba & Lincoln (1994), which is: defining the problem, describing the context, the issues and discussion of the “lessons learned”. My guiding principles for analysis and interpretation of the data were inductive and deductive approaches (Merriam 1998; Thomas 2006; Stake 1995). Inductive analysis refers to an approach as a means of deriving concepts, themes, or models from raw data through interpretations made by the researcher, whereas deductive analysis refers to an approach as a means of interpreting the data with a predefined set of codes (Thomas 2006, p.238). This sort of approach to synthesizing findings of the qualitative study is explicitly acknowledged by Thomas & Harden (2008), Braun & Clarke (2006), who find its roots in the “thematic analysis” process and is also suggested by Minocha (2010b) to evaluate the data gathered within VWs. The inductive approach allowed generating codes with concepts

suggested by participants, whereas the deductive approach allowed defining ideas and themes with predefined concepts before coding began. By combining two strategies, I approached the data not only with a theoretical perspective that borrowed from the literature but also from the ground up with emerging themes. Therefore the data was examined with concepts suggested by initial literature review and considering RQs, and also by looking at meaningful codes where participants’ views seemed to encapsulate some aspects of the data. I used deductive and inductive analysis together to construct themes from the data based on pre-existing codes and emerging codes. Table 1 illustrates the codes generated from the literature review, which were used to analyse the data as part of the deductive aspect of data analysis.

| Research Questions (RQs) | Codes |
|--|---|
| 1. How do tutors implement teaching into SL/f2f situations? | Immersion, authenticity, connections, experience, field trips, identity, interaction, collaboration, playfulness, presence, teamwork, rapport, role-play, simulation, meshed, peregrination, assessment |
| 2. Does teaching in SL give tutors insight to improve their f2f pedagogy? | Creativity, learning, collaboration, reflection |
| 3. How did they learn how to approach teaching in SL? | Community, avatar identity, awareness, pedagogical models, networking, collaboration, professional development |
| 4. How do tutors overcome challenges such as learners’ resistance to virtual worlds? | Authenticity, VWs culture, embodiment, games, realism, support, rationale, identity construction, disquieting, embodiment, emotional connection, identity contractions |

Table 1: RQs and Associated Codes Generated from Deductive Analysis.

FINDINGS

As stressed earlier, the central pedagogic approach for the module is IBL and it suggests that the students engage with the module more deeply. The aim of adopting the IBL approach in this module was to stimulate students’ curiosity and engagement (Levy & Petrulis 2012). Sheila Yoshikawa aims to convey this by encouraging the students to develop their own arguments in order to become information literate along with using a mix of technologies. The emphasis on this module explores existing knowledge and discovering the discipline, yet the IBL approach is associated with SL activities because it focuses on the following:

- Analysis of the students’ own information behaviour in SL.
- Identifying ways in which they can become more information literate in SL.
- Interacting with others to explore their information behaviour and needs in SL.

My own exploration of the meaning and practice of IBL in this module are based on the activities and use of learning environments. With the activities for instance the students explored and presented their existing conception of information behaviour through a mind-mapping exercise, working initially as individuals and then in small groups. They then presented their PowerPoint slides in SL and reflected on the development of their conceptions. The reflective part of the activity was Sheila Yoshikawa’s use of cognitive teaching approach where the students experience the environment and reflect on their experiences. Arguably, it is possible to infer that SL took a limited role in this mode of IBL. This is because all three environments, classroom, Blackboard and SL, play a role in the activities and the module is a campus-based class with weekly f2f sessions. Likewise, the role of IBL perhaps is limited and “information-oriented” (Levy 2008; Webber 2010), since the ultimate focus was primarily on exploring existing knowledge and interacting with others. I also observe that pedagogical strategies of Sheila Yoshikawa remain rather directed, tutor-led approaches in which she set the questions, e.g. information problems, and offer a great deal of guidance and support on the students’ learning process, though within an authentic and challenging experience. The challenge lies in the sense of unfamiliar environment of SL, and unfamiliar interview participants, interviewees in SL.

As the inquiry based approach underlies the pedagogy, the island does not have any lecture halls or sit-style classrooms in which the students may have sessions in a traditional way, i.e. sitting at desks, listening to lectures and watching the PowerPoint presentations. Instead, the island has a variety of spaces in which the students can have activities or the visitors can have events, meetings and discussions. The island is therefore a working and meeting space for the students and the others. Despite the fact that there are specific areas in the island, which

are designated for learning, the entire island could be perceived as a learning space, as the whole island provides facilities for meetings, formal and informal learning and socialisation. As Minocha (2010, p.119) states based upon the works of Felix (2005) and Grummon (2009), this de-centred design of the island underlines the principles of socio-constructivism where the whole island is perceived as a learning space for learning together and collaboration rather than highlighting classroom activities. What is also charming for the island is that the space provides student residences in order to give them a sense of ownership, i.e. something they might feel belongs to them. The island is also designed considering newbies so it is not a very challenging or complex environment, but relaxing and welcoming. These features imply that the social constructivist view has a strong influence on the design of the island and pedagogy. The design of the island thus reflects Sheila Yoshikawa's pedagogical beliefs and teaching approaches. In addition, having several venues for the entertainment and relaxing, warmth atmosphere on the island and a specific stylish design of the island reflect Sheila Yoshikawa's personal character into the place. The analysis of the interview data yielded the themes of 'cybergogy', 'creativity', 'trial and error' and 'wow moment'. At the same time, the analysis of the data within the subcase module yielded the themes of 'experiential learning', 'uncertainty', and 'dynamic relationship'.

With my first research question, I addressed how tutors implement teaching into SL/f2f situations. Participants' comments typically fell into the categories of learning archetypes within the cybergogy model (Scopes 2009; Scopes 2011; Chase & Scopes 2012). Participants find SL accommodates the archetypes of the cybergogy model and they appear to value these practices in which students experience immersive learning. Most interviewees cited that their teaching within VWs includes giving learners authentic experience, the ability to meet students in real time with a shared sense of space, or the ability to explore identity in relation to their learning. As one of the interviewees stated "*I am demonstrating how SL closes the gap between locations, times, people, ideas, and what is real. (Avatar12)*" This is well supported in the relevant literature such as studies of Camilleri et al. (2013), and Rapanotti et al. (2012).

With my second research question I addressed whether teaching in SL gives participants insight to enhance their classroom teaching approaches. "Creativity" was the code I applied most often in my initial open coding. Interview responses showed that the participants associated the creativity with words such as "new models", "opportunities", "raised the bar", and "active". This suggests that creativity is a process of making something new, stimulating original ideas that have value and putting one's imagination to undertake (Robinson 2011). Immersing in VWs helps participants to perceive an embodied nature in the environment. This is significant because educators, who perceive VWs to be capable and valued in terms of creativity despite the challenges associated with them, tend to see VWs in a more positive light as suggested below.

Avatar7: I think it has probably pushed me to be more creative about how I use space and activities/resources in a classroom. In SL you have to make new models and I enjoyed that creative step, and transferred it out to the physical world. For example, in SL I have an activity where students move about in physical space depending on their degree of agreement with the topic under discussion. I now do a similar activity in the physical classroom.

Avatar12: Having the experience of being able to be truly creative has "raised the bar" for my real life practice. I have experimented with group projects in SL, projects that are authentic and useful. I am more comfortable finding similar activities around which my students can develop their knowledge in the classroom.

These comments suggest that Avatar7 and Avatar12 found bringing VWs into the classroom is not just using the environment as an integral part of the teaching and learning process. It is also about moving away from traditional teaching where they can capitalise on their innovative potential. The built-in mechanisms of the environment enable users to create almost anything imaginable. Furthermore, the availability of spatial enhanced richness of the context can benefit educators to be capable of bringing their potential to new levels. This is where the innovative educators could design unique and inventive activities and transfer the value created in VWs to the classroom. The data from Avatar12 emphasises this aspect of the environment by indicating that teaching in SL has raised the expectations and standards in her f2f teaching. For Avatar7 and Avatar12, it has also become an inspiring source for f2f teaching. This means that the creative nature of VWs is not limited only within them, but crosses the line into the physical world. In line with the argument that ideas generated in VWs might not be directly transferable to the physical world, they may still provide a creative source of inspiration. VWs might be especially conducive for such experiments.

Avatar9 and Avatar19 keenly stated that teaching in SL helped them to reflect on their classroom teaching approaches. In their interviews, they talked of being reflective practitioners to improve their teaching approaches that ultimately impacts on their creativity. The following excerpt illustrates the way they also see how teaching in these environments prompts them to reflect on their teaching assumptions.

Avatar9: I think it has been one of the things that have kept me reflecting and learning about teaching.

Avatar19: I think it helped me understand a bit more about my own assumptions and approaches and challenge with them.

In light of the argument that educators consider being in VWs to be a source of inspiration for their teaching strategies, I examined Sheila Yoshikawa's concept of creativity within SL, considering the Four C creative model (Kaufman & Beghetto 2009). Kaufman & Beghetto (2009) describe four dimensions of creativity as; while the concept of mini-c suggests the idea of personal understanding, expression and development aspects of creativity, little-c is bound with the idea of everyday creativity in which the average person may encounter each day. In the level of Pro-c, it is expected that creativity could enhance learning, and skills to become professional-level expertise and produce products, whereas, innovative, eminent, clear-cut level might be expected in the Big-C.

Considering the Four C creative model, Sheila Yoshikawa's aesthetic personalisation of her avatar, in a way consistent with her understanding of the VW, therefore might be a good example of mini-c as a way of expressing intrapersonal insights and interpretation, ideations of creativity. Sheila Yoshikawa is a keen follower of fashion and purchasing clothing and accessories to alter her mode of avatar. Sheila Yoshikawa sometimes prefers to craft the products that she purchased in SL in the ways that are aesthetically pleasing for her. Her avatar appearance is in some aspects as close as possible to her own real world appearance. However, a mini-c avatar personalisation might represent a variety of appearances which are similar to the physical world self, or idealised self. Sheila Yoshikawa's practices of mini-c creativity can also be observed in crafting a profile to include relevant information such as self-descriptions, interests, or belonging groups. Furthermore, it is reasonable to consider additional practices as mini-c in Sheila Yoshikawa's personalised environment. Whilst the island belongs to the institution in the UK, she owns a variety of areas on the island that can be characterized as her own space, which may reflect her personal creativity. She purchased some appealing structures or buildings and decorated them inside and out with artsy-craftsy motifs, furniture, plants and a wide variety of virtual objects and textures. It is clear from my observations during the study that Sheila Yoshikawa's construction of avatar identity that reflects mini-c creativity is influenced by her physical world experiences. It is reasonable to expect this, as individuals tend to bring existing concepts based on their physical world experiences when they immerse in VWs.

Ward & Sonneborn (2011, p.35) state the possibility of progression from mini-c to little-c through acquisition of skills to produce content or potentially to Pro-c by "adopting the professional identity of producing virtual content as a way of making a living". In this point, setting up a shop with autumnal feeling in SL to sell framed photos of RL autumn or creating virtual objects such as, 3D SCOUNL 7 Pillars Model, that were of interest to others, could be reasonably characterised as Sheila Yoshikawa's little-c creativity, if not Pro-c since Sheila Yoshikawa does not primarily aim to create virtual products to sell them as part of her profession. Based on the conception of the model of creativity, crafting virtual objects in SL can be considered as one aspect of little-c. Sheila Yoshikawa purchases ready-made objects, which may be developed by skilled individuals for the island, yet the ways in which she personalises the environment, can reach as much a reflection of little-c. The island contains properties and some structures, which may have features unique to VWs, such as buildings placed above the surface, and are aesthetically pleasing for her. Although some properties, objects and beautifully crafted furniture, including chairs, tables, sofas and plants are imitative recreations of physical world structures, they are creative in the sense that they were artistically rendered and emotionally evocative. To amplify this point, Sheila Yoshikawa for instance mentioned that she realised she was becoming emotionally attached to various bits and pieces on the island and felt it was her own land. There is also a café with tables and chairs and other publicly accessible venues on the island that may support social interactions among avatars in encouraging the creative functioning of group activities. Another example is with designing clothes. Sheila Yoshikawa at some point creates clothes of any merit to offer them free to incentivise and boost people to visit the island. On the other hand, Sheila Yoshikawa presents in SL/RL educational conferences such as VWBPE, and participates in SL discussion meetings, and publishes relevant academic papers that could be considered as part of her profession, Pro-c. The nuance here is Sheila Yoshikawa's professional creative contributions to the field. The central focus at the Pro-c level is therefore Sheila Yoshikawa's accomplishments. With years of acquired expertise and advanced experiments, Sheila Yoshikawa and the island are being recognized worldwide by educators in SL.

The third research question addressed how educators learned how to approach teaching in VWs. According to the sheer amount of the data relating to this theme it seems that, perhaps not surprisingly, participants learned how to teach within VWs by immersing themselves in SL and doing it. It is unlikely to come as a surprise to me

as this often requires the dedication of the educator in time, effort and enthusiasm. Yet, perhaps innovative approaches require trial and error to fully understand what these environments might be able to offer for them. It's by trial and error, by experimentation, that educators scaffold their understanding and engagement with VWs. As being another motif of educators' involvement with the communities, I sought to find out their motivation to engaging within VWs other than the class activity requirement. This was important as motivation is considered broadly to be an essential factor that drives perceptions, behaviours and individuals' intention to experience any sort of environments.

Avatar9: *I actually like being in SL, whereas I cannot say that I like being on VLE.*

Avatar10: *In a general sense, networking is important for us as academicians.*

Avatar13: *I began to see how I could also learn things related to my professional development.*

Avatar15: *I think it is very important to explore new perspectives. So the events and seminars - it's amazing and brilliant.*

The data indicate that these participants refer to their motivations with words such as "like", "networking", "professional development", and "new perspectives". The data indicate that these participants exhibit a willingness to engage together in SL presumably with some commitment and enthusiasm. These comments indicate that participants' motivation involves utilitarian, hedonic and social dimensions. The utilitarian dimension of motivations is based on the participants' purposeful and rational values such as professional development. The hedonic dimension of motivations is based on participants' enjoyment - related motives such as entertainment, excitement, and happiness. That is why Avatar9 'likes' being in VWs whereas she does not feel the same when she refers to VLEs. The social dimension of motivations is based on interpersonal communication such as social networking or participating events or seminars in VWs. The findings suggest that participants' motivations for being in VWs other than the class requirement can range across utilitarian, hedonic, and social dimensions which also provide valuable insights to involve teaching in these social environments. The professional development of educators within institutions with respect to VWs is an issue in need of consideration if adoption beyond the course requirements is to take place. With my fourth research question, I addressed how educators overcome potential students' resistance to VWs. A theme that permeates often under this research question is that of empowering the students to realise the potential of VWs. The idea was indicated by Avatar17:

Avatar17: *It's through their experiencing the possibilities that they sometimes come to realize the value...so not trying too hard to convince them, but just showing them what's there and letting them come to their own opinion which is usually....'Wow, I had no idea'*

The excerpt indicates an interesting point. Literally, the central position participants undertake is to illuminate what is available within SL and provide students with a "wow moment". The idea often connotes realising, or enhancing the validity of immersive experiences. Participants often indicate their strategies with words such as 'reassurance', 'support', 'scaffolding', and 'collaboration'.

On the other hand, the data gained within the subcase module gave an element of qualitative data that supplemented the whole picture of designing teaching strategies and the utilisation of VWs in the classroom. Experiential learning was the theme that was obvious in my interpretation of the data both in terms of the learning outcomes and teaching activities, which embodied this theme, and their significance. I argue that everything the tutors within the module attempted to employ both in the classroom and SL was somehow associated with experiential learning.

Data Excerpt:

The link with SL there was getting the students to think about what they had just learned and try to apply it.....the ultimate objective is that the students are able to carry out a research interview in SL.....so the focus is particularly on the basics they need to carry out the interview.

The intention here was to display Sheila Yoshikawa's objective in bringing SL into the classroom. This data is indicative of evidence in linking the classroom and VWs. Sheila Yoshikawa chooses the verbs 'think', 'apply', 'carry out', which are mostly associated with the cognitive dimension of *Apply* within Bloom's revised taxonomy. This is explained as an endeavour to enable the learners to put what has been learned into practice, i.e. to apply and contextualise what they have learned theoretically. The data therefore suggests that Sheila Yoshikawa anticipated that the experiential approach of the teaching pedagogy might promote skills and better

understanding of the subject with the activities implemented both in the classroom and SL. The data also indicates that Sheila Yoshikawa expected her students to conduct an interview in-world to understand information behaviour of the interviewees, who were seeking information for SL activities, by implementing interviewing techniques in SL. A great number of scholars recognise that SL has the capacity to conduct this sort of activity (Dalgarno & Lee 2010; Peachey et al. 2010). The assessment strategy for the module seems not to enable the students to demonstrate their grasp of information behaviour theory as it is assessed primarily through writing an essay but conducting an interview activity in SL would be an example of evidence of ability to gather the data and apply their understanding of the information behaviour models.

Another example could be seen with the exhibition activity. Sheila Yoshikawa aimed with this activity to enable her students to improve their communication and presentation skills. Here it is noteworthy that Pancha stated in the elicitation interview that perhaps there could have been a stronger link between the students' design of the exhibition and the concepts of information but Sheila Yoshikawa finds this would have been more difficult in a limited time. Drawing implications from the above understanding, the common terms identified repeatedly as characteristics of immersive experience within the data are "exploration", "performance", "experimentation" and "abstraction" in which these terms include the sustained involvement of the students in their learning process. All of these are examples of implementation of experiential learning paradigms. As I focused on the experiential learning paradigms, I therefore found the following as a means of understanding Sheila Yoshikawa's experiential learning mechanisms:

- The use of the structured group activity as a technique for dealing with information problems.
- The use of reflection as part of the learning experience.
- Furnishing and designing the mini islands.
- Conducting interviews in SL.

I view these findings as a starting point to indicate that the teaching approach used for utilising experiential learning has important pedagogic implications to develop new skills such as navigating, integrating and designing in-world as well as interpersonal skills such as presentation, interview and teamwork skills within socially rich contexts. However, the study of Kim et al. (2012, p.6) indicates that the major focus of studies about the educational application of VWs is not based on experiential space in VWs, rather that VWs have been used as simulation of space. This suggests that there is a trend as an increasing interest in educational implementation of VWs to reproduce reality using avatars, objects or tasks such as a virtual campus or classrooms in the form of the curriculum where experimental teaching paradigms could be utilised successfully.

Another theme that emerged with Sheila Yoshikawa's responses in the elicitation interview and participants' comments was "uncertainty". This theme and its significance arose from my reiterative study of the observational and interview data.

Data Excerpt:

Sheila Yoshikawa: so one of the benefits of using SL is getting them [the students] to put different features of the interview in focal awareness

Sheila Yoshikawa: it always seemed to me that their reflections were a bit deeper, when they had the novel environment to deal with.

Sheila Yoshikawa feels that the different environment enables the students to think reflectively. This is another indicator of her intention within unfamiliar space to enhance critical thinking skills of the students. Here it is my interpretation that Sheila Yoshikawa's teaching approach is influenced by the "variation theory" of learning and teaching (Pang & Marton 2005). According to variation theory, learning is seen as a process in which the learners develop a certain capability to discern what varies and what is invariant in the experienced situations. In this process, Sheila Yoshikawa designs activities to help the students establish substantial connections between their new knowledge and their previous knowledge by having a range of experiences. Sheila Yoshikawa harnesses this theory as a basis for designing and teaching the module. To give an example, conducting interviews both in physical world and SL is an attempt by Sheila Yoshikawa to enable the students to vary experience in different environments and to help build awareness through discerning object of the study. She expects that experiencing the same concept inside and outside of SL might enable this sort of discernment. Thus, the students experience variation between conducting interviews in the classroom and SL and notice differences in the RL/SL interview experience. There are also connections here with the term of uncertainty in teaching practices, through place, body, and text, formed within the context of VWs. A key point I draw at this juncture is that although work by Sköld (2012) for example indicated that the ambiguity and uncertainty of virtual spaces presents a major pedagogic challenge depending upon the learning task design, my observations and the data

indicate that such an approach, defamiliarising the familiar through VWs, makes teaching new, strange, rich and productive.

Another theme came up in the elicitation interview when Sheila Yoshikawa talked about inter-student dynamics. While it is important for any teaching context to be characterised by positive classroom relationships, it might sometimes be difficult to establish and maintain such relationships in the context of VWs based teaching.

Data Excerpt:

Sheila Yoshikawa: there were various problems with different groups - one group very focused on being efficient - another not really understanding the task for a while through language issues - another fragmented by personality issues - another with 1 or 2 people usually missing etc.

*Sheila Yoshikawa: it was exhausting actually, the class the following semester - one week ***** [name anonymised] had them for 4 hours and the next I did - in each case we were just limp rags by the end of the day.*

Here Sheila Yoshikawa describes potential inter-student dynamics occurred in a negative way both in the classroom and SL. This does not mean that uncomfortable moments occurred due to religion, politics, race, class, or gender issues, rather sometimes the flow of communication was fragmented possibly due to the diversity and individual needs of learners affected by personal histories or low self-esteem and emotional issues. Inter-student dynamics can be at the core of sparking new ideas and it may therefore be an important part to establish positive student relationships.

Dynamic relationships are largely about students' characteristics and they are at the core of sparking interactions between learners and learners and educators. At this point, developing a presence with a social and emotional manner comes forward in the unit of the module in order to encourage dialogue between Sheila Yoshikawa and students, and among students. The key to collaboration in VWs is interpersonal interactions, which are carried out to a large extent through representations of individuals, that is, avatars. By doing so, Sheila Yoshikawa's identity creation and projection through her avatar could be considered to lead to the establishment of positive relationships between students and her. It is based on the idea that Sheila Yoshikawa's conceptualisation of the self within VWs may provide meanings associated with her social formation. Further, the social presence and socialisation created through the avatar of the module coordinator, having f2f interaction components, may be helpful to reduce physiological distance between her students and herself. Thus, the development of rapport between students and Sheila Yoshikawa and among students was an essential component in sustaining collaborative social learning. These characteristics have much in common with existing concepts of immersive teaching experience within VWs.

DISCUSSION

Teaching that approaches learning within the cybergogy model, provides a step beyond traditional forms of learning experiences, and utilises innovative skills such as creativity, communication and collaboration might be desirable, but there has not been a widespread adoption of VWs in education due to several reasons. Linden Lab has decided to remove the 50 % educational discount, rendering it too costly for a great number of educators. Further, Linden Lab does not see educational activities to be an area on which they intend to primarily focus, but see SL as a potentially valuable game development platform. This points them having no interest in offering direct support for educational institutions. At the same time, the high volume of the learning curve still applies for many, which may lead to haphazard and erratic consequences. The first cycle of educators is still comprised of early adopters who devote numerous hours to exploring, tweaking and creating. Perhaps the majority of others do not want to be forced to dedicate that much of their time and just want to use VWs as long as they receive a lot of help and support in the class. There are still few exemplars of desirable teaching and the academic trend to investigate from the field of education is not growing largely and is even slightly decreasing as compared to previous years. This is consistent with the recent indication proposed by Gartner, which places VWs just off the bottom of the Trough of Disillusionment on the Hype Cycle (Gartner 2013). The educational main trends are therefore more likely to focus on other current initiatives such as mobile learning, or MOOCs.

On the other hand, as the literature reflects, SL has been embraced by a substantial number of institutions to have a virtual presence, or design and experience anything that can be imagined. However, it is noteworthy that most educators use the environment in much the same way that they use physical spaces (Salmon 2009, p.529). Most educational spaces I have visited in SL were full of lecture theatres, classrooms and auditoriums with habitual spatial paradigms such as a regular bricks and mortar classrooms. Educators often stand at the front of the set of avatars representing their class, usually displaying a PowerPoint on a screen and asking students to raise a virtual hand or text in chat should they have any questions. Students sit on rows of seats and desks facing the front. The

typical educational scenario represents an ordinary SL classroom, which resembles its physical world counterpart and replicate carbon-based activities. With this sort of scenario, educators who consider adopting VWs in their teaching usually stem from “default” teaching strategies. Therefore, it appeared over time that educators relied upon their prior experiences in the physical classroom. Although a variety of teaching practices were employed in SL, a pedagogical approach is commonly found in the physical classroom and ends up as a duplication of traditional teaching paradigms. In general, my personal opinion, based on my research and my teaching experiences, is that the most compelling aspects of VWs are those which are either not possible or too expensive and difficult to invest in the physical world. The interesting teaching experiences I have had were the ones whose key focus was on features that highlight the capacity of SL to conduct what is impossible in the physical world. We are now witnessing more realistic experiences of VR by highlighting these with the help of Augmented Reality such as Google Glass or High Fidelity, and Oculus Rift to add ‘more degrees of freedom’ (Rosedale 2014) without relying on the set of keyboard and mouse. This said, I personally believe that VWs have huge potential for educators, offering a big upside as a place of wonder and discovery.

CONCLUSION

The so-called “pedagogy of uncertainty” clarified by Barnett (2007) and its tie with teaching in VWs (Bayne 2008; White & Le Cornu 2010) as well as the “cybergogy” concept posited by Chase & Scopes (2012), and the idea of “metaxis” (Falconer 2011) seem to be the catalyst to changes for participants in rethinking the concept of learning and teaching. I observed that Sheila Yoshikawa expects to harness her students’ learning experiences by engaging them within spaces and practices that may be disquieting, strange, unfamiliar, and disorienting. Foremost, it was evident that Sheila Yoshikawa adopted SL mainly for its potential to foster constructivist and experiential learning. Most notably, the affordances highlighted by participants regarded SL’s potential for being a venue in which students can interact with others, the ability to customize avatars and develop identity presence, the ability to manipulate the environment to create various activities including simulations. It became evident that participants integrated SL into their teaching to design learning activities for place exploration, concept exploration, task or skill practice, role-play, and communication. It was clear from the interview extracts in the study that educators approached the use of VWs, which embraced higher order characteristics of learning such as taking the initiative and reflection, focusing on a process in which the learning experience is placed. Such a teaching design characteristically focuses on learning experience that promotes socialisation, participation, collaboration, interaction and communication. Emerging pedagogical practices identified by participants were similar to those previously classified by other studies, such as Savin-Baden et al. (2010) and Dalgarno et al. (2013).

Furthermore, it was demonstrated that Sheila Yoshikawa’s identity creation and projection through her avatar could be considered to leading to establishment of positive relationships between students and her. One of the most notable points I observed in the SL sessions compared to classroom sessions was that the appearance of Sheila Yoshikawa might offer insights into facilitating communication and heightening social interaction throughout dialogue between students and her. At the same time, I can relate that in a class of first-year students Sheila Yoshikawa was teaching, both f2f and in SL, students met an avatar that resembled Sheila Yoshikawa’s real-life self and personality, my real-life self, as well as an avatar that totally differed from another tutor’s real-life appearance. Students were comfortable with either similar or different expressions of identity, and they did not feel distracted as some of them also had a distinct identity in SL.

Overall, participants indicated that immersing in VWs helped them to challenge their existing assumptions about teaching and learning and reflected what they had been doing within the classroom. Participants in the interviews most often reported that teaching in SL had raised the expectations of their classroom pedagogies, as they were more creative and reflective about their teaching assumptions within VWs. Participants indicated that this pushes the boundaries of what they previously had considered possible. The data illustrated that the participants often came into SL with little or no immersive experience and the way to become an SL educator is by engaging in hands-on activities, experimentation, and exploration. With the initial exposure to SL, participants value learning through a trial and error method and are happy to ask for help and support from experienced others when they feel they need it. The data also revealed that nurturing professional development in the educational communities motivate educators to sustain adoption of VWs. The connectedness of the community and the engagement of being there to share commonalities or trivialities bound educators to the space. The appeal is not principally SL itself, but the presence of the community and togetherness. Most notably, it was demonstrated that the chance to be a part of something new and exciting, the simple desire to have fun, and the desire to learn, provided sufficient motivation to continue.

The data also addressed educators’ strategies to overcome learners’ potential anxiety towards immersive experience. It was demonstrated that the causes of this anxiety are rooted primarily in the perception of

discomfort at new social experiences. The data illustrated that the rationale for adding immersive value into learners' experience is needed to be well established. Further, more reassurance is needed for those who do not necessarily experience presence, embodiment, and are reluctant to engage. For those students, they may need to be given an opportunity to express their concerns regarding immersing into VWs as well as become familiar and connected with their avatars and the space. Included in this argument is an underlying assumption that letting students voice concerns, and express their anxieties is essential in the constitution of self-understanding and embodiment. It was indicated that educators might need to provide different forms of support within the different stages of the activity. Besides, students could be encouraged to involve themselves in learning activities with peers, allowing them to observe their peers and to influence each other and develop a social presence. It was indicated that students could be allowed to invest robust emotion and establish a stronger sense of self and place. These assertions are also supported by the findings of Childs (2010, p.261).

In terms of employing methods, some of the key themes emerged from in-depth elicitation interviews conducted with Sheila Yoshikawa and Pancha. This was a different approach among other studies in this area. I prepared various picture boards with attached notecards which referenced a particular chunk of conversations which had emerged in SL activities. To better understand the methodological niche elicitation interviews hold, this gave me an opportunity to zoom in and zoom out of snapshots and ask specific questions to the informants regarding what had been done and why. This was a genuine attempt to understand and elaborate what snapshots and a chunk of data meant to Sheila Yoshikawa and Pancha and to elicit diverse opinions from them. The combination of screen captures and thematic analysis in particular represents novelty in method that could be used in other studies to explore teaching and learning through SL and other spaces.

Concerning the limitations of the study, restrictions in the research were mostly related to the analysis of the data. Firstly, a case study is about depth and insights not volume. This implies some concerns for presenting a sizeable depiction of a body of literature. The intent of this study was not to generalize to a larger population, but to provide qualitative data that could be considered with the implementations of other studies. Certainly semi-structured interviews provided additional information, but the class with which I worked is not representative of all disciplines taught within VWs and personal qualities and skills of the educator and interactions determine the ways the class is shaped and developed. This can be considered another limitation. However, an exceptional focus on Sheila Yoshikawa's skilled use of SL helped me to capture and analyse much of the setting and provided rich data. Secondly, my interview participants represent a subset of a small population. They fall within the boundaries of an educational community who are actively engaged in educational activities in SL. The situated nature of the setting and pedagogical implementations need to be taken into account when evaluating my findings and the applicability of the research. Finally, the thematic analysis of the participants' reflections towards students' potential anxiety about immersive experience was totally limited to the participant interviews.

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An Investigation of Graduate Students' Help-Seeking Experiences, Preferences and Attitudes in Online Learning

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ABSTRACT

This study explored graduate students' help-seeking preferences, attitudes and experiences based on the online classes they took at a Midwestern higher education institution. The findings indicated that the majority of the students used self-regulatory strategies in their help-seeking process striving for independent mastery of learning. Thematic analysis of the qualitative data led to four themes with respect to the help-seeking experiences of online students: Asynchronous learning; help-seeking process and strategies; self-regulation and goal orientation; student characteristics and previous help-seeking experience. The researchers suggest that help-seeking mechanisms and tools need to be structured into online classes utilizing formative assessment, collaborative community of learners and technologies that will facilitate student help-seeking.

INTRODUCTION

An emerging area in the online learning research is the academic help-seeking behavior of students. Help-seeking is an important self-regulatory and metacognitive skill (Nelson-LeGall, 1981; Newman, 1994). It is defined as “an achievement behavior involving the search for and employment of a strategy to obtain success” (Ames & Lau, 1982, p. 414). Seeking help contributes to a general pattern of student resilience in overcoming obstacles to learning and achievement (Newman, 2000, 2002). When students engage in appropriate help-seeking behaviors and instructors provide effective help mechanisms and tools, increased learning gains can be achieved. Help-seeking plays a crucial role in student learning experience due to the unique challenges online learning environment may pose (Dunn, Rakes, & Rakes, 2014). Online help-seeking is different from traditional help-seeking in many aspects. Whipp and Chiareli (2004) found that online learners sought help from the instructor, peers to reduce feelings of loneliness, use Web-based helpers and peer postings in online discussions.

Help-seeking in the online environment can be influenced by a variety of factors such as the technology, course management system, the nature of the class and student and instructor characteristics. While much research has been conducted on help-seeking in traditional face-to-face environments, there is limited amount of research on help-seeking behavior, preferences and strategies in the online environment. Research on help-seeking is an important area of study because of the need for support and guidance to meet the particular needs of distance learning students (Kitsantas & Chow, 2007). An understanding of cognitive, motivational, and technological characteristics of students' help-seeking behavior and the factors that influence help-seeking in an online classroom can help instructors develop effective tools and techniques for increased student learning.

HELP-SEEKING PROCESS, GOALS AND STUDENT BEHAVIORS

Online learners must be active and deliberate seekers of their learning. They need to obtain the necessary help taking responsibility for their learning (Manasneh, Sowan & Nassar, 2012, p. 196). Academic help-seeking requires the use of resources such as time and effort as well as the knowledge of when and how to use help-seeking as a strategy (Karabenick, 2006).

Various models have been proposed to explain the process of academic help-seeking (e.g., Nelson-LeGall, 1981; Newman, 1994; Karabenick & Dembo, 2011). These models share some common elements that mimic problem solving phases. In the first phase, students encounter a problem in their learning and become aware of the need to seek help. During the second phase, they try to decide whether they should seek help or not by considering the type of help needed, whom they should ask for help, and how. If they decide to seek help, they then enter the

third phase of help-seeking, which is using strategies to solicit help. The last phase involves receiving help and evaluating or processing the help received.

As indicated in the models of help-seeking process, choosing strategies or sources to solicit help is very important once a student decides to seek help. Karabenick and Knapp (1991) classified help-seeking behaviors into five categories: Formal help-seeking, informal help-seeking, instrumental activities, lowering performance aspirations, and altering goals.

Formal help-seeking is seeking assistance from sources such as instructors and teaching assistants. Informal help-seeking is seeking assistance from peers. Instrumental activities are designed to improve performance such as studying harder, taking notes. Lowering performance aspirations and altering goals include taking a lighter load, registering for easier classes and changing majors. Research shows that the act of help is dependent upon the classroom focus, students' perceptions and beliefs about help-seeking and a teacher's instructional approach, openness and flexibility (Kitsantas & Chow, 2007).

Help-seeking mechanisms instructors provide to students can influence the help-seeking process and strategies of online learners. Previous research has examined help-seeking mechanisms used by students in online learning. A consistent finding is that using email seems to be the preferred mechanism for formal help-seeking among college students. For example, Kitsantas and Chow (2007) found that the majority of the students enrolled in blended and Web-based courses preferred using email and considered it effective when seeking help from instructors or peers, while about 12% of them preferred using message boards and chat to receive help from instructors. Similarly, emailing the instructor was the most commonly used help-seeking strategy among nursing students enrolled in the online section of a nursing course followed by posting comments under discussion forums, and posting questions in the 'Ask Question' area within Blackboard (Mahasneh, Sowan & Nassar, 2012).

A few studies, including the two studies above, examined frequency of student help-seeking across different learning environments. Kitsantas and Chow (2007) found that college students enrolled in blended and online courses reported higher instances of formal help-seeking than traditional classroom students. The authors indicated that students in traditional classrooms felt more threatened in receiving help than students in blended or online learning classrooms. Such an explanation is supported by an earlier study that found students, particularly the students with performance orientation, felt more anonymous and less threat posed by seeking help to their self-esteem in Web-based environments than they do in traditional classrooms (Schofield, 1995). Kumrov (2007) also found that nursing students in a blended learning setting sought help more and received higher grades compared to those in traditional classroom settings. However, Mahasneh, Sowan and Nassar's (2012) study concluded that students in the online section of a nursing course asked significantly fewer questions than those in the face-to-face section of the same course. This may be the result of the help mechanisms and tools supported by the course design and the instructor. The asynchronous nature of online learning that promotes flexible and easy access to resources in addition to students' self-regulatory approach in online learning can be factors that explain the findings in this study.

Promoting help-seeking behaviors among online learners can be challenging. Contrary to the help technologies available, online learners avoid help functions or may not use them effectively (Aleven, Stahl, Schworm, Fischer & Wallace, 2003). The absence or avoidance of help-seeking may not be directly related to the degree of help a student may need (Karabenick & Dembo, 2011). When students do not seek help, it may mean that they cannot formulate a reasonable question or are embarrassed to seek academic help. In addition, students who are self-regulated learners may avoid help-seeking due to their strive towards autonomous learning.

Help-seeking goals can have a significant impact on students' help-seeking behaviors. According to Nelson-Le Gall (1981, 1985), there are two types of help-seeking goals: Instrumental (adaptive) and executive (expedient). Learners' goal to enhance their understanding leads to instrumental help-seeking behavior whereas executive help-seeking serves a short-term perspective and is focused on completing the task without striving for deeper understanding (Nelson-Le Gall & Resnick, 1998). As a result, executive help seekers often involve others in an attempt to avoid work or to minimize the perceived cost of achievement. Interestingly, it was found that instrumental help seekers prefer formal sources such as the instructor and those seeking executive help prefer informal sources that are often more readily available to them such as other students (Knapp & Karabenick, 1988). Educators need to understand what influences learner help-seeking in order to design and deliver content that support positive learning outcomes.

STUDENT-RELATED FACTORS IN ONLINE HELP-SEEKING

Aleven et al. (2003) list learner-related factors that influence help-seeking: prior knowledge, self-regulation, age and gender, epistemological beliefs, goal orientation. In addition, cultural values and social roles emphasizing self-reliance and individual achievement may influence attitudes toward help-seeking (Nelson-Le Gall, 1985). Seeking help can imply inadequacy; threaten self-worth that learners may avoid the consequences of perceived costs of asking for help (Karabenick, 2006). Understanding what students may perceive as threatening can help instructors find ways to minimize issues that may occur in an online class. A study conducted with 300 college students at Taiwan University found that students' academic help-seeking behaviors were related to their Web-based learning self-efficacy (Cheng & Tsai, 2011). Study results indicated reciprocal relations between experience, self-efficacy of web-based learning and preference in students' online academic help-seeking behaviors. Other studies showed that effective help-seeking is positively related with academic achievement and prior knowledge. Wood and Wood (1999) found that students with lower prior knowledge sought help more frequently, whereas students with higher prior knowledge exhibited more effective help-seeking behavior.

Self-regulated learners use a toolkit of strategies when dealing with academic challenges (Newman, 2002). They tend to seek instrumental (adaptive) help that is based on cognitive and social competencies as well as personal and contextual motivational resources. Cognitive competencies are about knowing when help is necessary and how to ask a question. Social competencies include knowing how to execute a request in an appropriate way and to the best person. Personal motivational resources are: personal goals, self-beliefs, and willingness to express a need for help. Contextual motivational resources include factors such as classroom goals, collaborative activities and student-teacher interactions (Newman, 2002). These competencies need to be kept in mind when designing online courses in order to address the dynamics involved in academic help-seeking.

In order to succeed, online learning requires that students use self-regulatory strategies and metacognitive skills. Students need to know when they need help, what kind of help they need and how they can get help. Help-seeking is a self-regulative behavior in which the learner engages in monitoring and assessing their own learning. Self-regulated learners are characterized by their control over learning processes (Newman, 1998). College students who use a variety of self-regulated learning strategies tend to seek help more frequently than other students (Karabenick & Knapp, 1991). If the learner has metacognitive skills, then they can assess help is needed and act upon it. Age and learners' epistemological beliefs are factors that influence students' help-seeking behavior as help-seeking and self-regulatory mechanisms improve with age. Learners' epistemological beliefs can influence their "awareness of whether they need help, their engagement in help-seeking activities, and their interpretation of the value of the help offered..." (Aleven et al., 2003, p. 306).

Achievement goals are closely related to help-seeking behavior and may have different implications depending on the type of help sought. Learners with mastery goals are more likely to seek help that is instrumental (adaptive) whereas learners with performance approach and performance avoidance goal orientations are more likely to engage in help-avoidance or seek executive (expedient) help (Karabenick, 2006). Learners may avoid help because of their orientation on perceived lack of ability, or autonomous orientation of striving for independent mastery (Butler, 2006).

The classroom context should support help-seeking behavior rather than help-avoidance regulated by perceived lack of ability. In contrast, students with help-avoidance due to their strivings for autonomous orientation of help-seeking are likely to seek help "as long as the context enables them to try to first overcome difficulty on their own and the help is relevant to learning and is thus supportive, in the long run, of their autonomy" (Butler, 2006, p. 27). In this respect, providing help mechanisms and tools that gear to different help-seeking or avoidance approaches becomes an important instructional design consideration.

The anonymity of the learning environments may provide opportunities of help-seeking behavior and reduce the effects of ability-focused orientation that may result in help-avoidance (Aleven et al., 2003). In addition, accessibility to information on the Internet may provide advantageous to help-seeking motivation. Although there are advantages, students' perceived writing ability in an online discussion or text-based chat can be a drawback for some learners when they are willing to seek help which may lead to help-avoidance through those channels.

There are many ways that an online instructor may encourage help-seeking among his/her students as implied by research on help-seeking in traditional classrooms. First of all, student help-seeking behavior is impacted by classroom goal structure (Kitsantas & Chow, 2007). Task-focused classrooms promote help-seeking behavior whereas achievement-focused classrooms decrease student help-seeking. Second, if the students do not perceive the teacher as supportive when they seek help, they may not ask for help (Ryan & Shin, 2011). Finally, prompt,

positive and constructive instructor feedback lead to higher levels of student help-seeking (Glover & Zimmer, 1982; Ames & Lau, 1982, as cited in Kitsantas & Chow, 2007, p. 385). In a qualitative study that examined college students' experiences in an online class via analysis of course participation records and individual interviews, it was found that the frequent and timely feedback received from the course instructor was a key factor in students' success (Whipp & Chiarelli, 2004). It is important to understand how to design the online classroom, particularly the help-seeking mechanisms and interactions for effective teaching and learning.

PURPOSE OF THE STUDY

In an online classroom, several factors such as the technology, the asynchronous nature of online learning, student goal orientations can influence student behavior in seeking academic help. Seeking help is not always conducive to learning; therefore, "how the more productive and less productive forms of help-seeking can be distinguished, what factors lead to productive help-seeking, and how help-seeking is related to the development of independent skill and ability" need to be studied (Aleven et al., 2003, p. 278). A knowledge base of learner help-seeking strategies and attitudes in the online learning environment can inform instructors in incorporating mechanisms and tools for effective student help-seeking. The purpose of this study was to examine graduate students' academic help-seeking experiences, preferences and attitudes in online learning.

METHODOLOGY

The present study utilized a mixed method research design combining both quantitative and qualitative approaches to investigate the research questions. Specifically, we implemented a concurrent nested mixed method design with the priority given to the quantitative approach. A survey was developed to collect primarily quantitative data to answer the first two research questions and describe students' self-reported help-seeking methods and attitudes. The survey was embedded with a few open-ended questions to collect qualitative data that would supplement the quantitative component by providing a rich, detailed picture about individual students' subjective experience in the help-seeking process in online courses.

Participants for the current study were recruited from students enrolled in online sections of three graduate-level courses in educational technology, curriculum and instruction, and adult learning and development at a Midwestern university. At the time of the study, all courses used Blackboard as their course management system. In addition to the Web-based presentation of course materials and assessment, the instructors posted frequently asked questions and included both asynchronous forum discussions and synchronous text-based chat sessions. While email was the primary means of communication between the instructor and the students, all instructors offered face-to-face office hours and phone contact. Among the students, communication occurred in the form of postings on the discussion board as well as email messages through Blackboard or the university's emailing system empowered by Microsoft Office. Student grades were based on quizzes and exams, individual and group projects, and participation in discussion forums and chat rooms.

The final sample for the data analysis includes a total of 26 students who agreed to participate in our study and completed the survey. Among them 20 were females and six were males. Sixty-six percent of the students were between the ages of 30 and 49. At the time of this study, about 39% of the students had taken one online course, 27% took two or three courses online, 19% four or five online courses, 12% six or seven online courses, and 4% took more than eight online courses.

The questionnaire consisted of demographic questions, student help-seeking from the instructor and classmates, and student attitudes towards help-seeking. The section on help-seeking from the instructor listed five methods of communication and asked the students to check their preferred methods of contacting the instructor in two help-seeking situations, respectively: a) when they are confused about or do not understand a subject matter concept in an online course, and b) when they are confused about the directions for completing an assignment, a due date, grade or other class procedures. Students were allowed to check more than one preferred methods of communication from the list. Two additional options were added for the respondents to check whether they have not needed to ask the instructor for help or whether they were not comfortable asking the instructor for help. "Help-seeking from classmates" questions were the same except that "my instructor" was changed to "classmates". Finally, the section on attitudes toward help-seeking consisted of four subscales: a scale on perceived need for help-seeking, a scale on perceived availability of help, a scale on help-seeking efforts, and a scale on help-seeking avoidance. There were 10 questions in this section and students were asked to respond to each question on a three-point Likert type scale (3 = *a great deal*, 2 = *somewhat or sometimes*, 1 = *little or no*).

In order to gain a deeper insight into students' help-seeking experience, five open-ended questions were used in the questionnaire. The questions were as follows: What are the advantages of studying online when you need help? What are the disadvantages of studying online when you need help? What strategies do you use when you

need help in an online course? What advice would you give to instructors when they design an online course in order to better support students who need help? What advice would you give to other students to get help when they are taking an online course?

The course instructors distributed the consent form and the questionnaire to their students by email. Instructors also posted an announcement about the study on Blackboard. Students were told that their participation in this study was voluntary and whether they participated or not would not affect their relationship with the instructor, the researcher or the university, or any benefits that they may receive or expect to receive in the future. Students who decided to participate sent the completed questionnaire as an attachment to their instructor. The instructors then forwarded all responses to the principal investigator by email after making sure that there was no identification information in the file.

FINDINGS

Quantitative findings

Student help-seeking preferences

Results from the survey (see Table 1) showed that a majority of the students (92.3%) preferred emailing instructors privately when they are confused about or don't understand a subject matter concept. A small percentage of the respondents indicated that they preferred calling their instructor on the phone (19.2%) or posting a question on the Q & A discussion board (15.4%). The Q & A discussion board questions were designed to be answered either by the course instructor or by the students. Only one participant favored posting a question for the instructor in chat rooms and meeting face-to-face with the instructor respectively (3.8% and 3.8%). 7.7% of the respondents indicated that they did not need to ask their instructor for help with directions or class procedures though they were all comfortable asking their instructor for help with such matters.

Similar help-seeking pattern occurred on matters related to directions and procedures. When confused about the directions for completing an assignment, a due date, a grade or other similar class procedures, a majority of the students preferred seeking help from their instructor via email (84.6%). Calling the instructor on the phone or posting a question to the instructor on the Q & A discussion board was much less preferred (19.2% and 11.5%) as methods for help-seeking, whereas posting a question to the instructor in a chat discussion and meeting face-to-face with the instructor was least preferred (3.8% and 3.8%).

Table 1. Student Preferences for the Methods of Seeking Help from the Instructor in Online Learning (N=26)

| Methods of help-seeking | Item 11- Subject Matter Content | | Item 12- Direction & Procedures | |
|---|---------------------------------|-------|---------------------------------|-------|
| | N | % | n | % |
| Emailing my instructor privately | 24 | 92.3% | 22 | 84.6% |
| Calling my instructor on the telephone | 5 | 19.2% | 5 | 19.2% |
| Posting a question to my instructor on the class discussion board | 4 | 15.4% | 3 | 11.5% |
| Posting a question to my instructor in live chat | 1 | 3.8% | 1 | 3.8% |
| Meeting face-to-face with my instructor | 1 | 3.8% | 1 | 3.8% |
| I have <u>not</u> needed to ask my instructor(s) for help. | 0 | 0.0% | 2 | 7.7% |
| I am <u>not</u> comfortable asking my instructor for help. | 0 | 0.0% | 0 | 0.0% |

Note. Item 11 - “When you are confused about or don't understand a subject matter concept, which method of contacting instructor in an online course would you most prefer?” Item 12 - “When you are confused about the directions for completing an assignment, a due date, a grade or other similar class procedures, which method of contacting your instructor would you most prefer?”

Table 2. Student Preferences for the Methods of Seeking Help from their Classmates in Online Learning (N=26)

| | Item 13- Subject Matter Content | Item 14- Direction & Procedures |
|--|---------------------------------|---------------------------------|
|--|---------------------------------|---------------------------------|

| Methods of help-seeking | N | % | n | % |
|---|----|-------|----|-------|
| Emailing my classmate(s) privately | 14 | 53.8% | 18 | 69.2% |
| Posting a question to my classmates on the class discussion board | 8 | 30.8% | 7 | 26.9% |
| Calling my classmate(s) on the telephone | 4 | 15.4% | 5 | 19.2% |
| Meeting face-to-face with my classmate(s) | 4 | 15.4% | 4 | 15.4% |
| Posting a question to my classmates in live chat | 2 | 7.7% | 0 | 0.0% |
| I have <u>not</u> needed to ask my classmate(s) for help. | 4 | 15.4% | 2 | 7.7% |
| I am <u>not</u> comfortable asking my classmate(s) for help. | 1 | 3.8% | 1 | 3.8% |

Note. *Item 13* - “When you are confused about or don’t understand a subject matter concept, which method of contacting OTHER STUDENTS in an online course would you most prefer?” *Item 14* - “When you are confused about the directions for completing an assignment, a due date, a grade or other similar class procedures, which method of contacting OTHER STUDENTS would you most prefer?”

Student preferences for seeking help from classmates showed a slightly different pattern (see Table 2). About half of the respondents (53.8%) indicated that they preferred emailing their classmates privately when they are confused about or don’t understand a subject matter concept. The second most preferred method of contacting their classmates for help on subject matter content was posting their question on the Q & A discussion board, chosen by 30.8% of the respondents. Calling their classmates on the phone or meeting face-to-face with them was preferred by a small percentage of the respondents (15.4% and 15.4%, respectively) when they needed help on subject matter content, whereas posting a question to their classmate(s) in live chat was the least preferred (7.7%). The order of student preferences remained the same when seeking help from classmates regarding the directions for completing an assignment, a due date or other class procedures. Moreover, 69.2% of the respondents preferred emailing their classmates privately when they needed help with directions and procedures. The second most preferred method was still posting a question to their classmates on the Q & A discussion board (26.9%). The third was calling classmates on the telephone (19.2%), and the fourth preferred method was meeting face-to-face with classmates (15.4%). None of the respondents indicated any preference for posting a question to their classmates in live chat to seek help with directions and procedures. Regarding the perceived need for help-seeking from peers, almost all of the students indicated such a need though a few indicated no need to seek peers’ help with subject matter content (15.4%) or to seek peers’ help with directions and procedures (7.7%). All but one respondent indicated that they were comfortable asking their classmates for help with either subject matter content or directions and procedures.

Student attitudes toward help-seeking and help provided

We explored student attitudes toward help-seeking, including perceived need for help-seeking and perceived availability of help, and their help-seeking efforts or avoidance in online learning. As shown in Table 3, most students considered that they needed help from their instructor somewhat or sometimes (61.5%), with 23.1% considered they needed little or no need from their instructor and 15.4% indicated that they needed a great deal of help from their instructor. When asked about their need for help in an online class from their classmates, most students indicated “little or no” such need (61.5%) while some indicated “somewhat or sometimes” (30.8%) and still fewer indicated “a great deal” of help from their classmates (7.7%). In terms of availability of help, about half of the students (57.7% and 53.8%, respectively) indicated that their online classes were structured to provide help for them “somewhat or sometimes”, regardless of whether the help was about subject matter content or about class procedures. About a third of the respondents indicated that their online courses were structured to provide a great deal of help, while very few students indicated that their online classes were not structured to provide much help. On the other hand, students reported low to moderate help-seeking efforts about working with their classmates but more efforts about working on their own. A majority of the students (88.5%) indicated that they tried a great deal to do work on their own without help from anyone. Relatively speaking, students tried harder to work with their classmates when they had questions about the class procedures than when they did when they had questions about the subject matter content. Over half of the students (53.8%) indicated little or no effort in seeking help from their classmates when they had questions about the subject matter content and 26.9% indicated such help-seeking efforts somewhat or sometimes, whereas 42.3% of the respondents reported that

they made little or no effort to seek help from their classmates when they had questions about the class procedures and 46.2% reported they tried to seek such help somewhat or sometimes.

Table 3. Students’ Attitudes towards Help-Seeking and Help-Seeking Efforts/Avoidance in Online Learning (N=26)

| | A great deal | | Somewhat or sometimes | | Little or no | |
|---|--------------|-------|-----------------------|-------|--------------|-------|
| | N | % | N | % | n | % |
| Perceived need for help-seeking | | | | | | |
| To what extent do you think you need help in an online class from your <u>instructor</u> ? (Item 15) | 4 | 15.4% | 16 | 61.5% | 6 | 23.1% |
| To what extent do you think you need help in an online class from your <u>classmate(s)</u> ? (Item 16) | 2 | 7.7% | 8 | 30.8% | 16 | 61.5% |
| To what extent do you think you need help in an online class from <u>outside resources</u> such as the web, the library, or tutors? (Item 17) | 8 | 30.8% | 12 | 46.2% | 6 | 23.1% |
| Perceived availability of help | | | | | | |
| To what extent do you feel that online classes are structured to provide help for students when they have questions about the <u>subject matter content</u> ? (Item 18) | 9 | 34.6% | 15 | 57.7% | 2 | 7.7% |
| To what extent do you feel that online classes are structured to provide help for students when they have questions on the <u>class procedures</u> ? (Item 19) | 10 | 38.5% | 14 | 53.8% | 2 | 7.7% |
| Help-seeking efforts | | | | | | |
| To what extent do you try to work with other students when you have questions about the <u>subject matter content</u> ? (Item 20) | 5 | 19.2% | 7 | 26.9% | 14 | 53.8% |
| To what extent do you try to work with other students when you have questions about the <u>class procedures</u> ? (Item 21) | 3 | 11.5% | 12 | 46.2% | 11 | 42.3% |
| To what extent do you try to do work on your own without help from anyone? (Item 22) | 23 | 88.5% | 3 | 11.5% | 0 | 0.0% |
| Help-seeking avoidance | | | | | | |
| To what extent do you avoid asking for help from the <u>instructor</u> in an online class? (Item 23) | 4 | 15.4% | 7 | 26.9% | 15 | 57.7% |
| To what extent do you avoid asking for help from your <u>classmate(s)</u> in an online class? (Item 24) | 3 | 11.5% | 14 | 53.8% | 9 | 34.6% |

Finally, help-seeking avoidance existed but it was not common. Over half of the students (57.7%) indicated that they rarely or never avoided asking for help from the instructor and 26.9% indicated that they avoided help-seeking from their instructor sometimes. Relatively more students indicated that they avoided seeking help from their classmates in an online class, with 53.8% reported they did so sometimes and 34.6% indicated that they rarely or never did so. Findings also indicated that male students tend to avoid seeking help which corroborates with the research that male students avoid seeking help more frequently than female students.

Qualitative findings

Participant responses to open-ended questions were analyzed using thematic approach. “Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data” (Braun & Clarke, 2006, p.6) to gain a deeper insight and understanding about a phenomenon. The two researchers read and coded student responses to the open-ended questions independently. They then collectively examined the coding categories and refined the coding scheme before sorting them for emerging themes. All together four themes emerged with respect to the graduate students’ help-seeking experiences in online learning. The following themes influenced help-seeking behavior and strategies of online learning: Asynchronous learning, help-seeking process and strategies, self-regulation and goal orientation, student characteristics and previous help-seeking experience in online learning.

Asynchronous learning

The non-real time nature of asynchronous learning provided the students the time needed for effective help-seeking and independent learning. Students took chance of the flexibility of asynchronous learning to think through their questions. For example, a student reported that the reduced time constraints in online courses provided more time in her help-seeking process. This student also thought that the non-real time aspect of online learning helped instructors to think through the help sought and in the process of providing help. The student said:

I can take all the time I need to think about, form and then type my question, ensuring its precision. Instructors likewise can answer at their convenience, enhancing the likelihood that they will understand my question and provide the correct information.

Students talked about the importance of “immediacy” or “wait time” required for a response. They reported that getting help was not as immediate as it would be in a face-to-face classroom setting. The time of the day when students studied for the course influenced the “wait time” for receiving help. For example, one student noted, “... it is annoying sometimes that I want some information at 11 p.m. & I'll have to wait until the next day or longer to get a response.” Asynchronous learning did not allow for the immediacy of the help needed by the students.

Writing was another factor with respect to asynchronous learning that interrupted the “study flow” when help was needed as one student implied that “asynchronous answer interrupts her study flow.” This student also mentioned that if she doesn't type her questions clearly, there is an additional delay in having to restate the question and wait for a response. Another student reported that if his question is not clear, it might take more time to get a response. He said, “It takes more time if I have not been able to make my questions clear.” He continued, “If a question is complicated or nuanced, the back-and-forth of e-mail may require a lot of effort and time which might have been avoided in a face-to-face encounter.” Another student's comment included: “Be careful with the words you choose via e-mail or chat when you ask help from anyone... Thus, miscommunication may occur, causing undue conflict.” On the other hand, for students whose English was their second language, seeking help in the online environment gave them more time to compose their written messages even though it was challenging at times as one student put it: “Sometimes it is difficult posing the question in a way that answers it.”

In majority, students reported that courses were structured in a manner that facilitated strategies and mechanisms for seeking help and for providing help. For example, one student noted that online courses and instructors provide help sources that are flexible [asynchronous] and easy to access. As suggested by the students' comments, online learning enabled easy access to help resources provided by the instructors and those that were available on the Internet.

Help-seeking process, self-regulation and goal orientation

In majority, the students' help-seeking process followed a sequence of decision-making in the order of: Rereading the course material, searching information on the Web and then asking the instructor or classmates. Although all participants reported that they were comfortable asking the instructor for help, a few of the students noted that they ask their classmates first and then the instructor because classmates are usually the first to respond. The students frequently utilized discussion boards when they needed to ask a question to their classmates or for reading other students' postings to find help to their questions. Some comments included: “You can post a question and usually get a response from someone in the class.”, “Every classmate may see [your question] and offer his/her help.”, “You can make a post on the discussion board and get fairly quick answers.”, “I can post questions to my classmates on the Q & A discussion board or in live chat when I need help.” However, one student noted that her last choice would likely be to ask a classmate. Two students said that they ask questions to their classmates but only if they have “previously met them in person.”

Student responses indicate that they use self-regulation strategies when they think they need help or when they feel the need to revisit or clarify their questions. For example, one student said that if he is not able to gain understanding from the material, she calls upon her instructor and/or classmates. Another student's response included, “If materials provided are not helpful, I can search the Web for alternate materials that fit my “readiness” level.” These responses also indicate student self-awareness of their learning and metacognitive processes. Some students reported that they wanted to solve their course-related problem or question on their own instead of seeking help from others that indicates goal orientations such as autonomous orientation. One student reported that it was difficult for him to ask classmates because he feels he should be able to figure out the response to his question. He said:

The more web classes I have taken, gradually I have gotten more comfortable asking my classmates for advice or help. But this still doesn't come naturally to me. I feel like I should be smart to figure most things out for myself.

Student responses showed that access to the course discussions or chat transcripts helped them clarify their own questions. This indicates a reflective approach to learning supported by a venue to revisit content when help is needed as shown in one of the student's comment: One can take time to understand the helping messages and review them repeatedly.

Learner characteristics and previous help-seeking experience

Student comments on the advantages of online help-seeking reflected different help-seeking preferences based on learner characteristics. For example, one student wrote: "Seeking help from the instructor is similar to having one-on-one interaction - you can ask your own specific question(s)." Another student felt that she can perform a quick search on the Web when she needed help "without feeling like I'm [he is] interrupting" the class. On the contrary, one student said that help-seeking online was lacking "personal, individualized contact." Another student said "Sometimes it is nice to just be able to raise your hand and ask a question."

Students' previous help-seeking experience influenced what they thought about help-seeking online. For example, one student said "Instructors are easier to get a hold of when you take an online class." It also seemed that students have developed strategies for seeking help based on their previous online learning experiences. Student responses included: "get to know the professor right away at the beginning of the course", "find out the most effective way to get questions effectively", "make full use of the communication channels available and talk (could be in the form of text, chat, video conferencing, face-to-face, etc.) with the instructor often." This student's statement indicated that she has developed a particular strategy when it comes to asking for help from her instructor. This student's response demonstrated self-regulatory strategies and competencies such as cognitive and social competency. She said:

Don't be afraid to be aggressive when needing help. Try everything you can think of first, then email the professor with your question. AND include what you have already tried to work out the problem, for example; which materials you have read, what techniques you have tried. If the professor's answers to your questions do not help, rephrase the questions. If all else fails, call for a phone conversation or make an appointment for a face-to-face [meeting].

Some students talked about the importance of collaborating with another student in the class and the importance of communicating help messages properly. For example, students said: "Try to establish a relationship with classmates.", "Try to seek out an online classmate and friend, it makes the learning easier. Speak up when you are stuck, being aggravated or freaked out and silence doesn't get you anywhere."

DISCUSSION

Help-seeking is an important learning strategy in online learning. The present study investigated help-seeking behaviors and attitudes towards help-seeking among graduate students. Survey results indicate that the students' decision-making process for selecting help resources primarily followed these strategies: Rereading the material, searching for information on the Web, seeking help from the instructor or classmates. In addition, survey results showed that a majority of the students (88.5%) reported working on their own without help from anyone. The students reported that they should be able to solve a content-related question on their own before seeking help from other resources such as the instructor or classmates. Based on a review of the literature, Lynch and Dembo (2004) found that learning assistance management (help-seeking) is one of the five self-regulatory attributes of online learners. These findings suggest that students preferred studying independently as they were motivated by self-regulatory cognitions. This result may also be related to students' self-efficacy and prior knowledge in the particular domain that they were studying. When learners feel that they have knowledge of the topics of study, they may not seek help and may persist in trying to find the solution on their own (Aleven et al, 2003).

Help-seeking orientation can be autonomous – focused on understanding and increased competency (Butler, 1998). In the current study, the participants reported that due to the asynchronous nature of the online course, they had the opportunity to review the course materials or help messages on their own time until they understood the help provided. The reflective approach that the students demonstrate in their efforts of understanding the course content indicates autonomous orientation. However, the students' tendency to not seeking help from their classmates may indicate that student help-seeking orientation may be ability-focused – concern with not appearing incompetent. Learners may avoid help because of their orientation on perceived lack of ability or

autonomous orientation of striving for independent mastery (Butler, 2006). The findings with respect to the male students' tendency for help-avoidance may be related to their autonomous or performance approach goal orientations. Further research can investigate the relationship between online learners' achievement goal orientations and tendency for help-seeking or help-avoidance.

Knowing when and how to seek help is a key self-regulatory skill (Nelson-Le Gall, 1981; Newman, 1994). Students who possess self-regulatory strategies are motivated to use appropriate strategies at the appropriate time (Newman, 2002). In the current study, the participants emphasized the importance of knowing when and how to ask a question properly. This indicates that students utilized cognitive and social competencies. The students reported low to moderate help-seeking efforts when working with their classmates but reported more effort when working on their own. Students' use of motivational strategies were demonstrated when the students reported that they seek to answer the question on their own before seeking help from other resources. In addition, the ease of access to the course content materials due to the asynchronous nature of online learning and to the Web facilitated self-regulatory cognition and activities that the students engage in may have increased student orientation towards help-seeking from different resources.

The study findings regarding the immediacy of help support needed can be minimized by creating a collaborative learning community which may help decrease the "wait time" for receiving help. A community of learners can assist with the immediacy of information help sought by the students without disrupting their "study flow". This approach may also help minimize the transactional distance, a psychological and communication space to be crossed, by the instructors and students. In addition, a supportive learning community may help reduce help-avoidance driven by feelings of perceived threat to ability or content-related competence. Peer-review activities, group work, collaborative roles for students and more knowledgeable peers are some strategies instructors can utilize to support effective help-seeking. However, caution is needed for allowing adequate "wait time" for student inquiry and reflection on the question when providing immediate help resources to the students. Instructors may need to develop strategies that will help design courses accordingly.

Students' motivation in solving content related questions on their own before they ask the instructor or classmates can be categorized as instrumental (adaptive) help-seeking. Instrumental or adaptive help-seeking is the learner's goal to enhance his/her understanding. Online learning environments need to be designed to encourage instrumental help-seeking behavior particularly for those students who do not have as much self-regulatory skills. "Instructors must use instructional time to provide students with learning experiences that involve using competencies/resources effectively to complete specific tasks." (Karabenick & Dembo, 2011, p. 41). As Newman (2002) suggests, cognitive and social competencies, personal and contextual motivational resources need to be studied further for an in-depth understanding of student help-seeking preferences, behavior and patterns. Help tools or mechanisms should minimize expedient or executive help students may seek. Providing help-seeking mechanisms for the students becomes an important instructional design issue for the instructors in order to improve student learning as well as student retention in online courses.

Asynchronous communication formats can influence help-seeking behavior by promoting privacy, reducing the anxiety associated with face-to-face communication, allowing time for students to think and construct their questions and providing the convenience and flexibility of anytime, anywhere posting. Although the instructor of the courses in this study had set up synchronous chat sessions, the participants did not find them as useful as asynchronous formats. Concurring with this finding, Kitsantas and Chow (2007) also found that one-to-many format, the lag time between questions and answers, and the public nature of chatting with its potential for public embarrassment may be possible explanations for why students do not prefer synchronous chat for help-seeking. 3.8% of student response for using chat may also indicate that the synchronous chat sessions were not utilized or structured by the instructor for informal or formal help-seeking. However, current mobile and synchronous technologies offer great potential with respect to ease of use and access. Instructors may need to think ways for taking advantage of these technologies. Hwang, Wu, Tseng and Huang (2011) suggest using mobile technology for context-aware ubiquitous learning. These types of help-seeking mechanisms can provide real-time help from peers, particularly from more knowledgeable peers or instructors that support collaborative knowledge construction.

The study results indicated that an overwhelming majority of the students preferred emailing their instructor when they sought help regarding the subject matter content and regarding the directions and procedures for course requirements. When asked about the amount of help needed from the course instructors, 15.4% of the students reported that they needed a great deal of help from their instructor. About a third of the respondents (Table 3) indicated that their online courses were structured to provide a great deal of help. Instructor awareness of a student's need for help plays an important role in motivating students in online learning. As found in Beebe,

Vonderwell, and Boboc's (2010) study, most online instructors did not have a mechanism of detecting that help is needed unless students emailed them with their questions. When instructors are not aware of student need for help, they may develop what Ryan and Shin (2011) call an "observer dilemma" and misinterpret a lack of help-seeking as showing low motivation or effort in a student. Such a dilemma, however, can be largely avoided with the use of innovative instructional strategies, checking for student help needs and scaffolding particularly early on during the coursework. Instructors should monitor and encourage student participation. This requires that the instructors provide a supportive environment where all responses are valued. Creating a learner culture where students are comfortable participating and asking questions to the instructor and to each other publicly through the discussion board will benefit student learning.

The students' help-seeking experiences show that instructors need to provide multiple ways or mechanisms for help such as a list of credible Web resources or help prompts. For example, Schworm and Gruber (2012) used instructional prompts to encourage students to seek for help such as performing an information search on the Internet, talk to their classmates or instructor when they thought they need help. Their study found that students who used prompts about the relevance of active help-seeking had better learning outcomes. Providing help resources that facilitate formative assessments and instructor follow-up of those assessments may encourage student help-seeking; thus, increase learning.

There are many advantages to using course management systems; however, course instructors need to integrate creative ways for encouraging help-seeking behavior. With the use of Web 2.0 tools, online apps and mobile technologies, online courses can be redesigned for increased student support for effective help-seeking. Online course design standards (i.e., Quality Matters) can also include an item that is specific to providing help mechanisms and tools.

CONCLUSION

This study found that the students demonstrated a great deal of self-regulatory strategies. It should be noted that the study was limited to twenty-six graduate students in a teacher education program at a Midwestern university in the U.S. Future research is needed to investigate help-seeking behaviors in online learning among different student populations, with a larger sample size, or within a different instructional context. In addition, this study only explored student perspective in the help-seeking process without collecting data from the instructors. Online instructors' perspective in terms of soliciting help-seeking and responding to help seeking requests warrants further investigation.

Help-seeking mechanisms and tools need to be structured into the course utilizing formative assessment techniques, Web 2.0 tools and apps motivating the students beyond some constraints of course management systems. Further research can investigate help-seeking differences and motivational resources between courses that support community of learners and those that are geared towards independent coursework. In addition, instructor understanding of student help-seeking behavior and how they provide help to their students will be valuable for developing professional development programs for faculty who teach online.

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Cyberbully, Cybervictim, and Forgiveness among Indonesian High School Students

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ABSTRACT

Cyberbullying has been commonplace practice among Indonesian teenagers engaging in on-line space. However, this phenomenon has not been extensively researched in the context of Indonesia. This present study aims to examine the extent to which level of forgiveness contribute to varying degrees of cyberbullying. It is a quantitative in which the data were drawn from 495 senior high school students in Yogyakarta, Indonesia. The research findings revealed that there was a significant correlation of $\beta = .255$, $p = .011$ between level of forgiveness and patterns of response towards cyberbullying and also a correlation of ($\beta = .316$, $p = .001$) between cybervictim and cyberbully. The study concluded with some recommendations with regard to the effect of cyberbullying.

Keywords: senior high school students, cyberbullying, cyberbully, and forgiveness.

INTRODUCTION

It is generally acknowledged that communication technology via the Internet brings positive benefits such as easy access to information (Subrahmanyam & Smahek, 2011), internationalization and organizational growth (Davis & Harveston, 2000). On-line communication can also serve as a significant predictor of people's social capital, civic and political participatory behaviors (Gil de Zúñiga, H., Jung, N., & Valenzuela, S, 2012). However, in addition to its positive contribution, cyber-space communication also brings some undesirable consequences such as cyberstalking (Seto, 2002), sexual predation (Dombrowski, Lemasney, Ahia, & Dickson, 2004), cyberstalking (Seto, 2002), sexual predation (Dombrowski, Lemasney, Ahia, & Dickson, 2004), pornography, cybercrime and cyberbullying (Tokunaga, 2010).

Cyberbullying is a form of harassment and humiliation through the virtual world. In other words, cyberbullying is an act of bullying which is transformed into cyberspace (Vandebosch, & Van Cleemput, 2008; Juvonen, & Gross, 2008). Cyberbullying differs from conventional bullying. Whereas conventional bullying involves face-to-face encounter and predominantly takes place in school grounds, cyberbullying occur in on-line space without physical contact (Smith et al, 2008; Slonje, & Smith, 2008; Agatston, Kowalski & Limber, 2007; Suprihatin, 2012).

Therefore, cyberbullying has no physical constraints. Perpetrators of cyberbullying can disturb the victim outside schools through mobile phones, emails and online social media (Dooley, Pyzalski, & Cross, 2009). Cyberbullying is a concept associated with similar construct like online bullying, electronic bullying and internet harassment (Dooley, Pyzalski, & Cross, 2009). Thus, cyberbullying has four main characteristics, namely the action should be repeated, involving psychological torture, done on purpose, and happen in cyberspace platform.

Frequency of Cyberbullying

Nowadays cyberbullying is becoming a big issue around the world. In Indonesia, the prevalence cyberbullying among children is considerably high. One of eight parents stated that their children had been the victims of harassment and humiliation via online media. As many as 55% of parents said they are aware that their child is experiencing cyberbullying (Ipsos, 2011).

Another study by Lindfors, Kaltiala-Heino, & Rimpelä (2012) in a sample of 5516 adolescences found that girls reported more often than boys that they had experienced at least one dimension of cyberbullying during the last

year. The proportion was highest among 14-year-olds and lowest among 18-year-olds of both sexes. Among girls, the most commonly encountered dimension was witnessing the cyberbullying of friends (16%); and being a victim was slightly more common than being a bully (11% vs. 9%). Among boys, an equal proportion, approximately 10%, had been a victim, a bully, or had witnessed cyberbullying. The proportion of bully-victims was 4%. Serious and disruptive cyberbullying was experienced by 2% of respondents and weekly cyberbullying by 1%; only 0.5% of respondents had been bullied weekly and considered bullying serious and disruptive.

Another study involving 1454 American teenagers found that 72% of respondents reported having experienced at least one type of cyberbullying, 85% of them also experienced bullying at school (Juvonen and Gross 2008). Forms of cyberbullying most often experienced by respondents is insult and a name-calling (Juvonen and Gross, 2008). 90% of respondents never reported cyberbullying that happened to other people, and only a few respondents used a digital tool to prevent incidents of cyberbullying. Moreover, cyberbullying victimization was associated with increased social anxiety (Juvonen and Gross, 2008).

Furthermore, Goebert et al (2011) in his study of 677 teens found 1 out of 2 respondents have been victims of cyberbullying. Girls have more frequent experience of being victims of cyberbullying via SMS and online social media. Girls were also more likely to have anxiety symptoms, and idea to suicide compared to teenage boys. Study by Schneider et al (2012) in a sample of 20.406 Metro West Massachusetts adolescents, found 15.8% were victims of cyberbullying and 25.9% being bullied at school during the past 12 months. 59.7% of cyberbullying victims were also being bullied at school. 36.3% of bullying victims had also become victims of cyberbullying.

Psychosocial Consequences of Cyberbullying

The negative outcomes of cyberbullying on the victims have been confirmed in several previous studies. But, the negative effects of cyberbullying depend on the frequency, duration, and severity of the cyberbullying itself (Tokunaga, 2010). Cyberbullying that happens occasionally have lower long-term outcomes compared to cyberbullying that occurs continuously (Tokunaga, 2010). Gradinger, et al (2009) found that victims of bullying or cyberbullying had poor adjustment, including reactive aggression, instrumental aggression, depression symptoms and somatic symptoms. In addition, Gradinger et al (2011) found that victims of cyberbullying are more at risk of mental health, especially triggering drug abuse and attempting suicide. Cyber victimization also predicts depression symptoms among Turkish secondary school children (Baker & Tanrikulu, 2010).

Another study by Bauman (2009) in sample of 221 teenagers in the rural area of the Southwestern United States, found 1.5% were perpetrators of cyberbullying, 3% and 8.6% cyberbullying victims were also perpetrators of cyberbullying. Victims of cyberbullying experienced and increased their emotional distress and the likelihood of behavioral acting out. Some of the negative outcomes of both types of bullying (school bullying and cyberbullying), including decline in school performance, reduced involvement in schools, increase in symptoms of depression, ideas for suicide, and self-harm, was found (Schneider et al, 2012). Increased psychological distress was found either on victims of cyberbullying as well as on school bullying (Schneider et al, 2012).

Teenagers who became victims of cyberbullying showed decreased concentration in learning, increased school absenteeism, and decreased learning achievement at school (Beran & Li, 2007). Another study involving a sample of 432 teens found 42% have never experienced cyberbullying, whereas 58% experienced cyberbullying action more than once. As many as 37% respondents reported becoming victims of both either cyberbullying or school bullying (Beran & Li, 2007). Fu, Chan, & Ip's (2014) study found that countries with higher rates of cyberbullying were more likely to have a higher incidence of unnatural child death. Based on their data, an increase of 1% in the prevalence of cyberbullying was translated into a 28% increase in risk of unnatural child death. The study reveals a positive ecological association between the rates of exclusively online bullying and unnatural death mortality of the age 10–14 children among 24 European countries.

One study by Beran and Li (2007) found that adolescents who were victims of cyberbullying showed a decrease in concentrations, increase school absence, and a decrease in school achievement. Goebert et al (2011) found that girls who were victims of cyberbullying have higher level of anxiety symptoms, and suicide attempts than in boys. Victims of cyberbullying usually feel angry, sad, frustrated, and anxious. This is because the perpetrators used hurtful ways, by sending threaten messages, humiliate and degrade the victim. Furthermore, Schneider et al (2012) found that cyberbullying victim has declined school performance, decreased involvement in schools, increased symptoms of depression, ideas of suicide, self-harm, and suicide attempted. The increased of psychological distress that caused by cyberbullying (depression, suicidal ideation, self-injury, and suicide attempts) also occurred among victims of school bullying as well, above result was confirmed by Patchin and Hinduja's study (2010) that found low self-esteem on both victims and perpetrators of cyberbullying. One theory

concluded that low self-esteem encourage teenagers to bully others in order to improve their self-esteem, while low self-esteem in victims cause inability for them to be assertive against perpetrators.

The Effect of Forgiveness on Cyberbullying

For almost three centuries, the notion of forgiveness has been forgotten and it was not until the beginning of the 20th century that social scientists began to learn more about this (McCullough, Pargament, & Thoresen, 2000). Forgiveness can be viewed from three different perspectives, in terms of response, personality disposition, and characteristic of the social unit. Response constitutes prosocial changes in thinking, emotions, and behavior of actors (transgressor). The key feature of response is forgiveness whereby someone forgive others, and their responses (what they think, feel, what they want, how's behavior change) become less negative and more positive all the time (McCullough, Pargament, & Thoresen, 2000).

In view of personality disposition, forgiveness refers to the tendency of individuals to forgive others in interpersonal situations. While from the viewpoint of the social unit, forgiveness is seen as a similar attribute to intimacy, trust, and commitment (McCullough, Pargament, & Thoresen, 2000). In some social structures such as family or marriage, forgiving behavior is very important, so that the perpetrators are directly forgiven for his mistakes. While on the other social structures such as a business or government organization, performers are not easily forgiven even after being punished and exiled.

The relationship between forgiveness and physical health has also been a subject of interest in some research. Witvliet, Ludwig, and Vander Laan (2001) designed an experiment in which subjects were asked to imagine a painful event in the past in two perspectives either forgiving or unforgiving imagery trial. During the session when the subject practiced the imagery, the physiological response was measured and recorded. They found subjects undergoing forgiving imagery trial showed decreased physiological stress response and negative emotions (anger and sadness), increased positive emotions and perceived control. In contrast, subjects undergoing unforgiving imagery trial showed increased physiological stress response (increased heart rate and blood pressure), negative emotions, and decreased levels of self-control.

Some past studies have found a significant relationship between forgiveness with subjective well-being and mental health. Mauger et al. (1992) found that individuals who have low scores on a forgiveness scale appeared to have a tendency to demonstrate depression, anxiety, anger, and low self-esteem. Another study by Tangney et al. (1999) found that the tendencies to forgive other people have a correlation with low depression, hostility, anger, prejudice, and interpersonal sensitivity. Exline, Yali, and Lobel's (1999) study of 200 students found that an individual who had forgiven God for negative events in their life had a low depression and anxiety.

An experimental study by Hebl and Enright (1993) found that older women who took the forgiveness therapy sessions showed increased willingness to forgive, and decreased depression and anxiety scores. In addition, the experimental group that showed a high level of forgiveness was associated with increased self-esteem score, decreased levels of anxiety and depression. Other studies by Freedman and Enright (1996) involving 12 female survivors with physical incest who underwent forgiveness therapy showed increased forgiveness tendency and hope, decreased anxiety and depression. Further data showed a positive result obtained 1 year later. Lawler et al. (2005) found that forgiveness had a significant association with a decreasing of physical symptoms, use of medications, improved sleep, decreased fatigue and somatic complaints.

RESEARCH OBJECTIVES

The purpose of the current study is to explore the nature of cyberbullying in a sample of Indonesian teenagers. There have been a few studies and publication exploring the impact of cyberbullying and the role of forgiveness in Indonesia senior high school students. Therefore, this study is expected to shed light on how to prevent, design prevention programmers and decrease cyberbullying phenomenon among senior high school students. The current study replicates and develops Safaria's study (2016) with recruiting more sample, and focus on several research questions below. The following research questions were developed to guide the study:

1. How frequently does cyberbullying occur among the selected Indonesian adolescents as research participants?
2. What kinds of online platforms are most frequently used as a playground for cyberbully attacks?
3. Does the victim know the perpetrators?
4. Whether there a relationship between forgiveness with cyberbully and cyberbullying?

METHODS

Participants

The data were collected from three high schools in Yogyakarta region, involving as many as 495 students in the study. Simple random sampling was used to select the participants. Informed consent was given to all participants, and they have the right to refuse participating in the study anytime. Meanwhile, the researcher has had permission from the school to collect the data. 63.6% (315) of the sample were boys and 36.4% (180) were girls. All participants agreed to get involved in the study without coercion or incentive.

Measurement

A questionnaire was developed for the purposes of this study after the items were adapted from previous research (Bauman, 2009; Kwan & Skoric, 2013; Li, 2005). A pilot study was conducted to test the validity and reliability of the questionnaire before being used to collect data. The consistency of internal tests reliability was carried out using Cronbach alpha, and content validity was assessed using professional judgment. Two external experts in the field of psychology were involved in checking items in the questionnaire.

The questionnaire consists of general questions on the frequency of cyberbullying; i.e., “*Have you ever experienced cyberbullying?*” The response options include: *never, once or twice, several times, often, almost every day*. The questions measure the types of media used by bully, such as “*What kind of online media was used by bully to harass you?*” (Response options included: *email, phone call, text, Facebook, and video*), *who perpetrated the abuse, and how they responded after being bullied, i.e., “What did you do when you experienced cyber victimization? (Response options included: ignored it, fight back, told the teacher, told the parent, told the police, and told a friend)*. This questionnaire was used in the previous study focusing on cyberbullying and its impact (Safaria, 2016).

The questionnaire also contains a cyberbullying victimization scale which consists of several items that measure the frequency of cyber victimization experienced by the participants (“*I have received humiliation messages on my social networking account (Facebook, twitter), mobile phone and email*”. “*I have received negative name calling harassment on my social network account (Facebook, Twitter), mobile phone and email*”. “*I have received unwanted sexual suggestions/ sexually explicit pictures on my social network account (Facebook, Twitter), mobile phone and email*”). Response options comprised of a four-point scale, from e.g., “*I have not been bullied*” (scored 1), “*only once or twice*” (2), “*two or three times a month*” (3), and “*more than three times a month*” (4).

Forgiveness. Transgression-related Interpersonal Motivation Inventory [38] (TRIM; McCullough & Witvliet, 2002) was used to measure state forgiveness and was translated to Indonesian language. TRIM consists of 12 items, answered on a 1-5 Likert scale from strongly disagree to strongly agree. Forward backward translation method was used to validate the items of TRIM. The example of the items is: “*I will make him/her pay*”; “*I keep as much distance between us as possible*”; “*I am going to get even with*”.

Table 1: Reliability of Questionnaires

| Scale | Cronbach alpha |
|-------------|----------------|
| Cybervictim | .808 |
| Forgiveness | .750 |

Data Analysis

Quantitative data analysis was performed for the purpose of this study. Descriptive analysis and regression analysis were applied to achieve the aims of the study. SPSS version 18 was used in the quantitative data analysis.

RESULT

Overall frequency data

The results indicated that out of 495 senior high school students, 16.2% (80) had never experienced cybervictimization, 43.2% (214) experienced it occasionally (*one or twice*), 26.3% (130) rarely experienced it (*twice or three times*) and 13.1% (65) experienced it frequently (*four or five times*). The remaining 1.2% (6) of participants experienced cybervictimization almost every day (*more than five times*). Approximately 83% of the sample had experienced cybervictimization from occasionally to almost every day. In response to the question “*Did the person who bullied you on cyberspace also bullied you in school*” a total of 24.2% (120) reported they had never experienced bullying in school, 44.4% (220) experienced occasional bullying, 21.2% (105) of participants experienced bullying several times and 8.1% (40) of participants frequently experienced bullying. The remaining 2% (10) of participants experienced bullying almost every day.

Type of cyberbully's media used

Out of 495 students, 18.2% (90) experienced cyberbullying through mobile phone communication. Many participants experienced cyberbullying on Facebook (255, 51.5%), Twitter (65, 13.1%), Email (10, 2%) and Short Message Service (65, 13.1%). The rest of the participants experienced cyberbullying via Youtube (10, 2%).

Types of cyberbullying act

The majority of participants had experienced name calling harassment (225, 45.5%), 31.3% (155) had experienced rumors/gossip, while 5.1% (25) had experienced threats. 2.6% (13) of participants had experienced unwanted sexual contents, and 15.6% (77) of participants had experienced their personal matters being uncovered.

Who does the cyberbullying?

26.3% (130) of participants in the sample do not know (anonymous) who committed cyberbullying against them. 33.3% (165) noted that the bully was their friend in class, 8.1% (40) reported that the bully was their former best friend, 24.2% (120) said that the bully was someone in their school, and 8.1% (40) of the participants said that the bully was someone from another school.

What did you do when you were cyberbullied?

Regarding what action was taken when the participants experienced cyberbullying, 25.3% (125) ignored the behavior, 49.5% (245) fought back against the bully, 4% (20) reported it to teachers/school administrator, 11.1% (55) said that they told their parents about it, 9.1% (45) told a friend about what happened to them, and 1% (5) told the police.

Relationship between forgiveness and cyberbullying victimization with cyberbully

The results showed that forgiveness has a significant relationship with cyberbully ($\beta = .255, p = .011$) and cybervictim have a significant relationship with the cyberbully ($\beta = .316, p = .001$). Table 1 below presents the results of regression analysis.

Table 1. Regression analysis for cybervictim, forgiveness and cyberbully(N=450)

| Variable | B | SEB | β | t | p |
|-------------|------|------|---------|-------|------|
| cybervictim | .038 | .011 | .316 | 3.306 | .001 |
| forgiveness | .019 | .010 | -.192 | 2.007 | .048 |

Note. Adjusted $R^2 = .161 (N = 99, p = .000)$.

While the descriptive data presented in Table 2 below.

Table 2. Means, Standard Deviations, and Intercorrelations(N=450)

| Measure | M | SD | 1 | 2 | 3 |
|-------------|------|-----|--------|-------|-------|
| cyberbully | 1.53 | .67 | 1.000 | .255 | .354 |
| forgiveness | 41.7 | 6.7 | .255* | 1.000 | .201 |
| cybervictim | 15.6 | 5.6 | .354** | .201 | 1.000 |

* $p < .05$. ** $p < .01$

DISCUSSION

While the advance in information technology has brought positive changes to the society, it has also led to undesirable consequences. The present study found that approximately 83% of the research participants experienced cybervictimization from occasionally to almost every day. These findings indicated that cyberbullying became a significant problem among Indonesian teenagers, and it should deserve our serious consideration.

Regarding what online media most frequently used by cyberbully, the finding suggests that the majority of teenagers (51.5%, 225) in our sample have become cyberbullying victims through Facebook. These finding is consistent with Li's study (2005; 2007) which found that 36.4% to 39.4% cyberbullying victimization occurred in online social media like Facebook. The result also supports MacDonald and Roberts-Pittman (2010) who found online social media as a site where the cyberbully occurred. Goebert et al (2011) suggested that girls more frequently experienced cyberbullying victimization via SMS and online social media like Facebook. A large proportion of Internet users in Indonesia (50-80%) are young people from 15-30 years of age (MarkPlus, 2011)

with a considerable proportion of this age group using the Internet for social networking. Facebook (Abbott, 2013; Yulianti & Tung, 2013) have become the most popular means of online communication in Indonesia (Galih & Ngazis, 2012). This fact should be taken seriously and used for educating young people in Indonesia to communicate in Facebook wisely. One of the important questions is what action should be taken when cyberbullying occurs. This question is beyond the scope of present study.

The anonymity is a unique aspect of online technology as it is being used as a shield for the bullies. It is also a characteristic of cyberbullying not found in bullying (Tokunaga, 2010), and become a serious obstacles for combating cyberbullying (Li, 2007). The present study found 26.3% (130) of participants in the sample do not know who committed cyberbullying against them. This finding is consistent with Slonje and Smith (2008) who found that the majority of respondents do not know who bullied them.

The results suggest that 25.3% (125) of cyberbullying victim ignored the harassment, 49.5% (245) fight back against the bully, 4% (20) told a teachers/school administrator, 11.1% (55) said that they told their parents about it. This finding supports Bauman's study (2009) that found 24% of his respondents ignored bully, and 32% bullied back, meanwhile 16% told adults in school and 13% told parents. Retaliation is the most action taken by the victims in order to make the bully stop their harassment. It may be caused by the nature of cyberbullying that as a form of indirect aggression, rather than using physical contact. This condition allows the victims to have equal power to defend their selves against the threats.

The present study found a significant role of forgiveness in the prevalence of cyberbullying, and this finding supports previous studies. Watson, Rapee, and Todorov (2015) found that a person advised to forgive the perpetrators shows low level of anger against the perpetrators, and less likely has the desire to revenge the perpetrator. Egan and Todorov's study (2009) showed that teens with a high level of forgiveness experienced lower feelings of hurt when being bullied. In addition, forgiveness also corresponds with emergent tendency of positive coping strategies (Flanagan, Vanden Hoek, Ranters, and Reich, 2012), and the influence of forgiveness ethos decline retaliation on the victims of cyberbullying (Hui, Tsang, & Law, 2011).

Aftab (2008) identified four types of perpetrators of cyberbullying, first, vengeful angel (angel avenger), second, power hungry (the thirst for power), the third revenge of the nerds (retaliation the nerds), fourth the mean girls, and inadvertent (provocateur). Four profiles are based on personality characteristics and based on the motives underlying the act of cyberbullying. In this study the forgiveness variable and cybervictim have a role in acts of cyberbullying. Persons who become victims of cyberbullying and have low tendency to forgive, is more likely to take revenge to the bully. This means that forgiveness attitude can change the intention to take revenge, and can play a role to diminish revenge personality tendency. As suggest by König, Gollwitzer and Steffgen (2010) in their study that found the victims of bullying tend to choose revenge on the perpetrators. Hinduja and Patchin (2009) also reported that the primary explanation for the occurrence of cyberbullying acts was revenge.

There were limitations to this study. As a correlation study, the current study cannot establish causation, and only shows association between variables. Future inquiry using experimental design is recommended to examine the role of forgiveness on cyberbullying for more convincing results. It is also highly recommended that a longitudinal study be conducted to look more deeply at cyberbullying phenomena as suggested by some scholars (Kowalski et al., 2012; Sticca et al., 2013; Kowalski & Limber, 2013). It is clear that bullying prevention programs should address cyberbullying specifically, as some teenager's bullying experiences happen only online. In conducting prevention program, this present study suggests looking at forgiveness as disposition or attitude that should be developed among teenagers to stop the cycle of retaliation. It also found that Facebook has become dominant online social media where cyberbullying occurs, and it should become our main focus in preventing cyberbullying among teenagers. Teenagers should be informed how to engage wisely in online social media, and how to cope with bullying acts and manage themselves effectively when cyberbullying occurs.

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Design of a Problem-Based Online Learning Environment and Evaluation of its Effectiveness

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ABSTRACT

Problem-based learning approach present several advantages such as improving students' engagement in learning and fostering their higher-order thinking skills. Although there is a plethora of research regarding implementation of problem-based learning in classrooms, its design and application process for web-based environments need further investigation because of independent nature of online settings. This study developed a problem-based online learning environment based on constructivist learning design model proposed by Jonassen (1999) and evaluated its effectiveness. It was conducted in the spring 2014 semester with an intention to access to total population that is 1,417 students receiving distance education for Turkish II course at six university vocational schools. The online lesson was implemented in one week, and data were gathered through students' performance tasks and self-evaluation form. The research indicated that the problem-based online learning environment has a positive influence on learning. Moreover, it was revealed that dynamic nature of online environment affected learner's participation in the designed activities and collaboration among students could not be fostered. Several suggestions were proposed based on the results.

Keywords: Problem-based learning, online learning, distance learning.

INTRODUCTION

In the process of knowledge construction, interactive learning environments provide different opportunities for stakeholders. These online environments can be designed using the problem-based approach to create an active learning process. Barell (2007) defines problem-based learning as a process of investigation in which the students try to solve curiosities, doubts, uncertainties and problems in real life context. Problem-based learning is a constructivist, self-directed, collaborative and contextual process. Thus, it allows students to improve their questioning, problem-solving, creative/critical thinking, reflective and teamwork skills (Dolmans, Grave, Wolfhagen & Vleuten, 2005; Uden & Beaumont, 2006; Barell, 2007). It also enhances their autonomy and encourages them to construe knowledge using real life problems (Crawford, 2011). In their meta-analysis research, Strobel and Barneveld (2009) state that problem-based learning is more effective than traditional approaches in terms of long-term retention of knowledge and skills.

Recently, studies on the use of problem-based learning in online learning environments have been increasing (Tsai & Chiang, 2013). Studies of applied problem-based learning in online environments indicate that learners develop higher-order thinking skills such as creative and critical thinking and also have more motivation to participate and became more active learners (Şendağ & Odabaşı, 2009; Sulaiman, 2011; Delialioğlu, 2012). Problem-based learning also has a strong influence on learning and achievement (Schmidt, Rotgans & Yew, 2011). Karadeniz-Bayrak and Bayram (2012) determined that students in problem based web environment obtained higher and more significant levels of success than those in traditional courses. Tsai, Lin and Shen (2013) determined that vocational high school students with poor achievement levels attained permanent

improvement thanks to the problem-based online learning environment. In addition, findings indicate that the problem-based learning environment improves students' perceptions of classroom community (Baturay & Bay, 2010). Allen, Donham and Bernhardt (2011) found that learner assessments of problem-based learning implementations were positive. Günbatar and Çavuş (2011) also found that students had positive attitudes towards the problem-based online learning environment. These studies mainly show that problem-based learning approach is more effective than traditional teaching methods with respect to a variety of learning outcomes, and it brings similar positive results when it is applied in online and face-to-face environments.

There are researches which compare implementations of problem-based learning in online and face-to-face environments, as well. The research outcomes indicated that students' attitudes and success levels in the problem-based online learning environment were higher than those in problem-based face-to-face learning environments (Gürsul, 2008; Gürsul & Keser, 2009). In addition to these studies, Ioannou, Brown and Artino (2015) found that wikis are more influential tools than forums with respect to creating collaboration in problem-based learning environments.

Findings on the benefits of problem-based learning lead to higher expectations for its contributions. Therefore, distance education courses can be one of the application area to cope with the problems of low participation rates and students' dropouts (give reference). According to the research conducted by Boling, Hough, Krinsky, Saleem and Stevens (2012) students in distance education courses favor interactive and multimedia-based courses rather than text-based and individualized ones. In order to create such engaging learning environments for the students taking distance education, this study designed a course in accordance with problem-based learning approach based on constructivism. "The Constructivist Learning Design Model" proposed by Jonassen (1999) was chosen as a basis for the design since problem-based learning was developed using the constructivist learning approach. These are the indications that problem based learning is based on the theory of constructivist learning: knowledge being construed by the interaction with the environment, learners being motivated by cognitive conflicts, knowledge being improved by discussion and knowledge being constructed by learners (Uden & Beaumont, 2006). According to Savery and Dufy (1995), problem-based learning is among the best applications of the theory of constructivist learning.

Jonassen (1999) proposed the constructivist learning design model based on the idea that: "A constructivist learning environment is technology-based." Figure 1 shows this model, and Table 1 shows its main components.

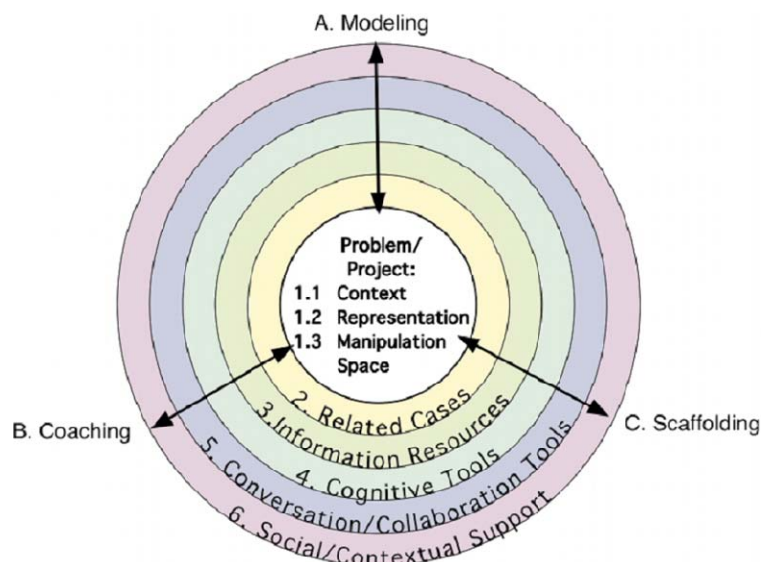


Figure 1. Model for designing constructivist learning environments

Table 1. Main Components of Constructivist Learning Environment

| | |
|--------------------------------------|---|
| Problem context | This is the social, cultural and physical structure and the network of relations that generate the problem. Problems are created in a context, and they are endowed with meaning by it. Thus problems should be considered in their contexts. |
| Representation | The problem should be presented in a way to make it interesting, attract students' attention and encourage students to participate. Simulations and cyber worlds are effective tools for this purpose. |
| Manipulation space | This area includes the settings and opportunities to experience the problem and to manipulate it. The learner can see the outcomes of the manipulation and observe the significance of the change. |
| Related cases | These situations include our and others' experiences of the problem and its details. The analyses of exemplary situations provide us with specific data to orient our actions. It is important to create a database including this kind of data. |
| Information resources | These sources include the information necessary for the project or the problem. Some examples of these sources are text files, graphics, information sources that include audio, video and animations and learning object repositories. |
| Cognitive tools | Students need cognitive support to solve a problem that is embedded in its natural complexity. Mind maps, concept maps and dynamic modeling tools are cognitive tools that provide this cognitive support. |
| Conversation/ Collaboration tools | Learning comes naturally when learners study a problem cooperatively. Therefore, collaboration and talks between the groups should be encouraged, and computer-based communication tools should be used. Online conferences, chat rooms, multi-player games and e-mail are some examples of the tools for this purpose. |
| Social/ Support | ContextualHardware, software and, more importantly, the good faith and social support of implementers are also important factors. |

The focus of the model is the problem and the learner. The teacher is just the guide, and the learner is encouraged to construct their own meaning. The teacher does not play an active role in learning, and s/he only gives guiding feedback. By following these constructivist principles, this study examined the effectiveness of a problem-based online environment with a focus on learning and students' confidence. It sought responses to these questions:

1. What is the effect of the problem-based online course on learning?
2. What is the effect of the problem-based online course on students' confidence?

METHODOLOGY

This study aimed to design a problem-based online course and evaluate its effectiveness using a mixed model. Qualitative and quantitative data were collected, analyzed and were interpreted to support each other.

Study Sample

The study was conducted in the spring 2014 semester with an intention to access to total population that is 1,417 students enrolled in pre-licence programs at six vocational schools of a national university. They attended "Turkish II" as an online course.

The research was conducted in the spring 2014 semester with an intention to access to total population that is 1,417 students receiving distance education for "Turkish II" course at six university vocational schools. The students were expected to both complete performance task and to fill self-evaluation form. However, some students filled self-evaluation form without completing performance task. Moreover, some students did not answer all of the questions in self-evaluation form. This situation was arisen from not putting prerequisite for the designed activities. Therefore, the number of students participating in activities changed continuously, and the author did not make a holistic assessment of the group. Participants were asked to write petitions, and 187 students did this performance task. Of the students, 234 responded to the first, second and third questions on the self-evaluation form. Respectively, 70, 59 and 92 students responded to the three sub-steps of the fourth question which were: "To what extent did you learn how to write a petition in this environment?", "How confident are you about writing a petition?" and "What are your weaknesses in petition writing?" Finally, 230 students responded the fifth question. The findings were interpreted regarding the number of participants who responded to each question.

Problem-Based Online Learning Environment and its Development Process

The authors used the Distance Learning Center at one of the universities in Turkey to implement the online

activities. The problem-based online learning environment was designed for “What Do We Know about Petitions?” unit of “Turkish II” course, which aims to improve students’ knowledge and skills regarding the effective use of Turkish language in written form. The problem scenario and the activities related to the course were developed by the authors. Implementation of the online course took one week. Details regarding the design and procedure are provided below.



Figure 2. The presentation of a rejected petition

Problem context and representation

Learning process began with the presentation of a petition that was rejected by Distance Education Center of the university (Figure 2). The rejection of petition (or its having led to no action or results) made it an authentic problem, and the target group was tried to be motivated by selecting a problem that they experience in their lives. The author asked the learners to examine the sample petition and determine the reasons for its rejection.

Guiding questions

The learners were provided with specific guiding questions regarding form, expression and content of the petition. This helped them to take a closer look at the problem.

After the students analyzed the petition in framework of guiding questions and became mentally prepared some caricatures were presented to strengthen the connection between real life and the problem and to make it more interesting as figure 3 shows.



Figure 3. A caricature to make writing petition more interesting

Later, the right of petition was discussed to answer student questions such as “Why should I write a petition?” and to let every individual discover their own reason.

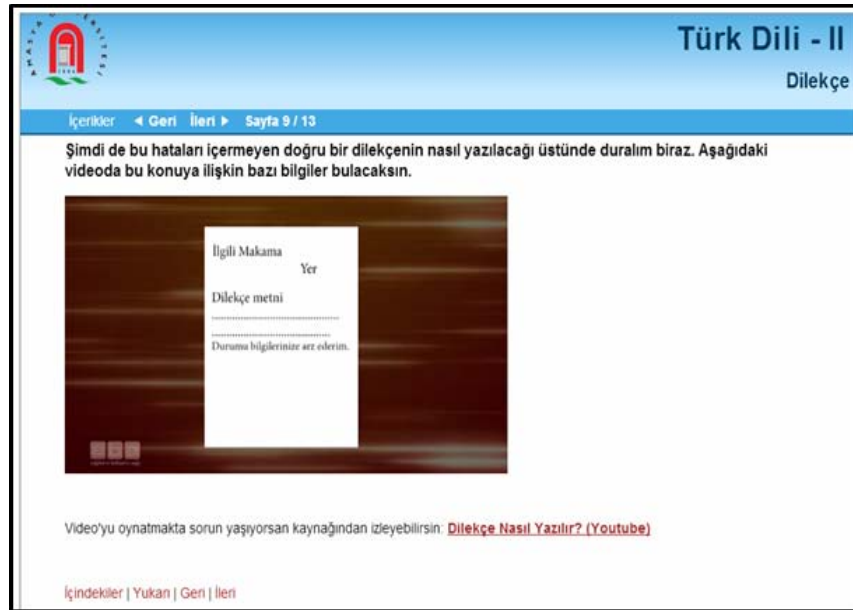


Figure 4. A video as an information resource

Information resources

The study also included the use of the learning materials shown in Figure 4. The information resources were text files that included the information necessary for the process of petition writing, graphics, videos and web documents. Learners were given a flexible structure so that they could progress according to their own learning preferences.

Collaboration tools

The forum tool was activated to create collaboration and enhance dialogue among the students. Students were asked to share sample petitions on the forum as a performance task and to give feedback to each other.

Teacher support

Students' petition writing process was continuously monitored by the teacher. Students were given guiding suggestions rather than correcting remarks, and they were assisted with rethinking the issues. This gave them a foundation to create their subjective meanings.

Self-Evaluation

Finally, the students filled out a self-evaluation form at the end of the process. They were asked to evaluate their own learning. Its aim was to determine whether the expected learning outcomes were obtained.

Data Collection Tools

The data collection tools used in this study are the performance task evaluation form (for the sample petitions that students were asked to provide at the end of the activities) and the self-evaluation form.

Performance Task Evaluation Form

It was created to evaluate the sample petitions shared on the online forum (the forum was developed to measure the effect of the problem-based online course on learning). This form is a tool that consists of three main constructs. They are form, expression and content. Form includes proper use of date, signature, name and surname. Expression includes the difference between submission and request, excluding phrases such as “I would like to” and “it is necessary that...”, using terms of address that are suitable for the administrative structure and avoiding unnecessary details and personal information. Content includes introducing oneself, declaring the reason for writing the petition and providing accurate information about the motives for the petition. All researchers in the current study were involved in the development process of the form to ensure its construct validity.

Self-evaluation Form

This form was created to enable students evaluate themselves after the activities in the unit “What Do We Know about Petitions?” in the “Turkish II” course. It has two items:

- To what degree did you learn about writing a petition in this environment? How confident are you about writing a petition?
- What score do you give yourself on a scale of 10?

Data Analysis

For the assessment of the self-evaluation form, conducted content analysis of the data. First of all, created codes of students’ answers considering the intentions of each student. These codes were arranged in order starting with the most frequent towards the least. Then they were tabulated. The sample petitions were assessed and scored using the criteria in the Performance Task Evaluation Form.

FINDINGS AND INTERPRETATION

An Analysis of the Effects of the Problem-based Online Course on Learning

As part of the sub-problem, the teacher evaluated the students’ work at the end of the course. Students wrote petitions since it was required by the curriculum. The researcher assessed these petitions based on the aspects that a petition should include as in Performance Task Evaluation Form. The petitions were given scores on a scale of ten. Scores between 8 and 10 were high scores. Scores between 5 and 7 were intermediate, and scores between 1 and 4 were low scores. The values acquired by scoring 187 petitions that were shared in the online learning environment are shown in Table 2.

Table 2. Categorized scores given to written petitions.

| Degree | n | % |
|--------------|-----|-------|
| High | 146 | 78,07 |
| Intermediate | 37 | 19,80 |
| Low | 4 | 2,13 |
| Total | 187 | 100 |

Table 2 indicates that 78.07% of students obtained high scores for their petitions, while 19.80% obtained an intermediate scores, and 4 students obtained low scores. At first glance, these findings indicate that the online learning environment has a positive influence on learning, and that students learned how to write a petition. However, it is not possible to determine the extent that the problem-based online learning environment influences the observed performance since there are no systematic data for students’ pre-research performances. On the other hand, the author thought that the self-evaluation data (the next sub-problem) might help explain the findings of this study in relation to the online learning environment.

An Analysis of the Effects of the Problem-based Online Course on Students’ Confidence

In this sub-problem, students did a self-evaluation of their learning in the problem-based online learning environment. The students were asked how much they learned about writing a petition, how confident they were about this issue and their weaknesses about it. The self-evaluation form also asked students to score their own learning on a scale of 10. This scoring was based on all their learning in the online learning environment. The data acquired by this scoring were categorized using the same intervals used by the teacher’s evaluation of the students’ work. The findings were tabulated and are explained below.

Table 3. How much did you learn about writing petition?

| Degree | n | % |
|-----------|----|-------|
| Very well | 25 | 35,71 |
| Enough | 41 | 58,57 |
| Poor | 4 | 5,71 |
| Total | 70 | 100 |

Table 4. Do you feel confident in writing petition?

| Degree | n | % |
|--------|----|-------|
| Yes | 54 | 91,53 |
| Weak | 3 | 5,08 |
| No | 2 | 3,39 |
| Total | 59 | 100 |

Table 5. Categorized scores the students gave themselves

| Degree | n | % |
|--------------|-----|-------|
| High | 197 | 84,19 |
| Intermediate | 30 | 12,82 |
| Low | 3 | 1,28 |
| Total | 230 | 100 |

An analysis of Table 3 shows that 35.71% of students said they learned to write a petition in the problem-based learning environment very well, and 58.57% of them said they learned enough. Only 5.71% said that they did not learn much about writing a petition in the problem-based online learning environment.

An analysis of Table 4 indicates that a high percentage of students (91.53%) responded affirmatively to the question “Are you confident about petition writing?” Three students (5.08%) said, “Not very confident,” and two students (3.39%) said, “No,” in response to this question.

Here are some the participants’ responses to the questions in Tables 3 and 4:

The student with the code name “STU20” said: “Now I can write a totally correct petition all by myself. I am very confident about petition writing. I used to have doubts about the places of date and address, but I don’t anymore.”

“STU127” said: “I learned how to submit a request to government agencies. I am confident about petition writing. While I was writing it, I noticed that I did not know enough about the agencies’ names.”

“STU87” said: “A relative of mine had some things to do at the bank, and he needed to write a petition to the bank. He asked me for help. If he had asked before, I would not have been able to help. But this time, I wrote it in just a minute. I was able to do it without asking someone else.”

However, the student with the code name STU26 said “I cannot say that I learned much about petition writing in this environment. I am usually not very confident, and I am not very confident about writing a petition, too. My weakness is that the difference between request and submission is not very clear to me. Besides, I sometimes give unnecessary details.”

Table 5 indicates that 84.19% of students gave themselves a score of 8 and above, while 12.82% gave themselves scores between 5 and 7, and 1.28% gave themselves scores between 1 and 4. These values are quite close to the values given by the teacher.

A total analysis of the findings indicate that the majority of the participants learned from the course in the online environment and became more confident about the subject. Of the students, 94.28% thought that they had learned enough about petition writing (Table 3), 91.5% said that they were confident about this subject (Table 4) and 84.19% gave themselves a score of 8 and above (Table 5). These findings are regarded as a positive outcome for problem-based online learning. They also allow for positive thinking about the effect of the online learning environment on learning that was discussed in the previous sub-problem.

CONCLUSION AND IMPLICATIONS

This study designed a problem-based online learning environment and analyzed its effectiveness. The environment was developed using the constructivist nature of problem-based learning and the constructivist learning design model proposed by Jonassen (1999). The environment aimed to answers the needs of learners and enable them to achieve permanent learning. The researcher employed the learning management system that was already included in the current distance learning program to avoid an extra workload for the learners. Accordingly, the author selected the “Turkish II” course and its unit “What Do We Know about Petitions?” in the distance learning curriculum of a national university. The online environment was created for these lessons, and was made available to the students for one week.

The study employed both instructor evaluation, self-evaluation methods and students’ learning were both analyzed. With this purpose, first the instructor was evaluated and then the researcher gave scores to the petitions that students wrote based on the features that a petition should include. The students were grouped in three categories based on their scores. Scores between 8 and 10 points were high scores. Scores between 5 and 7

points were intermediate, and scores between 1 and 4 points were low scores. Students were also asked to evaluate their own learning on a scale of 10, and these values were categorized in the same way as the teacher evaluation.

The research outcomes indicate that the majority of students (78.07%) had high achievement in petition writing. Before interpreting the outcome in favor of the online learning environment, the researcher asked the students two questions: “How much did you learn about petition writing in this environment?” and “Are you confident about petition writing?” The results indicate that 94.28% of students thought that they had enough knowledge about petition writing, and 91.53% were confident about this subject. Along with this, students were asked to give scores to themselves on a scale of 10, and 84.19% gave themselves 8 points or more. A comprehensive analysis of the acquired outcomes shows that the problem-based online learning environment has the potential to contribute both to learning and their confidence. The outcomes of the studies conducted by Tsai, Lin and Shen (2013), Karadeniz-Bayrak and Bayram (2012), Günbatar and Çavuş (2011), Gürsul and Keser (2009) and Gürsul (2008) support the notion that problem-based learning has a positive influence on learning.

The researcher noticed that there were differences between the numbers of participants before and after the research. Possible reasons for this include the lack of a criterion for students’ access to the components of the problem-based learning and participant dropouts during the process of learning. Since online environments have a dynamic and flexible structure, it is easier for students to leave them. This reduces students’ participation in tasks and activities. In the development of the online learning environment, the links between pages can be structured more effectively, and data from students who left without completing the unit can be excluded from the study after analyzing the log records in order to prevent problems originated from dynamic and flexible structure of online environments. This reduces the gap between the numbers of students who participated in tasks and activities.

Another limitation was the lack of a strong collaboration between the students. Although the participants shared the petitions they had written with the other students, they did not provide enough feedback to each other, which resulted in weak communication between them. Ge, Planas and Er (2010) revealed that students’ reading of their peers’ solutions to the problems is not an effective strategy to foster their problem solving process, and they recommend that they should interact with each other by giving feedback and suggestions and discussing meanings. In this study, the lack of collaboration might have resulted from time limitations since the entire process was completed in one week. For this reason, it is suggested that researchers choose problems that direct students to do more collaboration and choose activities that increase interaction between students.

One of the main limitations of this study is not determined prequalification. Forthcoming studies be conducted using experimental methods involving pre-test and post-test in order to ensure that learning was resulted from online learning environment. Moreover, future studies can monitor students’ interactions in online environment through log records of the learning management system to reveal engagement duration of each student, and it can be compared to that in previous weeks when traditional teaching methods were used. In this way, it will be possible to see effects of problem-based learning on student engagement in online learning environments.

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Digital Tools: Enhancing Painting Skills among Malaysian Secondary School Students

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ABSTRACT

Digital tools refer to software applications in the production of artworks particularly in painting. Digital art work is materialized by using computers, software and a combination of computer peripherals such as tablet support. With the aid of electronic equipment, digital artists manipulate pixels or coloring with light to compose the work and traditional artists manipulate paint or ink as a medium for the same purpose. This study seeks to explore the construction of painting using digital media in four aspects of productive dimension, namely: composition, color manipulation, interpretation and creativity. Moreover, this study aims at examining to what extent digital tools can assist in building painting skills among secondary school students in Malaysia. The group's production of two painting types, digital and conventional was analyzed to determine the effects of treatments on students' skills. Findings show that students construct better paintings, both digital and conventional paintings, upon their mastery of the digital media. This implies that digital media may be an effective means to help students improve their skills in both conventional and digital painting.

INTRODUCTION

Painting is a main form in the visual arts. Traditionally, paintings are prepared by applying paint pigment onto the surface of the canvas using various painting techniques. The paint strokes effects on canvas can be seen through the direct process. The development of a painting is not only associated with the use and experimentation of various techniques, but also the application of various materials or non-conventional media such as computers. Painting using the computer as a medium is known as digital painting.

Digital painting is a generating painting created using a computer. Digital painting is processed electronically using paint software. The processing output is displayed on the screen. It looks like a conventional painting that uses tools such as pencil, pen or brush. All these painting tools are found in the paint software. More and more visual artists today who tend to make the computer not only as a tool to draw, but also as new media that can generate an attractive visual art through the presentation, editing and exploring various ways of arrangement for art works (Hearn & Baker, 1997; Lewis, 1984).

In the visual arts traditional methods, the artwork is produced using the media directly on a support material. A painting produced when a pigment is processed directly on the canvas, which was prepared in a certain size. Displayed oil paintings have the same dimension either at the exhibition hall or in the studio. Pigment remains on the canvas, but only slightly different colors depending on the time and the lighting around the perimeter. This differs from digital painting designed or prepared using a computer. The production process occurs on one computer only. While the final works may be displayed through projection system that transmits images through a monitor or projector. The end product can also be displayed on different output and medium such as printed matters or video (Prater, 2001; Wilson, 1986).

The computer monitor is like a canvas during the process of art production. The size of the work depends on the size of the monitor that is calculated based on the number of pixels, unlike the works on canvas that are measured using the metric or imperial units. While in terms of color, the hue seen on the monitor may be different when transferred to other display medium because of different concentrations. Due to its digital form, it can be stored as files. Digital painting file size are usually large and require large storage space. Like traditional painting, the process usually involves the creation of a long experimentation and evolution of artists' ideas (Wong, 2005).

Gooch, Coombe, and Shirley (2007) noted the digital art painting depends on representation and abstract value. In the process of painting production, two basic tasks must be done by a painter. The first aspect is the creation of brush strokes position, and the second is the brush strokes display. If the brush strokes position is manually created by the artist, it is a program of classical painting. If the brush strokes position is by computer algorithm counting, it is a digital painting system (Gooch et al., 2007).

The application of digital coloring technique allows the artist to create brush strokes on the surface of another image. In fact, the image source can also be blurred. The background painting can be manipulated to obtain a more artistic effect. This technique allows the paintings to be constructed in layers. Painting special effects such as various brushes, color mixture between layers and strokes joining is also possible. Blending is used to simulate the color in varying degrees of opacity.

Technology exploitation without obstacles or medium limitations can lead to creative invention. Raimes (2006) recognizes that the computer is now equipped with an impressive level of processing power, screen capability of displaying billions of colors and a high resolution printer. This enables economical price of color images production. This situation allows anyone to become a digital artist. Digital art as a new media is reinforced by the existence of the internet. This means that the digital art production process is not only convenient, but also facilitates the end product dissemination. It provides an opportunity for artists to exhibit their work to a global audience immediately. These factors make the software and the internet as a primary source for those interested in digital art (Wands, 2001).

Do Digital Tools Enhance Painting Skills Among Secondary School Student In Malaysia?

The School Inspectorate of the Ministry of Education found that students are unable to apply theory in practical activities, especially in producing creative and innovative art. Students were found to be less able to exploit the senses in interaction with the environment and materials. This affects the development of visual perception and imagination to produce art works that are creative and innovative. Beside less creative, the report shows the students are unable to make a critical interpretation (Hassan Sulaiman, 2000). Producing painting requires the compositions skills such as sketching, drawing and coloring. The report found that Malaysian students are not proficient in those skills.

The question is whether students are willing and able to produce paintings using software and digital equipment? To what extent are students able to master the tools and digital medium in their paintings? The problem is, does digital equipment help to improve cognitive and psychomotor skills in the production of either conventional or digital painting?

In this context do digital art equipment help to improve cognitive and psychomotor skills of students in producing conventional painting. Fine art design requires the use of brush strokes movement, drawing and coloring tools spontaneously (McNaughton, 2006). This process requires students to master use of drawing and coloring tools, especially when making brush strokes with wet color.

The shape size in painting display is important. Shape composition is a significant problem among students. Students cannot compose it, especially on the canvas area itself. One example is when a rat behind is larger than a cat in front (Ashcraft, 1989). The description refers to the mind or visual imagery. The composition process is to collect and create the images in painting. To create a still life or landscape students need to arrange the setting in which subjects are to be drawn, choose the background, color and lay out the lighting as required. This process continues to the determination of the space in placing the subject, the size of the subject in space and how much emphasis should be given to the different elements (Betti & Sale, 1980; Monahan, Seligman & Clouse, 2004; Smith, 1996).

The sketch composition process is the first step in painting. Composition is the process of arranging different elements of subject on paper. Focal points will be concentrated in key areas. The most important thing in determining the composition idea is the point of view, how many subjects to be included and the overall shape appearance. The whole process requires a lot of small sketches and showing an overall arrangement for each view. The final selection of compositions will be redrawn on larger paper and be more detailed. The shape and painting size is an important component in the image composition. It refers to the position either vertical or horizontal. In this context, students have difficulty in making a lot of experimentation of the early compositions and find it difficult to determine the beginning. Conventional painting clearly has to follow the chronological order and is a difficult task for students (Betti & Sale, 1980; Monahan et al., 2004).

Painting requires technical skills because the end product cannot be expected. Skills start from the first step of a simple single color to the wet in wet washes technique. Success depends on the skill and bold attempt with brush

and paint colors through manual dexterity and hand-eye coordination. Individuals need sufficient knowledge and skills to produce a painting. Watercolor painting for instance has a bright translucent color, moist and appealing, but no doubt it is a medium that is quite difficult to master (Gair, 1996; Smith, 1999).

Failing in doing painting resulted in much crumpled drawing paper. Watercolor washes technique uses a lot of water content. Color applications are built on paper using one by one wash layers. However, to get a certain effect and prevent colors from being mixed and become stagnant murky color, the painting should be left in one period to enable it to dry between the washes process. This turned out to consume time for each round even though watercolor painting technique is said to be fast (Balldinger, 1960).

To master conventional painting, a lot of paper is required to make the exercise repeatedly. This clearly shows the end product of watercolor paintings cannot be expected or projected. Students should have the ability to control this medium and abide by the accidental combined effects. Large amounts of water are required either for mixing colors or cleaning brushes. Brushes should be washed between each color application on paper. If a little color left on the brush, it will affect the purity of other colors (Gair, 1996, 2004).

Wash technique applications depends on the numbers of colors mixing. If not the work continuity will be affected halfway and students need to stop coloring and need to re- mix the colors. It is difficult to get the proper intensity and color tone similar to the previous one (Balldinger, 1960). Therefore, students need to be proficient to control this medium as well as having sufficient knowledge related to pigment.

Pigments also tend to leave granular effect on the paper surface. The conventional painting washes layering technique only allows a stroke of dark colors on bright colors only. The concept of a watercolor painting is an application of brightest colors followed by darker tones (Distefano, 1999). Another problem is to produce faded colors tone. Lower color tone or faded tone is obtained by adding water to the pigment. Another problem in watercolor is the loss of white, especially when the entire paper has been colored and it is impossible to get back the white background. Thus the white area must be reserved before coloring. This means that there must be proper planning at the early stage (Distefano, 1999). Fortunately, use of other media such as digital application allows white color to be placed at the end of the process. It can also be placed spontaneously without planning. But this cannot be done when using watercolors.

Water color medium is water and liquid pigments and it takes time to dry. Therefore to get the absolute white is quite difficult. A high level of liquid pigment stain is very difficult to remove once the stroke has been put on paper (Monahan, 2004; Monahan et al, 2004; Wyeth, 1958). Watercolor painting is said to be a miracle in itself. This leads to the belief or assumption among those who are not familiar or skilled that the medium is only for those who are trained, talented or skilled in this difficult medium (Monahan et al, 2004).

Based on the problems described, it is necessary to do a study to assess to what extent digital software equipment can be applied as an alternative to painting equipment among secondary school students. Drawing software in computer graphics store coloring category in bitmap and vector data. Photoshop files contain both bitmap and vector data. One should understand the difference between these two categories in order to help the process of design and editing digital painting. Bitmap image or technically called raster images use colors grid known as pixels to display the image. Each pixel is provided with location and a specific color value. When working with bitmap images, amendment will be carried out on the pixels and not the entire object or shape (Junger& Mutzel, 2004).

The important issue in bitmap image is the resolution or the pixels number that make up the image. Pixels is a color grid to display the image. It is a dot that is used to produce a variety of image element intensity in the process of creating the bright and dark shadows. Pixel is abbreviation for picture elements. Pixel data of the image can be measured and displayed. With bright colors, clean lines, fine details, pixels art is a contemporary illustration technique. (Adobe Systems Incorporated, 2002; Burns, 2001 Raimes, 2006; Wong, 2006).

Bitmap image is the most common electronic medium for continuous tone images such as digital painting and photography. Bitmap images are capable of displaying the gradation of subtle colored, smooth and subtle aspects of light and dark shading and coloring. Bitmap images contain a fixed number of pixels. Thus details can be lost or appear jagged when the scale is magnified on the screen or printed in a lower resolution than the original design (Adobe Systems Incorporated, 2002; Foley et al., 1993).

Bitmap and vector software applications are equally important to the digital artist. Understanding the operation beside mixing and matching existing techniques allow the exploitation of full potential of digital creativity. A

bitmap pixel is so fine that it does not appear rectangular; instead it appears in a continuous color tone resulting from millions of pixels color. When using bitmap applications, the artwork will be made on the screen as painting application on paper or on canvas painting using various tools such as brushes and pencils (Adobe Systems Incorporated, 2002; Burg, 2009; Wong, 2006).

Professional software such as Photoshop include a large number of additional controls that allow various aspects including image manipulation, color, texture and variety of filter effects. A single pixel or a whole section can be copied or removed using the eraser. Bitmap application has two basic elements: layer and mask. Mask allows changes of selected areas on the artwork without affecting other areas. Layers allow independent element manipulation. Layers is tiered according to the instruction and can have different transparency or blending mode application. Layers can be copied, duplicated, and can be removed if not needed (Seegmiller, 2007).

PURPOSE OF THE STUDY

This research aims to look to which extent Adobe Photoshop digital tools can assist student as a painting medium. The main goal is to identifying students' ability in producing painting using the digital medium. The feasibility of this digital equipment is viewed from the end output which is the painting produced. In this context four aspects studied: composition, color, interpretation, and creativity in painting.

Major focus of this study is also to examine whether a group of low or moderate category student is a factor of achievement variances in painting production. In addition it is also to examine achievement differences before and after using the digital equipment. All variances are seen from four aspects, namely composition, color processing, interpretation and creativity among students.

OBJECTIVES

This research is guided by the following objectives:

1. To examine digital painting production in four aspects of composition, color processing, interpretation and creativity between the low and moderate category student.
2. To examine conventional painting production in four aspects of composition, color processing, interpretation and creativity between the low and moderate category student.
- 3.

METHODOLOGY

The research design used is quasi-experimental design with one group pre-test post-test design. Quasi-experimental emphasis on experiments that have treatments, the production measurement and experimental units but did not use random selection to form a comparison. The comparison depend on the different groups which are not similar to each other in various aspects. The impact of a given treatment will be tested (Cook & Campbell, 1979; Creswell, 2008).

In this group, the sample will be divided into low and moderate achievers groups. This design uses a treatment group of intact group to study the effect of independent variables (Stanley & Campbell, 1966). Quasi-experimental design is appropriate under the circumstances to prevent the presence of complications or completely experimental control. The school administration may not want any interference with the intact group or group distribution to form random groups or equivalent samples (Tuckman, 1999).

The study to be carried out requires a sample of all students in a class. Students in this class undergo treatment in manipulating Adobe Photoshop as a digital painting medium. Creswell (2008) states that assigning students randomly into two groups can disrupt the learning process in the classroom. Thus the total sample selection of a class is appropriate to carry out this research. This design actually involves observations and measurements within a period of time before and after treatment. The samples will undergo treatment with two observations (Cook & Campbell, 1997).

The independent variable in this study is a digital painting application that uses Adobe Photoshop to produce a painting. Application leads to visual arts knowledge in general and mainly in painting. The use of software cover the know-how in computing and Adobe Photoshop software applications. The dependent variable is the students' performance in the conventional and digital painting production using test scores. Testing focuses on the composition aspect, color, interpretation and creativity in producing of paintings, and is measured by the scale interval. The study aims to study the changes and analyze the group performance.

Before starting intervention the treatment sample will sit for a test in which they have to produce conventional and digital painting. Students are given a stimulus such as an illustration or photograph. They are required to produce a painting based on that stimulus. The data obtained from this test is regarded as the pre test score. After

sitting for a pre-test, the sample will be given treatment that is learning how to use digital tools in producing paintings. In this context, students will manipulate Adobe Photoshop as a tool of painting.

To study the changes caused by the independent variable, the sample would sit for post-test after completing the treatment. Post-test requires students to produce a conventional and digital painting base on stimulus images provided.

The image stimulus of the pre and post-test is different but the same theme is given which is landscape. All the participants are required to apply the principle of fine arts in painting production. Elements of art and design principles are the basic and core elements in paintings production. Scores from this test series will be studied to determine the statistical differences between independent variables and the dependent variable.

SAMPLE SELECTION

The subjects consisted of 53 students from two classes. They consisted of social science students taking Visual Art Education subject. Basic selection of 53 students is to avoid mortality while increasing the reliability and validity of the study. The selected students are from the same age group from social science stream but from different schools. They are a homogeneous group of students. The students also study visual art since grade one, and it is an ongoing process until form four. This study was carried out at the Bukit Changgang Secondary School, Kuala Langat, Selangor and Sungai Pelek Secondary School, Sepang, Selangor.

A measurement tool was used to assess the painting is based on theory of art elements and principles of design. Evaluation criteria focus on the composition element, color, interpretation and creativity. This includes the scoring in artwork from pre-test and post-test. It covers conventional painting and digital painting using computer software. The conventional painting artworks were made using drawing paper and tools while digital painting artworks were based on computer application and printout.

The study was conducted on 53 students (low achievers group, n = 24; group of moderate achievers, n = 29) selected from the intact group.

Table 1: *Sample According to Performance*

| | | Value Label | N |
|-----------------|---|-------------|----|
| Group Achievers | 1 | Low | 24 |
| | 2 | Moderate | 29 |

DATA ANALYSIS

Descriptive statistics were used to distinguish the mean scores in comparison between digital and conventional painting. In this study, there is one independent variable (group) and four dependent variables of composition, color manipulation, interpretation and creativity.

RESEARCH QUESTIONS

The following research questions are presented as a guide to address the objectives of the study and data interpretation:

1. Are there any developments in student digital painting in four aspects of composition, color processing, interpretation and creativity between the low and moderate category students after the treatment?
2. Are there any developments in student conventional painting in four aspects of composition, color processing, interpretation and creativity between the low and moderate category students after the treatment?

Research question 1 - Are there any developments in student digital painting in four aspects of composition, color processing, interpretation and creativity between the low and moderate category students after the treatment?

The following Table 2 gives the pre-test results for digital painting of the sample.

Table 2 : *Pre-test Descriptive Statistic for Digital Painting*

| Digital Painting Pre Test | Group | Mean | Std. Deviation | N |
|---------------------------|----------|------|----------------|----|
| Composition | low | 7.00 | 1.911 | 24 |
| | Moderate | 9.14 | 1.620 | 29 |
| | Total | 8.17 | 2.045 | 53 |
| Color | low | 6.75 | 1.847 | 24 |

| | | | | |
|----------------|----------|------|-------|----|
| | Moderate | 9.03 | 1.592 | 29 |
| | Total | 8.00 | 2.048 | 53 |
| | low | 4.08 | 1.018 | 24 |
| Interpretation | Moderate | 5.28 | .960 | 29 |
| | Total | 4.74 | 1.146 | 53 |
| | low | 4.13 | 1.076 | 24 |
| Creativity | Moderate | 5.14 | .789 | 29 |
| | Total | 4.68 | 1.052 | 53 |

Descriptivestatistics displayed in Table 2 show the different mean between the low and moderate groups in the pre-test. For composition aspect the low achievement group mean was 7.00 (9.14 for the moderate group). In terms of coloring skills, the low group had a mean of 6.75, while the moderate group had 9.03. For interpretation, the low group showed a mean of 4.08, and moderate group 5.28. For creativity, the low group had a mean of 4.13, while the moderate group recorded a mean of 5.14. Before the treatment given, both groups showed significant differences in achievement. The moderate group showed higher achievement than the low achievers group.

Post-test Descriptive Statistics for Digital Painting

Table 3 gives the post-test results of the sample for digital painting. The descriptive statistics of post test digital painting (Table 3) shows a small difference for four aspects of the mean value. In terms of composition the low achievers group had a mean of 9.00 while the moderate group had a mean score of 10:00.

Table 3 : Descriptive Statistics for Post Test Results for Digital Painting

| | Group | Mean | Std. Deviation | N |
|----------------|----------|-------|----------------|----|
| Composition | low | 9.00 | 2.187 | 24 |
| | Moderate | 10.00 | 1.871 | 29 |
| | Total | 9.55 | 2.062 | 53 |
| Color | low | 9.08 | 2.358 | 24 |
| | Moderate | 10.24 | 2.081 | 29 |
| | Total | 9.72 | 2.265 | 53 |
| Interpretation | low | 5.58 | 1.442 | 24 |
| | Moderate | 6.14 | 1.356 | 29 |
| | Total | 5.89 | 1.410 | 53 |
| Creativity | low | 5.62 | 1.469 | 24 |
| | Moderate | 6.00 | 1.254 | 29 |
| | Total | 5.83 | 1.355 | 53 |

In terms of coloring skills, the low achiever group had a mean of 9.08, while the moderate group recorded 10,24. For interpretation, the low group showed the mean of 5.58, while the moderate group got 6.14. For creativity, the low group had a mean of 5.62 and the moderate group recorded the mean of 6:00. These results show that, after the treatment given, the moderate group recorded higher achievement than the low achievers group.

Table 4 : The Comparison between Digital Painting in Pre-test and Post-test Scores

| Variables | Group | Mean Pre Test | Mean Post Test | N |
|----------------|----------|---------------|----------------|----|
| Composition | low | 7.00 | 9.00 | 24 |
| | Moderate | 9.14 | 10.00 | 29 |
| | Total | 8.17 | 9.55 | 53 |
| Color | low | 6.75 | 9.08 | 24 |
| | Moderate | 9.03 | 10.24 | 29 |
| | Total | 8.00 | 9.72 | 53 |
| Interpretation | low | 4.08 | 5.58 | 24 |
| | Moderate | 5.28 | 6.14 | 29 |
| | Total | 4.74 | 5.89 | 53 |
| Creativity | low | 4.13 | 5.62 | 24 |
| | Moderate | 5.14 | 6.00 | 29 |
| | Total | 4.68 | 5.83 | 53 |

The descriptive statistics of Table 4 show the mean differences between pre-test and post test within the group. The mean is higher in the post test for each value of the composition, color, interpretation and creativity. Both group shows an increasing mean during the post test. Overall, it showed a significant difference. Although in both pre-test and post-test, moderate group showed higher score, but the low achievers group score increased during the post-test. This indicates treatment in digital painting helps and improves the painting skills in all four aspects of composition, color, interpretation and creativity.

Research question 2 - Are there any development in student conventional painting in four aspects of composition, color processing, interpretation and creativity between the low and moderate category students after the treatment?

Table 5 shows the descriptive statistics of the different pre-test mean value for the composition, color, interpretation and creativity between low and moderate groups.

Table 5 : *Pre-test Descriptive Statistics for Conventional Painting*

| | Group | Mean | Std. Deviation | N |
|----------------|----------|------|----------------|----|
| Composition | low | 5.63 | 1.245 | 24 |
| | Moderate | 9.17 | 2.054 | 29 |
| Color | low | 5.38 | 1.279 | 24 |
| | Moderate | 9.38 | 1.990 | 29 |
| Interpretation | low | 3.50 | 1.285 | 24 |
| | Moderate | 6.34 | 1.396 | 29 |
| Creativity | low | 3.54 | 1.062 | 24 |
| | Moderate | 6.10 | 1.372 | 29 |

With reference to Table 5, the low achievers group scored a mean of 5.63 in composition, while the moderate group scores 9.17. In terms of coloring, the low group had mean score 5:38, while the moderate group scored 9:38. For the interpretation, the low group gets mean was 3:50 and 6:34 for the moderate group. And for creativity aspect, low group obtained a mean of 3:54, while the moderate group recorded a mean of 6.10. Overall, it showed a significant difference between these two groups.

Table 6 : *Post-test Descriptive Statistics for Conventional Painting*

| | Group | Mean | Std. Deviation | N |
|----------------|----------|------|----------------|----|
| Composition | low | 8.04 | 2.177 | 24 |
| | Moderate | 9.31 | 2.002 | 29 |
| Color | low | 7.96 | 2.312 | 24 |
| | Moderate | 9.48 | 2.011 | 29 |
| Interpretation | low | 4.92 | 1.213 | 24 |
| | Moderate | 5.41 | .907 | 29 |
| Creativity | low | 5.04 | 1.268 | 24 |
| | Moderate | 5.48 | .986 | 29 |

The descriptive statistical tables for the post test scores in conventional painting (Table 6) show a slight difference for the mean value of the four aspects. In terms of composition, the low achievement group gained mean 8.04 and moderate group had a mean of 9.31. In terms of coloring skills, low group had a mean of 7.96, while the moderate group scored 9.48. For interpretation, the low group showed a mean of 4.92, and moderate group 5.41. In creativity aspect, the low group obtained a mean of 5.04, and the moderate group recorded 5.48.

Table 7 : *The Pre-Test and Post-Test of Conventional Painting*

| | Group | Mean Pre Test | Mean Post Test | N |
|----------------|----------|---------------|----------------|----|
| Composition | low | 5.63 | 8.04 | 24 |
| | Moderate | 9.17 | 9.31 | 29 |
| Color | low | 5.38 | 7.96 | 24 |
| | Moderate | 9.38 | 9.48 | 29 |
| Interpretation | low | 3.50 | 4.92 | 24 |
| | Moderate | 6.34 | 5.41 | 29 |
| Creativity | low | 3.54 | 5.04 | 24 |
| | Moderate | 6.10 | 5.48 | 29 |

The descriptive statistics of Table 7 shows the mean differences in conventional painting between pre-test and post-test for both of low and moderate group achievers. The mean is higher in the post test for both groups. There is a slightly decrease for interpretation and creativity for the moderate achievers. Interpretation mean decreased from 6.34 to 5.41 while for creativity it decreased from 6.10 to 5.48. Overall, both group performances show an increasing mean during the post-test compared to pre-test.

Table 8 : Overall Pre-test and Post-test for Digital and Conventional Painting

| Variables | Digital Painting | | Conventional Painting | | N |
|----------------|------------------|----------------|-----------------------|----------------|----|
| | Mean Pre Test | Mean Post Test | Mean Pre Test | Mean Post Test | |
| Composition | 8.17 | 9.55 | 7.57 | 8.74 | 53 |
| Color | 8.00 | 9.72 | 7.57 | 8.79 | 53 |
| Interpretation | 4.74 | 5.89 | 5.06 | 5.19 | 53 |
| Creativity | 4.68 | 5.83 | 4.94 | 5.28 | 53 |

Table 8 shows that there was an increasing mean in post-test for both of digital and conventional painting over all of the variables.

Manova repeated measurements used to spot the differences between pre and post test. This analysis below was to assess the effectiveness of digital tools in bringing changes in the production of digital painting which cover the area of composition, color, interpretation and creativity among students. The results of Multivariate Pillai's Trace in Table 9 shows there is a significant major effect of the digital paintings independent variables [$F(4, 49) = 14.77, p < .05$]. This proves that there are significant differences in all independent variables of the pre-test and post-test.

Table 9 : Multivariate test of Digital Painting in Pre and Post-Test (N = 53)

| Effect | | Value | F | Hypothesis df | Error df | Sig. | |
|------------------|-----------|--------------------|--------|---------------|----------|--------|------|
| Between Subjects | Intercept | Pillai's Trace | .965 | 333.842b | 4.000 | 49.000 | .000 |
| | | Wilks' Lambda | .035 | 333.842b | 4.000 | 49.000 | .000 |
| | | Hotelling's Trace | 27.252 | 333.842b | 4.000 | 49.000 | .000 |
| | | Roy's Largest Root | 27.252 | 333.842b | 4.000 | 49.000 | .000 |
| Within Subjects | prapasca | Pillai's Trace | .547 | 14.771b | 4.000 | 49.000 | .000 |
| | | Wilks' Lambda | .453 | 14.771b | 4.000 | 49.000 | .000 |
| | | Hotelling's Trace | 1.206 | 14.771b | 4.000 | 49.000 | .000 |
| | | Roy's Largest Root | 1.206 | 14.771b | 4.000 | 49.000 | .000 |

Manova repeated measurements analysis also used to assess whether the application and the treatment of digital tools given effective in bringing changes in the production of conventional painting. This change is detected in terms of composition, use of color, interpretation and creativity among students.

The results of Multivariate Pillai's Trace in Table 10 shows there is a significant major effect of the conventional painting independent variables [$F(4, 49) = 4.95, p < .05$]. This proves that there are significant differences in all of the independent variables in the pre and post-test of the conventional painting.

Table 10 : Multivariate test of Conventional Painting in Pre and Post-Test (N = 53)

| Effect | | Value | F | Hypothesis df | Error df | Sig. | |
|------------------|-----------|--------------------|--------|---------------|----------|--------|------|
| Between Subjects | Intercept | Pillai's Trace | .955 | 261.963b | 4.000 | 49.000 | .000 |
| | | Wilks' Lambda | .045 | 261.963b | 4.000 | 49.000 | .000 |
| | | Hotelling's Trace | 21.385 | 261.963b | 4.000 | 49.000 | .000 |
| | | Roy's Largest Root | 21.385 | 261.963b | 4.000 | 49.000 | .000 |
| Within Subjects | prapasca | Pillai's Trace | .288 | 4.950b | 4.000 | 49.000 | .002 |
| | | Wilks' Lambda | .712 | 4.950b | 4.000 | 49.000 | .002 |
| | | Hotelling's Trace | .404 | 4.950b | 4.000 | 49.000 | .002 |
| | | Roy's Largest Root | .404 | 4.950b | 4.000 | 49.000 | .002 |

Thus digital tools application is effective in enhancing student ability in painting from the aspects of composition, color processing, interpretation and creativity. Basically there is a significant difference between the pre-test and post-test either in the digital painting or the conventional painting.

DISCUSSION

The statistics show that the digital painting treatment gave a positive impact in improving the skills of painting in both digital painting or conventional painting. Digital painting treatment is effective in increasing the skills of composition, coloring, interpretation and creativity. This is clear based on the comparison between the mean of the pre and post-test that proves the differences in mean after treatment for both conventional and digital painting.

Digital art learning is closely related to conventional painting learning. Weakness in producing conventional painting will affect the results of the work in digital painting. Digital art is inseparable from the art fundamental elements, aesthetic value and design. Teaching and learning digital art requires both using art and science perspective. Both must be integrated to get a clear understanding of the principles of art and skill that can help generate digital art as well as understand the scientific concepts in digital technology.

Human perception also helps in manufacturing quality technical work (Wong, 2005). Digital painting requires knowledge in science, especially physics, for example to understand wavelengths and light elements as well as coloring. Learning and producing digital painting can enhance the student's knowledge in science and technology aspects (Arnston, 2006).

CONCLUSION

Digital equipment in painting is a relatively new exploration and exciting field from the practical point of view. Digital canvas is a manual attempt at using the software and becoming a digital artist. It is not a genre that denies conventional art. Digital Canvas is systematic artwork exploration using the pixel and vector painting in forming a line, color as well as modifying and manipulating form (Raimes, 2006).

It is simple, attractive and practical, easy to reach and sophisticated creative medium and arbitrarily manipulated through inspiration and imagination. This does not mean conventional painting is replaced by digital art but rather something contemporary will be created featuring the latest designs. Indeed, with time, work and artistic expression are constantly developing (Wands, 2001).

Digital painting production enables the students in interdisciplinary nature such as technical training and digital art. Being an artist and knowing how to use graphics package itself is not enough. A computer science background is a necessity (Davis & Gibbs, 2006). Instructional technology applications in producing digital paintings in secondary schools are expected to be an alternative or variation to the conventional or traditional painting.

Applying contemporary technologies to fulfill the needs and requirements and using digital equipment is essential. Developed countries like Japan put arts education based on production. The emerging technologies turned out to fix the country's future art education. According to Motomura (2003), the expression of image media has entered the school curriculum in Japan. Therefore digital art exposure at Malaysian secondary school level could provide our students with an early start and opportunities for them to explore their future career in digital art

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Establishing a Framework on OER Practices for ICT Competence of Disabled Citizens

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ABSTRACT

The research encapsulates the framework on potential contributions of OER practices for supporting the ICT competence for disabled adult learners in building equal opportunities within the society. The study underlined the developing OER policy and framework to focus on digital citizenship competency for disabled adult learners. OER practices can promote the construction of digital societies which disabled citizens also need ICT and digital literacy to access, social inclusion, and participation. Significantly, developing OER policy in the area of vocational and professional knowledge promotes fostering ICT competence in order to enhance the quality of access and participation. Although the researches and projects are highlighted on OER practices and policies, this study become a debate on establishing OER practice and framework for supporting ICT competence and digital literacy for disabled learners. The study covers documentary analysis on real practices and research projects in developing country for creating a framework upon the needs of expectations and needs of disabled citizens to create access, social inclusion, participation to society and education for the collaboration. Further to this, this study encapsulates the evaluation of higher education institutions upon this scope.

Keywords: Access, Digital Competence, Disability, Social Inclusion, Participation

INTRODUCTION

Disabled citizens face challenges in various aspects of life in our country such as teaching-learning, accessibility, etc. Developing technology is at the point of being a solution for these problems. We, as the society, have a major duty in realizing these solutions. It is crucial for a family with disabled children to guide their child in the appropriate path based on the child's skills and abilities. This guidance will enable the disabled individual to adapt to social life and become a productive, confident individual. In both national and international studies conducted in the field, individuals are also considered as disabled due to not only their physical or mental illnesses but also chronic diseases. In other words, the term "disabled" represents a large population.

Therefore, it is difficult to define the term disability because disability can be a physical deprivation or lack as well as a social cultural, economic, psychological or any other reason. Hence, the concept of "disability" can be describe as a situation of "limitations" due to many other reasons other than physical deprivation (Dalbay, 2009). In this regard, "being disabled" serves a very different situation within society. Without a doubt, each individual is unique with his/her own characteristics. Thus, "being different is not something bad. It is this what makes an individual interesting yet" as soon as individual has difficulty in meeting the expectations of the society being different becomes a problem (Ataman, 2009).

The term disabled puts forward the obstacle for the individual rather than the problem rising from the individual. According to this, disability is an (external) situation/concept that results from environmental and societal

attitudes/preferences (Küçükaslan, 2013). On the other hand, Sürmen (2014) suggests that the word disabled is an external statement and is humiliating because it is used to estrange and isolate people. However, we believe that it is this reality suggested by the word itself that makes this group disadvantaged and makes it possible to change the reality. Other words with internal or objective meanings see the situation, not as a problem but rather a concept to be accepted (Swain, 1993; Shakespeare, 2006; Malhotra & Rowe, 2014).

According to the 1st article of the United Nations Rights of Disabled Citizens Agreement, the term disabled involves “people who can prevented from fully and actively participating in society with equal opportunities as other people due to long-term physical, cognitive, mental or perceptive disorder”. According to this, from the perspective of these people, the approach to disability from a medical model is being abandoned; it is acknowledged that disability is not caused by the individual but on the contrary, it is caused by negative external conditions (UN, 1945; WHO, 2012).

It is impossible to deny the existence of prejudices, negative and isolating, rejecting attitudes especially towards disabled individuals. Such attitudes are not experienced by the individuals within society but also by the families of disabled individuals. The factors that are sources of stress for families can be listed as follows: emotional challenges faced by families, not receiving sufficient information regarding the condition of their child, difficulty in explaining their child’s condition to other people, behavioural and health problems seen in the child due to his disability, lack of consulting with experts on treatment and education issues, efforts for trying to find a suitable educational setting, financial difficulties and most importantly, worry for the future of the disabled individual (Türker, 2011).

Fifteen percent of the world’s population is living with disabilities. Being disabled will become a bigger source of worry in the near future due to its rapid widespread. Populations getting old and higher risk of older people becoming disabled along with the global increase in health problems such as diabetes, coronary diseases, cancer and mental disorders are causes of increased disability (WHO, 2012). Accessibility is the door that enables disabled individuals to reach information on their own. Along with this, providing accessibility for disabled people to fully and effective benefit from websites results in the need for simpler, flexible and rapidly loading web designs (Foley and Regan, 1997).

In order to make web pages accessible, it is firstly, required to understand the needs of the disabled individuals. For example, blind people need the written captions of photos used in the websites as they can’t see the picture or photos. People with low visual ability experience problems with using the mouse because use of the mouse required coordination between hand and eyes. People with colour blindness cannot benefit from information that are solely expressed with colours or recognize red/green colours. People with hearing problems or those who are deaf need the written expression of the audio information used in the web sites. People with physical disabilities can experience problems with using the data input (mouse, keyboard, etc.) or data storage tools (CD drive, disc drive, etc.). People with learning difficulties need consistent/standard page designs and simple language use due to memory problems. Such people can also benefit more from web pages where audio and visual materials are used in the same setting. Accessibility means removing the obstacles that can prevent disabled people from participating in life events. Accessibility can put forwards results that are not beneficial only for disabled people but also others. For example, ramps on pavement did not only help those using wheelchairs but also led to ease for cyclists, and people with strollers or shopping carts. Similarly, designing computer software or web pages in accessible ways can result in benefits for larger audiences. Removing access obstacles is not no longer an option that is wished to be done; it started to become a legal must in many countries. For example, Section 508 of the USA Federal Rehabilitation Act requires public websites to meet pre-determined accessibility criteria (Çakmak, 2008).

The regulations that were put into practice in 1999 in Ireland, consist of comprehensive sections on preparing accessible public websites. In Denmark, needs if disabled individuals were also taken into consideration while shaping the information technology policy of the government. These efforts have been good indicators of how well the term involving disabled people in numerical economy is understood. Portugal, also, made following accessibility rules compulsory in governmental and public internet pages and thus, contributed to developing this understanding in many other European countries. Similarly, China, France, Japan, Portugal, Singapore and many other countries are increasing levels of awareness on the accessibility of information and make legal arrangements to provide equal opportunities for disabled citizens (Çakmak, 2008).

METHODOLOGY

Low accessibility and usability levels are seen as chronic problems of web sites (Ergün and Ergün, 2008). The web pages of the 12 universities in North Cyprus have been reviewed within accessibility. Their websites that

are published as of 25 December 2015 have been used. The number of errors that prevent the accessibility for disabled people have been determined based on the WCAG (Web Content Accessibility Guidelines) standards. Also, these guidelines consist of all types of disabilities, their levels and possible combinations and answers the needs of all disabled individuals. (Web Content Accessibility Guidelines -WCAG- 2.0, 2010). WCAG involves international standards that determine how web contents can become more accessible for disabled users.

WCAG does not only focus on removing obstacles for disabled people but also greatly contribute to web accessibility. WCAG standards aim the independent website accessibility with gadget, scanner or operation system independent web sites accessibility and their cooperative working together (Centeno, V., L., Kloos, C. D., Gaedke, M. and Nussbaume, M., 2005).

The report aims to reflect on rapid improvements on OE practices and its value as institutional policy for quality. The growing importance on equality for disabled learners in every aspects of education including informal and formal learning process, there is significant attention to emphasis on OE practices to show how openness and access is possible for those learners.

FINDINGS

The institutional websites of 12 universities have been tested via the open-source code Achecker (www.achecker.ca) tool developed by University of Toronto based on WCAG standards. Achecker is a widely set accessibility testing tool that has been cited in many studies (Smith, 2009, p. 5). This tool provides information for web developers on where the error is, what kind errors are there and how these errors can be fixed. A checker tool analyses accessibility errors under four categories as: “Known Problems”, “Similar Problems”, “Potential Problems” and “HTML Approval”.

Known problems: problems found by achecker and definitely block accessibility.

Similar problems: problems found by achecker checker and potentially block accessibility but are undecided. A person is required to make the decisions.

Potential problems: problems that cannot be clearly defined by achecker and require a person to decide whether it is a problem or not.

HTML Approval: it’s the process of reviewing after accessibility check. The appropriateness of the updates on the site are tested here. Based on this, the total number of mistakes of universities regarding “adaptation to internet site accessibility standards” are presented in Table 1.

Table 1. Test results for the universities’ websites error numbers

| University Code | Known Problems | Similar Problems | Potential Problems | Total Number of Errors |
|-----------------|----------------|------------------|--------------------|------------------------|
| University 1 | 11 | 3 | 547 | 561 |
| University 2 | 28 | 1 | 926 | 954 |
| University 3 | 26 | 3 | 864 | 893 |
| University 4 | 7 | 0 | 126 | 133 |
| University 5 | 30 | 0 | 300 | 330 |
| University 6 | 8 | 0 | 301 | 309 |
| University 7 | 18 | 2 | 230 | 250 |
| University 8 | 46 | 0 | 360 | 406 |
| University 9 | 98 | 1 | 369 | 468 |
| University 10 | 2 | 0 | 75 | 77 |
| University 11 | 463 | 10 | 380 | 853 |
| University 12 | 73 | 0 | 408 | 481 |

According to this, about “conformity to the internet site accessibility standards”, the following universities have the highest number of errors: University 2 with 954; University 3 with 893; University 11 with 853 (Table 1). According to Web Content Accessibility Guidelines -WCAG 2.0 (2008), the content accessed by a person who wishes to use the Web should be perceivable, operable, intelligible and robust. If any of these qualities are missing, the person will not be able to use the Web. Web Accessibility Evaluation Tool (<http://wave.webaim.org/>) was used to test to see whether university web sites provide the requirement for accessibility or not and the results are presented below.

Table 2. Error Distribution of University websites at the WCAG Principles Level (Reasonable Conformity Situation)

| | Perceptibility | Operability | Intelligibility | Robust |
|---------------|----------------|-------------|-----------------|--------|
| University 1 | 10 | 8 | 6 | 1 |
| University 2 | 16 | 11 | 8 | 1 |
| University 3 | 14 | 10 | 7 | 1 |
| University 4 | 11 | 8 | 6 | 1 |
| University 5 | 10 | 9 | 5 | 1 |
| University 6 | 12 | 8 | 6 | 1 |
| University 7 | 12 | 10 | 7 | 1 |
| University 8 | 13 | 8 | 6 | 1 |
| University 9 | 14 | 9 | 6 | 1 |
| University 10 | 10 | 8 | 5 | 1 |
| University 11 | 14 | 11 | 7 | 1 |
| University 12 | 13 | 9 | 7 | 1 |

It will help us in terms of preventing errors to know which indicators' success criteria do error distribution in principles is focused on. The four indicators on the Perceptibility principle are 1.1 Text Alternatives, 1.2 Time-Based Setting, 1.3 Adaptability and 1.4 Discernibility. Although the indicators within Perceptibility principle involve 22 success criteria the highest number of errors in our study was found to the 16 in University 2. Again, although, the four indicators of Operability principle (2.1 Access with keyboard, 2.2 Sufficient Time, 2.3 Pauses, 2.4 Surfable) involved 20 success criteria, the highest number of errors was found as 11 in University 2 and University 11. The three indicators of Perceptibility principle (3.1. Readability, 3.2 Foreseeable, 3.3 Input Aid) involved 17 success criteria and the highest number was 8 in University 2. The single indicators of Robust principle (4.1 Adaptable) and out of the two success criteria of this indicator, only 1 is seen in all universities.

CONCLUSION AND RECOMMENDATIONS

Technology enhanced learning environments discards the barriers for disabled learners. There are potential developments on researches about technology & disability which are crucial to have evidence based solutions and implications for the welfare and development of the disabled learners. In a knowledge society, sharing knowledge and creating collaboration among the learners in open education platform shows how technology fosters breaking down barriers in learning and sharing. Thus, open education platforms and practices provide access, additionally social inclusion and participation for the disabled learners. With the digitalization and improvements on digital education in enhancing learning and teaching; digital literacy and competences of digital citizenship become very significant that all learners and citizens need to be achieved. Growing impact of digital resources with the opportunity on access and openness become crucial indicator to put forwards to the quality in education. Open education resources in higher education practices, even in every level of the education system creates a path to equality and openness for the collaboration on sharing and learning as a sense of peer support and participation. Furthermore, involving to the open education and getting opportunity of education require internalisation of ICT competence to effectively use and implement. Therefore, gaining ICT competence and digital literacy become first step for the digital learners, especially for the disabled learners. Although open education resources and digital education foster openness and equality in learning and teaching at the same time for professional development; integrating into the life and learning process of the disabled learners is also significant debate that needs to be discussed. Upon this debate, social inclusion, participation could be enriched through open education resources. In this respect, compelling ICT and digital literacy need to be addressed in the learning and teaching process through OER practices.

Within a frame of equality and the openness in education, disabled learners and adults also need training on having ICT competence to reach open, accessible education for their social inclusion and participation. This study put forwards to establishing a framework of OER practices for ICT competence of disabled learners through theoretical and practical implications. In this respect, the goals and outcomes can be listed as following:

- to reflect OER practices for access, social inclusion and participation
- to underline technology & disability in knowledge society
- propose a framework on ICT competence of disabled citizens through OER practices

The rapid growth of the transformation of OER practices in every level of education is very apparent. Accessible, shareable digital resources make learning and teaching easier. Giving value to sense of collaboration and increasing the importance of social inclusion with the development of digitalization increase the attention on how to manage digital resources and how to use effectively in learning, teaching and professional development.

In this respect, rather than using technology managing technology in an efficient manner become much significant role in disabled learners for the welfare of the society. Significantly, OER practices become a path for the equal opportunity in education and also could be the alternative solution to enrich the professional learning of disabled learners in gaining ICT competence and digital literacy. The research projects and articles underlined and presented as regards the openness, access and quality strategy in the practices of OER. Significantly, ICT competence of disabled learners were reviewed upon real practices and researches to create a road map of the practices on disability & technology. Furthermore, the impact of OER practices and how those practices provide social inclusion and participation were revealed. In this respect, funded projects about increasing ICT competence and open education resources and those impacts on professional development and learning of disabled learners are the revealed. Upon the description of topics, the following statements summarize what studies and projects can cover for further implications:

- The road map of conducting research on OER practices
- The fostering ICT competence through technology based on real practices

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Even in E-Learning is Important to Do Your Own Notes!

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ABSTRACT

In the last decade is e-learning a standard part of the educational process at all types of schools - primary, secondary and high schools. When use e-learning can be achieved significant savings not only in terms of time as well as operating costs. However, e-learning is also often criticized. This is mainly due to direct absence of teachers. This is mainly due to direct absence of teachers (lack contact with him). This fact brings with it a range of following these problems, such as long response times in asking a question or impossibility to consult on specific issues. E-learning brings with it other, often - hidden problems, that in the traditional way of teaching we do not perceive. Since from year 2009 we try at to Department of Computer Science, Faculty of Natural Sciences, Constantine the Philosopher University in Nitra create modules for LMS Moodle, which could help students in organizing way of teaching process (module Interactive Element Stat, Module Emotion Recognition and others). The aim of the creation of modules is to support adaptivity in Moodle. Nowadays for the support of teaching process we designed and created module with a name Notes. The aim of this paper is to highlight the importance of creating their own notes in Moodle. The basic function of the newly created solution is to add comments to the study materials including highlighting text. The module allows users to edit notes, created and printed them together with study materials.

INTRODUCTION

In the 21st century, the ongoing technological development has had an impact on all parts of people's lives, including education. Especially the growth of the Internet – in its beginnings it was considered a revolution, later an evolution in education. With the evolution of mankind, the education evolves, too. New technologies intervening in our everyday lives bring also new forms of gaining and exchanging of knowledge. Information flow was transformed from spoken word to knowledge exchange by means of information technologies. Nowadays, realisation of distance learning at the same level as classical learning, eventually as its complement, is nothing exceptional. Acute necessity to widely apply distance form of education results mainly from the socio-economical phenomena related to providing access to the education for all members of information society being created in recent years. In developing countries, it represents a tool for elimination of secondary analphabetism caused by prolonging of man's life and faster ageing of his knowledge (Jusczyk, 2003).

Organization of the distance form of study is not an easy task. It can be quite complicated, especially regarding the communication or rather the instantaneousness and promptness of giving the feedback to the students. One of useful methods of increasing the effectiveness of the learning process and quality of students' results is integrating the on-line content and learning management system (Cápay et. al, 2011).

A typical example is the case of academic education. According to Drlík and Skalka (2011), e-learning has become an increasingly popular learning approach at universities due to the rapid growth of web-based technologies. E-learning implementation at universities is a long-lasting and complicated process. This process has to overcome a wide range of internal and external factors influencing e-learning effectiveness and content quality resulting in stakeholders' satisfaction and acceptance of web-based learning.

In connection to active introduction of e-learning as an equivalent form of education to classical education process, new systems of education administration have been being developed over time under different names: Internet Based Training, IBT, Online Learning. Currently, we are talking mainly about learning management systems – LMS. Lin et al (2009) describe, that Learning Management System (LMS) plays a critical role in current pedagogy. Along with the concept of WEB 2.0, web has become an interactive platform for contribution and collaboration. Moodle open source LMS is one of the most popular learning management systems currently. In present-day education, it is essential to note that a transformation is taking place. Nowadays, students are constantly exposed to Information and Communication Technology (ICT), so teachers must also adapt to current students' needs and interests, having digital resources in mind. The rapid development of these technologies,

combined with access to content almost anywhere and anytime, allows learners to gain new experiences regarding learning in a variety of situations and not only in school settings (Luján-García & García-Sánchez, 2015). Internet learning environments are considered as individual and learner-centered learning environments as they contain multiple and rich resources and have an autonomous character which offers a flexible learning environment (Chu & Tsai, 2009). The e-Learning can construct an independent and individualized learning environment and break through the restrictions of the conventional learning (Wen & Lin 2007).

Many universities have adopted Learning Management Systems (LMSs) to offer teachers a range of pedagogical and administrative tools for supporting teaching and learning activities (El Mawas et al., 2016).

In education technological developments have had a strong impact on the behavior of learners and teachers as well as on learning and teaching scenarios. For instance, the availability of digital content and a constant internet connection have led to a reduction in the relevance of traditional textbooks (Lucke & Rensing, 2014).

THEORETICAL BASIS

E-learning we use at Department of Computer Science, Faculty of Natural Sciences, Constantine the Philosopher University in Nitra since 2005. Of course we have also tried out various technological improvements, management systems. We were looking for suitable solution that would allow students to develop their cognitive and intellectual abilities. As the best solution we have chosen on the basis the analysis the system Moodle. It is used to actively at Department of Computer Science since 2007. We have a wealth of experience with him, because our priority is to provide study material for students in high quality and the ability to manage a personal method of teaching. In this way we try to contribute to the adaptivity in LMS Moodle. For us the priority is that the students should in study at the greatest convenience and could manage way of teaching process (in the form of the amount of received knowledge's). On the basis of previous ideas since 2007 we gradually developed a variety of modules for Moodle that to students facilitating the better and more comfortable use of this management system

For example, in 2009 was created module IES – Interactive Element Stat (pozri Magdin & Turčáni, 2016 and Magdin & Turčáni, 2015), module LogicSimMoodle (Magdin et al., 2012) and currently now the latest module Emotions Recognitions.

The module IES is designed to capture activity of students when working with an interactive element that has been implemented in some of the lessons in LMS Moodle.

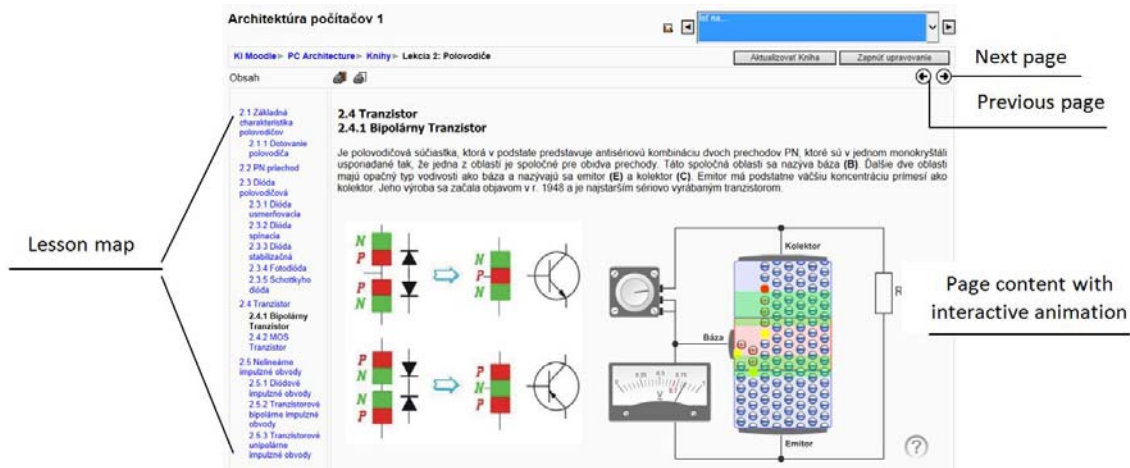


Figure 1: Stat Interface and typical content page created by the module Book with implemented interactive animation (Transistor), from original course in Slovak language.

It may be animation in format *.swf, Java applications as well as interactive tests, in which is included the animation or simulation. An important factor in the design and development of this module was to determine how the various students working with interactive elements, and offer them an adequate solution for his problems.

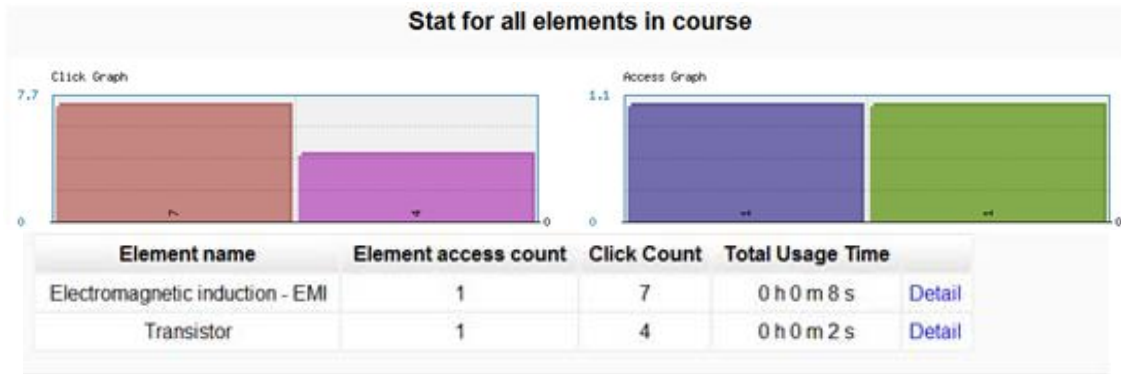


Figure 2: Stat Results statistics and graphical evaluation Axis x: interactive element name, axis y: total number of accesses or the number of performed actions during the accesses.

In spite of all the positive factors that e-learning brings, we noticed the one important feature that revealed the use of IES module. By this is the loss of direct contact with the teacher. Often, opponents of this claim they say that contact can be replaced by other activities that Moodle offers us - surveys, discussion forum or private correspondence. The problem could be the speed of response to the answer that in direct contact with the teacher is very fast. Opponents they can argue of notification settings messaging on a mobile phone, which can ultimately accelerate next communication. But what in case if student looking answer to your question at 22.00 hour? How and when you get an answer to your question? The Opponents have for this problem also the answer - as soon as possible... But how we can explain the fact that students despite all well prepared materials with implemented interactive features (quality and effectiveness has been verified using questionnaire), the e-learning course have used only the minimum extent possible and prefer a printed study materials? This fact was confirmed in internal and external forms of study.

After analyzing the state of this problem and complex analysis of the responses from students, we came to the conclusion that:

1. Study Materials are prepared by high quality,
2. Study Materials provide enough interactivity,
3. Study Materials developed cognitive and intellectual abilities of students,
4. Study Materials combines the advantages of inquiry based learning,
5. Study Materials are available from any location,
6. Study Material is also possible to use offline,
7. Study Materials **not provide** direct contact with the teacher,
8. In the study materials **is not the possibility** of creating their own notes, which would temporarily replace direct contact teacher.

The last two points accurately characterize the resulting state. If the absence of direct contact students and teacher, the students prefer printing study materials and including your own notes. Then with these materials also looking teacher and jointly solve problems and seek answers to their questions. For this reason we decided to students facilitate their study process with following way - design and implementation of the module Notes. LMS Moodle already has a module Comments, but this module works on a completely different principle and does not provide possibilities for students how is labelling of study the text, as in the case of using the Notes.

THE LEARNING ENVIRONMENT LMS MOODLE

Moodle is an acronym for „Modular Object-Oriented Dynamic Learning Environment“. It is the modularity of the system that shows unlimited options for its further enhancing. Adding necessary modules and enhancements into the system allows adjustment of the educational system according to our requirements and needs.

As standard functions in LMS Moodle can be considered the following modules:

- Registry and management of students,
- Registry and management of courses,
- Catalogue of teaching courses and objects,
- Management of study schedule,
- Registry of student assessment,
- Testing of students,
- Management of access rights,
- Communication tools,

- authoring tools for creating teaching courses and objects,
- Repository of learning content.

The modules can be inserted into different sections of the course (for thematic arrangement or weekly rate) or to the side of the block (in the discussion arrangement course). For add a new module is necessary enable edit mode. The basic division is to the standard modules and third-party modules. Standard modules are created Moodle developers. They are part of the installation system. These basic modules meet the requirements for full working with the system. Third-party modules are not included in the default installation of Moodle, but can be easily added to the installation. Currently of them exists a large number. Their number is growing and is updated every day. Their database is in the official website of Moodle.

Moodle from the perspective of modularity gives the opportunity to a wide range of programmers and enthusiasts to participate in the development of this system that is written in the PHP scripting language. Creating and adding new modules is very easy without interfering with the original system as a whole. For all these functions is an important requirement their portability and standardization. LMS should be open and able, for example, easily and quickly integrated tutorial content created before yet the introduction of LMS.

Every e-learning course is characterized by (Pavlíček, 2004):

- content and structure,
- educational goal,
- didactic function.

In the case of creating the content of the study material is often only active teacher. He has the right to add text, images, animations, sounds, and thus create a comprehensive study material divided into individual lessons. In our opinion, to the content of study materials have to say also students. It is similar as in the case of lectures where the teacher can raise a problem and then with the students find solutions.

MODULE NOTES

Our aim was to create a module that would enable users in the role of student to create your own notes for study materials, save them and then with the study material printed. In order to implementation of this solution usable in practice, it is necessary to observe the following rules:

- creation of notes must be done intuitively, ie It should offer direct reading of study material in the form of comments,
- except text comments should be available functionality of highlight without creating notes,
- created notes as comments must be editable and removable,
- storing created Notes must take place at the user's request immediately after creating notes,
- view the notes in study materials must not be disruptive, the notes shown as comments upper the selected words,
- When you print the notes is need to maintain the integrity of the study material, notes are displayed in the form of indexed footnotes as in standard printed documents.

For our purposes we chose the type of module *Block*. This type of module is shown after the page margins, and thus does not disturb the user in study in teaching process, but it is always available for quick use. Module *Block* is usable in the study materials which contain text, graphics, and so on. By using intensive exploration of currently available options we evaluated that, for our purposes, is effectively and easily applicable open-source solution *annotatorjs*. This functionality uses a simple and transparent way of creation notes by using annotation of text and comments made. The presence of notes in the text of the study material is indicates shading the annotated text. After passing the cursor over the selected text appears to save the memo with the possibility of editing and deletion. Files needed libraries for correct functionality *annotatorjs* are freely available for download at github (<https://github.com/openannotation/annotator/releases/tag/v1.2.10>).

INSTALLATION AND TESTING MODULE

After programming module, you can proceed to install the system Moodle. In a simplified view the module installation consists of the following process steps:

1. compression of module directory structure into a ZIP archive,
2. login to the LMS Moodle under an administrator account,
3. open administrator sites, expanded menu *Plugins* and select an options *Install plugins*,
4. created zip archives with the module we insert into the dialog window and confirm installation,
5. system performs validation of module,
6. After successful validation is necessary to update Moodle database,

7. After these steps, the module can we fully use.

For to use this module Notes, we must activate its function through select Add Block - Notes. In this step is then possible to use the module for addition of comments such as similarly in Microsoft Word.



MAS English (en) ▾

Poznámky v LMS Moodle

Dashboard ▸ PLM ▸ 11 March - 17 March ▸ Lekcia 1: Úvod do elektroniky

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| 1.5 Rezistory | ↑ ↓ ✕ ⊕ + |
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Lekcia 1: Úvod do elektroniky

1.8 Vodivý materiál

Materiál, ktorý dobre vedie elektrický prúd. **Vodivý materiál sa rozdeľuje do dvoch tried: vodivé materiály** voľné elektróny. Keďže elektróny majú prakticky nulovú hmotnosť, elektrický prúd prechádza kovmi bez pre aj záporných iónov, t. j. premiestňovaním hmoty. Vodivé materiály možno rozdeliť aj z hľadiska ich použ najpoužívanejším materiálom na výrobu elektrovodivých častí patrí meď, hliník a zliatiny hliníka. Najdôležit

Figure 3: Select text in study material with the possibility of add comments.

After selecting a particular part of the sentence can be entered comment into the comment box.

Lekcia 1: Úvod do elektroniky

1.8 Vodivý materiál

Materiál, ktorý dobre vedie elektrický prúd. **Vodivý materiál sa rozdeľuje do dvoch tried: vodivé materiály** prvej triedy - kovy a vodivé ma voľné elektróny. Keďže elektróny majú prakticky nulovú hmotnosť, elektrický prúd prechádza kovmi bez premiestňovania hmoty. Naproti to aj záporných iónov, t. j. premiestňovaním hmoty. Vodivé materiály možno rozdeliť aj z hľadiska ich použitia na elektrovodivé materiály najpoužívanejším materiálom na výrobu elektrovodivých častí patrí meď, hliník a zliatiny hliníka. Najdôležitejšou vlastnosťou týchto kovov na prvé miesto zaraďuje striebro, potom meď, zlato a hliník. Použitie zlata a striebra je obmedzené len na zvláštne účely.



Figure 4: Comments box with added comment.

If you confirm button Save, the comment is saved and the selected text is highlighting.

1.8 Vodivý materiál

Materiál, ktorý dobre vedie elektrický prúd. **Vodivý materiál sa rozdeľuje do dvoch tried: vodivé materiály** prvej triedy - l voľné elektróny. Keďže elektróny majú prakticky nulovú hmotnosť, elektrický prúd prechádza kovmi bez premiestňovania aj záporných iónov, t. j. premiestňovaním hmoty. Vodivé materiály možno rozdeliť aj z hľadiska ich použitia na elektr najpoužívanejším materiálom na výrobu elektrovodivých častí patrí meď, hliník a zliatiny hliníka. Najdôležitejšou vlastnosťou týchto kovov na prvé miesto zaraďuje striebro, potom meď, zlato a hliník. Použitie zlata a striebra je obmedzené len na zvláštne účely.

Figure 5: Selected text with highlighting.

The module Notes is not compatible with lower versions of Moodle since version 2.9. This is due to the fact that the system itself uses from to version 2.9 different JavaScript libraries. The Moodle version 3.0 and higher uses jQuery library. In previous versions it was the YUI, which already is no longer supported. In a module whose implementation is based on javascript solutions is therefore easier to use principle jQuery library that has a prospect for the use of the module in the latest versions of Moodle.

Full-featured functionality and use of the module Notes has been tested in the new versions of the most commonly used browsers. The seamless and correct functionality module we can guarantee (on the basis of testing) in the following versions of browsers on those platforms:

Operating system Windows 7 (32, 64-bit)

- Google Chrome (Version 48.0.2564.103 m)
- Mozilla Firefox (Version 44.0.1)

- Opera (Version 35.0)
- Safari (Version 5.1.7)
- Internet Explorer (Version 11 Windows 7 (64-bit))

Operating system Ubuntu 14.04 (32, 64-bit)

- Chromium (Version 48.0.2564.82)
- Mozilla Firefox (Version 44.0)
- Opera (Version 35.0)

During testing, we found that when using the module in supported browsers Firefox and Internet Explorer is required interaction with user. Specifically, it is necessary to disposable browser settings - permission for printing color and background images in the settings to the printing of web browser. In Opera browser we found a restriction in the form of highlighting print in shades of gray scale. This shortcoming we can remove by printing the document to a PDF file, where the highlighting appears correctly with a preset yellow tint. A key aspect in the use of the module Notes is turned on JavaScript when we use the Internet browser. In the case when we manually disabled this functionality through your browser settings, the module will not work properly because the solution is based precisely on the use of JavaScript. The module Notes is available in English as well as Slovak locations.

CONCLUSION

Information and communication technology (ICT) can improve the operational processes of any business and the education industry is no exception (Stefanovic et al., 2011). As development in ICT field is progressing rapidly, it is crucial not only to sustain the correct trend in education by using modern tools but also search for and implement newest methods and forms of education. Kostolanyová states that, we live in a society in which information and communication technologies (ICT) are becoming a driving force for its development. E-learning is obviously a part of this (Kostolányová, Šarmanová & Takács, 2011). Electronic learning (e-learning) environments offer the possibilities for communication, interaction and multimedia material delivery that enhance learner-directed learning, especially in higher education (Stefanovic et al., 2011). However, literature shows that adopting e-learning does not guarantee improved learning. This is because mixing technology and the content does not necessarily yield effective learning (El-Ghalayini, El-Khalili, 2012).

From personal experience from projects along with classical teaching we can state that e-learning has its positives but also negatives. E-learning in current form is not possible to perceive as a creation of e-course which we can afterwards use several years. E-course is not a printed publication and thus it is constantly updated and innovated (Cápay et al., 2011a). Between the main positive aspects include e-learning form of study is available and accessible 24 hours a day. Each student has his/her own routines and is used to study in different time periods according to individual needs. In this paper we demonstrated the possibility of making notes in LMS Moodle. Creating your own notes for the students is an important step in education. By using these notes students can record their thoughts and practices and confront them with the ideas of the teacher. With this step we are combining the advantages of e-learning and traditional teaching. We believe that the module Notes will help all who use Moodle as a tool not only for provide study materials, but especially as a real tool for provide content and management of study materials with options adaptivity. Our idea is that students should have a feeling an active approach from the perspective of a teacher, as well as in terms of Moodle. Currently is performed testing for determination of efficiency of this module. We believe that the module can help learners to create their own notes on topics that interest them and allow them to develop their own ideas, opinions and insights.

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Implementing Open Source Platform for Education Quality Enhancement in Primary Education: Indonesia Experience

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ABSTRACT

Information and Communication Technology (ICT)-supported learning using free and open source platform draws little attention as open source initiatives were focused in secondary or tertiary educations. This study investigates possibilities of ICT-supported learning using open source platform for primary educations. The data of this study is taken from a 3-years ICT-supported education quality enhancement project involving 300 elementary schools and 200 junior high schools in the Special Province of Yogyakarta, Indonesia. In this research, 50 elementary and 50 junior high schools are used as samples for pilot observation. Technology Acceptance Model and Structural Equation Model are employed to analyze the findings. It is concluded that open source platform is accepted even in a low e-readiness environment such as in primary educations. Further, this research also develops strategies to successfully implement open source platform for ICT-supported learning in primary educations. However real e-learning outcome is not yet measured as this study is performed before the national exam of the participating students performed.

INTRODUCTION

Information and communication technology (ICT) is expected to produce positive effects in education not only because ICT can improve communications among relevant education stakeholders, such as students, school managers, teachers, and government staff responsible of education, but it can also increase motivation to study. It is believed that ICT will contribute in supporting teaching and learning process, enhance school governance by improving accessibility to useful Web sites, enhancing ICT skills, and improving interactions among schools and teachers. ICT is also often perceived as a catalyst for change; change in teaching style, change in learning approaches and change to access to education information (Hoskins & van Hooff, 2005), (Lee, Tseng, et al, 2007).

Funded by the Japan International Cooperation Agency (JICA), the Ministry of Communication and Information of the Republic of Indonesia together with the Government of Special Province Yogyakarta has initiated an information and communication technology utilization program for educational quality enhancement in Yogyakarta Province. The project involved selected 300 elementary schools and 200 junior high schools in the Special Province of Yogyakarta, Indonesia. This project is used as a model of ICT-based education quality enhancement implementation in Indonesia and expected to be replicated to other provinces in order to level up the quality of education.

The expected outcome of the project is to enhance the quality of primary educations in Yogyakarta Province especially in mathematics and science. The outcome will be observed through increase in the average score in National Exams, increase in Mathematics and Science Olympiad participation, increase in teachers' ICT competence in general ICT skills as well as in the utilization of ICT for teaching-learning process.

The study is important for three reasons. First, this is the first large scale ICT-supported learning project implemented in primary educations in Indonesia. Most of e-learning implementation project in developing countries focus on higher level educations such as secondary schools (Year 10 to Year 12) or even tertiary education or university level (Anonymous, 2008). The result of this study can be used further to formulate better strategy in implementing e-learning in primary educations in other provinces or countries. Secondly, the project is implemented using open source platform. OpenSUSE, a Linux distribution was chosen by the project to minimize project cost as well as an initiative to introduce open source at early age students. Even though National Education ICT Curriculum is based on Microsoft platform, the decision of using open source in developing countries struggling with copyright problems like Indonesia is deliberately taken as free and open source platform has many beneficial advantages (Orman, 2007). The third reason is that Yogyakarta Province, a relatively small and rural province, was chosen as the pilot province for the project. The project can be seen as a

“model” for and open source based e-learning implementation in primary education in Indonesia as Yogyakarta Province can be considered representing average of Indonesian provinces. The scientific importance of this study is to investigate factors that determine e-learning readiness and e-learning implementation success.

However, due to that the project finished by end of 2012, the expected real outcome is not yet available to be measured. Kickul & Kickul (2006) described that e-learning outcomes are determined primarily by attitude towards e-learning. Therefore this study uses behavioral intent to use as a proxy to the e-learning outcomes. The limitation of this study is assuming that behavioral intent to use as approximation to the e-learning outcome. Further observation is undergone to investigate the real outcome of the project after one full cycle of study of the participating students from their National Exams results.

IMPLEMENTING ICT-ASSISTED LEARNING FOR EDUCATION QUALITY ENHANCEMENT

While most application of ICT were in the area of improving business competitiveness in business sectors, the application of ICT to improve quality of education has drawn attentions to researchers in the last decade. ICT is expected to generate breakthrough in education as what it did in the area of business. Various efforts in integrating ICT into educational settings to support teaching learning have been initiated since the 1980s (Starr & Milheim, 1996).

Research has shown that e-learning outcomes are influenced by a complexity of factors. Kickul & Kickul (2006) found that students’ attitude towards e-learning, such as proactive personality and learning goal orientation, is an important determinant of e-learning outcomes. Beyond students’ attitude, other researchers have shown that various factors such as learning strategy (Santhanam, Sasidharan, & Webster, 2008), technology acceptance, and system quality (Chang & Tung, 2008), effective or appropriate e-learning environment (Gregg, 2007; Wangpipatwong & Papisatorn, 2007), and also learning motivation (Meissonier, Houzé, Benbya, & Belbaly, 2006) have significant contribution to the e-learning outcome.

An observation by Ho (2009) with focus on analysis of e-learning system quality, technology readiness, online behavior, and learning outcome of students in urban junior high schools, concluded that the quality of the e-learning systems and the technology readiness supported by appropriate leadership behavior play a significant impact on the e-learning outcome.

MEASURING E-LEARNING READINESS IN THE SAMPLE SCHOOLS

As measuring readiness is important before implementing e-learning systems especially in schools that have little access to computers. Chapnick (2000) developed a model to measure e-learning readiness. She categorized readiness into 8 factors. The first factor is psychological readiness. This factor includes students and teachers attitudes toward e-learning initiative. This factor is considered one of the most important factors as it impacts directly the e-learning implementation process. The second is sociological readiness. This factor considers the interpersonal and cultural aspects of the e-learning environment. Learning preference of the students and teaching preference as well as existing learning culture may impacts e-learning outcome significantly. The third is environmental readiness. This factor considers education stakeholders support, education policy, and leadership’s attitude toward e-learning. The fourth factor is human resource readiness. This factor considers the availability of human resources to support e-learning infrastructure and develop e-learning content. The fifth factor is financial readiness. This factor considers the availability of budget to support e-learning implementation and operation. The sixth factor is technological skill (aptitude) readiness. This factor considers observable and measurable technical competencies of the content developers, technical support staffs, and teachers’ ICT competencies. The seventh factor is equipment readiness. This factor considers the availability of e-learning ICT infrastructure which includes workstations, screen projectors, network connection, and other relevant proper equipment possession. And the last factor is content readiness. This factor considers the e-learning material for relevant subject matters and suitability with applicable subject curriculum.

In this observation, 50 elementary schools and 50 junior high schools are selected as sample schools. Each sample elementary school is represented by its mathematics teachers in Year 4, Year 5, and Year 6 as the e-learning is only employed for Mathematics, while sample junior high school is represented by its mathematics teachers and science teachers in Year 7, Year 8, and Year 9 as in these years e-learning is applied for Mathematics and Science. The total number of respondents is 600 teachers. Most of the teachers were not exposed to open source before as the National Education ICT Curriculum is based on Microsoft Windows platform and the teachers are familiar with that proprietary platform. The sample schools are evenly distributed to all areas of Yogyakarta Province. The sampling method is convenience sampling method because the geographical span of the Province and the implementation duration of the project that span 3 years. The e-learning readiness is measured before the implementation of the project by distributing questionnaires to the

teachers. All samples are tracked such that the respondents of e-learning readiness measurement and the respondents of technology acceptance model are the same teachers.

The e-learning readiness is measured using Chapnick’s e-readiness model (Chapnick, 2000). However due to the nature of the project, only 5 out of 8 factors are measured. The 3 excluded factors are financial readiness and equipment readiness as the project was fully funded by JICA and block grant from the Provincial Government, and the schools are provided with necessary equipment to implement e-learning. Content readiness is also excluded as e-learning material suitable with national curriculum will be developed and provided by the Project. The digital content product of teaching material in multimedia format for subject matter of Mathematics for Elementary School Year 4, 5 and 6 and subject matter of Mathematics and Sciences (Physics, Biology and Chemistry) for Junior High School Year 7, 8 and 9 with a total of 75 topics has been developed and installed in the participating schools.

The 5 factors measured are psychological readiness (Psi), social readiness (Soc), environment readiness (Env), human resource readiness (Hum), and technological skill readiness (Tec). The result is shown in Figure 1.

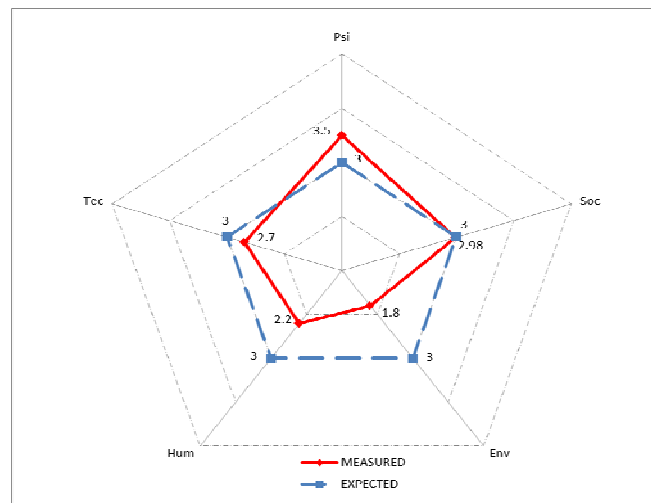


Figure 1. Measured e-readiness versus expected e-readiness in participating schools

It is shown that from Figure 1, psychological readiness is higher than what is expected. This shows that teachers and students in participating schools are very enthusiastic to be involved in the Project. Some observation and interviews confirm this. They are very eager to be selected as participating schools of the project and being included in the Project increase their motivation and increase also the school’s reputation. High value of sociological readiness confirmed that Yogyakarta Province selection of the project was the right choice. Schools and teachers in Yogyakarta Province have sufficient interpersonal quality and culture to embrace ICT in their work. This is also confirmed by high percentage of teachers who own laptops and tablets than in other province in Indonesia. It is found that 89% of teachers own laptop or tablet.

Utilization of ICT in learning involved existing groups of teachers, both at the elementary and junior high schools. In elementary school domain, there are groups of teachers based on subjects or class called *Kelompok Kerja Guru* (teachers working group), while at the junior high schools there are groups of teachers based on the subjects referred to the *Musyawarah Guru Mata Pelajaran* (community of subject teachers). These forums aim to improve teachers’ professionalism through systemically guided approach and active teaching and learning activities, and to improve the quality of taught subjects. The existence of the groups contributes to psychological readiness and sociological readiness as the groups facilitates teachers helping each other and sharing solution to the problems related to the development of teaching methods and materials.

However, while psychological readiness and sociological readiness are sufficient, the environment, human resource, and technological skill readiness are below expectation. There is a lack of support in this area from other stakeholders such as schools’ inspector, parent association, and also lack of commitment from the school masters in some schools. It is found that ICT leaderships of the school masters, especially old school masters, are low. Many of them are still technologically backward and even have technophobia.

Junior high schools have ICT subject matter teacher with sufficient ICT skill available as ICT laboratory manager. Unfortunately their ICT skill is based on Microsoft platform which is not compatible with the selected

open source platform of the Project. Meanwhile elementary schools have only class teacher who teach every subject, so there is no teacher with sufficient ICT skill available. Besides that, elementary schools only have teachers and do not have administrative or support staff like in junior high or senior high schools, so they do not have ICT laboratory manager.

The low value of technological skill is due to the chosen platform of the project which is based on open source platform. The e-learning platform is based on OpenSUSE, a Linux distribution, while the students and teachers ICT skills are based on Microsoft platform as mandated by the National Curriculum from the Ministry of Education and Culture.

TECHNOLOGY ACCEPTANCE OF THE E-LEARNING SYSTEM

Before the e-learning system is implemented in learning process, further observation is made to formulate the right implementation strategy in order to ensure project success. Technology Acceptance Model (Davis, 1989) is employed to model how users accept and intent to use e-learning technology. Structural Equation Model (SEM) is applied for testing and estimating causal relations of factors that influence decision about how and when they will use e-learning when users are presented with a new technology.

The respondents of this survey are the same as the respondents of e-learning readiness measurement described in previous section. The data is taken after the respondents accomplish a training program on Linux environment and on the use of the e-learning in teaching-learning process. SmartPLS is used as analysis tool for path modeling of latent variables (Ringle, Wende & Will, 2005). Quality of the questionnaire is conducted by distributing the questionnaire to 100 respondents to perform reliability and validity test. The quality of the data can be seen from Table 1.

Table 1. Quality criteria of Linux questionnaire

| | AVE | Composite Reliability | R Square | Cronbachs Alpha | Crossvalidated Redundancy | Crossvalidated Communality |
|--------|------|-----------------------|----------|-----------------|---------------------------|----------------------------|
| INTENT | 0.74 | 0.90 | 0.69 | 0.82 | 0.48 | 0.41 |
| ATT | 0.60 | 0.74 | 0.32 | 0.41 | 0.16 | 0.33 |
| EASE | 0.73 | 0.90 | | 0.81 | 0.55 | 0.33 |
| USEFUL | 0.77 | 0.94 | 0.63 | 0.92 | 0.48 | 0.65 |

Using SmartPLS, the network is modeled into path diagram as shown in Figure 2.

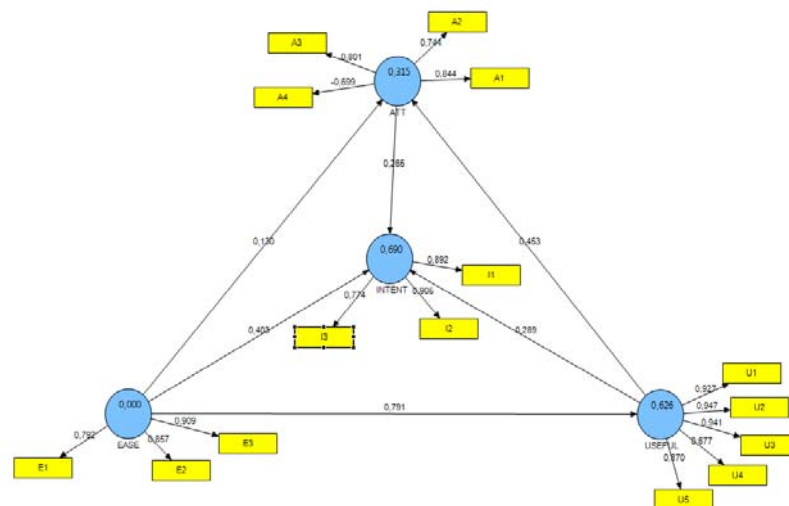


Figure 2. Path model for Linux acceptance from 100 schools. EASE = perceived ease of use, USEFUL = perceived usefulness ($R^2 = 0.636$), ATT = attitude toward using ($R^2 = 0.315$), INTENT = behavioral intent to use ($R^2 = 0.690$)

Table 1 shows that all indicators have composite validity > 0.70, therefore the model is considered valid. The R^2 indicates that endogenous variables have either good (USEFUL, INTENT) or moderate (ATT). Perceived ease of

use is the strongest predictor for behavioral intent to use (0.403). The teachers expect that using Linux should be as easy as using Microsoft Windows. Perceived ease of use strongly affects perceived usefulness (0.791) while perceived usefulness strongly affect attitude toward using (0.453). However there is only perceived eased of use has significant effect to attitude toward using (0.403), but the other predictors only contribute moderate effects. This again confirms that teachers really do not care what the chosen platform is as long as it is easy to use.

Table 2. Bootstrapping Linux acceptance

| | Original Sample (O) | Sample Mean (M) | Standard Error (STERR) | T Statistics (O/STERR) |
|------------------|---------------------|-----------------|------------------------|--------------------------|
| ATT -> INTENT | 0.27 | 0.26 | 0.09 | 2.94 |
| EASE -> ATT | 0.49 | 0.48 | 0.12 | 4.09 |
| EASE -> INTENT | 0.76 | 0.76 | 0.05 | 15.57 |
| EASE -> USEFUL | 0.80 | 0.85 | 0.05 | 16.42 |
| USEFUL -> ATT | 0.45 | 0.47 | 0.13 | 3.57 |
| USEFUL -> INTENT | 0.41 | 0.44 | 0.13 | 3.21 |

Bootstrapping the model as shown in Table 2 indicates that relationships are significant ($t > 1.96$) with perceived ease of use affect perceived of usefulness (0.80) and behavioral intent to use (0.76). An interesting finding is with indicator A4 which measured the question “I do not like to the idea of using Linux in my school” with a significant value of -0.699. The cross loading of indicator A4 shows also that this indicator has a high discriminant validity. Therefore it can be concluded that the choice of using Linux as the e-learning platform will not impact the outcome of the project as long as it is easy to use.

The survey is done to study factors related to the e-learning digital content using technology acceptance model to all respondents in 100 tracked sample schools after reliability and validity test.

Table 3. E-learning content acceptance data quality criteria

| | AVE | Composite Reliability | R Square | Cronbachs Alpha | Crossvalidated Redundancy | Crossvalidated Commuality |
|--------|------|-----------------------|----------|-----------------|---------------------------|---------------------------|
| INTENT | 0.82 | 0.93 | 0.83 | 0.89 | 0.65 | 0.60 |
| ATT | 0.72 | 0.82 | 0.75 | 0.55 | 0.51 | 0.55 |
| EASE | 0.73 | 0.91 | | 0.87 | 0.53 | 0.53 |
| USEFUL | 0.79 | 0.94 | 0.76 | 0.91 | 0.57 | 0.63 |

From Table 3, it can be concluded that the data obtained is qualified for further processing. Using SmartPLS, the network is modeled as shown in Figure 3.

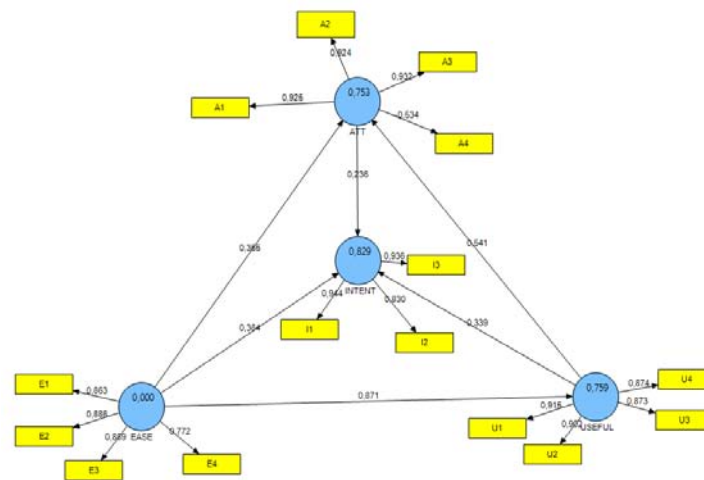


Figure 3. Path model for e-learning content acceptance of teachers in 100 sample school. EASE = perceived ease of use, USEFUL = perceived usefulness ($R^2=0.759$), ATT = attitude toward using ($R^2 = 0.753$), INTENT = behavioral intent to use ($R^2 = 0.829$)

Figure 3 shows that all indicators, except A4, have convergent validity > 0.70 , therefore the model is considered valid. The R^2 indicates that all endogenous variables have either good (USEFUL, INTENT, and ATT). Perceived ease of use is the strongest predictor for behavioral intent to use (0.384).

Table 4. Bootstrapping e-learning content acceptance

| | Original Sample (O) | Sample Mean (M) | Standard Error (STERR) | T Statistics (O/STERR) |
|------------------|---------------------|-----------------|------------------------|--------------------------|
| ATT -> INTENT | 0.24 | 0.24 | 0.10 | 2.26 |
| EASE -> ATT | 0.83 | 0.82 | 0.05 | 14.59 |
| EASE -> INTENT | 0.87 | 0.86 | 0.05 | 15.96 |
| EASE -> USEFUL | 0.87 | 0.86 | 0.05 | 17.18 |
| USEFUL -> ATT | 0.54 | 0.53 | 0.11 | 4.77 |
| USEFUL -> INTENT | 0.47 | 0.47 | 0.10 | 4.30 |

Bootstrapping the model shown in Table 4 indicates that relationships are significant ($t > 1.96$) with perceived ease of use strongly affect perceived of usefulness (0.87) and behavioral intent to use (0.87). Perceived ease of use strongly affects perceived usefulness (0.87) while perceived usefulness affect attitude toward using (0.54). All endogenous variables show significant effect to attitude toward using being the smallest (0.24). Further interviews reveal that there are several factors affecting this.

First is that culturally in Indonesia, in primary education the teacher is the “guru” with all its attributes even though some active learning efforts have been introduced recently. Secondly, teachers do not possess suitable didactic method in technology-supported learning environments. Some of their fear is that computer will replace their “guru” status. They mainly use computer for preparing slides, exam questions, or searching teaching materials, not for teaching subjects. Thirdly, subjects like Mathematics for example, most teachers consider as a very clerical subject with full of hands-on exercises so teacher’s physical presence is a mandatory.

An interesting finding is with indicator A4 which measured the question “I do not like to the idea of using e-learning for my subject as it will waste a lot of my time” with a moderate value of -0.534. The cross loading of indicator A4 shows also that this indicator has a high discriminant validity, but lower correlation with variable INTENT. This also confirms that there is a slight sense of insecurity of the teachers related to the e-learning implementation. Further interviews show that this insecurity feeling mostly occurs with teachers who are above 50 years of age which consist of 23% of the sample.

CONCLUSION

The study has shown that open source based e-learning can be implemented even in a low e-readiness environment such as in primary educations. The existence of teacher groups and forums where teachers share solutions and support each other contributes to the success of implementation in this kind of environment. Users in such environment accept whatever platform as long as they perceive it to be easy to use. It is also found that even all factors contribute significantly to the e-learning intention to use; there is also some feeling of insecurity especially among teachers with over 50 years old of age facing with modern technology.

The limitation of this study is the use of behavioral intent to use as a proxy to the expected outcome as the expected real outcome is not yet available. Therefore further investigation should be performed to measure the real outcome of the project in enhancing the quality of education from the national exam results after one full education cycle of participating students. A strategy to maximize the impact based on the findings of this research has been developed. The findings are also used to develop a roll out plan to replicate this project in other provinces.

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In my end is my beginning: Elearning at the Crossroads

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ABSTRACT

The increasingly popularity of eLearning does not refer to a specific educational method of instruction nor method of delivery. The design can have different meanings depending on the sophistication of the educational method employed, the resources made available, and the educator's skills. Unfortunately the application of technology in education does not necessarily equate to effective forms of learning. The literature does not always provide clarity in defining a framework for educational technology initiatives. This paper suggests that such a taxonomy is necessary to establish distinct categories of eLearning between industrial models, bottom-up innovation and top-down institutionally-led changes.

Keywords: eLearning taxonomy, Learner-centered learning, education delivery, interactive learning, online instruction

INTRODUCTION

“In my end is my beginning” the quotation from T.S. Eliot's "Four Quartets" (1943) illustrates that the impasse that eLearning has arrived at is an opportunity to glance backwards to see where it had gone wrong and to choose a path which, having learned from the mistakes of the past, does not repeat it. To call up from another era a repeated slogan, it is ultimately the end-user that is the student, and not the administrator, nor the product developer who decides on the future of eLearning, and that is decided by what is delivered against promises made. Higher education has seen a proliferation of new models in response to growing market demands. For-profit universities, massive open online courses, and competency-based pedagogies have all vied for a piece of the pie. It could have been written over a decade ago, and promised as much, but it came out in June 26, 2014 in the highly esteemed *Times Higher Education* entitled “Beyond the limits of traditional learning”:

Adaptive learning systems, experiential learning, competency-based approaches, programs that offer alternative credentials, courses that are accessible on mobile devices and educational partnerships with employers all personalize higher education. They allow students to tailor their learning to fit their needs, their learning styles – and, just as importantly, their budgets. While the residential campus remains a superb model for education, it's expensive, place-based and unsuited to the lives of many non-traditional learners. New teaching and learning innovations push past these limits. Because they make higher education more customer-centric, they have the potential to increase student retention, graduation rates and overall attainment (Aoun, 2014).

There were numerous articles published a decade ago at the turn of the century, proclaiming much the same demise of traditional learning institutions and valorization of eLearning as virtual universities bringing to an end the brick-and-mortar campuses. At the start of eLearning, its technology still primitive, it was asserted with available studies necessarily of short duration how electronically mediated learning technologies (1) have a positive impact on course delivery and student learning, (2) are effective at achieving greater student participation and student interest, and (3) allow opportunities to improve critical thinking (Saunders and Cooper, 2003). The words commonly used then and still much in use include “explosive”, “unprecedented”, “amazing” and even greater praise directed at primitive instrument, the blunderbuss, in a scattered fashion aiming at anything that moved electronically.

The press release is astonishingly like many troubled and unsuccessful trends in business and industry, most especially the Knowledge Management (KM) trend to which we shall pay attention at some length to establish the danger of identifying eLearning indiscriminately across distinct categories. Business and Industry has to be by definition motivated by profit, whether or not its products are employed to increase the productivity of industry or that of education. Globally, the market for eLearning products in all areas reached US\$42.7 billion last year, and is projected to reach US\$53 billion by 2018, according to the research report by United States-

based international research company Ambient Insight. While the US leads sales, Asia is the second largest market with revenues from eLearning products in Asia projected to reach US\$12.1 billion in 2018, up from US\$7.9 billion in 2013. Revenues will more than double in a dozen of the 21 Asian countries analyzed and triple in nine of them, in part boosted by a huge amount of private investment going into learning technology companies in Asia, the report predicted (Adkins, 2015; Dutta and Mia, 2009). Superficially, it is a win-win situation where there is a benefit both to the vendor and the buyer. Only the buyer may not be an educator and the goal may be cost saving, not greater learning which has little to do with efficiency and productivity as a measure of success.

Vendors of eLearning platforms generally deal with administrators of highly centralized governments who are making decisions for poorly paid educators. Most teachers and professors in Africa don't get to fly to eLearning trade shows, enjoy an expense account while negotiating to buy the products of increasing sophistication designed for Chief Learning Officers, not College Deans. This trend is just beginning in developing countries whose adapting eLearning platforms is sure to increase the 'digital divide,' a term of such rising urgency that President Obama had need to intervene in his State of the Union Address in 2010 (Obama, 2010). That is why we need to study eLearning projects in distinct taxonomic categories that focus first of all on 'learning', not the platform, nor the pedagogy, the students' actual learning as a measure of achievement.

VAST PROMISES OF REVOLUTIONIZED LEARNING

Not only does the business and industrial model need to be studied for its lessons for the academic world and then firmly set in its place, we need to look skeptically at how it looks from the administrative level in the school, college and university systems, to uncover an exchange of considerable importance and increasing creativity taking place at a different level, on the front lines, between educators and students in the classroom, online and increasingly in a combination of face-to-face and electronically managed environment to which the term "blended" had become attached. It is this last category, educational institutions which are strictly delimited in this study so that accurate assessment could be made and a healthy, untroubled unfurling of eLearning programs managed. We pause therefore yet again at the rhetoric of eLearning ventures that seem appealing to administrators and arouse grave suspicion and fear among educators of troubled colleges and universities. Professors fear, perhaps rightly, that a strategic direction towards eLearning will employ the promise of constructivist educational language to plug expensive products and platforms that may, and often does, reduce salaries and cost jobs in an age when administrators are hired to balance the books of troubled educational institutions.

The following is typical of the rhetoric repeated without variation since the turn of the century which was marked; it will be remembered, by an unreasonable hysteria concerning the millennial meltdown globally of all computer systems. A recent press release may be repeated annually for many years to come, year after year burying the old fashioned, campus and lecture-based education in its irresistible advance:

eLearning refers to the learning facilitated with the help of electronic media. It comprises all forms of electronically supported learning and teaching tools, and is widely adopted by educational institutions, especially for higher education. eLearning service providers deliver learning solutions through the latest tools and technology, thus providing users with rich media and graphic-based learning. Since this form of learning is cost-effective and helps enhance employees' efficiency and productivity, many organizations across the globe have completely replaced their traditional forms of training with eLearning (TechNavio - Infiniti Research Ltd., 2014).

There is a rhetorical turn in the passage cited above from higher education to the language of industry with troubling words to educators, for 'efficiency and productivity' are notoriously difficult to measure and perhaps even absolutely inappropriate except as a basis for cutbacks and budget trimming. From that point of view, the coming of sophisticated electronic tools may be welcomed as the weavers of cottage industries welcomed the great factories and their machines during the Industrial Revolution. The latest products such as SnagIt, the new LMS with deeper integration with current technology of web-based tools like SoftChalk, TechSmith Relay, Camtasia Studio, Civitas (predictive analytics), Web 2.0 tools, Moodle, Google Apps, Big Blue Button, Microsoft Lync, Skype, MOOC (Massive Open Online Courses) and still more devices may not have an attractive sound to elderly professors whose salary grew over the good economic years and now worry that 'productivity' and willingness to embrace change will become a measure of their worth.

Only by demonstrating not just the equivalence but the superiority of eLearning as a medium of education at the classroom level in a transaction between educator and student that a genuine eLearning revolution will take place centered as it should on learning, not the learning platform. If that were the case, that is, if it is demonstrated that eLearning is superior in areas like reading and writing in K-12 classes or improving research and report writing

in colleges and universities, a case can be made for professors stuck in their ways to step aside. But that requires a strong case, not rhetorical tricks and platitudes.

It may be acceptable around the year 2000 to build a strong case on slender evidence, say a project in a single class, and with sufficient qualifications employing ‘could,’ ‘should,’ ‘might’ and ‘may’ present it as evidence for the glowing future of eLearning which may transform learning in positive ways, resulting in an increase in the quality of learning experiences (Garrison and Anderson, 2003; McKnight, 2001). In particular, online electronic resources as they existed at the time, may be employed successfully to facilitate the development of argument formation capabilities, improve written communication skills, develop greater complex problem solving abilities, and increase opportunities for critical and reflective thinking (Abrami and Bures, 1996; Garrison, Anderson, and Archer, 2001; Hawkes, 2001; Winkelmann, 1995).

STUDENT-CENTRED TECHNOLOGY

It is not hard to find recent studies which proclaim much the same success, almost always with qualifications. Still too often the loudest proclamations of success are from limited short term, seldom longitudinal studies, and almost never at the student-teacher end of the transaction. The gap between what administrators of eLearning programs believe and what teachers and students experience is vast and troublesome. A survey of college administrators was asked, as an example, to state on a scale of 1-12 the challenges they face in establishing eLearning initiatives. Student acceptance of eLearning as an educational medium ranked in last place among challenges seen from the point of view of college administrators (Michigan Community College, 2014).

That is why, rare as they are, we need urgently to heed empirical findings of recent vintage to respond to a challenge posed by the title of an empirical study by Kaznowska, Rogers and Usher (2011) entitled *The State of E-Learning in Canadian Universities, 2011: If Students Are Digital Natives, Why Don't They Like E-Learning?* ELearning has become as a feature of education, whether or not it was positively regarded as of benefit. “A large majority of participants (73.7%) found that the virtual learning environments in their classes were either fairly important or very important to their overall education experience...,” it was found. “In other words, even if students were not especially impressed by the e-Learning resources available to them, they were likely to say that the presence of such resources did materially alter the nature of their education” (Kaznowska, Rogers and Usher, 2011, p.11).

The conclusion of the Canadian team’s study is evident in the title; though there is an exception to the general ill-will that eLearning was held which is worth pursuing:

As the level of available e-resources increases, the proportion of students saying they ‘learned more’ drops significantly...Students were not actually more likely to say they had learned less in their courses with advanced e-resource availability..., but they were more likely to say they had ‘learned about the same’ in those courses as in other courses they were taking. While there were some variations by field of study, the only field in which the largest ‘learned more’ percentage was associated with the highest degree of e-resource availability was engineering (Kaznowska, Rogers and Usher, 2011, p. 20).

These distinctions are worth pursuing to explain what there was in engineering education which made eLearning attractive, just an example of the kind of student-centred question that is asked too rarely. There are a multitude of studies which demonstrate that a course with eLearning components is comparable to an old-fashioned lecture-based courses, a discovery presented positively to extol eLearning when the grudging acknowledgement of equivalence may have been given, as above, in resignation, with an unstated implication that eLearning as many students experience it is just ‘good enough.’ The most important question is the pedagogy, specifically whether eLearning was chosen as a means of teaching or, more likely, thrust upon the educator.

There are a multitude of such student-centred questions that require leaving aside the hopeful rhetoric at the turn of our century for a sober assessment of what is out there, thereby demarcating the student-centred parameters of this investigation. The Canadian study challenged the notion of a new student-type demanding technical tools that they had grown up with for their college and university education. Clearly, social networking, online gaming and music downloading has little to do with liberal arts, the sciences or engineering delivered as credit courses. That raises many interesting questions. Although increasing numbers of young people have access to a wide range of IT technologies during their leisure activities, little is known about this impact on their learning. Much of the research evidence to date of students' formal and informal uses of eLearning is about the growing number of eLearning courses or the frequency that WebCt/Angel or Blackboard is employed regardless of the setting, which is a great mistake. It is rather dreary to find after all the hype that those who usually are dedicated to face-to-face courses are also dedicated to logging to online courses and following them. On the other hand, what a surprise, students who do not display such dedication for normal face-to-face course, neither do they display such dedication to online courses (de Vega, McAnally-Salas and Lavigne, 2009, pp. 95-112).

UNPRECEDENTED OPPORTUNITIES IN EDUCATION

To be sure, to cash strapped college and university administrators, the decision to invest in eLearning makes sense. Beginning in 2008, the National Center for Education Statistics recorded a steady rise of distance education courses and the numbers of students enrolled in them (Parsad and Lewis 2008; Allen and Seaman 2010a and 2010b). At the same time, there is an almost equivalent loss of enrolment in full time studies suggesting that is not so much the scholarly benefits but an economic crisis through this period which has driven the growth of online education and eLearning in general. It may be proposed that with the advent of hybrid classes employing eLearning and face-to-face components together, it is not so much eLearning that has changed education, but the campus very much still in place had transformed the field of eLearning by its constant adaptation and remodelling of the available tools according to changing technology and growing financial constraints, especially after the severe economic downturn of 2008.

The ‘2014 MCCVLC Distance Learning Administrators Survey Results,’ specifically addressing distant learning administrators, allows us to assess educational delivery of electronically mediated instruction at our colleges and universities as it exists, far from the delirious prophecies of campuses disappearing into virtual space, and quite different from developments in corporate training, education in poor and developing countries and in medical education, to cite the categories which give an optimistic but very distorted view of eLearning as it is actually designed and delivered at our educational institutions. For instance, a situation which is unimaginable in the world of hospitals or the corporate world, only 24 percent of the colleges reported that their eLearning initiative was developed out of a comprehensive business and educational plan (p. 7) which means that fully 40 percent of the eLearning courses were developed on the initiative of interested professors who were given the freedom to develop their own website and use authoring and communication tools at their own expense, with some proprietary rights and creative freedom spelled out (p. 40). Blended and hybrid formats outnumber entirely online courses by a ratio of 9 to 1 putting an end to dreams of a disappearing campus (p. 8).

The above leads us to think that there is found on every campus a substantial number of educators who choose to employ online tools as a choice and not a cost-saving administrative measure reluctantly undertaken. We shall soon turn to how teachers share information in their educational journals and thereby create an eLearning path by walking it, given that administrators generally fail to provide a roadmap for the development of eLearning, though increasingly it is senior administrators who are in charge of eLearning initiatives and the allocation of funds. Meanwhile, it is in educational journals sharing favourite assignments where we will find imaginative uses for online tutoring, mobile learning, video/multimedia technologies.

As online instruction and associated eLearning systems continue to mature, universities which have seen a continued decline proclaim much the same advantage for online learning today as they always have relied on data from the turn of the century or from the corporate world to support their enthusiasm. The field desperately needs once again “a taxonomy” to establish distinct categories of eLearning as a field which has consistently changed its focus and breadth over the last decade as a consequence of changing technologies and changes in educational and corporate policies and practices. Looked at from the corporate profit nexus, all forms of eLearning may be collapsed into a single sector of the economy with valuable corporate training and eLearning components working together in an ever expanding market. How different the two sectors are may be gauged though from the ‘2014 Global eLearning Salary and Compensation Report’ of the corporate oriented eLearning Guild, which based on responses from 5,923 eLearning Guild members internationally, corporate trainers who provided their salary and compensation information as part of eLearning Guild general membership data. Salaries in this sector held steady in the United States and slipped slightly around the world in 2014 with the average global salary at \$76,530, and the 2014 average US salary at \$78,932 (eLearning Guild, 2014).

By comparison, the ‘MC Horizon Report on Higher Education’ in 2014 identified in an essentially optimistic assessment of the continuing expansion of higher education six key trends, six significant challenges, and six emerging technologies across three adoption horizons (Johnson et al. 2014). Only in passing does the report come to key challenges, above all ‘the low digital fluency of faculties’ and ‘the relative lack of rewards for teaching.’ Oddly, in a field which is undergoing varied assessment and surveys, it is this last sector, the students’ appreciation of eLearning in its current forms and available technology which suffers the greatest neglect. To cite just one example, a major study on eLearning by the Pew Research Center was unveiled to considerable fanfare in the United States, but while it presented results of a survey of the American public and of U.S. college presidents, it did not bother to get the students’ perspective on how students use eLearning technology, though that only 35 percent of the public who have taken online courses praise the experience is worth noting (Parker, Lenhart, and Moore, 2011).

TECHNOLOGY SUPPORTING TEACHING AND LEARNING

Many studies of eLearning programs have concluded that the key to ensuring successful outcomes is to blend more traditional classroom approaches with those that use technology. But educators need to learn how student learning changes with eLearning, and how to alter their teaching methodologies with pedagogical approaches that take advantage of the opportunities afforded by learning. A blended approach mixing face-to-face classroom methods with technology-mediated activities seems to provide the highest learning outcomes, but precisely what takes place in the interaction between educator and student through the mediation of technology and how it is changing the pattern of teaching and learning in colleges and universities has been greatly neglected. It is not whether technology is used (or not) which makes the difference, it may be argued, but how well the technology is used to support teaching and learning. Before we leave aside the question of blended learning as an important category of this taxonomy, we would do well to look at its possible, and yet to be proven advantages.

Using blended learning it is proposed benefits the learner, the training staff and the organization's bottom line. Focusing on the technology first and then the pedagogy is a very great mistake. Blended learning allows organizations to gradually move learners from traditional classroom practice to eLearning in small steps making change easier to accept. Working in a blended environment furthermore enables instructors and instructional designers to develop the skills needed for eLearning in small increments. Moreover, eLearning professionals can move small sections online as they develop the needed eLearning skills. Cost and resources are also a driving factor. By beginning small, there is assurance that the needed investment is supported by the community of users who perceive the need for the technology as the necessary next step in building a truly serviceable learning platform. Still, the perspective of the learner, is rarely, if ever, the subject of research into the effectiveness of blended learning. We find addressed instead forms of instruction, teaching, or at best, pedagogies, not a true measure of what is achieved their impact on pupil learning outcomes. The challenge eLearning faces is not only in providing the appropriate infrastructure, customizing the design and content for a local context, and overcoming social inequalities of the 'digital divide,' but also to be effective there must also be an investment in teachers as facilitators rather than as lecturers, or deliverers, of content. This requires some new skills, particularly in the effective use of technology and reinforces thereby the longstanding principle that good education requires a significant investment in building the competencies of teachers, not just the infrastructure and its content. It follows that we should peer over the shoulders of designers and vendors of eLearning tools or the administrators who purchase these tools and think so highly of them to how they are actually employed by teachers and students.

As an example of how it looks from the above, a review commissioned by the World Health Organization (WHO) and carried out by Imperial College London researchers concluded that eLearning is likely to be as effective as traditional methods for training health professionals. Drawn from a total of 108 studies, the team reported that students acquire knowledge and skills through online and offline eLearning as well as or better than they do through traditional teaching. The authors suggest that combining eLearning with traditional teaching, that is blended learning, might be more suitable for healthcare training than courses that rely fully on eLearning. Such programs could potentially, it was hoped, help address the shortage of healthcare workers by enabling greater access to education, especially in the developing world where the need for health professionals is greatest (WHO, 2015).

It is not quite clear what such studies actually demonstrate, however grounded they may be empirically. For when after the heavy investment of eLearning initiatives, it is repeatedly found equal to face-to-face teaching, it follows that there is no urgent need to introduce eLearning unless there is another proven advantage beyond the improvement in the quality of the teaching and the increase in learning that makes the project valuation. Again, the blended approach for all its advantages makes it extremely difficult to tell whether it is the new technology or the old fashioned face-to face lecture that accounts for the program's success. When it is proposed, as an example, that the shortage of medical practitioners in third-world countries may be overcome by eLearning initiatives, it should not be overlooked that there is, among other inequalities of our world a digital divide to be overcome, most especially in access to computers, internet connections, and learning resources. In sum, it may be the privileged in the many countries where injustice is the norm who alone benefit from the heavy investment in online education not to those living in areas of Africa which are contemptuously called 'the bush'.

UTOPIAN DREAMS LACKING EMPIRICAL FOUNDATION

Emerging technologies and eLearning are perhaps providing incredible opportunities and transformations. However, these opportunities are largely confined to those aspiring to the middle class who are already educated and well-connected. The barriers that keep individuals from accessing the educational infrastructure that is already in place are the same ones that keep the majority of people from participating in the eLearning revolution. Digital divide separates the Internet 'haves' from the 'have-nots:' those who are online from those

who would like to get online, but are prevented based on the availability or affordability of access. Digital gaps in education, employment, race, and gender have already become worldwide issues and the educational divide is getting wider between developed countries and developing countries, between cities and rural areas, and between the rich and the poor. Not even comparatively wealthy countries are immune. Even in America, according to an NTIA report, *Falling Through the Net: Defining the Digital Divide*, black and Hispanic households are only 40 percent as likely to have home Internet access as white households are. In addition, whites are more likely to have access to the Internet from home than blacks or Hispanics are to have access from any location. A survey conducted by The Public Policy Institute of California found that even in California, where technology-use is widespread, only 39 percent of the state's Hispanic people accessed the Internet compared to 65 percent of white people (Baldassare et al., 2011). Barack Obama has pledged to close the digital divide, and in 2010 the president unveiled a national broadband plan with the aim of giving “every American affordable access to robust broadband” by 2020. But the new figures from the Census Bureau, which collected data on internet use at a sub-state level for the first time in 2013, show how hard it will be to hit that target in the next five years. There are still 31million households in the US without a home or mobile broadband subscription.

The start-up cost of an eLearning service is expensive and the cost of production of online training materials is very high. We should be confident that the extra costs are balanced with the benefits of delivering a course online. Yet, many very poor countries of late had invested very heavily in various eLearning initiatives. Asia is in fact the second largest market with revenues from eLearning products in Asia projected to reach US\$12.1 billion in 2018, up from US\$7.9 billion in 2013. Seven out of the top 10 countries with the highest eLearning growth rates in the world are in Asia, with growth in these countries above 30 percent, the report said. The main buyers of eLearning products are, predictably enough, government agencies and sales are heavily concentrated in the academic sector.

Several online institutions are now enrolling very large numbers of online students, and enrolments are accelerating, the report said. For example, ChinaEdu in China has over 311,000 online students in both degree and non-degree programs - the second-largest online student population in the world after the University of Phoenix, which has not exactly distinguished itself for its excellence. In December 2013, ChinaEdu reported a staggering 211,000 students enrolled in their online degree programs, a 14.5 percent increase over the year before. Korea National Open University has more than 200,000 online enrolments and is the largest university in South Korea in terms of enrolments. In addition, by September 2014, 24 cyber-universities were operating in South Korea. The Open University Malaysia has more than 90,000 online students. The Open University of Japan is the largest online education provider in that country, with over 85,000 students enrolled (Adkins, 2015). Here again, we see the need to make distinctions. A virtual university entirely online, an educational support program for high school and university students, an online training program for nurses may all belong in a general sense to eLearning defined as the learning facilitated with the help of electronic media and comprising all forms of electronically supported learning and teaching tools. Still, if distinctions are not made, there will very quickly follow concerns about whether that investment of money could be better spent in other ways when seen from the point-of-view of students. Many eLearning websites, even free-of-charge platforms, have told *Tuoi Tre* (Youth) newspaper in Vietnam that the number of Vietnamese people using their services for studying is small and unstable. One site began with a million visitors in its first three months only to lose a staggering 300,000 visitors and the number of registered students fell from a height of 40,278 at its height to 5,399 within months making it uncertain how much longer the website could sustain such losses. Interestingly, Khan Academy, which introduces lessons in the form of entertaining videos and does not require fixed learning schedules, expressed optimism over the situation with 150,000 learners and growing each month by 20,000 additional learners (Tuoi Tre News, 2014).

As an aside, there is evidence that online education has to pay attention to a generation which connects electronic media with entertainment suggesting that such devices as games with their visual, quasi mythological avatars that young people are fond of could be built into effective learning platforms to teach mathematics whose abstractions can be baffling and made easier by concrete representation that is the advantage of the electronic media. But all that is hypothetical and, sadly, untested.

It takes time for robust evidence to emerge in education, but surely after at least two decades there need to be an alignment joining creatively and profitably the educator, the educational institution, the eLearning tools or platforms, the student and what is to be learned. It is the pedagogy of eLearning as student-centred technology that is of interest, but to this end we need first to severely delimit our particular area of investigation from adjacent areas, for in eLearning, as we have seen, it is all too easy to lose perspective and proclaim utopian dreams lacking empirical foundations and leading to the kind of failure that is associated with Knowledge Management (KM) in the world of corporate learning. Once again, to demonstrate the urgent need for an

eLearning taxonomy we will narrow the immediate object of our inquiry specifically to ‘learning’ from the students’ point of view, not administrators and vendors who may focus on what seems, looked at from above, infrastructure, customizing the design and content for a local context, and overcoming the barriers the accreditation bodies may set for what has not yet proven itself as an effective form of learning. Forms of instruction, teaching and pedagogies are left to a later stage or worse up to the educators who may include in their number many who fear the technology and may be inept at it.

KNOWLEDGE RULES

Again and again we find in areas of education, whether in medical education, education in poor and developing countries no less than in the United States K-12 system, the quality of the eLearning program assessed by the quality of the platform and its content. It seems self-evident but often forgotten by a formalist approach, sometimes masking itself in constructivist language, that eLearning is not only about investing in good learning content and the latest in learning technology. As well, there need be teachers as facilitators rather than as lecturers, or deliverers of content. This requires some new skills, particularly related to the ease and creativity of use by the educators, which reinforces the longstanding principle that good education requires a significant investment in building the competencies of teachers. In a field which changes with astonishing speed as ever new technologies or start-ups flood the market, what is lacking once again, is an accurate measure of the cost and sophistication of educational technology intervention with its impact on pupil learning outcomes. The world of business and industry where productivity and efficiency urged upon teachers rules serves as an example of the danger facing education if the profit-minded vendors and not teachers and students are consulted with systems accommodating their needs rather than asking that they accommodate systems thrust upon them.

Business practices have over the years, constantly required extensive changes to the corporate culture from many directions. In the 1990’s, one of the most important of these changes involved the discovery and emergence of tacit, hidden knowledge in the organization’s depths as a great value to be cherished, developed, protected, and turned to overt and useful knowledge. It was promoted to glory and extolled like ‘virtual universities’ and suffered much the same fate. Knowledge Management (KM) involves identifying, protecting, developing and making good use of an organization’s knowledge base in a much wider sense than originally conceived in database management. In the course of a working day at all levels of an organization of any kind, whether designed to lend books, serve hamburgers, direct traffic or save lives, every single employee meets and overcomes challenges and thereby gains some knowledge of a very pragmatic nature. That knowledge, in theory, could be mined and sifted to find what is of value for the organization as a whole and called ‘social capital’ to identify its relation to profitability (Nonaka, 1991).

Concealed in databases, documents, policies and procedures or the experience of individual workers who are the first-line contact of customers and vendors, the public face of the company, knowledge was identified with power in a discourse found commonly extolling the promise of eLearning, setting up the field for failed expectations in its inability to meet utopian goals. Software firms quickly realized the potential of Knowledge Management for lucrative projects. Just like we don’t use all of our brain-power, they explained, we make too little use of all the resources lying idle in our own organizations. It mattered in theory very little whether it was a fast-food franchise, nursing station, the town library or the factory floor, if an organization could increase its effective knowledge utilization by only a small percentage, the results promised were greater efficiency and profitability, as well as in better employee decisions made under conditions of improved organizational performance.

It takes a great deal of capital in investment to build a knowledge system to mine ‘social capital’ of employee knowledge and turn it to code, just as an eLearning platform is able to support multiple courses. Throughout the 90’s when K.M. was most popular, living experience of workplaces was transferred and stored in varied forms of electronic repositories and embedded in the different locations ‘campuses’ where managers challenged to build ‘learning organizations’ came to be open later to all manner of eLearning initiatives. But while all people have the capacity to learn, the organizational structures in which they have to function are often not conducive to reflection and engagement about daily experience or sharing what was learned, however valuable the knowledge so gained may be. It is comparatively easy to create a knowledge portal that can serve as a central repository for documents, discussion boards, and information of use that can be installed in different workstations, but very hard to get employees to see in a very expensive system the benefits of making use of it, as it is getting students to appreciate eLearning. That may be the reason that soon into our new century grim reports began to emerge of the failure of great many K.M. projects designed at great expense, launched with great fanfare and hopes of the enormous gains promised in profitability and efficiency, only to discover that in the end the K.M. systems couldn’t pass safely through crises and solve the bottlenecks.

The growth of information communications technology (ICT) and with that a knowledge-based economy leads us to forget sometimes that it is human beings in the end, employees or students and teachers who decide whether a project, K.M. or eLearning is successful or not. Effective acceptance and utilization of new technologies is not as easy as data to input and requires factors entirely human in nature, such as attention, motivation, commitment, creativity and innovation. Knowledge in our human sense, as Socrates and Plato understood it, need be factored into the business or eLearning plans for ambitious learning projects from their inception side-by-side and of equal importance with automation of functions, rationalization of workflows and redesign of business systems.

There is accurately described a “vendor feeding frenzy” (Kay, 2003, p.683), which developed as software vendors attempted to exploit the new and potentially lucrative market for knowledge management. It may be that very large-scale organizations with billions of dollars in play, and a great many colleges and universities are guided by managers who are like their employees human beings in the end, and so susceptible to flattery, delusion and a false sense of grandeur when approached by specialists who proclaim a new economy where ‘knowledge rules’ and a system of education outside of the expensive brick and mortars of post-secondary campuses. It takes only for a few very big companies already running globalized systems of production and distribution to start an avalanche of projects to mine profits lying idle among their own employees and the vast databases that record, like the human mind, everything that happens. Only, there is no need for any of us to harness our whole brain-power with every problem, but only a sector and that one needs constant updating and exercise to be relevant. There are very successful knowledge management systems like Wikipedia and countless websites that we consult to get information and make decisions. What’s their secret? Everyone profits in gaining and giving genuine knowledge, not the bill of goods very smart business leaders bought into to their loss of face and money.

ELEARNING INITIATIVES

At this point, we have identified the very lucrative industrial model of education only to set it in its own category within the incredibly promising field in considerable disarray for many reasons, most prominently the confounding of the seemingly successful industrial model with our troubled and underfunded educational system.

The field of learning is marked by a mixture of old pedagogy and new technology. Some of the key challenges eLearning faces are in providing the appropriate infrastructure, customizing the design and content for a local context, and overcoming social and gender inequalities. These are all key to enhancing eLearning and making sure that it does not lose the benefits of face-to-face learning. We need in order to meet these and still more challenges more than a fragmented approach to studying the opportunities and risks of eLearning that we have in place. For there is a huge gap between the dream that will transform educational transactions as taking place within an ideal community of learning and the cold light of day, what is taking place on the ground, between the start of an initiative raising great hopes and at least the first barriers that may be faced. In this context, we would do well to select three separate categories identified from two directions, top down and bottom up, from what it looks like as administrators see it and as how end users experience it (figure 1). The aim continues to be to demonstrate that high levels of learning are dependent not only the quantity of interaction, but also on the quality, or substance, of interaction.

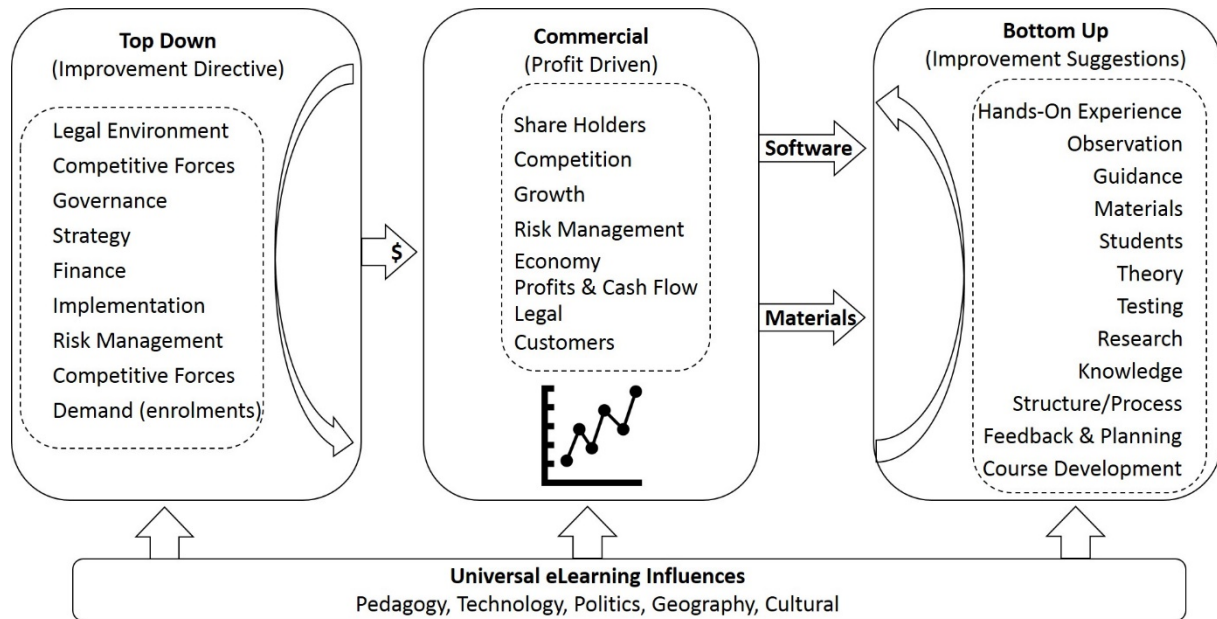


Figure 1: Towards a Taxonomy of eLearning Initiatives: The model details three separate identified eLearning categories and their major influences.

CONCLUSION

Evidence bearing upon whether, and to what extent, learning management systems (LMSs) and similar eLearning technologies achieve the pedagogical goals for which they were designed has not been well-grounded in theory-based evaluation measures and instruments, nor in sound methodological practice. To be sure it is often proposed without concrete evidence that students who grew up with, and are literally attached to, digital devices would differ from those of previous generations in learning patterns. As such, the challenge educational practitioners and designers face, it was said reasonably enough, is to recognize these differences and to develop educational offerings appropriate for their learning patterns, characteristics and behaviors. Students of this generation were said to face more flexible environments where self-initiated education is possible, enabling them to be engaged in learning throughout a lifetime, and fostering thereby appropriate online pedagogies and installing a rich learning environments employing technology as an instrument of the currently trendy constructivist learning theory.

As it was conceived not so long ago in Blomeyer’s words, “online learning or e-learning isn’t about digital technologies any more than classroom teaching is about blackboards. E-learning should be about creating and deploying technology systems that enable constructive human interaction and support the improvement of all teaching and learning” (2002; p. 19). Smith, Clark & Blomeyer (2005) studying knowledge transfer and knowledge sharing processes through the development of elearning systems imagined a decade ago how with the coming of online technology, a student observes how another individual solves a particular problem (interpersonal interaction). This student then constructs his/her ideas (intrapersonal interaction) based on the observed interpersonal interaction. In a social constructivist learning environment, the facilitator interacts with learners, builds scaffolding for specific topics, and promotes the type of interaction that expensive brick-mortar campuses deliver at a fraction of the cost, at least after the initial investment setting up an infrastructure. Decision-makers running colleges and universities leapt on new ways of learning that are more cost efficient than traditional learning strategies and which allow students to better control the process of learning because they can decide when, where and how fast to learn.

Reality, which has a way of over-turning illusions like the ‘paperless office’ and ‘knowledge management systems,’ has not been kind to the promoters of the idea that university structures would be overturned with the advent of the new learning systems. Over the last two decades, many higher education institutions have adopted a wide range of eLearning tools into their educational delivery and support processes which have stimulated an agenda of bottom-up innovation, rather than one of institutionally-led changes in educational delivery processes. ELearning has consequently primarily been evolutionary and not revolutionary, bottom-up, incremental change from within led by a very small number of technologically inclined educators through which the use of eLearning is increasingly integrated in old and existing practices in hybrid forms of learning.

Such communities of practice among technically-minded educators need to be rewarded and organized into working units. Technological advances have transformed the education landscape. However, educational devices are no substitute for good teaching. Colleges and universities need to find better ways to integrate technology. That is a complex, multi-faceted process that involves not 'just the technology' but also curriculum and institutional readiness, plus long-term financing. Above all, there need be created a network of educational support from those who see the value of online learning tools and make creative use of it. There cannot be specialization without specialists.

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Infographics for Educational Purposes: Their Structure, Properties and Reader Approaches

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ABSTRACT

Infographics are one of the new educational environments used to provide information to their readers in a visual way. Infographics are designed to provide information to their readers using various visuals such as texts, pictures, drawings, diagrams, graphs, etc. The use of infographics becomes increasingly widespread both in advertising activities of commercial organizations and educational environments. In this study, the views of those, who used infographics for educational purposes, towards educational effects of infographics are analyzed in addition to educational material, type of infographics, structure and use of infographics preferences. The participants of the study consist of students of Ataturk University, Kazim Karabekir Education Faculty. The study was conducted with a total of 64 participants including 37 female and 27 male students. All participants have the experience of reading infographics. According to the results of the study, participants find infographics instructive and prefer to use them in basic learning processes. In addition, infographics are considered as one of the basic instructional materials and it has been thought that these materials make learning more permanent.

Keywords: Information graphics, infographics, infographics' user preferences

INTRODUCTION

In the learning process, learning activities enabling transfer of the information in various educational environments and teaching materials used in these environments play an important role. Technological developments resulted in changes in the learning environments, formation of new environments and supporting learning processes through various means. The learning activities previously conducted in the classrooms have exceeded the walls of the classroom with technological advancements and moved to different learning environments. Learning environments generated by technology have enabled the realization of learning activities via the internet and computer. In this process, new learning activities compatible with the newly formed learning environments have emerged or existing activities changed their forms.

Technological developments have changed the use of web-based environments and the understanding towards sharing through these environments. In particular, Web 2.0 technologies and the changes in content development approaches enabled users to produce and web contents (Karaman, Yildirim and Kaban, 2008). Thus, users of web-based environments have also gained the identity of the person producing the data in these environments (Atici and Yildirim, 2010). Including web technologies and new environments in the learning process has contributed learning process to exceed the walls of classroom and to be conducted in different environments. This change has shown itself in the materials used for teaching purposes.

Materials used for educational purposes have different properties and various forms from special education software containing multi-media elements to an image showing a situation. In this way, information can be transferred to learners through different ways and alternative methods of presentation. Visuals are one of the most important forms of presenting information. Visuals allow a situation to be displayed and the information to be presented in an organized manner using visual components (Yildirim, Yildirim, Celik and Aydin, 2014). It is very important to visualize information, to use visuals in teaching environments and to make selections between different visuals presenting the same information. In this selection process, there are different dimensions such as properties of the information to be transferred, the intended use and learner preferences (Fleming and Levie, 1993).

Graphics are one of the visuals used for presentation of the information. Graphics allow performing comparisons between the information given and make it possible to present the information in a more visual way. In this way, information that can be presented on many pages can be transferred in an easy way. In general, graphs are used to visualize the specific information. However, today's learning approach reveals a more effective presentation of one-dimensional information presented by the classical graphs. These new materials defined as infographics provides the information to fit within a certain flow of scope (Krum, 2013). In this way, too much information can be presented with very little explanation. Infographics can be defined as presenting information within a certain flow with the help of various visuals and texts in a visual form. Infographics can contain many components such as pictures, graphs, charts, flow diagrams and texts (Krum, 2013). Information is presented in a logical sequence through its setup. They emerge as an alternative structure with these features to the texts giving information about a topic. Infographics, which contain many components used to visualize the information and allow information to be presented in different visual forms, have taken its place between the new trends of contemporary learning approaches (Williams, 2002). Well prepared infographics make it possible to present the information in an organized way. The strongest aspects of infographics can be listed as follows: Their flexible structure; allowing information to be visualized and they can be prepared in alternative forms (Schroeder, 2004). In addition, some components such as video and audio files can be used in the preparation of infographics.

Although infographics are so new among educational materials, in fact the components used to prepare them are not that new. While preparing an infographic, many components such as images, drawings, figures, symbols, graphics and texts are used either separately or together for the presentation of information. In this respect, the innovation brought by infographics is the use of visual components in the presentation of information and the way of building the content (Dick, 2013). Even though it is possible to create infographics by using popular image processing programs (Photoshop, Picasa, etc.), there are also software especially developed to create infographics (SmartDraw etc.). However, there are web sites, in which infographics can be created easily and quickly by using ready-made templates and tools (infogr.am, visual.ly, piktochart etc.). Thanks to these environments, the time spent on visual design is reduced and those, who prepare the educational content, spend more time to configure the information. Information should be well-organized and it should be easily remembered and can be compared with a proper flow in order to prepare an effective infographic (Lankow, Ritchie, Crooks, 2012). In this way, infographics providing the necessary information with a clear structure can be prepared.

Infographics can be used to serve different educational purposes. Since comprehensive information can be presented through infographics, they can be used for different purposes such as showing the relationship between different concepts, transferring processes and events, presentation of the content of the course and summarizing the subjects learnt (Meeusah and Tangkijviwat, 2013).

It is possible to prepare infographics in different ways. They can be classified as interactive, semi-interactive and non-interactive depending on the multimedia components they contain (Lankow, Ritchie, Crooks, 2012). Non-interactive infographics contain fixed text and visual components (Lankow, Ritchie, Crooks, 2012). In such infographics, the information is limited to the content presented. In addition, such infographics can be used by having print outs. Interactive infographics make it possible to use the information in the same or different media sources in addition to the features of the non-interactive infographics (Lankow, Ritchie, Crooks, 2012). For example, a relevant video, audio or animation relevant to the content can be used in these infographics. In addition, some other infographics allow their users to make selection and reach the information based on their selections are also in this group of infographics. This feature will enable the information to be presented as a whole and components to be used to meet the need for additional information.

The use of visual design principles can be said easily to be ensuring the striking of infographics. In order to create infographics not only is an effective approach for presenting information needed but also is visual design. Therefore, it is important to find, analyze and use the relevant information to create infographics. It is also very important to activate instructional design models while preparing infographics. According to Davis and Quinn (2013), the points that should be considered when attempting to create good infographics are listed as follows:

- Identification of the purpose,
- Decide on the components that can be used in infographics,
- Determination of the type of infographic to be created,
- Presenting the information in a way that allows learners to understand the subject.

Infographics created for educational purposes allow information to be presented within a particular context. Davis and Quinn (2013) argued that good infographics are useful in supporting the development of students. In addition, infographics are considered to be an effective communication tool for communication with the information (Smiciklas, 2012). The instructional effects of visuals are on the upper level when they are prepared according to the scheme of learners (Fleming and Levie, 1993). Similarly, learning with infographics may allow learners to understand the information in an organized way and form the basis for schemes needed to be created in the minds of individuals. The preparation process of infographics includes the steps such as using the existing information, learning new information and presenting the information in an organized way. Therefore, creating infographics may help students to improve their critical thinking, analysis and making synthesis skills in addition to creating instructional design skills (Mol, 2011; Hart, 2013).

Today, infographics have become environments that are widely used to present a variety of information. There are a few studies outlining the understanding of users towards infographics that have become more attractive by visual design principles and have a wide audience. Determining the status of use of infographics is very important for revealing the reader preferences, using these tools in the educational environments and formation of the design approach. Under the light of this importance, the aim of this study is presenting the views of learners reading infographics for educational purposes and status of information graphics within their learning preferences. For this purpose, the following questions are tried to be answered:

1. What are the views of the participants for impact of infographics on their learning?
2. What are the views of the participants regarding their infographic preferences for reading?
3. What are the views of the participants for sharing infographics with others?
4. What are the views of the participants regarding presentation of basic information by infographics?
5. What are the views of the participants regarding permanence/remembrance level of the information obtained by infographics?
6. What is the place of infographics in the learning processes of participants?
7. In what order participants prefer using infographics among all instructional materials?
8. In what order participants chose types of infographics?
9. What are the preferences of participants towards layout of infographics?
10. Which infographic structure participants like the most?

11. What are the factors affecting the educational power of infographics according to participants?
12. What are the views of the participants regarding the reasons of creating infographics?
13. What are the characteristics of a good infographic according to participants?
14. What are the differentiated situations of the participants regarding infographics depending on their genders?

METHOD

In this study, it has been aimed to present the views of learners reading infographics for educational purposes and the place of infographics among learning preferences.

Population/Sample

The population of this study consists of a total of 64 students composed of sophomore (17 female, 15 male) and junior (20 female, 12 male) students of the Department of Computer Education and Instructional Technology, Ataturk University, Kazim Karabekir Education Faculty. Participants' age ranged from 19 to 27. The study was conducted during the fall semester of the 2014-2015 academic year. All participants had infographic reading skills. Since the participants were studying computer and instructional technologies, they were considered to have sufficient computer skills. In the study, the appropriate sampling strategy was used.

Limitations of the Study

This study is limited with Department of Computer Education and Instructional Technology' students. Furthermore, the study is limited with students with high level of computer literacy learners.

Research Model

In this study, one of the quantitative research designs; the instant case study design was used. In this design, measurements are conducted after the administration to a single group is done (Creswell, 2014). In the study, a 20-week program was carried out including introduction of infographics to the participants, using them in learning activities and placing these infographics among their learning preferences. All participants were informed about types and features of infographics as well as ways of achieving them and their design processes. Then, the participants were given some learning tasks during 20-week training program and asked to prepare verbal and non-verbal presentations. Each student has prepared five presentations. They were set free in terms of reviewing the literature. The preferences of the participants regarding infographics were collected through a questionnaire.

Data Collection Tools

Infographic Reader Survey, which was developed by the researcher, was used as the data collection tool. Data collection tool is composed of 3 parts. The first part consists of 4 questions collects the demographics of the participants. The aim of the second part, which consists of a total of 23 5-points Likert type questions, is collecting the views of participants regarding infographics. The infographic reader survey developed by Yildirim, Yildirim and Celik (2015) was used in the second part. The reliability coefficient of this part containing 6 factors is 0.837. The factors of the survey are as follows: Informativeness, Selection Preferences, Sharing, Basic Presentation Structure, Retention-Memorability, Role in Learning Process (reliability coefficients of these factors are .863, .749, .750, .754, .679 and .678, respectively). In the last part of the survey, there were six questions asking participants to list their preferences towards infographics and other instructional materials.

Collection and Analysis of Data

Data was collected from sophomore and junior students of Ataturk University, Kazim Karabekir Education Faculty, Department of Computer Education and Instructional Technology in the fall semester of the 2014-2015 academic year. Surveys were printed and handed out to the participants. The data was analyzed by SPSS 18 package program. Percentage and t-test, which are descriptive statistical methods, were used to analyze the data. In the descriptive evaluations, the categorization of (1.00 - 1.80: I Strongly Disagree, 1.81 - 2.60: I Disagree, 2.61 - 3.40 I Rarely Agree, 3.41 - 4.20: I Agree and 4.21 - 5.00: I Strongly Agree) was used.

The participants were asked to state their views on various features of infographics and on various design components, ranking their order of importance based on their own preferences. The number of rankings was equal to the number of views solicited. For example, in a list in which 6 different views were presented, the first one received 6 points, and the forth view received 2 points. In this way, the actual score was calculated by taking the average of total ranking scores. Participants' preferences were determined based on their ranking of actual scores.

FINDINGS

In this study, the views of infographics users were discussed. The age of participants ranged from 19 to 27. A total of 64 participants including 37 females and 27 males were included in the study. Computer and literacy levels of all participants were high. The findings were organized in accordance with the questions asked with the scope of the study.

1. What are the views of the participants for impact of infographics on their learning?

The views of the participants for impact of infographics on their learning are given in Table 1.

Table 1. The Views of the Participants for Informativeness of Infographics

| Q | Statement | Male | | | Female | | | General | | |
|---|---|------|-----------|------|--------|-----------|------|---------|-----------|------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 1 | Visual representations used in infographics facilitate learning. | 27 | 4.30 | .775 | 37 | 4.59 | .551 | 64 | 4.47 | .666 |
| 2 | I think infographics are more instructive compared to long texts. | 27 | 4.26 | .903 | 37 | 4.49 | .651 | 64 | 4.39 | .769 |
| 3 | In infographics, presentation of information within a context facilitates learning. | 27 | 4.07 | .385 | 37 | 4.38 | .639 | 64 | 4.25 | .563 |

As shown in Table 1, participants think whether infographics had an impact of on their learning. They stated that since information is presented within a scope (\bar{X} =4.25) and visuals are used, infographics better facilitate their learning compared to plain text documents (\bar{X} =4.39). In addition, while the female participants strongly agreed that infographics provided within a scope facilitated their learning, the male participants agreed on this.

2. What are the views of the participants regarding their infographics preferences for reading?

Participants paid attention to certain points while selecting infographics, whether they provide similar or different information, to read. Participants' views on infographics preferences were determined by 5 questionnaire items. Their infographics preferences for reading are given in Table 2.

Table 1. The Views of Participants Regarding Their Infographics Selection Preferences

| Q | Statement | Male | | | Female | | | General | | |
|---|---|------|-----------|------|--------|-----------|-------|---------|-----------|-------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 4 | I look at the title of the subject when choosing an infographic to read. | 27 | 4.15 | .770 | 37 | 4.22 | .821 | 64 | 4.19 | .794 |
| 5 | I look at the visuals used in the content when choosing an infographic to read. | 27 | 4.19 | .681 | 37 | 4.11 | .966 | 64 | 4.14 | .852 |
| 6 | I look at the content when choosing an infographic to read. | 27 | 4.15 | .770 | 37 | 4.08 | 1.064 | 64 | 4.11 | .945 |
| 7 | I look at the person or organization that prepared it when choosing an infographic to read. | 27 | 3.85 | .818 | 37 | 3.97 | .897 | 64 | 3.92 | .860 |
| 8 | I prefer that it has social media sharing tools when choosing an infographic to read. | 27 | 3.78 | .974 | 37 | 4.00 | 1.106 | 64 | 3.91 | 1.050 |

As it can be seen in Table 2, the most important criterion while choosing infographics to read is title of the infographic (\bar{X} =4.19). The other two criteria are the visuals and content of infographics. The least important criteria paid attention are information of those prepared the infographic and social media sharing links (\bar{X} = 3.92; 3.91, respectively).

3. What are the views of the participants for sharing infographics with others?

The important situations for participants while sharing infographics are analyzed. The views of participants regarding infographics sharing were determined by 4 items. The responses given by participants to these items are given in Table 3.

Table 2. The Views of Participants Regarding Infographics Sharing

| Q | Statement | Male | | | Female | | | General | | |
|----|---|------|-----------|-------|--------|-----------|-------|---------|-----------|-------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 9 | Among the different sources of learning with visual representations, I especially recommend infographics to people around me. | 27 | 3.74 | .764 | 37 | 3.78 | .866 | 64 | 3.76 | .817 |
| 10 | I share the infographics, which I liked, to my friends who may be interested. | 27 | 3.56 | 1.155 | 37 | 3.64 | .961 | 64 | 3.63 | 1.047 |
| 11 | I share infographics that are prepared in compliance with copyrights. | 27 | 3.59 | .694 | 37 | 3.61 | 1.076 | 64 | 3.63 | .934 |
| 12 | I share the infographics that I like on social media platforms. | 27 | 2.93 | 1.174 | 37 | 3.42 | 1.052 | 64 | 3.23 | 1.137 |

As shown in Table 3, the views of the participants regarding sharing are mostly positive. The highest average value of the views belongs to "I mostly recommend infographics to people around me among all visual-based learning materials" (\bar{X} =3.76). Participants state that they share infographics with their friends if they like them and they care about being respectful to the copyrights (\bar{X} =3.63; \bar{X} =3.63, respectively). According to the responses of participants regarding that they share infographics on social media sites, they are neutral (\bar{X} =3.23).

4. What are the views of the participants regarding presentation of basic information by infographics?

Within the scope of the study, the views of the participants regarding presentation of basic information by infographics were investigated. Their views were obtained by 4 items. The responses of participants are given in Table 4.

Table 3. The Views of the Participants Regarding About Basic Presentation Structure of Infographics

| Q | Statement | Male | | | Female | | | General | | |
|----|---|------|-----------|-------|--------|-----------|-------|---------|-----------|-------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 13 | I do not interested in infographics taking too much time to read. | 27 | 4.04 | 1.091 | 37 | 3.92 | 1.339 | 64 | 3.92 | 1.276 |
| 14 | I do not trust infographics whose references are not indicated. | 27 | 3.67 | .734 | 37 | 3.75 | .967 | 64 | 3.71 | .869 |
| 15 | I do not read an infographic if the information presented is not up-to-date. | 27 | 3.70 | .953 | 37 | 3.58 | 1.339 | 64 | 3.61 | 1.190 |
| 16 | I do not understand the message given by infographics that have too much visuals. | 27 | 3.37 | 1.079 | 37 | 3.42 | 1.228 | 64 | 3.38 | 1.162 |

As it can be seen in Table 4, participants stated that they don't prefer infographics taking too much time to read (\bar{X} =3.92). In addition, they stated that they don't trust infographics that don't provide references of the sources (\bar{X} =3.71). Participants also don't prefer information is not up to date (\bar{X} =3.61). The views of participants, who have concerns about the amount of visuals used in infographics that may get ahead of the message given by infographics, are neutral (\bar{X} =3.38).

5. What are the views of the participants regarding permanence/remembrance level of the information obtained by infographics?

The views of the participants regarding permanence/remembrance level of the information obtained by infographics are investigated. The views regarding permanence/remembrance level of the information obtained by infographics were collected by three items. Their views are given in Table 5.

Table 4. The Views of the Participants Regarding Retention-Memorability Level of the Information Obtained by Infographics

| Q | Statement | Male | | | Female | | | General | | |
|----|---|------|-----------|------|--------|-----------|------|---------|-----------|------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 17 | I think visualizations in infographics make more memorable what I learn from them. | 27 | 4.26 | .712 | 37 | 4.27 | .693 | 64 | 4.27 | .696 |
| 18 | I remember information that I learned from infographics easier compared to plain text materials. | 27 | 4.19 | .834 | 37 | 4.24 | .796 | 64 | 4.22 | .806 |
| 19 | As infographics present critical information required to be learnt on a subject, I learn the conveyed information in a better way compared to other learning materials. | 27 | 3.85 | .770 | 37 | 4.03 | .957 | 64 | 3.95 | .881 |

As shown in Table 5, the views of the participants think that information obtained from infographics is permanent (\bar{X} =4.27). Similarly, they state that they remember the information obtained from these infographics easily (\bar{X} =4.22). In addition, they have stated that they learn better from infographics compared to other teaching materials since they provide critical information (\bar{X} =3.95).

6. What is the place of infographics in the learning processes of participants?

The views of participants regarding the place of infographics in the learning processes are obtained by 4 questionnaire items. Their responses are given in Table 6.

Table 5. The Role of Infographics in the Learning Processes of Participants

| Q | Statement | Male | | | Female | | | General | | |
|----|---|------|-----------|-------|--------|-----------|-------|---------|-----------|-------|
| | | N | \bar{X} | Std. | N | \bar{X} | Std. | N | \bar{X} | Std. |
| 20 | I prefer to read an infographic rather than reading a plain text to learn same subject. | 27 | 4.15 | 1.027 | 37 | 4.30 | .740 | 64 | 4.23 | .868 |
| 21 | Before checking other sources concerning a subject I am trying to learn, I prefer reading infographics, if there are any. | 27 | 3.48 | .893 | 37 | 3.84 | 1.118 | 64 | 3.69 | 1.037 |
| 22 | To gain an idea about a subject I will be learning, I first investigate/examine the infographics on the subject. | 27 | 3.59 | .971 | 37 | 3.65 | 1.033 | 64 | 3.63 | 1.000 |
| 23 | While making a search to learn about a given subject, I am able to find a | 27 | 2.89 | 1.155 | 37 | 3.16 | 1.344 | 64 | 3.05 | 1.265 |

| | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|
| sufficient number of infographics prepared in my native language. | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|

As shown in Table 6, participants state that they prefer infographics to learn instead of reading plain texts (\bar{X} =4.23). They also state that they prefer infographics to learn a new information and they search for such documents (\bar{X} =3.69; \bar{X} =3.63, respectively). However, they seem neutral in terms of finding sufficient number of infographics related to the subject that they are looking for in Turkish (\bar{X} =3.05).

7. In what order participants prefer using infographics among all instructional materials?

Within the scope of the research, participants were asked to put in what order they use infographics among all instructional materials based on their preferences. The results regarding order of instructional materials in the categories such as interactive instructional materials, infographics, videos, books and article/report are given in Table 7.

Table 6. Order of Preference of Educational Materials

| Instructional material type | 1.Row | 2.Row | 3.Row | 4.Row | 5.Row | 6.Row | Real Row | Total Point |
|--|---------|---------|---------|---------|---------|---------|----------|-------------|
| | 6 point | 5 point | 4 point | 3 point | 2 point | 1 point | | |
| Video | 28 | 14 | 14 | 3 | 2 | 1 | 1 | 308 |
| Infographic | 13 | 18 | 13 | 10 | 5 | 2 | 2 | 262 |
| Interactive instructional materials | 11 | 13 | 15 | 9 | 10 | 3 | 3 | 241 |
| Book | 4 | 10 | 6 | 22 | 16 | 4 | 4 | 200 |
| Article-Report | 3 | 6 | 10 | 15 | 20 | 6 | 5 | 179 |

As it can be seen in Table 7, the most preferred instructional materials are videos. Infographics are the second and interactive instructional materials are the third channels preferred by participants. The printed sources such as books and article/reports are the last two items rarely preferred by participants.

8. In what order participants chose types of infographics?

Within the scope of the study, order of preferences of participants regarding infographic types is investigated. They were asked to put their preferences in an order among 6 different infographic types as follows; static, zoomable, clickable, animated, video and interactive infographics. Results are given in Table 8.

Table 7. Order of Preference of Infographics Types

| Infographic Type | 1.Row | 2.Row | 3.Row | 4.Row | 5.Row | 6.Row | Real Row | Total Point |
|--------------------|---------|---------|---------|---------|---------|---------|----------|-------------|
| | 6 point | 5 point | 4 point | 3 point | 2 point | 1 point | | |
| Interactive | 27 | 6 | 9 | 6 | 7 | 6 | 1 | 266 |
| Animated | 9 | 16 | 25 | 6 | 4 | 2 | 2 | 262 |
| Video | 8 | 20 | 13 | 14 | 4 | 3 | 3 | 253 |
| Clickable | 4 | 14 | 7 | 22 | 11 | 2 | 4 | 212 |
| Zoomable | 3 | 7 | 7 | 6 | 26 | 12 | 5 | 163 |
| Static | 12 | 1 | 1 | 6 | 8 | 32 | 6 | 147 |

As shown in Table 8, interactive infographics are the most preferred types among the participants. In addition, animated and video infographics are also preferred followed by clickable, zoomable and static infographics, respectively.

9. What are the preferences of participants towards layout of infographics?

Within the scope of the study, the preferences of participants towards layouts of infographics were analyzed. Layouts of infographics were categorized as follows; horizontal standard paper size, proper size for horizontal presentation, vertical standard paper size and proper size for vertical presentation. The views of participants are given in Table 9.

Table 8. Order of Preference of Layouts of Infographics

| Infographic Type | 1.Row | 2.Row | 3.Row | 4.Row | Real Row | Total Point |
|--|---------|---------|---------|---------|----------|-------------|
| | 4 point | 3 point | 2 point | 1 point | | |
| Vertical Layout suitable for Presenting Information | 36 | 17 | 2 | 9 | 1 | 208 |
| Vertical- Standard Paper Sizes | 19 | 30 | 9 | 5 | 2 | 189 |
| Horizontal- Standard Paper Sizes | 6 | 7 | 29 | 19 | 3 | 122 |
| Horizontal Layout suitable for Presenting Information | 3 | 9 | 22 | 28 | 4 | 111 |

As it can be seen in Table 9, the most preferred infographics were the ones with vertical layout and suitable for vertical presentation, while the least preferred infographics were the ones with horizontal layout and suitable horizontal presentation.

10. Which infographic structure participants like the most?

In the study, the structures of the most preferred infographics were analyzed. Their structures contained more than one feature. Their preference components were categorized as single or serial, printed or electronic, color or black and white, horizontal or vertical, interactive or non-interactive, zoomable, animated or video. Participants had to respond to questions by selecting one or more of these categories. Participants' responses were analyzed while taking gender variable into account. The results are given in Figures 1 and 2, respectively.

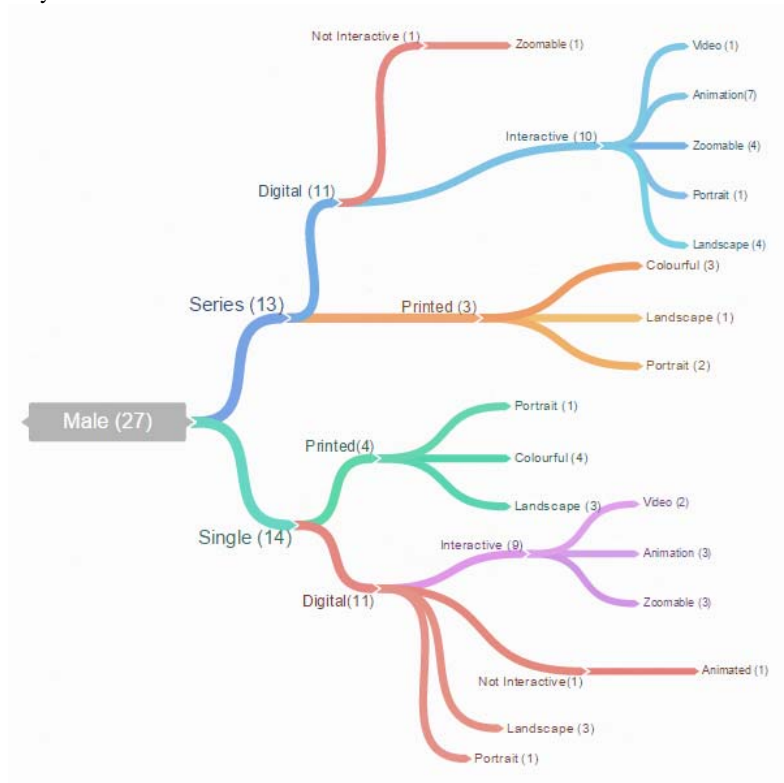


Figure 1. Infographics Preferences of Male Participants

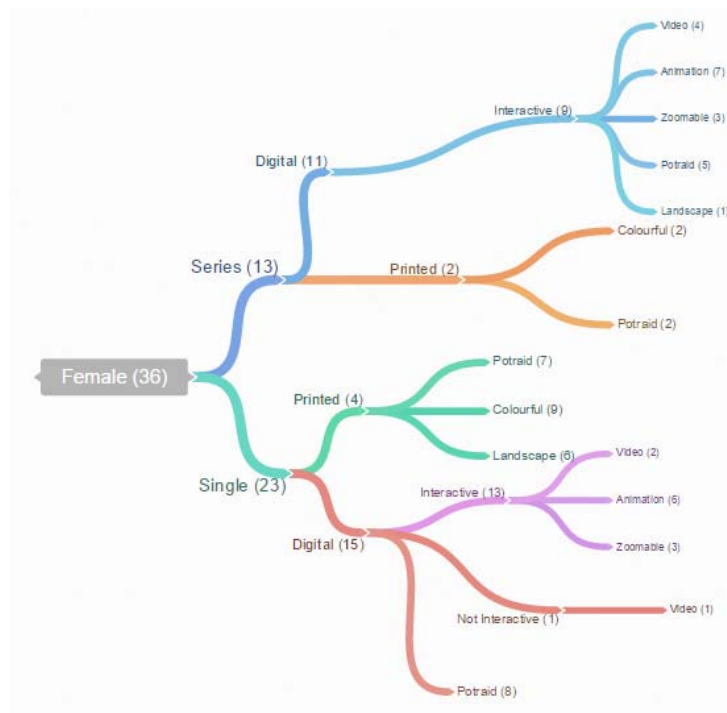


Figure 2. Infographics Preferences of Female Participants

As seen in the figures, the participants preferred infographics in a single form (37). Infographics with electronic form (48) were preferred more among both single and serial infographics. Participants stated that they would like to have infographics with a vertical layout (27). They also preferred electronic infographics to have an interactive structure (41). They preferred printed infographics be in color (18).

11. What are the factors affecting the educational power of infographics according to participants?

In the study, participants were asked to list the factors affecting the educational power of infographics and level of effectiveness of each factor. The factors affecting the educational power of infographics are categorized as information-visual adaptation, information quality, quality of the visualization, quality of the visuals and design approach. Results are shown in Table 10.

Table 9. Factors Affecting the Educational Power of Infographics

| Factor | 1.Row | 2.Row | 3.Row | 4.Row | 5.Row | Real Row | Total point | Level of Effectiveness |
|--------------------------------------|---------|---------|---------|---------|---------|----------|-------------|------------------------|
| | 5 point | 4 point | 3 point | 2 point | 1 point | | | |
| Information-Visual consistency | 8 | 16 | 6 | 9 | 2 | 1 | 142 | 4.35 |
| Information quality | 10 | 9 | 8 | 7 | 7 | 2 | 131 | 4.41 |
| Quality of information visualization | 12 | 5 | 9 | 4 | 11 | 3 | 126 | 4.41 |
| Visual quality | 3 | 8 | 12 | 14 | 4 | 4 | 115 | 4.5 |
| Design concept | 8 | 2 | 6 | 7 | 17 | 5 | 97 | 4.33 |

As shown in Table 10, the adaptation of visuals and information provided by infographics is in the first place among factors affecting the educational power of infographics (Level of effectiveness, \bar{X} = 4.35). The quality of information comes second (Level of effectiveness, \bar{X} = 4.41) followed by quality of the visualization of information (Level of effectiveness, \bar{X} = 4.41), respectively. Quality of the visuals comes fourth with an effectiveness level of \bar{X} = 4.5. Design approach is the last factor affecting the educational power of infographics (Level of effectiveness, \bar{X} = 4.33).

12. What are the views of the participants regarding the reasons of creating infographics?

Within the scope of the study, the views of the participants regarding the reasons of designing infographics were obtained. The reasons were categorized as performing the education, sharing information, establishing an understanding, advertisement and increasing the number of visitors who visit the website. The views of the participants are given in Table 11.

Table 10. The Views of the Participants Regarding the Reasons of Creating Infographics

| Reason | 1.Row | 2.Row | 3.Row | 4.Row | 5.Row | Real Row | Total Point |
|--|---------|---------|---------|---------|---------|----------|-------------|
| | 5 point | 4 point | 3 point | 2 point | 1 point | | |
| Perform teaching | 31 | 18 | 6 | 1 | 3 | 1 | 250 |
| Sharing information | 18 | 23 | 13 | 3 | 2 | 2 | 229 |
| Creating understanding | 3 | 9 | 24 | 15 | 8 | 3 | 161 |
| Advertising | 4 | 7 | 10 | 24 | 14 | 4 | 140 |
| Increasing the number of visitors for the site | 3 | 2 | 6 | 16 | 32 | 5 | 105 |

As shown in Table 11, the first reason why infographics are created was stated as performing education in any subject by the participants. Sharing information is in the second place followed by establishing an understanding, advertisement and increasing the number of visitors who visit the website, respectively.

13. What are the characteristics of a good infographic according to participants?

Within the scope of the study, the participants were asked to list the characteristics of a good infographic and level of these characteristics in terms of making infographics better. Characteristics were divided into 9 categories as follows; purpose, quality of the visual, level of visualizing the information, quality of information, association between visuals and information to be presented, information-visual consistency, typographic features, utilized resources and person or organization created the infographics. The views of participants are given in Table 12.

Table 11. The Characteristics of a Good Infographic

| Features | 1.Ro w | 2.Ro w | 3.Ro w | 4.Ro w | 5.Ro w | 6.Ro w | 7.Ro w | 8Row | 9.Ro w | Rea l Row | Tota l Point | Degree of Influence (effect) |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|--------|---------|-----------|--------------|------------------------------|
| | 9 point | 8 point | 7 point | 6 point | 5 point | 4 point | 3 point | 2point | 1 point | | | |
| Aim | 15 | 5 | 5 | 4 | 0 | 0 | 0 | 6 | 4 | 1 | 252 | 4.47 |
| Visual Quality | 3 | 12 | 6 | 9 | 1 | 2 | 0 | 3 | 3 | 2 | 239 | 4.63 |
| Visualization level of information | 2 | 3 | 13 | 4 | 1 | 6 | 2 | 2 | 6 | 3 | 237 | 4.68 |

| | | | | | | | | | | | | |
|---|---|---|---|---|----|---|----|----|---|---|-----|------|
| Information quality | 5 | 6 | 1 | 8 | 4 | 4 | 3 | 3 | 5 | 4 | 225 | 4,47 |
| Association of information visualization | 1 | 2 | 2 | 2 | 12 | 8 | 7 | 1 | 4 | 5 | 202 | 4,47 |
| Information – Visual consistency | 2 | 2 | 1 | 2 | 8 | 3 | 12 | 4 | 5 | 6 | 196 | 4,74 |
| Typographic features | 4 | 4 | 1 | 3 | 2 | 6 | 6 | 6 | 7 | 7 | 165 | 3,97 |
| Utilized resources | 4 | 2 | 4 | 1 | 6 | 5 | 3 | 10 | 4 | 8 | 124 | 4 |
| Prepared by a person or organization | 3 | 3 | 6 | 6 | 5 | 5 | 6 | 4 | 1 | 9 | 115 | 3,97 |

As it can be seen in Table 12, according to participants, purpose of infographics is the most important characteristic. This is followed by quality of the visual, level of visualizing the information and quality of information. The sources used and person or organization created the infographics are the last two factors concerned for a well-prepared infographic.

14. What are the differentiated situations of the participants regarding infographics depending on their genders?

In the study, the differentiated situations of the participants regarding infographics depending on their genders were analyzed. The views stating that providing the information within a concept in infographics facilitates my learning differentiate depending on gender of the participants (Male- $\bar{X}=4.07$; Female $\bar{X}=4.38$). There is significant difference between t-test results regarding this statement ($t=2.198$ $p<.05$). This may be caused by that female participants prefer visual materials to learn something.

Another differentiated situation between male and female participants is sharing the infographics liked on social networking sites. Male participants responded as being neutral while female participants agreed on sharing infographics on these sites ($\bar{X}=2.93$; $\bar{X}=3.42$, respectively). The views of participants regarding sharing infographics on social media sites were analyzed by t-test. No significant difference was found between these two groups in the results of t-test ($t=1.891$ $p>.05$).

DISCUSSION

This study reveals the views and various preferences of infographic readers. All the participants were capable of reading infographics. According to the findings, infographics facilitate learning and they are considered more instructive compared to plain texts. Vanichvasin (2013) implies that infographics provide awareness and they facilitate to remember the subjects. This situation may be due to the teaching capacity of visuals which are well-organized and giving a message. Well-prepared infographics are considered to be one of the effective instructional materials (Davis and Quinn, 2014). Fleming and Levie (1993) state that visuals are more permanent and well-prepared visuals have positive impacts on the cognitive learning processes of the learners. In addition, since students spend less time to learn the information presented by infographics and they are exposed to less amount of cognitive load, the thought that infographics are more instructive may be established. Due to the excessive information provided through different delivery tools of multimedia items that contain multiple components, limited capacity and the level of information that can be processed, the learning becomes more difficult (Mayer and Moreno, 2003). The important points presented as ready in the information presented and representation of the relationship between them may have created less cognitive load and enhance the satisfaction. As stated in the literature, excessive cognitive load makes it difficult to learn and detect the content links (Sweller, 1994). In addition, it may be due to the more interesting structure of infographics compared to classical learning materials and using different presentation tools in educational processes in a more effective form.

Readers first look at the title of infographic, then visuals and content to determine which infographic they choose to read. This may be due to that the title and visuals allow readers to quickly understand what information is provided by infographics at first glance (Fleming and Levie, 1993). Krum (2013) states that the title of infographics is important for readers and they pay attention to them to not to waste time and review a non-relevant infographic. Since they look through the content after checking the title and visuals of infographics first, title and visuals seem quite important for readers before starting to read an infographic. Readers prefer to read infographics, which provide name of the person or institution prepared the infographic, rather than those without any name. According to Fleming and Levie (1993), reliable information should be presented to the reader. This can be explained by that the confidence of the reader is transmitted to infographics created by either persons or institutions. In infographics providing the name of their creators, the perception of that these infographics are prepared more seriously may occur.

Infographics, which have visual features, are the most recommended materials among instructional materials to prospective readers. In addition, readers share infographics with those who may be interested in them. These two situations may be associated with high level of instructiveness of infographics and sharing them easily. Davis and Quinn (2014) states that infographics are easy to share and they allow its readers to learn in collaboration and support the communication. In addition, they consider copyrights while sharing the content of infographics. This may be associated with they would like to share more secured content. Similarly, Fleming and Levie (1993) state that sources with higher reliability are more convincing.

Infographics taking too much time to read are not preferred in learning processes. This situation may be due to that readers feel that the power of providing fast and effective information by infographics compared to other educational materials is reduced. Similarly, Krum (2013) states that infographic readers expect to see more visuals for a faster learning process and they would like to have less amounts of text. Fleming and Levie (1993) indicate that short texts should be preferred in order to ensure the confidence of learners and attract their attention. The reliability level of infographics with no references given for the information provided is low. In addition, the reading level of infographics that don't provide up to date information is also low. These two situations may be caused by the necessity of that infographics should be equipped with reliable and trustworthy information. It can be said that excessive visualization doesn't make it difficult to notice the information presented. This can be interpreted that readers believe in educational power of the visuals.

It is believed that the visualization in infographics increase the durability of learning. Zinonyev (2010) states that visualization used in infographics facilitate the analysis of message and allow its readers to remember this message given in the content. Since visuals allow readers to add new information to their existing schemas and facilitate to create new schemas, they may think that visuals increase the durability of learning. Fleming and Levie (1993) state that the visuals fit the existing schemas of readers facilitate the perception. In addition, this may be caused by that learning processes are performed by activating more than one channel. Sweller and Chandler (1994) indicate that for a successful learning, excessive cognitive load shouldn't be created and both audio and visual channels should be used within their capacities.

It is also believed that it is easier to remember the information learnt from infographics compared to texts. This may be due to that infographics use both audio and visual channels during learning processes. The information organized with stronger relationships can be more easily remembered. It can be said that presenting critical information by infographics facilitates the learning process. This may be due to that the participants think that the information provided by infographics is well-organized and important points are emphasized. In addition, spending less time for learning and learning without making any selections may lead readers to feel that they learn more effectively from infographics.

Readers preferred to use infographics rather than plain texts to learn. Readers prefer visuals rather than creating new schemas or improving existing schemas. Infographics are preferred before other instructional materials and infographics are searched for the subject to be learnt. This can be explained by the fact that infographics are very ideal because they ensure that readers to learn the important points of the subject quickly and reach similar information within a concept. In addition, infographics offer a learning environment that provides basic information about the subject and allows individuals to learn at their own pace.

Videos, infographics and interactive materials with high visual features are preferred first by people instead of traditional materials such as books prepared for the same subjects. Although these three materials have different features, their visual levels are high. Allen and Seaman (2014) states that faculty members prefer materials with high visual and interactive features for open educational activities and nearly half of them use infographics in educational activities. The reason why readers prefer materials with high visual features may be their desire to learn from alternative materials. Their high computer skills may have caused readers to prefer electronic learning materials. In addition, since these materials are easy to update, the confidence of readers and rate of preferring them can be increased.

The preference of reader can be affected by additional information offered by infographics. Most preferred infographics are interactive, animated, video and clickable infographics, respectively. This may be due to that readers would like to see additional information offered by infographics within the same concept along with basic information already offered. In addition, this can be also considered as a strategy readers choose to transfer the information more easily. Similarly, Fleming and Levie (1993) argued that the quality of visuals and visualization is important in the transfer of the information. This is supported by that the least preferred infographic types are the ones that are zoomable with static structures.

The most preferred infographics are those that have vertical layouts whose size for sufficient to presenting information intended to be given to the reader. The selection of vertical layouts of sufficient size for presenting information may be due to participants reading habits, their desire to read faster and presenting the information in that layout. Similarly, Krum (2013) stated that infographics with vertical layout are preferred more preferred by the readers. In addition, vertical scrolling may be easier than horizontal scrolling. This is supported by the fact that infographics presenting information in a horizontal layout are the least preferred infographics by the readers.

Considering the multiple features, the most preferred infographics are monolithic ones. This may be caused by the desire of learning the information as a whole within a context. Infographics with digital form are preferred. This may be due to that digital materials can be accessed independently from tools and environment. The dynamic structure of digital infographics may be another reason why they are preferred by readers. Interactive ones are preferred among digital infographics. This may be due to that additional information can be obtained from interactive infographics if needed. In addition, the motivation for learning with spending more cognitive effort can be another reason. Similarly, Fleming and Levie (1993) argued that more cognitive effort affect learning in a positive way. Printed infographics are preferred to be colored. This can be interpreted as that information is desired to be obtained without losing anything from its actual form and the power of visualization in learning shouldn't lose anything. In addition, infographics with vertical layout are preferred. This can be explained by reading habits and easy scrolling when the page is vertical.

The adaptation of information and visuals is the main factor determining the quality of infographics. It is possible to associate this with that infographics are perceived as a whole and consistency of all components forming infographics positively affect the instructiveness of infographics. Fleming and Levie (1993) state that visuals used in infographics and the information given should

be consistent with each other when they are used together. The quality of information and visualization are two main factors affecting the quality of infographics. Since presenting the information through visual components is basic philosophy of infographics, it may be thought that the quality of these components directly affect the quality of infographics. The quality of visuals affects the quality of infographics as much as visualization. This may be caused by that high-definition visuals create a feeling of quality. According to Fleming and Levie (1993), the quality of visuals has a positive impact on the motivation of learner. In addition, the visual quality may lead to an understanding that infographics are created professionally. The design concept of infographics is among quality indicators. This may be associated with understanding that presenting the information and visuals within a relevant concept increase the quality. In addition, since the design concept is not in the last place, this may be due to that this component is not directly associated with presentation of the information. Fleming and Levie (1993) argued that additional factors such as typographic features should also be considered.

Infographics are mostly prepared to teach a subject. This can be interpreted as that infographics have become one of the basic instructional materials. Information sharing is one of the main reasons for preparation of infographics. This can be interpreted as that infographics are considered as information transfer tools. Lamb, Polman, Newman and Smith (2014) revealed that infographics can be preferred as much as other instructional materials by building educational activities on infographics. It is quite obvious that infographics are prepared to deliver a message and understanding to their readers. This may be interpreted as that infographics can be used to establish awareness on a subject. The last two reasons with least importance to create infographics are advertisement and increasing the number of visitors who visit the website. This may be caused by that the readers think that infographics have also some side effects along with their educational power. Lankow, Ritchie and Crooks (2012) stated that infographics are prepared for purposes such as presentation of the information, attracting attention and promotion.

Purpose is the main feature of a good infographic. Since purpose affects many features of an infographic from level of information to its extent, it may be considered as the most important feature of a good infographic. Visual quality and level of visualizing the information are also considered as basic features of a good infographic. This shows that visuals are considered to be the basic information transfer tools of infographics. In addition, this also shows that the ability of good presentation of the information and expressing the information by a visual language is considered as basic features of infographics. Information quality and information-visual consistency are also seen among the features of a good infographic. This shows that information quality and consistency between visuals and information offered are important for a good infographic. In addition, typographic features should be considered while presenting the information and sources and person or institution prepared the material should also be provided to the reader.

CONCLUSION AND RECOMMENDATIONS

As a result;

- Infographics facilitate learning. Infographics can be used to teach basic information about a subject, present new information or confirm the information currently available.
- Infographics are perceived as more instructive compared to text materials. Therefore, infographics can be used as supporting elements in the books and as an alternative to plain text materials.
- While reading infographics; the readers reviews the material's title, visuals and content. Infographic designers should find a catchy title that reflects the information offered by the infographic. The best visuals reflecting the content should be used and contents consistent with the aim of the material should be prepared.
- The confidence level of infographics increases if the person or entity, who prepared the infographic, is known by the reader. The names of creators and designers should be provided while preparing infographics. In this way, the information either needed or wanted to see by readers would be provided.
- Infographics are the most recommended materials among visual educational materials to potential readers. Therefore, the components needed to share these materials should be included (for example: social networking buttons).
- Infographics paying attention to copyrights seem more reliable. Therefore, while creating infographics and sharing these materials, necessary attention should be paid to the copyright regulations.
- The confidence level for infographics, which don't provide the sources used, is low. All sources utilized in the preparation of infographics should be presented to the reader in the infographics. In this way, the reliability and validity of the information can be checked and readers can easily reach the original source of the information presented.
- Infographic, which don't provide up to date information, are not preferred. Infographics should be kept up to date and updated if necessary to ensure readers achieve the most accurate and latest information.
- Infographics taking too much time to read are not preferred. Therefore, the context should be determined very well for an effective infographic and putting useless information to these materials should be avoided.
- Visualizations facilitate learning. Infographic designer should plan visualizations well and visualizations should be designed as offering consistent information with the content in order to prepare an effective educational material.
- It is easier to remember the information learned from infographics compared to plain text materials. In order to use this feature of infographics, contents should be prepared by paying attention to the message design guidelines for the use of a combination of text and visuals. In addition, the content should be supported by some techniques such as using memory nails to make it easier to remember.
- Infographics contain the critical information that should be learned about the subject. In order to provide this understanding, content should be well-analyzed and basic components should be provided while preparing infographics. In addition, additional information should be provided for those who may need to learn more about the topic.

- Infographics are the main materials used to learn an unknown subject. It is important to take this into consideration while preparing the content of infographics within a structure that can deliver more detailed information if requested by the reader.
- Infographics in digital form are preferred more by readers. In order to provide learning independent from environment and tools, infographics in digital form should be designed.
- Infographics offering the possibility of receiving additional information are preferred more by the readers. Interactive infographics are the most preferred infographic types in digital form. In this respect, while creating infographics, links leading readers to external information should be given and alternative information presentations should be planned and integrated into infographics by considering readers who may have different knowledge levels.
- The vertical layout suitable for presenting the information should be preferred for infographics. Infographics can be designed by considering this layout in order to maintain the proper design structure and support the habits of readers.
- Single infographics are preferred instead of serial ones to deliver a subject. Infographics should be designed in a single structure to provide information as a whole to the reader without causing any distraction and making reader to spend any effort to find the next phase of the information offered.
- Printed infographics are preferred to be colored; because infographics are more powerful in terms of delivering their messages and information to their readers when the visuals are colored.
- For a good quality infographic;
 - The consistency between information and visuals should be provided.
 - Designers should pay attention to the consistency of content of information, taxonomic level and layout that are provided by visualizations.
 - Decorative images that may cause cognitive load and visuals that are not instructive should be avoided.
 - Information and visualization of the information should be top quality.
 - Presenting information without errors should be provided.
 - Unnecessary, irrelevant information and visuals that don't conform to the logical structure of the material must be excluded.
 - The visual quality should be top level.
 - The use of colors should be appropriate to the context.
 - The quality of visuals must be done so as not to arouse discomfort and must be prepared so as to contribute to the integrity.
 - Design concept should be appropriate to the purpose
 - Visual structure should be prepared as being associated with the subject and should be at a level to express itself.
 - Typographic features should be prepared in a consistency.
- Infographics are defined in instructional materials. They are considered as fast and engaging instructional materials and they should be designed as rigorous and systematic as other instructional materials to make them effective educational tools.
- In order to have infographics with good features and power of perception:
 - The purpose is the basic component of a good infographic. Since the purpose affects all components from visuals to level of presenting the information in the infographics, the purpose should be determined very well and considered in all phases of the design process.
 - Visual quality and visualizing the information are basic properties of a good infographic. Since they are two basic properties of an infographic, visuals should be prepared very well and they should reflect the information offered properly. Visuals should be in high quality.
 - The quality of information and consistency with visuals should be provided.
 - Attention must be paid on typographic components. Typographic structure should be decided during the design phase to avoid distractions and ensure consistency and this standard structure should be applied to entire infographic.

This study was conducted with a group with high ability of educational material design and computer skills. It is recommended to conduct similar studies on different groups. The study can be repeated with individuals from different educational levels. Design experiments can be prepared to determine the characteristics of a good infographic.

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Interactive Textbook - A New Tool in Off-Line and On-Line Education

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ABSTRACT

Implementation of ICT in the educational process has allowed us especially in the last decade to fully develop cognitive and psychomotor skills of students. A typical example is the use of multimedia, through which the learner gradually formed and developed their skills in the area of sensory perception. The paper is focused on one of the modern tools of education geography for interactive textbook for grammar (high) schools. The new generation of interactive IRS systems allows not only listen to audio files of the book, but the book also communicate with the computer. This function can be used in on-line teaching process, where the teacher receives immediate feedback regarding the work of students in class. The new generation of interactive textbooks it can perform the function of the voting equipment. Talking books as exercise books are intended primarily for testing and practicing curriculum.

Keywords: IRS system, Interactive textbooks, ICT, talking books.

INTRODUCTION

Numerous studies show that students complain about of their obsolete textbooks, and that they seldom read these textbooks, leaving them poorly prepared to understand lectures (Stelzer et al., 2009), (Podolefsky & Finkelstein, 2006), (Chen et al., 2010). Much recent innovation in classroom methods and technology addresses this problem of student motivation and preparation in the natural sciences.

Reading is an activity that is not only informative or pleasurable, but can have significant social benefits. Especially in a family setting, it is part of the interaction between children and their parents, it helps create a bond between children and their grandparents, and even bring adults and their older parents closer. Furthermore, reading can be a challenge for older adults or for those with impaired eyesight. To address these problems are determine e-book(Attarwala et al., 2013).

Interactive study materials have been shown to improve student learning outcomes in various STEM fields (Donnell, Singhose & Kivila, 2014). An interactive textbook has substantially less text than a traditional textbook, instead having numerous embedded question sets designed for learning and not quizzing, numerous animations of key concepts, and some built-in tools.

To address the problem of student engagement with textbooks, we have chosen to move away from the resources provided by traditional publishers. We promote the use talking books. These devices are poised to have a significant impact on the way textbooks are prepared and used in college science and engineering courses. Talking books to be very effective classroom tools when projects can be developed and programmed entirely on the devices (Liu et al., 2011).

Demonstrable impact on student learning It has been repeatedly discussed (Perez et al., 2012), (Perez et al., 2011), (Sloan, 2012), (Van Oostveen et al., 2011), (Weisberg, 2011).

Talking books for primary and secondary schools have broad use in collective work at the school during the classes, but also for individual activities in preparation for teaching and in leisure time activities. With active using of speaking textbooks students can do independently prepare to education, even learning a foreign language without the presence of a parent or teacher. Talking books as exercise books are intended primarily for

testing and practicing curriculum. Unlike traditional books the correct answers to each question can be immediately evaluated directly in the text and not at the back of textbooks. Talking books also contain quizzes, allowing a secret key, the correct password or code after successfully answering all questions. A parent or teacher can thus verify whether the student passed the whole curriculum.

Talking books contain a large amount of additional information that is not in written form, but as recorded. The amount of information in a talking book, therefore, is not limited by number of pages, but often several times higher than on the paper. Talking books are useful in school, at home, while traveling, anywhere. Talking books for students of secondary schools are richly illustrated and provides a large amount of interesting information. To work with books, it is necessary IRS pen, that can reproduce sound and work with books acquires a new and interesting dimension. Pen also facilitate the control and responsibility. The book offers many definitions and attractions that are not part of conventional textbooks.

THEORETICAL AND METHODOLOGICAL BASIS

Work with textbook has the most diverse forms and specific characteristics. It is preparing for higher forms of independent work with professional geographic text. Frequent, systematic, diverse and thoughtful application of geography textbooks in various stages of the lesson leads to the fact that students not only understand the formulations, designs and tasks, but also they create a skill and habit of working with textbooks or other required literature. When testing and checking knowledge, the teacher can rely on suggestions in the textbook to verify whether if students used it for preparation at home. Themselves able to use the book, is necessary to teach students how to find out internal connections and relationships between different parts of the text and match earlier knowledge with new curriculum (Čižmarová, 2008, Dubcová, Kramáreková, Oremusová, Bagita, 2010, Hasprová, Oremusová, Rampašeková, 1999).

Complementary geographic literature is very attractive for students and presents many phenomena, facts and regions more interesting, associated with personal experience, describing the journey into the unknown parts of the world (Krogmann, Veselovský, 2003, Kramáreková, Dubcová, Vojtek, 2012). Additional such documentation is the novelty of speaking textbook for secondary as well as primary schools.

Educational tests are the modern resource to detect the quantity and quality of knowledge and skills of learning subjects. The test contains a relatively large number of proposed tasks so that the answers to which are not time consuming, but doing so in difficulty undermine their solutions. These tasks may simultaneously solve all students of class or even more classes (Kramáreková, Dubcová, Farkaš, 2015, Dubcová, Kramáreková et al., 1999, Likavský et al., 2001, Kopernická, Rampašeková, Feszterová, 2010, Rampašeková, Kramáreková, Feszterová, Kopernická, 2001).

IRS SYSTEM

Interactive Response System (IRS), is an interactive system, that turns the classic books on speaking. Talking books with the IRS logo are not different from the classic book at the first view. On each page, they contain invisible code that can read by IRS pen sound files with possibility with listen through the built-in speaker in the pen, or through headphones connectable to the pen.

IRS pens allow not only listen to audio files of the book, but the book also communicate with the computer. This feature is useful in the learning process where the teacher receives immediate feedback on student's work in class (answers of questions are recorded and statistically processed on the teacher's computer).

Talking book works along with related interactive IRS pens. IRS interactive pen is compatible to all books. Each book includes in the background information, how it will be activated in the pen (supplied IRS pen at the logo on the cover of the book). After activation just only touch by pen on examples of relevant tasks or pictures and pen automatically reproduces relevant text or any audio recording. Besides the IRS pen reading books also works as a MP3 player while USB key. After connecting pen to the computer (via mini USB cable) can be on the internal memory (2GB) or external memory of pen (micro SD Card - Max. 8GB) to record MP3 music files and play those in the pen, either via built-in speaker or through headphones connectable to the pen. IRS pen also serves as a USB key to transfer any data, since the computer can connect to the computer is seen as an externally attached disk.



Figure 1: IRS system (www.hovoriaceknihy.sk, 2015)

By IRS pen knows every user work with book very quickly, since the work with the pen is very intuitive. After a short time everyone knows how to work with every book, creating tests to check their answers and thus improve itself. IRS pens have a headphone jack, so working with a talking book can be anywhere (on the bus, on the train, in the car, in a waiting room etc.).

IRS portal serves as a tool for teachers in testing and validation of students. Using this website, teachers can create any tests for students and how they respond by placing the IRS pen to the voting card. The test results are automatically evaluated upon their completion and thus relieve the teachers from manual correction of tests.

ADVANTAGES OF USING INTERACTIVE WORKBOOK

Interactive (speaking) exercise book has several advantages. One of them is the fact that the student / child can have fun without knowing read. Talking books are full of sounds, poems, stories, tasks to solve, but also information that children acquire by playfully stoking IRS pen on the pictures in the book. Children know how to entertain themselves without the presence of another person while to learn. Particularly through eye-catching way to develop their memory, attention and imagination. Talking books allow interesting way to learn a foreign language, for example. The student learns independently and can also be checked. Talking books as exercise books are intended primarily for testing and practicing curriculum. Unlike conventional books are the correct answers directly in the text and not just behind the textbook.

The student will obtain a greater amount of information compared with traditional books. Talking books contain a large amount of additional information that is not in written form, but only recorded. The volume of information in a talking book is thus not limited by the number of pages, and often several times higher than on paper. Talking books are available in both basic and extended the original which can be supplemented by various labels and coupons. The possibility of "movement" learning, it means that the book is useful in school, at home, while traveling, anywhere. IRS pens have a headphone jack, so working with a talking book can be anywhere (on the bus, on the train, in the car, etc.). IRS pens do not require special maintenance, operate on batteries or on the built-in rechargeable battery. Saving eyesight. Speaking reading books does not burden the eyes and the eyes do not get tired as when reading classic books or use a computer or tablet. Talking books allow to full-fledged entertainment, while at the same time they are building their relationship to books (www.hovoriaceknihy.sk, 2015; Šolcová, Baková, Trnka, 2015).

GEOGRAPHY - INTERACTIVE EXERCISE BOOK FOR SECONDARY SCHOOLS

Interactive geography exercise book for secondary schools is divided into three thematic areas - Introduction to geography, Physical geography and Human geography. Exercise book offers an interesting variety of different tasks. Topics and exercises are accompanied by pictures, maps, tables and graphs. The topics are accompanied by interesting information in paper form and in the form of recordings. Attractive processing curriculum in interactive form, contributes to higher motivation, creativity and student activities. The book impresses not only high school students but also students of lower ages who are interested in the geography. Physical geography is divided into chapters and georelief lithosphere, atmosphere, hydrosphere, pedosphere, biosphere and nature and landscape protection. Some sample tasks we present in this paper. Tasks are of different types such as open

questions, image and graphics tasks, right and wrong allegations, adding text, design of correct pairs and select the right answer and so on.

EXAMPLE OF TASKS FROM INTERACTIVE WORKBOOK

Tasks are different type’s such as open questions, image and graphics tasks, right and wrong allegations, adding text, design of correct pairs and select the right answer and so on.



Play button. If we apply Pen to this icon, we can to verify the correct answer to the task.



This icon hides interesting additional information about actual problems.

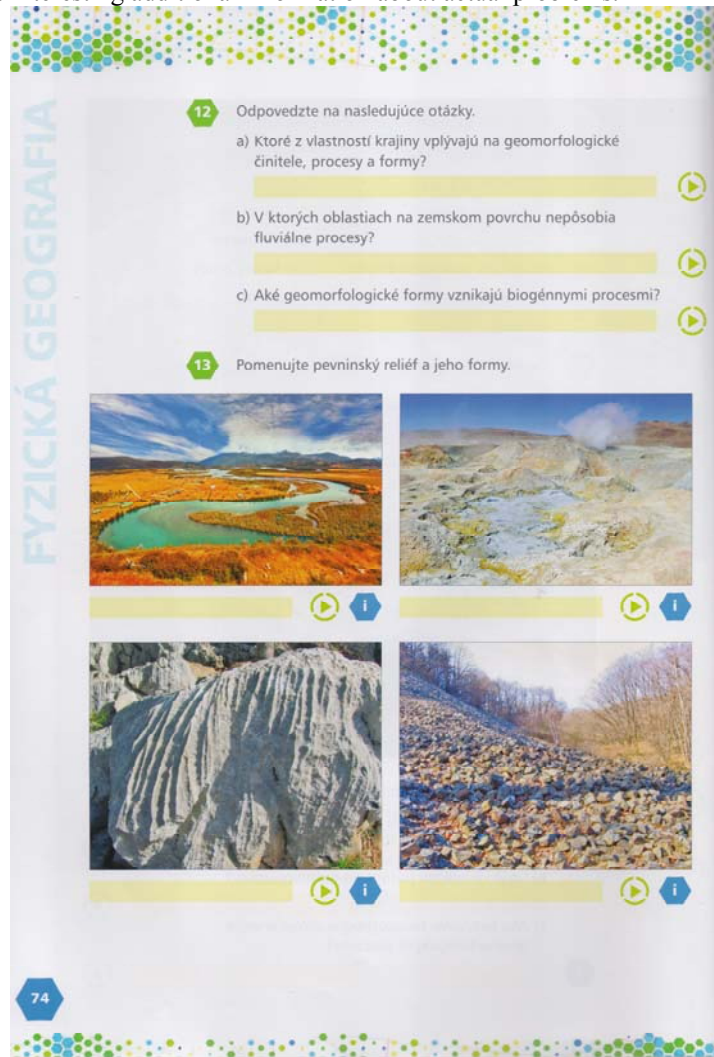


Figure 2: Talking book (own creation)

In figure 2 is example of tasks from interactive workbook in slovak language. In this section we present translation to the english language.

Translation:

12. Answer the following questions.

- a) Which of landscape features influence the geomorphological factors, processes and forms?
- b) In which areas on the surface do not act fluvial processes?
- c) What geomorphological forms generated by biogenic processes?

13. Name the continental relief and its forms.

At the end of the workbook is the key answers to all tasks. Questions and tasks are made up of creative, that students will be interested. Exercise book also contains texts marked with the letter “i”, which means that it contains supplementary information relating to the current theme or question.

The pen allows you not only read the questions but in prepared sites also inscribe answers. The pen is wirelessly connected to the server. In server are automatically saved and evaluated the answers. The teacher has a current overview of the number and accuracy answers.



Figure 3: Automatically sending correct answers to the teacher (own creation)

CASE STUDY QUALITY ASSESSMENT METHOD OF TEACHING GEOGRAPHY TEXTBOOKS AND INTERACTIVE MEANS OF A QUESTIONNAIRE

Note: The method of the study was assumed under the permission of the authors of publications Creation, management and analysis of e-courses (Munk, Munková, Lančarič, Červeňanská, 2008).

The aim of this research is to find out how students evaluate our method of teaching using an interactive teaching tool to support the teaching of the geography at high school, and identify problematic items in assessing their learning and interactive books from the student perspective. In addition, we wanted to get their opinion, whether the procedure and method of use remains.

At the end of the experiment already carried out, we asked the students experimental and control groups to complete a questionnaire, supplemented comment what they lacked and which according to them was too much. Students were divided into groups according to their ICT skills. The experimental group included students who reported, that they have only basic ICT skills. The control group consisted of students who reported that their ICT skills are at the level of the user or advanced. Total participated in testing was 97 students (70 students of the control group, the experimental group of 27 students). Types of groups were inhomogeneous, such as by age and gender.

The process for conducting research:

1. Accessing interactive textbook for students of experimental and control groups.
2. Work with a textbook from May to November (7 months).
3. Evaluation of teaching and interactive textbooks by students after the experiment.
4. Identification of problem items - interactive textbook evaluation, process and method of teaching.

METHODOLOGY

Using methods: Descriptive statistics, analysis of variance for repeated measures.

Individual items of the questionnaire, which characterized the method of teaching and interactive textbook by students were measured on a scale from 1 to 9, where 1 means completely disagree, 5 nor disagree, agree and 9 means strongly agree. Overall, in the evaluation involved 97 students. The average age of students was 20.5, the highest recorded age was 33 and the lowest 18. The testing was attended by 30 men and 67 women. One of the respondents stated that a negative relationship of Geography, 92 said their positive and 4 respondents reported no relationship with Geography. From the questionnaire we wanted to see if there are significant differences in the assessments of an interactive textbook and the method of teaching as among all respondents, as well as among students of the control and experimental groups separately, and whether the proposed method of teaching and created an interactive textbook equally positive opinions as students experimental and and students of the control group.

QUESTIONNAIRE

The survey, which was conducted through a questionnaire from May to December, we focused on the influence and support of interactive textbooks in teaching, because currently prevailing trend of their implementation in different parts of the learning process. Our interest lies particularly in the level of awareness regarding the use of ICT and multimedia by students. Information and communication technologies in cooperation with textbooks in the educational process is currently phenomenon that has its own internal dynamics, like group, which may also develop, stagnate or even regress may occur. This is the result of group dynamics.

In the survey, we are most focused on whether it would be appropriate for students to establish interactive textbooks only as a supplement or as a substitute for a full education. At the same time we focused on teachers, because they can determine the direction and progress of the education process.

In the survey, we have chosed a questionnaire method, since this way is possible to get a lot of information in a relatively short time. At the same time the respondent has the opportunity to rethink and consider their responses.

The questionnaire is pre-prepared form that is submitted to the selected respondents from the survey sample. The quality of survey depends mainly on the questions (Annex 1)

The results from the questionnaire were used as input data that has been processed into a matrix (Annex 2) Based on input data processed into the matrix we created descriptors range of individual items - descriptive statistics (average, standard deviation, standard estimation error of the average) and 95% confidence interval range of the average value of each item questionnaire - evaluation of interactive textbooks and method of teaching by students separately and both of groups were together (total). According to the average of the value range of the biggest differences were between the ninth and the rest of the item in all respondents groups. Whether this difference is statistically significant, respectively if there are also some other significant differences, we find the following testing hypotheses.

From these results we have set the following statistical null hypothesis:

H0: There is no statistically significant difference in ratings between students together.

H0: There is no statistically significant difference in the evaluation of experimental and control groups.

For testing the above hypothesis sufficient us an analysis of variance for repeated measures that tests both differences between multiple dependent samples (each item of questionnaire) and between independent samples (in this case between the experimental and control group). Before using this test, we have to verify the conditions of use, and it normally distributed dependent variable in groups according to levels of factors and condition of sphericity of the covariance matrix, ie equality of variance and covariance matrix of covariate. In case of violation of assumptions we use its non-parametric alternative, that the Friedman test.

The assumption of normality can not be verified in view of the fact that the sample is large enough. Any deviation from normality can be identified from the histogram translated by Gaussian curved line. To test the equality of variance and covariance of the covariance matrix used, for example Mauchley test of sphericity.

Sphericity condition of covariance matrix is not interrupted - variance and covariance of the covariance matrix are the same. Reject the null hypothesis with 99% confidence, that is we demonstrated statistically significant differences in the assessment of teaching methods and an interactive textbooks between students and we also showed differences in the assessments of individual students as experimental and control groups separately. Test results are visualized in graph of the average and confidence interval (Fig. 2).

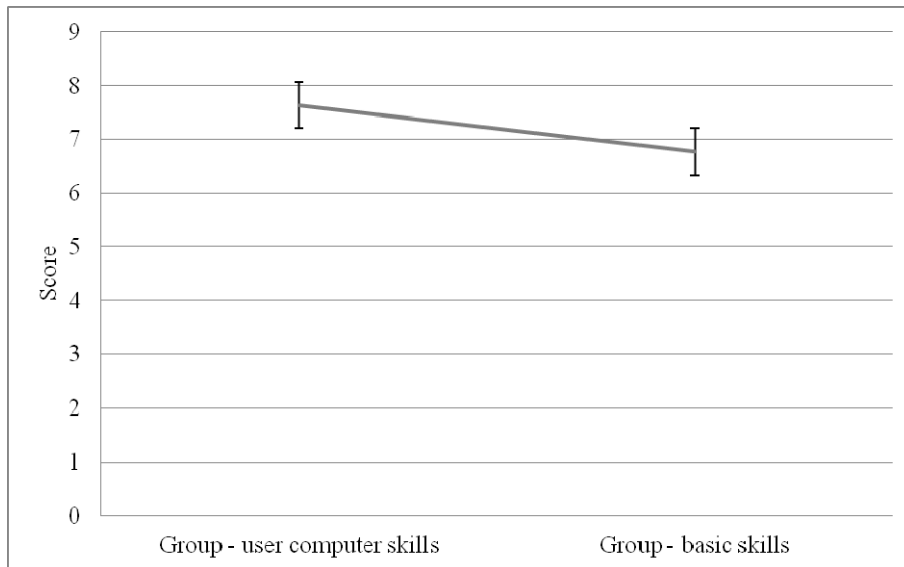


Figure 2: Figure of average and confidence interval by students assessment experimental and control groups

As can be seen from the graph of average and confidence interval, was positively evaluated an interactive textbook by students of the control group, those students with more user ICT skills.

The following figure 3 shows a graph of the average and confidence interval assessment of individual items for both groups together.

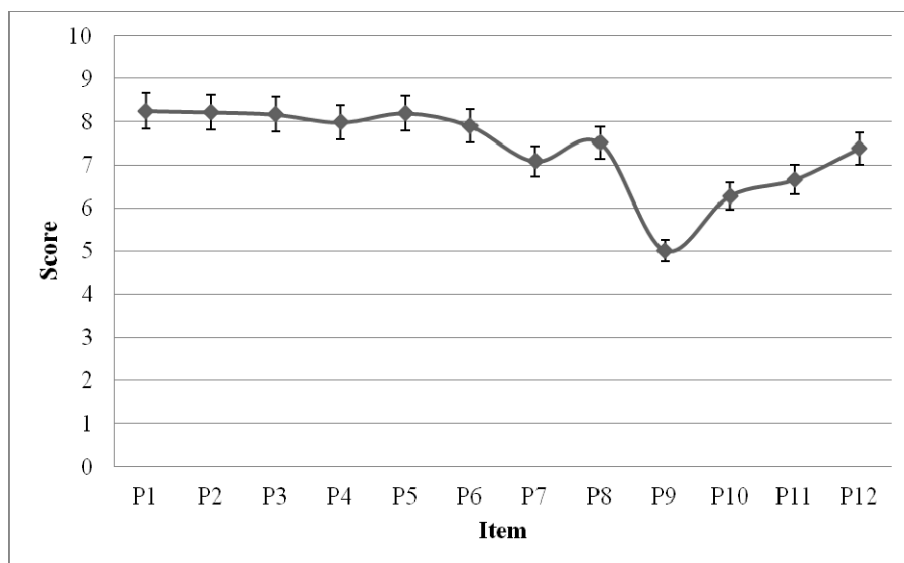


Figure 3: The average of the confidence interval assessment of each items for both groups together

From Figure 3 it can be seen that both groups of students negative evaluated particular question no. 9 - rated it by average 5.01. At the next Picture can be seen specific assessment by control and experimental group. The curves lines are essentially copied, which only confirms the results of the analysis in Fig. 4.

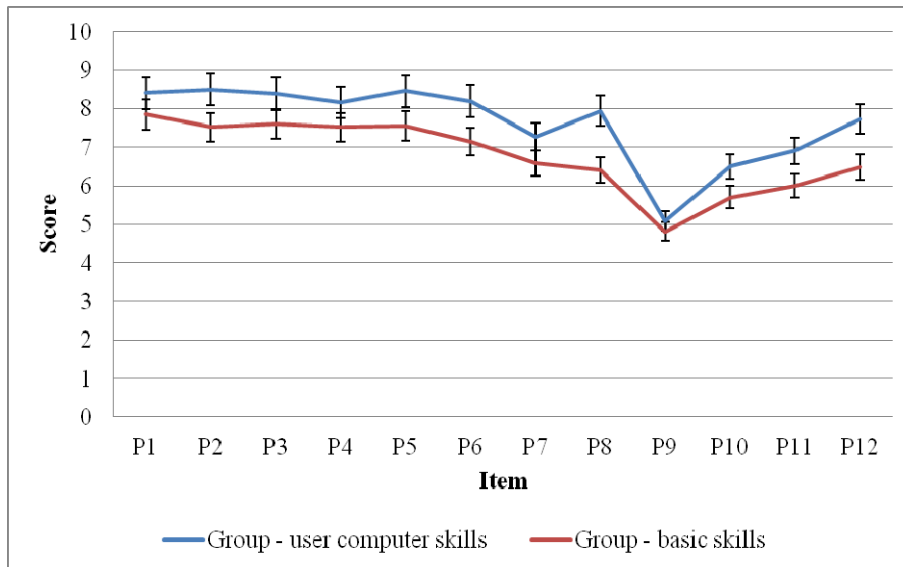


Figure 4: Average curve and confidence interval assessment of each items for both groups together

DISCUSSION

The results of the students questionnaire among find out that all of the items except no. 9 rated very positively (average ranging from 6.3 to 8.3 range from a peak of 9). Students agree that the structure of interactive books for them is transparent, we are glad of this fact because with its creation, we have intentionally used graphic symbols, which are standardized, easy to remember and re-identified. Students agree, that interactive textbooks to support the teaching of the Geography is sufficiently illustrative, individual chapters are sufficiently interactive and visual. They consider that the using of this textbook was the subject of Geography lesson more interesting and it facilitate their understanding of the curriculum. They agree that such interactive textbooks should be part of educational process.

Teaching method suits them and would like further training in this way. But it is not the opinion (item no. 9 (rated it an average range of 5.01, which means that disagree)) that they would suffice to understand the curriculum only through this interactive textbook. They need also teacher who will guide them, possibly indicates further step. But mostly teacher will confirm the accuracy of their solutions or conclusions. They need a teacher, even if they are convinced of something, to assure them that this correctly. A statistically significant difference in the assessment of individual items by students was demonstrated in particular between 9 and other item.

As mentioned earlier, the groups evaluated interactive textbooks and also method of teaching highly positive. Overall, the assessment of student control group (user of ICT, advanced skills) slightly better (7.63) than assessment of student experimental group (6.77), which has only basic ICT skills.

The comments, which highlight and vice versa, which would further add to this, the experimental group students said, that they really like working with interactive textbooks. Emphasized the simplicity launch an interactive visual illustrations and maneuverability. On the other hand, would added guidelines, marking an important for them, or even reminders of what follows by each activities.

CONCLUSION

Geography as a science has a great importance in solving many current problems of the world. Through this interactive text book students learn by fun way and acquire new skills. It is divided into three chapters - introduction to the geography, physical geography and human geography and managed well the following thematic units we consider them as priorities in terms of geography sectors. Talking book offers a varied range of different types of tasks - from definition through explanation, appointment, selection response, completion, assignment, calculation to identify geographic features on a map or data interpretation from graphs and charts. The book is not just a collection of requiring a mechanical reproduction of subject matter, but is the workbook, which encourages a comprehensive, logical geographical thinking. Therefore, we have expanded the basic question of challenging the solution which encourages work with information on making connections, finding new contexts and draw conclusions. Text of workbook is varied with more geographical curiosities and also images that are rich sources of additional information.

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ANNEX 1 QUESTIONNAIRE

Questions for evaluation of Geography interactive textbook

Sex:

- a) Male
- b) Female

Age:

Relationship to the Geography:

- a) positive
- b) negative
- c) none

ICT skills:

- a) basic
- b) custom
- c) advanced

Please, use the rating scale from 1 to 9, where **9** is **totally agree**, **5** means **neither agree nor disagree**, and **1** means **strongly disagree**, to express your score by circling.

- 1. The structure of the textbook is transparent

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 2. The textbook is visual

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 3. The answers to each question are sufficiently interactive (interacting)

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 4. Graphical maps representation of the material is sufficient

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 5. The textbook provide enough many tasks

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 6. Geography lesson was more interesting by using with this textbook

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

- 7. Using this textbook in geography class was facilitated curriculum understanding of physical geography and human geography

| | | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|--|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | | |

8. This textbook respectively similar exercise books should be included of geography textbooks (resp. hours of Geography)

| | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | |

9. To understand of the subject matter would need only this textbook (I would not need a teacher's interpretation)

| | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | |

10. I like the way this teaching

| | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | |

11. I would like to further educate in this way

| | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | |

12. Using of Interactive (speaking) textbooks should be included in the teaching of geography

| | | | | | | | | |
|---------------|---|---|---|----------------------------|---|---|-------------------|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Totally agree | | | | Neither agree nor disagree | | | Strongly disagree | |

ANNEX 2 MATRIX

| Sex | Age | Relationship to the Geography | ICT skills | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 |
|--------|-----|-------------------------------|------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| Female | 21 | positive | custom | 9 | 8 | 9 | 8 | 9 | 5 | 5 | 9 | 8 | 9 | 9 | 9 |
| Female | 21 | positive | custom | 9 | 9 | 6 | 9 | 9 | 9 | 5 | 9 | 9 | 6 | 6 | 8 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 9 | 9 | 3 | 4 | 1 | 1 | 1 | 1 | 1 |
| Female | 21 | positive | custom | 9 | 9 | 8 | 9 | 9 | 9 | 8 | 9 | 5 | 6 | 7 | 5 |
| Female | 20 | positive | custom | 9 | 8 | 9 | 9 | 9 | 9 | 8 | 9 | 7 | 8 | 9 | 9 |
| Male | 20 | positive | advanced | 9 | 8 | 8 | 8 | 9 | 9 | 9 | 8 | 5 | 6 | 5 | 8 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 3 | 8 | 9 | 8 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 2 | 7 | 7 | 9 |
| Female | 21 | positive | custom | 5 | 8 | 8 | 9 | 9 | 5 | 5 | 5 | 5 | 6 | 6 | 8 |
| Male | 21 | positive | custom | 9 | 9 | 9 | 8 | 9 | 9 | 8 | 9 | 7 | 5 | 8 | 9 |
| Male | 21 | positive | custom | 8 | 8 | 9 | 7 | 8 | 5 | 7 | 7 | 5 | 7 | 6 | 8 |
| Male | 21 | positive | custom | 9 | 8 | 6 | 9 | 7 | 9 | 6 | 9 | 5 | 5 | 7 | 9 |
| Male | 21 | positive | advanced | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 9 | 6 | 8 | 5 | 7 |
| Male | 21 | positive | custom | 8 | 9 | 9 | 8 | 9 | 7 | 8 | 9 | 6 | 8 | 9 | 8 |
| Female | 19 | positive | custom | 9 | 8 | 9 | 7 | 9 | 9 | 8 | 7 | 5 | 5 | 6 | 8 |
| Female | 19 | positive | custom | 8 | 9 | 8 | 7 | 9 | 7 | 8 | 8 | 4 | 4 | 6 | 5 |
| Male | 20 | positive | advanced | 8 | 7 | 8 | 9 | 6 | 9 | 8 | 9 | 6 | 8 | 9 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 8 | 9 | 9 | 8 | 8 | 5 | 5 | 7 | 7 |
| Female | 19 | positive | custom | 8 | 8 | 5 | 7 | 9 | 8 | 6 | 8 | 8 | 7 | 6 | 6 |
| Female | 20 | positive | custom | 8 | 7 | 8 | 7 | 9 | 9 | 8 | 8 | 6 | 7 | 8 | 9 |
| Female | 19 | positive | custom | 8 | 9 | 8 | 9 | 9 | 9 | 5 | 9 | 4 | 6 | 6 | 8 |
| Female | 20 | positive | custom | 7 | 8 | 6 | 7 | 9 | 6 | 5 | 6 | 4 | 5 | 5 | 4 |
| Female | 20 | positive | custom | 9 | 7 | 5 | 7 | 8 | 8 | 6 | 9 | 1 | 3 | 3 | 7 |
| Male | 19 | positive | advanced | 8 | 9 | 9 | 8 | 9 | 8 | 9 | 9 | 7 | 8 | 9 | 9 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 8 | 9 | 9 | 5 | 9 | 5 | 7 | 7 | 6 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 9 | 5 | 6 | 6 | 7 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 9 | 1 | 7 | 7 | 8 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 8 | 8 | 7 | 8 | 7 | 8 | 8 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 8 | 9 | 9 | 8 | 7 | 8 | 8 | 8 | 8 | 9 |
| Female | 19 | positive | custom | 9 | 8 | 9 | 7 | 9 | 8 | 9 | 9 | 1 | 5 | 3 | 6 |
| Female | 20 | positive | custom | 8 | 7 | 8 | 8 | 6 | 9 | 8 | 8 | 5 | 6 | 7 | 6 |
| Female | 19 | positive | custom | 8 | 8 | 9 | 7 | 8 | 8 | 7 | 6 | 5 | 5 | 6 | 8 |
| Male | 20 | positive | custom | 8 | 8 | 9 | 9 | 9 | 8 | 8 | 6 | 5 | 6 | 5 | 6 |
| Male | 21 | positive | custom | 9 | 9 | 6 | 7 | 7 | 7 | 6 | 9 | 5 | 6 | 9 | 9 |
| Male | 20 | positive | custom | 8 | 8 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 9 | 9 | 9 |
| Male | 33 | positive | custom | 9 | 9 | 9 | 7 | 9 | 9 | 9 | 9 | 5 | 5 | 5 | 5 |

| | | | | | | | | | | | | | | | |
|--------|----|----------|----------|---|---|---|---|---|---|---|---|---|---|---|---|
| Male | 20 | positive | custom | 7 | 6 | 9 | 7 | 5 | 9 | 7 | 9 | 1 | 7 | 9 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 8 | 8 | 9 | 9 | 9 | 5 | 9 | 9 | 9 |
| Female | 20 | positive | custom | 9 | 9 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 7 | 6 | 9 |
| Male | 19 | positive | advanced | 7 | 8 | 9 | 7 | 9 | 9 | 8 | 7 | 9 | 6 | 7 | 9 |
| Female | 21 | positive | custom | 7 | 8 | 7 | 6 | 1 | 7 | 6 | 4 | 1 | 4 | 5 | 6 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 9 | 9 | 9 |
| Female | 19 | positive | advanced | 8 | 9 | 9 | 8 | 9 | 9 | 7 | 9 | 3 | 6 | 5 | 9 |
| Female | 19 | positive | advanced | 8 | 8 | 9 | 8 | 9 | 9 | 6 | 9 | 5 | 5 | 5 | 8 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 1 | 9 | 5 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 1 | 5 | 5 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 7 | 8 | 9 | 7 | 5 | 9 | 9 | 9 |
| Female | 20 | positive | custom | 9 | 8 | 9 | 8 | 7 | 9 | 5 | 8 | 3 | 4 | 6 | 9 |
| Male | 21 | positive | custom | 9 | 9 | 6 | 9 | 9 | 9 | 9 | 8 | 5 | 6 | 6 | 6 |
| Male | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Female | 19 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 7 | 5 | 6 | 8 | 8 |
| Female | 20 | positive | custom | 8 | 9 | 8 | 7 | 7 | 8 | 7 | 9 | 5 | 6 | 6 | 9 |
| Male | 19 | none | advanced | 8 | 9 | 7 | 9 | 9 | 9 | 8 | 8 | 5 | 5 | 6 | 9 |
| Male | 20 | positive | custom | 9 | 8 | 7 | 8 | 9 | 5 | 6 | 5 | 8 | 8 | 7 | 5 |
| Female | 22 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 6 | 6 | 7 | 8 |
| Female | 23 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 8 | 5 | 6 | 4 | 6 |
| Male | 22 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 9 | 9 | 9 |
| Male | 22 | positive | custom | 9 | 7 | 9 | 6 | 9 | 8 | 5 | 7 | 6 | 7 | 9 | 7 |
| Female | 23 | positive | custom | 9 | 9 | 8 | 8 | 9 | 9 | 8 | 5 | 9 | 9 | 9 | 9 |
| Female | 23 | positive | custom | 7 | 9 | 9 | 8 | 9 | 7 | 9 | 7 | 5 | 7 | 7 | 7 |
| Female | 22 | positive | custom | 8 | 8 | 8 | 8 | 9 | 7 | 8 | 8 | 5 | 5 | 6 | 8 |
| Female | 24 | positive | custom | 8 | 9 | 9 | 8 | 8 | 9 | 8 | 8 | 7 | 8 | 9 | 8 |
| Female | 22 | positive | custom | 8 | 9 | 9 | 9 | 9 | 9 | 5 | 7 | 5 | 5 | 9 | 7 |
| Female | 22 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 6 | 4 | 5 | 6 | 7 |
| Female | 22 | positive | custom | 7 | 8 | 9 | 7 | 9 | 9 | 6 | 9 | 5 | 9 | 9 | 9 |
| Male | 22 | positive | custom | 5 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 1 | 6 | 9 | 9 |
| Male | 23 | positive | custom | 7 | 8 | 8 | 6 | 6 | 7 | 6 | 5 | 6 | 7 | 7 | 5 |
| Female | 22 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 9 | 5 | 6 | 6 | 9 |
| Female | 22 | positive | custom | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 5 | 8 | 8 |
| Female | 21 | positive | custom | 9 | 8 | 9 | 8 | 9 | 5 | 5 | 9 | 8 | 9 | 9 | 9 |
| Female | 21 | positive | basic | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 7 | 8 | 8 | 9 |
| Female | 22 | positive | basic | 9 | 9 | 8 | 8 | 9 | 8 | 8 | 7 | 5 | 5 | 7 | 5 |
| Female | 20 | positive | basic | 8 | 8 | 8 | 7 | 9 | 7 | 7 | 6 | 5 | 5 | 5 | 5 |
| Female | 20 | positive | basic | 8 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 5 | 6 | 7 | 8 |
| Female | 21 | positive | basic | 8 | 9 | 7 | 9 | 9 | 6 | 6 | 6 | 3 | 6 | 5 | 6 |
| Male | 19 | positive | basic | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 9 | 9 | 9 |

| | | | | | | | | | | | | | | | |
|--------|----|----------|-------|---|---|---|---|---|---|---|---|---|---|---|---|
| Female | 22 | positive | basic | 8 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 5 | 9 | 6 | 7 |
| Male | 23 | none | basic | 5 | 6 | 5 | 4 | 4 | 5 | 6 | 6 | 8 | 7 | 6 | 5 |
| Female | 20 | positive | basic | 6 | 5 | 5 | 3 | 4 | 6 | 5 | 1 | 5 | 3 | 1 | 1 |
| Male | 19 | negative | basic | 5 | 1 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Female | 20 | none | basic | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Female | 20 | positive | basic | 9 | 5 | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 5 | 9 | 9 |
| Female | 21 | positive | basic | 9 | 5 | 8 | 9 | 9 | 9 | 8 | 8 | 5 | 5 | 8 | 9 |
| Male | 20 | none | basic | 7 | 8 | 6 | 9 | 9 | 9 | 6 | 5 | 6 | 5 | 7 | 9 |
| Male | 19 | positive | basic | 9 | 9 | 9 | 8 | 9 | 9 | 9 | 9 | 3 | 8 | 8 | 9 |
| Female | 20 | positive | basic | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 5 | 5 | 5 | 9 |
| Female | 19 | positive | basic | 8 | 9 | 8 | 8 | 7 | 6 | 6 | 7 | 5 | 4 | 4 | 5 |
| Female | 19 | positive | basic | 8 | 8 | 7 | 7 | 6 | 6 | 5 | 5 | 4 | 4 | 1 | 5 |
| Male | 18 | positive | basic | 8 | 9 | 9 | 9 | 9 | 8 | 6 | 9 | 1 | 9 | 9 | 5 |
| Female | 19 | positive | basic | 9 | 9 | 9 | 9 | 9 | 9 | 5 | 7 | 5 | 6 | 6 | 5 |
| Female | 20 | positive | basic | 9 | 6 | 7 | 9 | 7 | 5 | 4 | 2 | 1 | 5 | 5 | 5 |
| Female | 20 | positive | basic | 8 | 8 | 7 | 7 | 8 | 6 | 9 | 8 | 7 | 6 | 7 | 9 |
| Male | 19 | positive | basic | 7 | 8 | 8 | 6 | 6 | 5 | 5 | 6 | 6 | 5 | 6 | 6 |
| Female | 19 | positive | basic | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 6 | 5 | 9 | 8 | 9 |
| Male | 23 | positive | basic | 9 | 9 | 9 | 7 | 7 | 6 | 6 | 5 | 9 | 5 | 6 | 6 |
| Female | 22 | positive | basic | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 4 | 8 | 9 | 9 |
| Female | 22 | positive | basic | 9 | 9 | 8 | 8 | 9 | 9 | 8 | 9 | 5 | 5 | 8 | 9 |

Ms Power Point vs Prezi in Higher Education

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ABSTRACT

The teachers use different presentation tools in Higher Education to make the presentation enjoyable for the students. I used MS Power Point or Prezi in my presentations in two different groups of the freshmen students at the University. The aim of this research was an analysis of the paper results in two groups of students to reveal the influence of the used presentation tool on the paper results of the students. The students have to write two papers in a semester to show how well they have learned the learning material. I used Prezi in the first group and MS Power Point in the second group before the first test and MS Power Point in the two groups before the second test. My starting hypothesis was that the group where I used the Prezi as a presentation tool would achieve better results in the papers. After the evaluation of the first paper results the correctness of the original presumption seemed to be proved. Significance level was 5% through the analysis. It was found significant divergence in the knowledge of the students. The students could get half mark better paper results when they followed the flash based Prezi presentation. I evaluated the second paper results too, before I used same presentation tool (MS Power Point) and I did not find difference in the paper results of the students in this case. Consequently, the use of the Prezi as a presentation tool is productive; the students get better results when writing papers.

INTRODUCTION

I teach Computer Science at the University and I have teaching experience in different subjects. The freshmen students of the undergraduate course Introduction to Informatics get acquainted with computer architecture, operating system, computer network and data encryption in history as well as with up to date applications. I used different didactical methods to make students get better paper results (Kiss, 2005, Kiss 2010, Kiss 2012a). One of my colleague use E-learning for help the practical training (Ambrus at al., 2012) and I have some experience in web-based education (Kiss 2012b, Kiss 2012c).

We can find lot of presentation tool what teachers use to make the presentation enjoyable for the students and these tools have different repository of visual effects (Savasci Acikalin, 2011). Earlier I used the MS Power Point in Computer Science Education as a presentation tool. Some years ago I became acquainted with Prezi which is a flash based presentation tool with other visual effects than MS Power Point and Keynote (Prezi). The visitors of Prezi presentation listened to the speaker with more motivation. The reason can be that Prezi gives an endless whiteboard in the hand of speaker, where we can drop pictures, tables, texts, frames and we can rotate, zoom in/out during the presentation (Fig. 1.)

I want to see if I use Prezi as other presentation tool in the Higher Education could I find difference in the paper results of the students in this case or not.

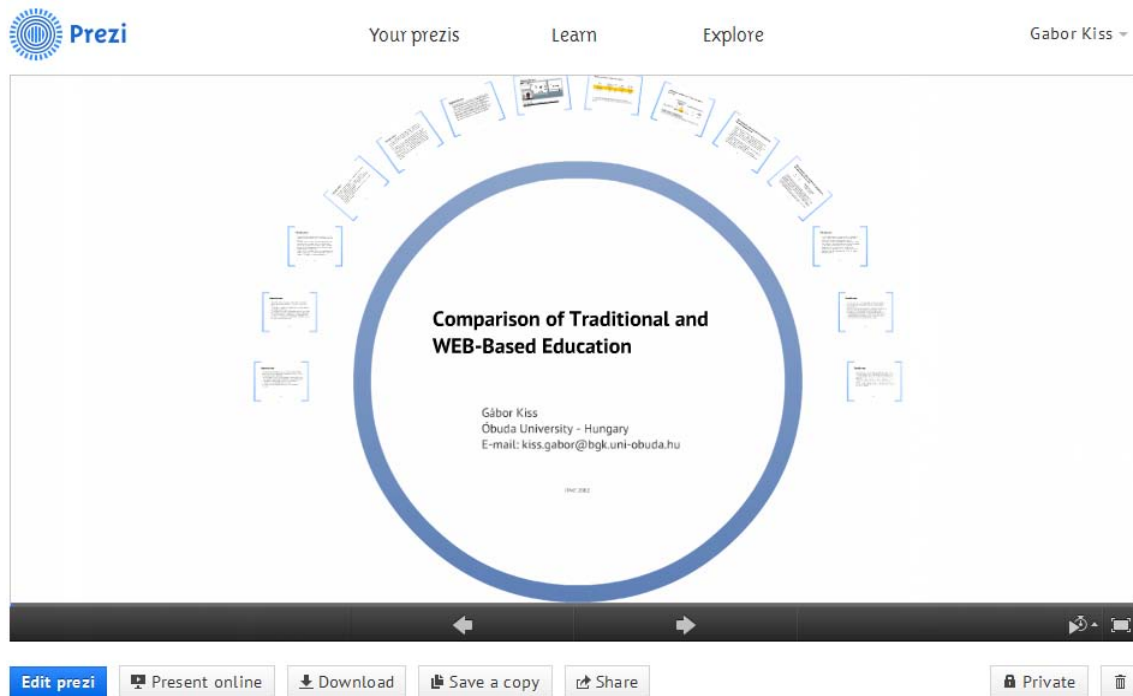


Fig. 1. Website of my own Prezi

ANALYZING OF THE PAPER RESULTS

The Number of Participants in the First and Second Test in the Two Groups and the Values of Mean and Std. Deviation

The students have to write two papers in a semester to show how well they have learned the learning material. I analyzed the first and the second paper results of the students during the first semester and made two groups. The students who visited the Power Point based lessons from week to week to follow the presentation were in the first group (group A) while the students who took part in Prezi presentation were in the second group (group B). After the first test both groups followed Power Point based presentation.

Table 1. Group statistics of first and second test results

| Test | Group | Number of participants | Mean | Std. Deviation | Pass the test |
|--------|-------|------------------------|------|----------------|---------------|
| First | A | 320 | 1,61 | 0,76 | 46% |
| | B | 378 | 2,26 | 0,85 | 81% |
| Second | A | 276 | 1,53 | 0,77 | 39% |
| | B | 364 | 1,76 | 0,74 | 59% |

According to the table (Table 1.) the mean of the results of the first papers of group B is higher. It means this group wrote the papers with a better result. It does not give enough information to state that the use of Prezi-based education results in better written tests because this can happen accidentally, too. So, we needed more analyzing to keep the chance of accident low. If we spend more time looking at this table, we can see ~81% of the mechanical engineers who took part in the Prezi-based education could pass the test and the students who used the traditional way of education passed the test in lower percent (~46%), but we still do not know if it is a coincidence. The situation is not so clear by the second test result. There we do not see big difference by the means and by numbers of successful test. We found lower difference between the groups if the presentation tool was same.

Independent Samples test of First and Second Papers

My null hypothesis was that the results of the first paper written by the two groups of students would not differ significantly. Since we have two independent samples, we can use the T-test to tell if the means of the first paper of these groups differ or not. An analysis of the first test results of the students showed, the variance of two groups are same, because the value of Levene's test is not significant $F = 0,36$; $sig.=0,55$; ($p<0,05$).

In this case the means could be compared with Independent Samples T-test, which showed up a difference between the means (Levene, 1960), because the value of T-test is significant $t=-10,64$; $sig.=0,00$; ($p<0,05$). It means the use of the Prezi as presentation tool had influence on the results of papers of the students.

The null hypothesis was same in case of second paper written by the two groups of student. The second test results of the students showed, the variance of two groups are same, because the value of Levene’s test is not significant $F = 0,60$; $sig.=0,44$; ($p<0,05$).

In this case the means could be compared again with Independent Samples T-test, which showed up a difference between the means, because the value of T-test is significant $t=-3,78$; $sig.=0,00$; ($p<0,05$). It means the students of two group show different knowledge level by using same presentation tool too. In this case we need more analyzing to see how strong the connection is between the grouping and the achieved result.

MEASURES OF ASSOCIATION BY THE PAPER RESULT

Earlier, significant differences could be detected between the means of the first papers written by the students. It means it is profitable to make a deeper analysis to reveal the influence of the web-based consultation on the calculated means. I could reveal the influence with the calculation of the Eta-squared (η^2) (Cohen, 1973). For the calculation of the Eta-squared first we have to calculate the main mean ($\bar{\bar{x}}$) (Eq. 1),

$$\bar{\bar{x}} = \frac{\sum_{j=1}^m n_j \bar{x}_j}{\sum_{j=1}^m n_j} \quad (\text{Eq. 1})$$

where n is the number of musters, \bar{x} is the mean of the musters and m is the number of musters. After that we have to calculate the values of the variance Between-Groups Sum of Squares (SS_{Error}) (Eq. 2) and the variance Within-Groups Sum of Squares ($SS_{Treatments}$) (Eq. 3), where the standard deviation of musters (s_j) appears in the formula.

$$SS_{Error} = \frac{\sum_{j=1}^m n_j (\bar{x}_j - \bar{\bar{x}})^2}{\sum_{j=1}^m n_j} \quad (\text{Eq. 2})$$

$$SS_{Treatments} = \frac{\sum_{j=1}^m n_j s_j^2}{\sum_{j=1}^m n_j} \quad (\text{Eq. 3})$$

The Total Sum of Squares (SS_{Total}) is the summation of the variance between groups and the variance within groups (Eq. 4).

$$SS_{Total} = SS_{Error} + SS_{Treatments} \quad (\text{Eq. 4})$$

The following table shows the calculated values (Table 2).

| | SS _{Error} | SS _{Treatments} | SS _{Total} |
|-------------|---------------------|--------------------------|---------------------|
| First test | 73,49 | 451,76 | 525,24 |
| Second Test | 8,12 | 362,71 | 370,83 |

Table 2. Calculated values of variances

The value of the Eta-squared (η^2) is the quotient of the variance between groups and the total deviation quadrate (Eq. 5).

$$\eta^2 = \frac{SS_{Treatments}}{SS_{Total}} \quad (\text{Eq. 5})$$

The calculated value shows in percentage how much the grouping influences the difference between means. Square root from the Eta-squared (Eq. 6) gives a value between 0 and 1 (η),

$$\eta = \sqrt{\eta^2} \quad (\text{Eq. 6})$$

This shows the measures of association, how strong the connection is between the grouping and the achieved result. The more achieved, the stronger the connection (Cohen, 1988). In the next table we see the calculated values and the strength of the connection (Table 3.).

Table 3. Measures of Association

| | η^2 | η | Strenght of the connection |
|-------------|----------|--------|----------------------------|
| First test | 14,0 % | 0,37 | middling weak |
| Second Test | 2,2 % | 0,15 | no connection |

When calculating the Eta-squared the effect of presentation tool on the result of the first test was put in the formula in percents. The result is showing the influence of presentation tool on the calculated means middling weak. This is meaning a middling weak correlation between the used presentation tool and knowledge level. Calculating the Eta-squared I tried to make the effect of the presentation tool on the result of the first papers written percentable and got 14%. This means there is a middling weak correlation existing between using the Prezi and the results of the first papers written by the students. We can remember the students who took part in the Prezi-based presentations could pass the test in higher percent (81% vs 41%).

On the other hand no connection by second test was found. It means when I used same MS Power Point by both groups, do not have influence of the presentation tool on the calculated means.

Consequently, the use of the Prezi as a presentation tool is productive; the students follow the presentations with more motivation and get better results when writing papers.

CONCLUSION

After the analysing process we can say my starting hypothesis is correct; students get better paper results by using Prezi as a presentation tool. The students could take advantage of this tool before the first test and could get a ~half mark better paper results when they took part in the Prezi-based presentations and the number of the students who could pass the test almost doubled.

In this research we could observe that the students are more motivated to take part in a Prezi-based lesson because it is a new way of presentation with different visual effect.

We can declare the use of Prezi as a presentation tool is useful for students and teachers as well.

ACKNOWLEDGEMENT

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Qzone Weblog for Critical Peer Feedback to Improve Business English Writing: A Case of Chinese Undergraduates

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ABSTRACT

This study explores Qzone weblog for critical peer feedback (CPF) in Business English writing (BEW) among the Chinese undergraduates. A qualitative case study is conducted by Nvivo 8 to analyze the three research data of semi-structured interviews, BEW writing assignments, and CPF artifacts on Qzone weblog. Three research questions are focused to study the case participants' perception of this study, the strength and weakness of Qzone for critical peer feedback, and online features of Qzone affecting critical peer feedback in Business English writing. The study aims to explore how Qzone weblog affect critical peer feedback in the online environment. The findings indicate that Qzone is a suitable type of weblog for online critical peer feedback, especially, for the Chinese undergraduates. The strength and online features of Qzone are models by Nvivo 8 for description by figures. The six aspects of strength and five online features are coded by Nvivo 8. The only weakness of Qzone is the character number limitation for each blog and feedback. The conclusion of this study will be implied for the use of Qzone weblog and other kinds of weblog for online peer feedback in English writing.

Keywords: Qzone weblog, critical peer feedback, Business English writing

INTRODUCTION

With the development of internet technology (IT) and the application of mobile learning (mLearning), the internet and smart phone have been used in the feedback assessment (Siraj, 2012; DeWitt, Siraj & Alias, 2014). Online feedback is more conveniently applied in the teaching and learning such as Facebook, Twitter, blogs, and many other internet communicative platforms. Online feedback has many advantages such as flexible idea expression, effective peer feedback, positive performative assessment, multi-media learning and teaching, improving autonomy learning, and the construction of authentic learning and working simulation environments (Yunus et al., 2013). In China, Qzone is one of the most popular weblogs among young generations combined with the instant messaging (IM) software - QQ. Qzone has been widely applied in EFL instruction as a CAI (computer-assisted instruction) platform (Wang, 2009; Xie, 2010; Du, 2013; Zhu, 2013). Qzone weblog and QQ have been explored in instruction which are helpful to guide the positive use of internet among students. Therefore, this study will conduct Qzone weblog for critical peer feedback and study how it affects the peer feedback in Business English Writing among Chinese college students.

LITERATURE REVIEW

Online Feedback

With the development of information communication technology (ICT) and mobile-assisted language learning (MALL), the online teaching and learning has been welcomed by students and teachers. Online feedback has been studied by many online communication platforms such as Web 2.0, SWORD, Facebook, Blackboard, and weblogs like Sina and Qzone in China (Siraj, 2012; DeWitt, Siraj, & Alias, 2014).

From the perspective of L2 learning, Chen (2014) summarizes the advantages of online feedback such as boosting learning motivation, autonomy, positive attitudes, linguistic awareness, content organization, intellectual exchanges, linguistic ownership, self-expressions, and a sense of community. Online feedback also is studied for the synchronous feedback by online chat room or instant communication (IM) software like Skype,

Wechat and QQ, etc. The online writing could receive asynchronous feedback when internet is available at any time and place.

Online feedback enables students to continuously communicate with peers and teachers to reflect on and revise their writing (Yang & Tsai, 2010). Online feedback can increase the willingness of engagement in collaborative learning and self-autonomy. The teachers can monitor the progress of their students assignments, online participation and communication. Teachers can automatically assign students to review more heterogeneous or homogeneous work based on background features such as gender, achievement, and preferences (Lu & Law, 2012). There are disadvantages of online feedback such as time-consuming, lack of supervision and monitor, high-ranked technological requirement, and informal feedback (Lu & Law, 2012).

The advantages of online feedback overweight the disadvantages. However, what online features are more helpful in giving online feedback, is not only an IT issue but also a practical question in instruction. It is meaningful to identify the efficient online features and apply to the online feedback. The most commonly used online feedback methods have text, audio, video, image, and hyperlinks, etc.

Therefore, with the ample use of internet, computer and smart phone, the online feedback will be one of the most popular way to offer feedback in the future, not only in education but also in other fields. More technique forms of online communication and feedback software or platform will be invented in the near future. There is a research gap to explore the online features in online feedback, to study what kinds of online features will be more helpful for online feedback.

Qzone Weblog

Weblog, Blackboard, Second Life, etc, are widely used in CAI education. Weblog has been used as a tool for collaboration and self-reflection on course content, peer feedback, and as a resource bank (Dippold, 2009). Weblog or blog application in education has a number of advantages such as a much wider audience of readers and raters, receiving critical feedback, collaborative learning with peers, and showcase for individual artifacts, etc.

Qzone is a new kind of weblog combined with instant message (IM) software QQ, developed by Tencent company at 2005, and QQ has about 848 million active users at April 2014.¹ QQ and Qzone are the most popular IM in China, which is completely free for users. The English version of QQ is QQ International that the users can download it free from its website (www.imqq.com) for computer and smart phone. After QQ is downloaded, the Qzone can be registered and designed by the users when it is accessing internet service.

Characteristics of Qzone Weblog

Qzone is different from Facebook and Sina Blog, which has more powerful specific characteristics. From the aspects of technology, the characteristics of Qzone can be concluded as:

1) Integration of IM and Weblog

Qzone is combined with IM software - QQ, which is developed by Tencent in China at 2005. The user registers QQ for one time, and the QQ registration number, which will be generate by system for the register, is unique and can be used for other Tencent software services such as Qzone, Wechat, WebQQ, QQ Music, QQ Player, QQ Games, QQ IE, QQ Mail. All Tencent softwares have versions for computer operating systems such as Windows, Lunix and Mac, and smart phone operating systems such as Android, IOS, Window Phone and BlackBerry. With the internationalization of QQ, the users can also use their e-mail address to register a QQ account.

Qzone weblog has the function of instant messaging which can notice your QQ friends when you upgrade your Qzone blog instantly. Information upgrading of Qzone can notice your “QQ friends” by the function plates of “instant talk”, “personalized signature”, “instant emotions”, etc, which is different from the traditional blog. The “friend” IM upgrade will notice the “QQ friends” automatically and synchronologically, and will be highlighted at your online devices as long as there is internet connect service.

2) Resource Access and Sharing Needs Permission

Qzone is widely connected with other websites for resource sharing such as the social network service (SNS) websites like Sina blog, Tencent blog, Renren, etc, and service websites like Phoenix, Sina, Youku, etc. The blog of Qzone resource sharing and visiting need the permission of the Qzone owner. The visiting authority of Qzone

¹ *Tencent Company*. Retrieved 26, August, 2014 from <http://www.tencent.com/zh-cn/ps/sng.shtml>.

is controlled by the Qzone owner who can decide the permission to visit and share your blog information. But other blogs are total open to any reader which is difficult to keep the personal privacy.

There are two relationships in the QQ users' "Contact List". One is "Friend" and the other is "Stranger". With the relationship of "Friend", the contact list numbers can obtain many "friend" information and visit each other's Qzone. However, with the relationship of "Stranger", he or she can not visit a stranger's Qzone weblog which needs to apply the owner's warranty and permission.

The instant communication of Qzone "friends" can be conducted by several methods such as QQ Group, QQ friends, QQ instant discussion (ID) group, and QQ mail. The following chart indicates the visiting and instant messaging methods to visit Qzone between QQ "friends" and QQ "strangers", in which the solid line means that they can visit each other directly, but the dashed line means that the visit need be applied by the stranger. The stranger can apply to be one friend of the Qzone owner, then they can visit each other directly.

3) User-friendly Template and Plate Compilation

Qzone is an open blog which can be compiled by the users with their preference and requirement, which offers beautiful free templates and basic plates for any user. Qzone also offers lots of template for users to decorate and modify their blogs, but some templates shall be bought from Tencent company, which has the whole-sale service for months, seasons and years on the Qzone weblog. The plates on Qzone can be compiled by the users as their requirement such as weblog, album, message board, etc, which offer the developing space for other uses such learning, teaching, entertainment, personal showcase, business activities and even marketing, etc.

4) Multimedia Weblog with Image, Text, Audio, Video and Flash

Qzone is a multimedia blog in which the blog can be compiled not only with words but also image, audio, video and flash, etc, which has no limitation of words, length, and storage, etc. Qzone can fulfill the needs of text processing and editing for various specific purposes.

Qzone Weblog in Instruction

Qzone has been researched in the field of instruction by many researchers. In English teaching and learning, many scholars articulate the application of Qzone in English teaching and learning in college and middle school. Wang (2009) conducts an empirical quantitative study of Qzone application on the course of English Pedagogy, who finds that Qzone can fulfill the needs of instruction feedback, motivate peer feedback, accelerate learning resource sharing, stimulate the in-depth communication.

Xie (2010) studies the application of English translation on Qzone in vocational and technique college. Du (2013) explores the course design of Business English teaching on QQ platform. Zhu (2013), Wen and Lai (2012) study the Qzone application in middle school English teaching. In English writing, Yu (2010) explores the QQ-assisted English writing and insisted to integrate Qzone, QQ Friends, QQ Group, and QQ Discussion Group to improve the English writing. She designed the QQ platform of English writing teaching resources and the platform of learning interaction to conduct English writing. At the platform of learning interaction, Yu (2010) emphasizes the peer feedback and teacher feedback in English writing.

In this study, the Qzone will be developed as a online feedback platform for Business English writing learning and peer formative assessment, which is a new approach of Qzone application in instruction. The participants will visit each other's Qzone weblog and make feedback to each other. The online feedback is regarded as an efficient platform for writing. However, it is important to discuss how and to what extent the online feature helps to improve the online feedback.

RESEARCH QUESTIONS

1. What's the perception of Qzone weblog in critical peer feedback to improve Business English writing among the Chinese undergraduates?
2. What are the strength and weakness of Qzone weblog for critical peer feedback to improve Business English writing?
3. What's the online features of Qzone weblog in critical peer feedback to improve Business English writing?

RESEARCH DESIGN

A qualitative case study is conducted in this research. The setting of this study is at School of Foreign Languages, Xuchang University, China, which is one of the representative universities of applied science. Case study of qualitative research is employed in this study. A case group of 6 case participants is selected from the 7 groups. The time duration of this study is one semester at the second semester of 2015 to 2016.

This study is carried out in two phases. The first phase focuses on the two workshops on the introduction of Qzone and critical peer feedback. Each of the workshops is conducted for two times with three hours. The second phase focuses on the collection of data for the study, and the data analysis. Three kinds of data are collected including semi-structured interviews, artifacts of Business English writing, and artifacts of critical peer feedback.

During the second phase, the semi-structured interviews are conducted three times among the six case participants, which are based on the interview protocols. Each of the interviews is lasted for 30 to 45 minutes. The interviews are conducted at the researcher's office at after work time. The researcher tries to set a free and comfortable environment for the interviewees. The researcher in this study is the interviewer and observer, while the lecturer is the conductor of syllabus and critical peer feedback. The six Business English writing assignments are written by the case participants based on the syllabus and uploaded on their Qzone for critical peer feedback. The three times of interviews for each case participants are recorded and transcribed. The three kinds of data are collected and analyzed during the second phase.

The data from interviews and artifacts are analyzed by QSR Nvivo 8 to gain insights on the case participants' justification on the perception, process, content and factors of critical peer feedback. The online features of Qzone for critical peer feedback in Business English writing, are analyzed by QSR Nvivo 8 based on the data of interviews and artifacts on Qzone. The trustworthiness of this study is concerned and the triangulation of data is conducted.

The findings are illustrated after the data analysis of QSR Nvivo 8 with free nodes, tree nodes and models. The writing of findings is based on the data analysis with quotations of data sources. The findings are based on data and the research questions. After the description of findings, a discussion of each research questions is conducted to summarize the relevant findings. Figures and tables are illustrated to make the summary more readable and visual.

FINDINGS

RQ1: Perception of Qzone weblog in critical peer feedback to improve Business English writing among the Chinese undergraduates

With the development of digital devices and internet, Qzone, QQ, Wechat and Facebook becomes the daily necessary instruments for the instant communication, which are also widely used in online learning. The case participants indicate that Qzone is a scientific and reasonable platform for online peer feedback.

First, the case participants indicate that Qzone is the most welcome weblog among the case participants, who has been habitual to the usage of Qzone. Everyone has the experience of using Qzone weblog for more than two years. According to the automatic QQ statistics of usage experience- QQ age, the case participants of CP5 has six years of Qzone experiences, CP4 five years, CP1 three years, and the others three case participants two years. They admitted that they has been very familiar with the techniques and skills of Qzone weblog. In the following example 1, CP1 points out that Qzone is a more convenient and efficient tool for critical peer feedback, which can fulfill the whole requirement for online feedback.

Example 1:

By Qzone, we upload our writing, make feedback with each other. It is very convenient and efficient. The function of Qzone weblog has fulfilled our needs. We has no other special needs.

(Cited from Interview Transcript/CP1/23, Oct., 2015)

Second, the case participants have the experience of peer comment or review on Qzone weblog. In the daily usage of Qzone, they used to upload their dairies, individual instant affection writings, or shared articles onto their weblog, which likes an online portfolio. At the same time, their Qzone friends will instantly give comments to each other. This kind of mutual comments on Qzone have become an instrument for online ideology communication, which has become the stable foundation for critical peer feedback on Qzone. They believe that Qzone can meet their needs for critical peer feedback.

Third, the case participants believe that Qzone is an efficient communication platform of critical peer feedback for the large class teaching in this study. Large class teaching of 42 students has the limitation for face-to-face critical peer feedback in the classroom. However, the online Qzone weblog offers a possible portfolio platform for them to store their writing artifacts, share within peers, and then make their critical peer feedback. In the following example 2, CP1 directly indicates that Qzone has the advantages for big class teaching for critical peer

feedback in their Business English writing.

Example 2:

It is impossible for critical peer feedback among 42 students in a 45 minutes class. However, if we divided into groups on Qzone, we share our writing with peers and make online comments. This is possible. We can read other groups' writings and make feedback if we want. We can read more and learn more.

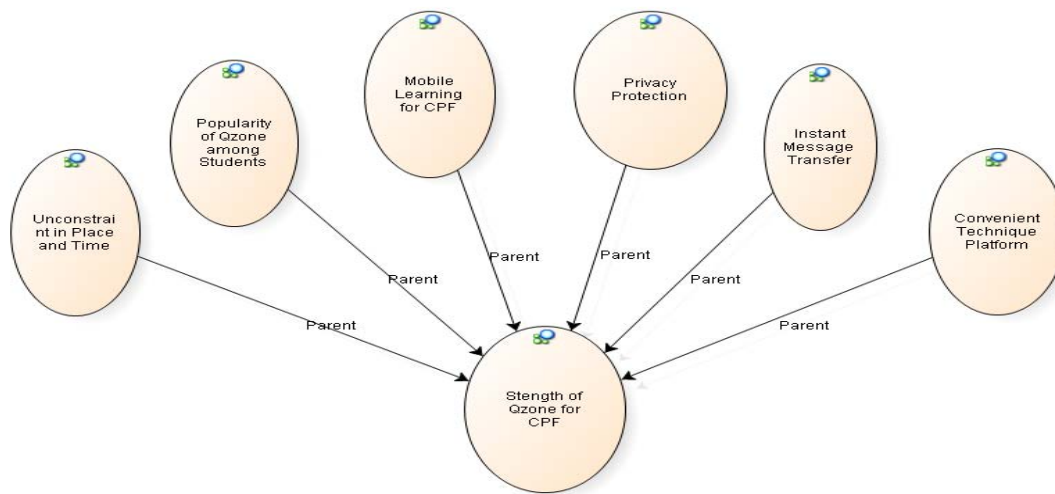
(Cited from Interview Transcript/CP1/23, Oct., 2015)

RQ2: The strength and weakness of Qzone weblog for critical peer feedback to improve Business English writing

Strength

According to the data analysis, the model of the strength of Qzone has been conducted by QSR Nvivo 8 (see Figure 1). The strength of Qzone has been categorized into the following six parts such as popularity of Qzone among students, unconstraint in place and time, mobile learning for CPF, instant message transfer, convenient technique platform, and privacy protection.

Figure 1. The Strength of Qzone for Critical Peer Feedback



Based on the data analysis, the case participants indicate that Qzone is the most popular weblog among them. Everyone has the Qzone weblog and has the application experiences for more than two years. Qzone can be accessed without the constraint in place and time. There is convenient free internet access in their campus. With the development of portable digital devices such as smart phone and ipad, mobile learning with Qzone and internet materials is becoming more popular and acceptable. Qzone connected with QQ has become the most popular IM software among the students, which is a convenient technique platform for instant message communication.

One of the most important strength of Qzone is privacy protection which can control the access of weblog readers. The weblog readers must apply for the agreement of the access of the peer's Qzone. After they obtain the agreement, they obtain the permission to browse and read the blogs. In critical peer feedback, the Qzone owners can keep their privacy out of the unwelcome peers.

Qzone weblog can be used as an electronic portfolio for storing and sharing artifacts on the internet such as textual writings and photos. The "comment" and "reply" function by text message in Qzone weblog is suitable for critical peer feedback, which is the direct reason of how critical peer feedback improves their Business English writing via Qzone. Qzone weblog offers a platform for the peers to share their writings with each other, access their peers' writings, and make their feedback with the software function of "comment" and "reply".

Weakness

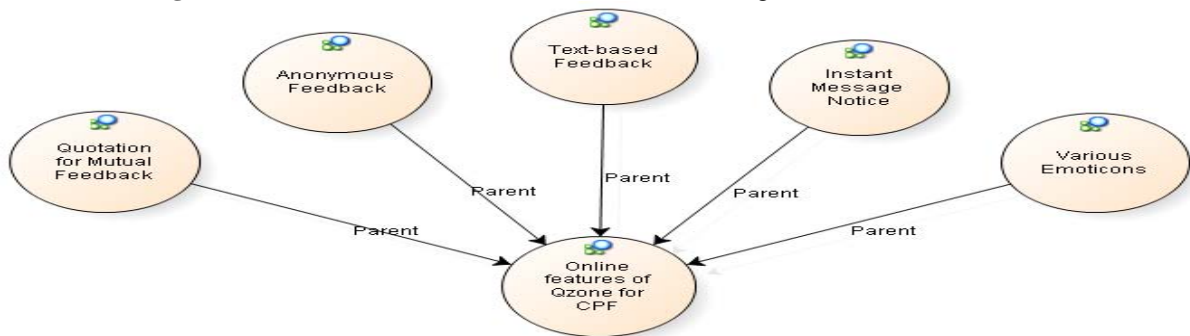
Based on the data analysis, the case participants indicated that there are two main weakness of Qzone for critical peer feedback. First, there is only a Chinese version of Qzone, which means that Qzone is more suitable for the Chinese students. While, there are translation tools for the international bloggers such as the internet explorer of Chrome with the function of various language translation.

Second, the case participants point out that the other software weakness is the number limitation of character for one feedback and blog. According to the technique support from Tencent Company, the number limitation of character is 5,000 bytes in computer and 400 bytes in smart phone for each comment or feedback. However, it is applicable to make several comments or feedback for a writing in the practice of critical peer feedback. There is a number limitation of character of 10,000 bytes on each blog length. However, the case participants indicate that 10,000 bytes of blog length is sufficient for their present Business English writing. According to the requirement of Business English discipline, the undergraduate graduation thesis is about 3,000 to 5,000 words in English.

RQ3: The online features of Qzone weblog in critical peer feedback to improve Business English writing

In this study, online features refer to the characteristics and special functions of an online software for fulfilling the efficient communication or the needs of application. Based on the data analysis by QSR Nvivo 8, the online features of Qzone for critical peer feedback can be categorized into five nodes which include text-based feedback, various emoticons, anonymous feedback, quotation for mutual feedback, and instant message notice. The online features of Qzone for critical peer feedback can be modeled by QSR Nvivo 8 in details at the following figure (see Figure 2).

Figure 2. The Nodes of Online Features of Qzone Weblog for Critical Peer Feedback



1) Text-based Feedback

The form of feedback and comment function on Qzone is a text-based written feedback, which means the users can only send text message for feedback and comment. The feedback and comment can not be in the form of audio, video or picture on Qzone. The feedback and comment dialogue box is located at the bottom of the web page. The users can write their feedback and comment into the web page dialogue box (see Figure 3). After the writing of feedback and comment, the users can click the icon “Submit” (“发表” in Chinese) to submit the feedback and comment to the Qzone. After the submission, the feedback and comment will be displayed to the Qzone owner and the owner’s “Qzone friends”. In the process of critical peer feedback, the peers can directly write their feedback into the page dialogue box, and then submit the feedback. In the following figures, the peer’s name on Qzone has been blurred by mosaic to protect the privacy.

Figure 3. The Feedback Dialogue Box of Qzone for Critical Peer Feedback



(Cited from Qzone/CP1/20 Dec., 2015)

There is an English character limitation writing in the dialogue box for different digital devices, 5,000 characters on computer and 400 on mobile devices such as smart phone and ipad. However, the peers can make several comments or feedback to express their critical peer feedback. After the feedback, the commenter’s individual

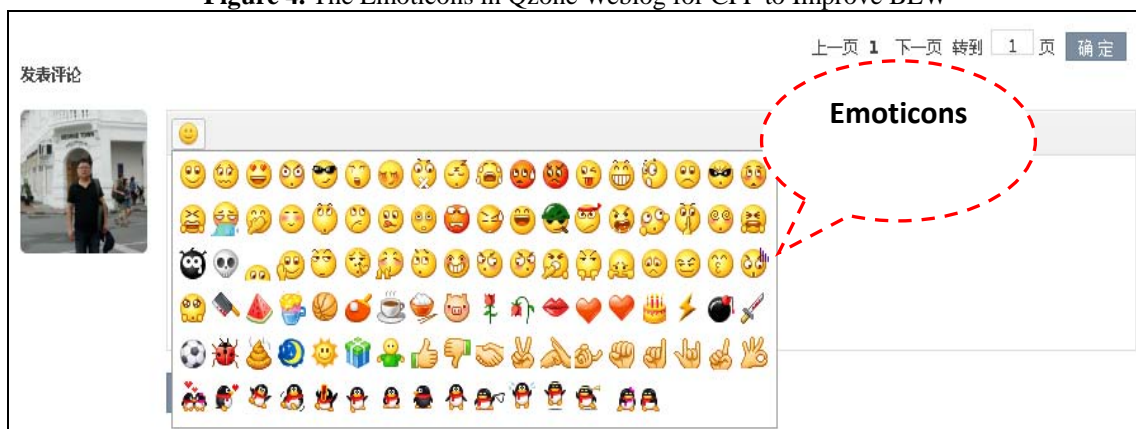
photo image and name will be shown on the left of their comments. Other information will also be shown on the web page such as time of feedback, devices of feedback such as computer, smart phone, or ipad, and your Qzone grade and point, etc. The Qzone grade and point can illustrate your experiences in the use of Qzone, who with higher grade and point will have more rights in controlling the Qzone. The Qzone “friends” in the peer group can visit their peers’ Qzone by clicking the photo image or name.

2) Various Emoticons

“Emoticon” is a combination of word “emotion” with “icon”, which has become a popular online subculture. Emoticon is used to express the writer’s emotion and feeling in online communication, which has become a non-language communication method. Emoticon is presented by icon, image, photo, or combined punctuation marks in computer.

Based on the data analysis, the case participants indicate that they are used to selecting emoticons in dialogue box to express their different emotions during critical peer feedback such as agreement, appraise, thank, happiness, consolation, angry or sadness, etc. There are about 105 emoticons, which is located at the up-left corner of Qzone dialogue box (see Figure 4).

Figure 4. The Emoticons in Qzone Weblog for CPF to Improve BEW



(Cited from Qzone/CP1/20 Dec., 2015)

The case participants argue that they are used to adopting a “smile face” to comfort peers when they are going to write the weakness of their peers’ writings, “thumb up” to praise their writings, “hug” to console the peers, and “shake hands” to express the agreement and thanks, etc. They believe that the emoticons have the pragmatic functions to save their face and keep the peer’s face, which can not be expressed in language during the critical peer feedback. The use of emoticons is connected with their personality and culture. However, they indicate that this is an informal expression in critical peer feedback and it is difficult to control the balance between formal and informal during critical “peer” feedback. They further that they are used to being informal among the peers in forms of online communication, even including critical peer feedback.

Example 4:

I feel the emoticons are very vivid. We usually will choose these emoticons to express our real idea and feelings.

(Cited from Interview Transcript/CP1/23 Oct., 2015)

I like to use emoticons. Because, if you add a “smile face” icon at the end of your feedback, it means that I point out his errors in a good emotion, it is not a vicious, shameful criticism.

(Cited from Interview Transcript/CP2/23 Oct., 2015)

I will possibly use some emoticons to express my idea. It is helpful for communication. If I find the peers’ shining points, I will use emoticons to encourage them. However, it is better to express for detailed emotion in language, which is better for your peers.

(Cited from Interview Transcript/CP6/23 Oct., 2015)

At the example 4, CP1, CP2 and CP6 directly argue that they prefer to using emoticons to expression their emotions at Qzone in online communication. Emoticons have the pragmatic functions instead of language in Qzone communication, which have become a special feature in critical peer feedback.

3) Anonymous Feedback

Anonymous feedback has been widely studied in peer feedback, which has many advantages in peer feedback

such as little peer pressure and freely feedback (Zhao, 1996; Lu & Bol, 2007). However, this study is not designed to conduct anonymous critical peer feedback, which is depended on their case participants' preference. The Qzone weblog can provide two methods for anonymous peer feedback. One is that a peer can use his or her code name or pseudonym to make their critical peer feedback. The other is that the Qzone id designed with the function toolbar for anonymous feedback (see Figure 5). If one wants to make an anonymous critical peer feedback, he or she can tick the choice box, written on the right of "Submit" with "Anonymous Comment" ("匿名评论(隐身草)" in Chinese).

Figure 5. The Function of Anonymous Feedback on Qzone for CPF



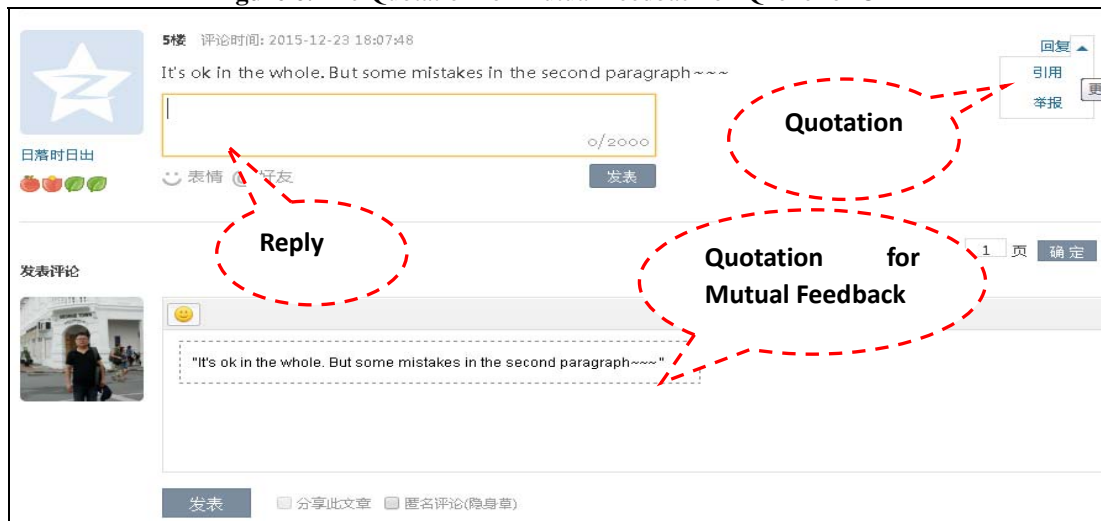
(Cited from Qzone/CP6/20 Dec., 2015)

Based on the data analysis, the case participants insist that they will not use anonymous feedback to their peers in this study, because they have been familiar with each other and their critical peer feedback is for the purposes of learning. However, they indicate that they will make anonymous critical peer feedback to other groups of students in their Business English writing lesson, which could keep their privacy and save their face for the reasons of modesty or "poor" feedback. The function of Anonymous feedback is useful for many situations to keep the commenter's privacy in critical peer feedback.

4) Quotation for Mutual Feedback

During the critical peer feedback on Qzone, peers can directly conduct their critical peer feedback for the writing to the writer. They can also conduct mutual feedback with each other's critical peer feedback or comment. This kind of mutual feedback is a further critical peer feedback among the peers during the study of critical peer feedback. At the practice of critical peer feedback on Qzone, if one peer want to make a critical peer feedback to someone's feedback, he or she can click "Reply" ("回复" in Chinese) on the up-right of the comment, a new dialogue box will be displayed for feedback and comment. If the peer wants to make a concrete and detailed feedback to someone's critical peer feedback, he or she can use "Quotation" ("引用" in Chinese) (see Figure 6).

Figure 6. The Quotation for Mutual Feedback on Qzone for CPF



(Cited from Qzone/CP1/07 Dec., 2015)

When you click "Quotation", the peer's feedback will be in your dialogue box, you can make a further feedback for his or her feedback. However, you can only make a mutual feedback to one peer at one time for the use of

“Quotation”. This kind of “Quotation” and mutual feedback can be repeated. The function of “Quotation” can be used only on computer. At portal devices like smart phone and ipad, there is only “Reply” function on Qzone feedback and comment. If you are the owner of the Qzone, there are more options for the owner in “Reply” such as “Quotation, “Delete”, “Report”, and “Blacken and Silent”. “Blacken and Silent” (“加黑禁言” in Chinese) means the reviewer can only visit your weblog and cannot make any comment on your blogs.

“Report” means the complaint the commenter to Tencent Company of Qzone to report the commenter’s unsuitable feedback or comments. The commenter maybe will be prohibited to make feedback by Tencent Company for the reasons of virus, sex, intellectual property, or advertisement, etc. The function of “Report” has been seldom used in mutual feedback among peers.

The “quotation” function in Qzone for mutual feedback, offers a direct and clear way for peers to make a further feedback to one’s comment. Based on the data analysis, the case participants indicated that they made few mutual feedback or mutual discussion for others’ feedback. This function can be highlighted in the further practice.

5) Instant Message Notice

Qzone weblog is connected with IM software QQ, which are designed by Tencent Company in China. Qzone has the software version for smart phone operational system. QQ and Qzone both have the function of synchronous notice for new feedback or comment on Qzone.

If one peer gets critical peer feedback, he or she can notice it synchronously when his or her smart phone, ipad or computer is connected with internet and installed with QQ or Qzone. QQ and Qzone installed on smart phone or ipad and other portable devices have the function of automatic notice.

Based on the data analysis, the case participants indicate that there is no problem of synchronous feedback notice. They has the daily usage habit of smart phone and computer with QQ and Qzone. They can receive the critical peer feedback notice almost synchronously, which is helpful for critical peer feedback.

CONCLUSION

In this study, Qzone is explored as a technique software platform for critical peer feedback in Business English writing among the Chinese undergraduates. Qzone can be regarded as a convenient and practical software platform for critical peer feedback in Business English writing in China. There is no need of specific knowledge about computer programming and webpage design during the use of Qzone. The Chinese undergraduates have been habitual of updating their Qzone daily. The present environment of internet and mobile learning is also suitable for online collaborative learning. Qzone also is an efficient communication platform for critical peer feedback in large class teaching.

The strength of Qzone in this study has been emerged such as popularity among students, unconstraint in place and time, mobile learning for critical peer feedback, instant message transfer, convenient technique platform, and privacy protection. However, the weakness is the character limitation of 5,000 bytes in computer feedback and 400 bytes in smart phone for one feedback, and 10,000 bytes character limitation of the blog length. This weakness may be overcome by more blogs and feedback. However, five online features of Qzone positively affect the critical peer feedback in Business English writing.

RECOMMENDATIONS

During the practice of critical peer feedback on Qzone weblog, the lecturer shall enhance the supervision in assignment writing and critical peer feedback. The learners should enhance self-discipline and self-supervision for effective critical peer feedback. They could also supervise other peers on the effectiveness of their critical peer feedback. Anonymous feedback may be conducted with criticism for the poor feedback and inefficient feedback to avoid invalid critical peer feedback. The formal language in critical peer feedback is more efficient to scaffold their peers’ writing. The informal language is unacceptable for the purpose of learning. The learners should also improve their involvement and performance and upload their critical peer feedback on time.

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Technology Integration: Exploring Interactive Whiteboards as Dialogic Spaces in the Foundation Phase Classroom

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ABSTRACT

Among its many affordances, the interactive whiteboard (IWB) as a digital space for children's dialogic engagement in the Foundation Phase classroom remains largely under-exploited. This paper emanates from a study which was undertaken in an attempt to understand how teachers acquire knowledge of emerging technologies and how this shapes their classroom practices when employing technology as a pedagogic tool. The findings of this ethnographic case study show that, while teachers have become technically skilled through continuous professional teacher development (CPTD), they have also begun to reflect more rigorously on constructivism as a learning theory. Data was generated through semi-structured interviews and classroom observations with digital video recordings. Observations revealed a perceived gap in the use of the IWB as a promising space to generate reciprocal dialogue in classrooms to influence curriculum delivery and learning. This paper argues, therefore, that IWBs can become spaces for dialogic engagement to expand learners' participation and higher order thinking skills through pedagogic strategies. Thus, there is a need to introduce Foundation Phase teachers to dialogic teaching methodologies and the potential impact thereof on learner engagement and learning.

Keywords: Interactive whiteboards, technology integration, digital literacy, dialogic spaces, dialogic teaching

INTRODUCTION

The presence of technology compels teachers who have been trained prior to the emergence of digital technologies in classrooms and who are not technologically skilled, to first become efficient users of technology. This is so because 21st-century learners are said to be 'digital natives' who are spending most of their time 'surfing' and playing games on ICTs such as smartphones and tablets. Consequently, many South African classrooms in urban areas are equipped with interactive whiteboards (IWB) and other ICT tools for teaching and learning. The White Paper on e-Education (DoE, 2004) views ICTs as a vehicle to access learning opportunities and, at the same time, redress inequalities of the past. Learners and teachers, therefore, are expected to be able to function in a knowledge-society by using appropriate technology and mastering communication and collaboration skills (DoE, 2004). One of the overarching policy goals set out in the e-Learning policy (2004) is that "every South African learner in the General and Further Education and Training bands (GET and FET) will be ICT-capable ...". There is thus the assumption that teachers should be ICT capable. The discourses around teachers' efficacy, proficiency and attitude towards technology integration in the classroom are buttressed by the discourse of "technology as delivery of learning", and also resonate within the research arena internationally (Hannon & Bretag, 2010:106). Research by Stroud, Drayton, Hobbs and Falk (2014:46) report that when teachers use the IWB infrequently, without taking advantage of the IWBs' interactive features, it is not sufficient to reap the benefits reported in the literature.

The aim of this paper is to understand how teachers use the IWB in their classrooms for curriculum delivery. The researchers, therefore, asked the following question which gave drive and focus to the study:

How are teachers using the interactive whiteboard (IWB) as a space for dialogic engagement to stimulate learner participation and higher order thinking skills?

To answer the above question, the Technological, Pedagogical and Content Knowledge (TPACK) framework by Mishra and Koehler (2006) was employed to guide the study. A qualitative research approach was used to gather data whereby semi-structured interviews were used to explore the purposively sampled teachers' perceptions and use of IWBs in their classrooms. Observations were also used to gather information on how the teachers are using the ICT tools. Results show that availability of IWBs in the classrooms is welcomed by teachers; however, optimal use of dialogic pedagogies has yet to become part of their teaching repertoires.

CONCEPTUAL FRAMEWORK

The conceptual framework which guided the study drew on the TPACK framework of Mishra and Koehler (2006). Technological knowledge (TK) involves a fluency of technological information that goes beyond traditional notions of computer literacy. It requires persons to understand information technology broadly enough to apply it productively at work and in their everyday lives, to recognise when information technology can assist or impede achievement of a goal, and continually adapt to changes in information technology. TK encompasses a comprehensive understanding of modern technologies such as computers, the internet, digital video, IWBs, data projectors, and multimodal software applications. The introduction and integration of emerging technologies or ICTs in the classrooms, as an approach to transforming learning and teaching, requires teachers to reflect on their current classroom practices. TPACK, as a framework, is essential for teachers to promote effective teaching with technology. As newer technologies continue to emerge and permeate all levels of society, schools have been compelled to focus on how the professional development and support of teachers might contribute towards enhancing and developing this emerging knowledge domain as a means of enhancing teachers' digital competencies and skills.

Koehler and Mishra (2009:61) explain that TPACK examines the entire teaching performance. Technology integration does not require one single pedagogical orientation but a spectrum of approaches to teaching and learning. Harris and Hofer (2011:211-229) acknowledge the current gap in the literature that addresses how teachers' knowledge and beliefs influence the pedagogical decisions teachers make while planning to integrate technology into their teaching. Due to this gap there is an advocacy (Ager, 2013:19) in more recent literature for the incorporation of technology, even in the primary grades. Starkey (2012:110) describes a 'digital age' teacher as one whose practice of teaching is enabled by the use of digital tools and the extensive information on, and analysis of, students' learning progress. Extensive academic knowledge of their teaching domain, how students learn and create knowledge, how to critique and use evidence to inform their teaching practice, and how to establish and maintain learning relationships within their teaching and professional contexts, further characterises the 'digital-age' teacher.

LITERATURE

According to Pahomov (2014:6), technology can increase democracy in teaching-learning interaction in a variety of ways. Integrated technology can also support an intentional shift toward a more democratised classroom structure because, together with the Internet, it allows for infinite possibilities for innovative learner-centred activities in the classroom.

Learner-centred teaching methodologies that receive minimal attention around the IWB relate to the concept of dialogic teaching. Wegerif (2005:2) argues that 'dialogic' is the idea that meaning-making requires the inter-animation of more than one perspective. He further posits that dialogue and dialogic are the key to 'learning to learn' and other higher-order thinking skills. The unique features of the IWB, therefore are suited particularly to inducting learners into dialogues. According to Bakhtin (1986) and Wegerif (2007), as cited in Hennessy and London (2013:7), dialogue is more than just 'talk', it is the shared enquiry that bridges the gap between two or more perspectives. The dialogic view shares with socio-cultural theory the idea that individual thinking skills originate in mediated dialogues. The sample in this research study is familiar with the constructs of higher order thinking as proposed by Resnick's Principles of Learning (1983). These principles underpin the teaching methodology of the sample. These principles are: academic rigour; accountable talk; clear expectations; socialising intelligence; self-management of learning; credible and fair evaluation; organising for effort; recognition of accomplishment.

DIALOGIC APPROACHES TO TEACHING AND LEARNING

Wegerif's research (2005:2) on the concept of 'dialogic' teaching is firmly rooted in the work of Bakhtin (cited in Holquist, 1990) and his literary theory. Bakhtin (1981) views language as a social practice – all language, indeed all thought, is dialogic. The concept of 'dialogical meaning-making' allows the learner to play an active role in developing a personally constructed understanding of the curriculum through a process of dialogic interchange. Bakhtin (1981) distinguishes between monologic and dialogic talk, which are both functions of discourse. Monologic talk focuses the power on the teacher and, therefore, stifles dialogue and interaction

between learners and their ideas. Hence, it reduces teacher and learner agency in favour of delivering curriculum content. Bakhtin (1981) claims that dialogic talk creates a space for multiple voices and classroom discourse that challenge power relations constructed by monologic practices. There has been a move in recent years against the power discourse which has long been the preserve of the teacher in front of the classroom, to methodologies that value 'talk' and promote a dialogic discourse (Lyle, 2008:225). The IWB, whole-class teaching and small-group teaching approaches allow for the creation of such dialogic spaces. Alexander (2006:35) identifies the essential features of the dialogic classroom as being:

- Collective: teachers and children address learning tasks together, whether as a group or a class, rather than in isolation
- Reciprocal: teachers and children listen to each other, share ideas and consider alternative viewpoints
- Supportive: children articulate their ideas freely, without fear of embarrassment over 'wrong' answers, and they help each other to reach common understandings
- Cumulative: teachers and children build on their own and each other's ideas and chain them into coherent lines of thinking and enquiry
- Purposeful: teachers plan and facilitate dialogic teaching with particular educational goals in view.

Hennessy (2011:463) proposes that classroom dialogue in the context of IWB use is construed as being facilitated by teachers and learners constructing digitally represented knowledge artefacts together. Thinking then becomes emergent, rather than a finished product of dialogue. Research by Kennewell, Tanner, Jones and Beauchamp (2008: 61) investigated the impact of IWBs on learner-teacher interaction. It was noted that the IWB has failed to support the envisaged shift of control away from the teacher to learners' self-directed learning. Advocates of dialogic engagement (Gutierrez & Larson, 1995:450) lament the absence of interchange, of genuine conversations in classrooms where learners are prevented from developing both a voice and a critical awareness of their own ends, means and capacities in learning. Lyle (2008: 228) raises the notion of barriers to implementing dialogic teaching as: the dominance of the teacher's voice at the expense of learners' own meaning-making voices. The power relationship between teachers and learners, albeit not always a negative one, could be a further stumbling block to authentic dialogue in classroom settings.

THE IWB THROUGH A SOCIO-CULTURAL LENS

In case study research on the leveraging of the IWBs as a learning tool, Guomundsdottir *et al.* (2014:25) refer to the mediocre use of the IWB in terms of pedagogical usage. It was found, therefore, to be expedient to view teachers' engagement with the IWB in this study through the lens of socio-cultural theory. This theory has become an important influence in studies of ICT education. A key aspect of socio-cultural theory (Vygotsky, 1978; Wertsch, 1985; Wertsch, 1991) is the claim that all human action is mediated by 'technical' and 'cognitive' tools. Sutherland *et al.* (2009:10) interpret the idea of a 'tool' to include a wide range of technologies and artefacts.

Within this broad conception of tools, the master tool is language. Premises for investment in technology have lacked clarity at school level, while, at the same time, technology itself has undergone considerable changes in the last decade. According to Haugsbakk (2011:249) teachers' pedagogical judgments have also often been replaced by more instrumental perspectives on the development of both technology and society. He claims that little or no attention has been paid to how the use of technology can result in greater complexity, doubt, and uncertainty. As a consequence of this pro-instrumental approach, digital technologies have often been described metaphorically as 'instruments or tools'.

Tools are something humans develop to ease or automate processes, to save time (and money) and to achieve results more efficiently. As Haugsbakk (2011:250) points out, the challenge of metaphors such as 'tools' is that they reduce or hide complexity. They also obscure the potential of digital technologies both to transform existing practices and to pave the way for new ones – not least in the field of learning and teaching (Hauge, Lund & Vestol, 2007; Lund & Hauge, 2011b). The latter authors make a critical observation, namely that there is a need to theorise the relationship between tool and agent in order to unpack this relationship's inherent potential and what is at stake when it is integrated in learning and teaching activities.

Wertsch's (1991:119) idea of 'person-acting-with-mediational-means' considers concepts such as appropriation and instrumentation. Appropriation is important to the analysis in which ICT tools are incorporated in subject domains, and instrumentation explains why different people arrogate the same tool in different ways. So, rather than conceiving the individual as having 'abilities and skills', the focus is on the 'person-acting-with-mediational-means'.

THE AFFORDANCES AND BARRIERS OF INTERACTIVE WHITEBOARDS

Currently, IWBs are seen as powerful tools for aiding teaching and learning in the classroom context. Teachers wanting to explore the benefits of digital technology, therefore, need to know that technology comes with affordances and barriers.

The functionalities of the IWB promise a fully immersive, interactive and visual experience, and thus the IWB has become a vehicle for driving digitally enhanced lessons in classrooms. According to Bucy and Tao (2007:647) interactivity can be understood as a technological feature of mediated surroundings where people communicate and exchange information and interact with technology or with other people through technology. Beauchamp and Kennewell, (2010:759) argue that interactivity from a pedagogical stance can be reached through dialogue when teachers and learners interact and collaborate. Mercer, Warwick, Kershner and Staarman (2010:367) define notions of ‘dialogic teaching’, also known as ‘dialogic pedagogy’, in which the relationship between the guiding role of the teacher and children's active involvement in their own learning is highlighted. In further research by Kershner, *et al.* (2010:380) the benefits of teaching with an IWB are the enhancement of learner attention and communication. The external representations of thinking on a large screen support productive talk. Wegerif (2005:2) states that the main role of technology in teaching thinking skills, should be to open and maintain ‘dialogic spaces’ in which different perspectives co-exist and inter-animate each other.

Although the adoption of IWB technology has influenced teaching methodologies and pedagogical decisions in the classroom, Jacobsen (2001) asserts that the gap between the presence and use of an IWB as a tool is too wide. Furthermore, research by Lewin, Somekh and Steadman (2008:99) reveals that IWBs can facilitate the emergence of new digital pedagogic practices. It reduces the teacher’s cognitive load by providing an ‘invisible script’ which allows that teacher to ‘multi-task’ in new ways, by releasing greater mental capacity to make observational assessments for learning during whole-class teaching.

The affordances of the IWB as an artefact thus can hardly be ignored in the Foundation Phase classroom. According to Loveless (2003:5) these IWB affordances, as a means to improve cognition through technological mediation of shared thinking, can be mapped as follows:

- Speed and automatic functions: enabling large amounts of information and routine tasks to be automated
- Provisionality: the ability to change texts and other outputs
- Interactivity: the capacity for feedback and response
- Range: the capacity to overcome barriers of time and distance
- Multi-modality: the capacity to integrate a range of modes of communication including film, graphics, sounds and texts (adapted by Wegerif, 2005:7).

In conjunction with the holistic teaching approach of the Foundation Phase teacher, the IWB becomes a medium for pedagogically supported technology integration which is visual and engaging and creates a focal point for whole-class learning.

Besides barriers of a technical nature that were experienced by the teacher participants in the initial stages of the implementation phase of the study under review, other constraints must be mentioned. None of the participants, however, exhibited ‘technophobia’; although, initially, some concerns around confidence and issues of efficiencies were raised and observed, but exposure to technology integration at workshops allayed initial uncertainties as teachers gained skills and competencies.

Constraints which interrupted the use of technology – more specifically the IWB – and which were outside the participants’ control, was load-shedding. This happened when the local supplier of electricity was unable to meet the demands of its consumers, resulting in the shutdown of electrical power, on a rotational basis, to prevent the failure of the entire system. These interruptions of the electricity supply could also occur at unscheduled times, with the result that teachers needed a back-up plan for their lessons should they not have access to electricity and the internet. Other external factors, which occur regularly at some schools, are acts of vandalism and theft which impact the sustainability of purchasing and storing expensive digital resources and equipment.

RESEARCH DESIGN

The research setting for this study simulates that of an ethnographic case study. The intent of ethnographic research is to obtain a holistic picture of the subject of study, with emphasis on portraying the everyday experiences of individuals by observing and interviewing them and relevant others. Ethnography allows considerable flexibility in the choice of methods used to obtain information about a culture (Creswell, 1998). The researchers needed to understand how the participant teachers engage with and through technology and also

describe their acquisition of technological knowledge and skills. It was necessary, therefore, to select a methodology that would be appropriate to the subjective description of the human experience.

Throughout the eighteen-month period that this investigation was in operation, opportunities to become fully immersed within the ecology of the Foundation Phase classrooms, allowed for rich data collection on the utilisation of the IWB within the teaching context. The duration of this study made it possible to evaluate the embedding of the IWBs. Observations covered the installation phase of the IWBs, persisted throughout the continuous professional teacher development (CPTD) phase, followed the development of teachers' technological skills and competencies, and recorded how lessons were executed during formal lesson observations. This multi-faceted observational process allowed a clearer understanding of the uniqueness of each participant.

In this study a predominantly qualitative paradigm was employed in which the choice of method is a multiple case study that adopts a 'within-case' and a 'cross-case' analysis approach. Merriam (1998:40) notes that the inclusion of multiple cases within a case study is a means by which the external validity or generalisability of study findings can be enhanced. Nevertheless, selecting a case study as the research method proved to best fit the data collection and analysis for this study for several reasons. The researchers wanted to investigate thoroughly a particular phenomenon, namely the integration of IWB into the classroom, not to generalise but to begin to understand the phenomenon. Case studies are 'intensive' and, according to Sayer (1992), call for 'intensive research' that requires detail, richness, completeness and variance or depth. In this case study the issue is probing Foundation Phase school teachers' acquisition and development of TPACK to support their learning about instructional technologies.

SAMPLE

The investigation for this study was conducted with a purposive sample of six in-service Foundation Phase teachers at an independent and donor-funded school in Cape Town, South Africa. Each teacher participant in this study constitutes a unique case which is influenced by their past experiences, perspectives of teaching and learning, formal teacher preparation and ongoing professional development. All the teachers in the sample have been teaching for longer than seven years and subscribe to the ethos and culture of the school. They have experienced the progression from a traditional mandated curriculum, to a curriculum underpinned by Resnick's (1983) Principles of Learning, which strongly advocate an application of a 'constructivist theory of instruction' to the adoption of technologically enhanced methodologies in the classroom through the use of information and computer technology (ICT).

DATA COLLECTION AND DATA ANALYSIS

The study used semi-structured interviews to explore participant teachers' perceptions and use of IWBs in their classrooms. The open-ended questions probed the affordances and the barriers that teachers experienced during the phases of embedding the IWB technology. Observations with digital video recording were guided by a Technology Integration Assessment Instrument (Harris, Grandgenett & Hofer, 2010:323). This instrument provided a structured understanding of lesson content, planning, teaching, as well as choice of digital tools. To quote McMillan & Schumacher (2014:353-354), "the qualitative phases of data collection and analyses were interwoven and occurred in overlapping cycles". These phases were: planning; beginning data collection; basic data collection; closing data collection; and the completion phase. All aspects pertaining to the collation and analyses of data took place during the completion phase. Data collecting was blended into formal data analysis and construction of meaningful ways to present the data. This analysis included the transcription of the audio-recorded semi-structured interviews. The semi-structured interviews with the participants were then transcribed, using an open-source generic transcription tool. After repeated checking that the interviews were transcribed verbatim, the transcripts were coded using open and in-vivo coding protocols in the Atlas.ti software. Through this feature of the software, 'document families' and 'quotations' narrowed the analytic focus, which helped to shape the data for interpretation and explanation (Lester & Paulus, 2011:671). The video footage was watched a number of times and then coded, based on the categories in the TPACK framework. The multiple viewing of the video data allowed for a layered approach, searching for subtle nuances that are hidden in the data and which only become visible after several viewings. At the same time the nature of the conversations between the teachers and learners revealed the dominant forms of dialogue used during teaching. Once data saturation was reached, the researchers were ready to leave the field, in the words of McMillan and Schumacher (2014:354): "the field residence terminates".

LIMITATIONS

The investigation under review was confined to an independent school in the Western Cape Province of the Republic of South Africa. Selecting a case study approach has limitations that pertain to lack of generalisability.

This limitation must be acknowledged (Yin, 2009:15). Simons (2009:23), however, posits that its unique strengths are its ability to deal with a full variety of evidence – documents, artefacts, interviews and observations – which underpin the nature of this kind of study. She further postulates that ethnographies usually require long periods in the ‘field’ and emphasises detailed, observational evidence, a prerequisite the researchers could adhere to, due to their unique position in relation to the research site. One of the researchers has been teaching at the research site for a number of years.

ETHICAL CONSIDERATIONS

Ethical safeguards were observed and measures were taken to ensure that all the necessary requirements to conduct this investigation were met (Hartas, 2010:117). Assurances of confidentiality and anonymity of the site, organisation, participants and other individuals were given and maintained during and after the research process. Permission was also obtained from the school where this research was conducted.

RESULTS AND DISCUSSION

Following the analysis of the data collected, the results and discussion of the study will be presented under the following themes:

- i) Dialogic pedagogies when using the IWB
- ii) Need for technological pedagogical knowledge (TPK)
- iii) Inflexible curriculum design impacting on the use of IWB

i. DIALOGIC PEDAGOGIES WHEN USING THE IWB

The use of the IWB in this study revealed an under-utilisation of its potential, despite the IWB’s many affordances, which this paper outlines. The study found limited evidence of extended learner dialogue around the IWB during the classroom observations. Linked to any level of IWB use is the need to also include some learner ownership of the board, arising from opportunities for focused cumulative, open-ended discussions. Researchers observed that when seated around the IWB, learners would intermittently be summoned to select answers through the touch functionality of the board. Evidence of learner responses thus appeared to be short and limited and focused on identifying the correct answers in the activity displayed on the IWB. The touch functionality was limited to novelty engagement. Teachers would often dominate the discussion. In line with research recorded by Mercer (2000: 52-56), the observed teachers were inclined to summarise and review information; ask questions to stimulate recall; repeat a learner’s answer; paraphrase a learner’s response; or encourage learners’ to ‘think’ or ‘remember’ what was said earlier. All these strategies allude to teachers’ inability to stimulate dialogic engagement to elicit learners’ verbal responses to verbalise their [learners] own ideas and thinking. Hence there was a lack of “dialogic exchange” that can foster a deeper engagement and conceptual understanding (Cullen, 2002:117).

Analysis of the data collected showed that despite the participants’ technological fluency when using the IWB, optimal use of dialogic pedagogies has yet to become part of their teaching repertoire when employing the IWB. Shortly after being introduced to the native software which was installed on the IWBs and the knowledge gained at a CPTD workshop, teachers were motivated to explore the potential offered by the various applications through the multi-modal features of the IWB. The teacher participants related that digitally enhanced lessons extended learner engagement and motivation.

One respondent commented: “*Technology makes the lessons interesting and interactive. I like that there is some sort of communication between themselves, the teacher, their peers and whatever programme.*” Another responded: “*The children were in awe of the visuals and showed a renewed interest in the lessons. Since I started using the IWB, my teaching has been enhanced and learners greatly enjoy being actively involved in lessons in this way.*”

The observations in the classrooms also reflected that there was a more observable constructivist approach from the teacher, which led to greater learner engagement. Beetham and Sharpe (2007:2-3) contend that “pedagogy itself needs to be reconsidered in order to link technology and transformation” and that a constructivist alignment provides the possibility of a shared dialogue within the dialogic space afforded by the IWB.

There is no doubt, therefore, that dialogic teaching pedagogies as proposed by Alexander (2001), Nystrand *et al.*, (1997) and Wells (1999), together with the use of an IWB, create opportunities that can promote inclusion because it promotes learners as a social collective. According to Lyle (2008: 233), concepts undergirding dialogic approaches in classroom practice call for teachers to engage children as co-collaborators in meaning-making by planning lessons that will generate dialogue which will lead to deep learning and participation and not only test what they already know.

ii. NEED FOR TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE (TPK)

It was clear that the participant teachers needed to find a balance between the curriculum deliverables and the use of technology. It was also noted that such a shift towards technologically enhanced teaching needed to be sustained, because some teachers tended to fall back into old and familiar routines.

The conducted research validated teachers' acquisition of technologically enhanced methodologies through continued teacher professional development. It also acknowledges that teacher perspectives on learning and technology are no longer considered didactic opponents, but is congruent as a tool to mediate learning. The TPACK conceptual framework illustrates the knowledge domains needed by the teacher to teach effectively with technology so that it is "integrative and transformative" (Shulman, 1986). The seven knowledge domains put forward by Mishra and Koehler (2006:1026-1027) include content knowledge; pedagogical knowledge; technological knowledge; pedagogical content knowledge; technological content knowledge; technological pedagogical knowledge. This framework provides categories to measure and understand teachers' development of TPACK.

All these components amalgamate as TPACK, which is an emergent form of knowledge that extends beyond all three 'core' components (content, pedagogy and knowledge). Underlying truly meaningful and deeply skilled teaching with technology, TPACK is different from knowledge concepts of all three components individually. Developing a TPACK mind-set is thus modelled as a 'constructive and iterative' process (Borko & Putnam, 1996:673) during which teachers need to reflect on and carefully revise multiple experiences and events for teaching their content with appropriate technologies.

One participant responded as follows: *"I made a deliberate decision to start getting to know technology and the IWB, although I don't read up a lot about it. It is just about finding my own way around technology."* Another participant said: *"... I can explain things better when I use technology."*

Understanding the purpose of technology within a given context underpins the understanding of technological pedagogical knowledge (TPK). Initially teacher participants who were less confident also lacked the terminology to explain the constraints that they experienced. In the majority of the classroom observations, it was noted that the IWB was used mainly as a presentation tool, thus the teacher was automating how lessons were taught prior to the presence of the IWB, which defeated the purpose of authentic and purposeful technology integration. To quote one participant: *"You know the IWB might go on everyday and I might just have a worksheet displayed on there. Next year I want to use it fully and not only display information."*

iii. INFLEXIBLE CURRICULUM DESIGN IMPACTING ON THE USE OF IWB

Another critical and constraining factor relates to the delivery of the curriculum. The limitations of a content-laden and tightly scripted curriculum were raised as a damper to technological innovation. Other constraints mentioned by the teacher participants related to time needed to 'cover' the curriculum content, for example: *"I am motivated to use it [IWB], I must admit the obstacle that I obviously have is time, because I need time to research. But I do feel motivated to use it."* On constraints related to the curriculum another participant responded as follows: *"... but I think this year with the new curriculum (CAPS), I need to put my head around CAPS and put my head around planning of my lessons and my assessments, especially. I think that was a bit of a challenge for me this year."*

Technical difficulties that were experienced initially related to calibrating the software and regular power outages. Some of the technical 'glitches' became less of a hindrance as teachers became technically skilled. At times technical difficulties also contributed to the constraints experienced and added to participants' frustrations: *"I actually downloaded some of my things, then my Laptop crashed and it had to be re-done. This new one was on the point of crashing and then he[administrator] had to install some other software programmes."*

Analyses of the video-recorded data revealed that the teacher participants' interaction and use of the IWB related closely to Asmavi's (2005:213) modalities of learning using the IWB and are, therefore, characterised by:

- (1) visual learning through the use of text and pictures, animation and video;
- (2) auditory learning through pronunciation, listening to sounds or music;
- (3) tactile learning through the students' physical interaction with the IWB, all of which makes it suitable for creating digital stories in the classroom.

CONCLUSIONS AND RECOMMENDATIONS

This study has considered teachers' development of technological knowledge when integrating technology through the use of the IWB in the Foundation Phase classroom. Despite teachers acquiring technological skills,

and developing a fluency in using the IWB, evidence from classroom observations found that there was a perceived gap in dialogic teaching methodologies.

Competency, attitude and support counted as some of the more influential factors when teachers gained knowledge of technological tools accompanied by the relevant pedagogies in this study. The IWB as a digital artefact brings technology into the Foundation Phase classroom. However, the IWBs' untapped potential has yet to make inroads in how teachers employ this digital artefact as a dialogic space in the classroom. Technology integration practices still fall short of extracting its dialogic perspective to aid teaching and learning – more so in the language classroom, where digital literacies are still taught alongside traditional print literacies. It is evident from the literature that if well-used, IWBs can transform teaching in the language classroom which can greatly enhance learner agency.

More specifically, the potential to stimulate higher-order thinking skills during lessons remains under-utilised. Learners' perceptions and use of digital tools are closely associated with the stimulation provided by video and other online games which can entertain them for hours. Digital games are said to improve cognition and strategic thinking and are found to engage learner attention. Together with dialogic teaching practices, exposure to 'gaming' as a digital skill could be incorporated during staff development activities to create awareness of how gaming can be incorporated as a potential strategy when using the IWB and how it aligns with constructivist approaches.

What was further observed in this study was that the enactment of the curriculum was seen as separate from technology integration. Teachers need better designed professional development opportunities to come to the understanding that when planning lessons, these should be content-based and that technology should be used purposefully and selected to be aligned with the instructional outcome. It remains critical that teachers keep abreast of changes in the effective use of new technologies and manage a flexible classroom curriculum that can accommodate the affordances of technology for learner use.

Technology integration in the classroom calls for new approaches to teaching practices to leverage fully the affordances of IWBs. A Becta (2004:2) review describes the IWB as a powerful teaching tool that has the potential to: enhance demonstration and modelling; improve the quality of interactions and teacher assessment through the promotion of effective questioning, redress the balance of making resources and planning for teaching; and increase the pace of learning.

In this paper the authors offer suggestions, based on extensive research by Alexander (2006:35), who defines dialogic teaching as the exploration of the learner's thought processes: "It treats students' contributions, especially their answers to teacher questions, as stages in an ongoing cognitive quest rather than as terminal points." Furthermore, in dialogic interactions, learners state points of view and comment on ideas which arise in the lesson. Such a process nurtures students' engagement, confidence, independence and responsibility." He proposes that teachers need other repertoires to move away from monologic teaching towards a dialogic classroom, which will probe more deeply children's thinking and understanding.

The availability of this technology challenges the assumptions of the role of technology in learning. Evidence suggests that teacher proficiency and confidence increased following focused professional development as was borne out by this study. It is, therefore, incumbent on the school's leadership to ensure that teachers' continued professional development activities consider how dialogic teaching pedagogies, together with the use of the IWB, can lead to integration practices that will deepen learner engagement through the elements of dialogue and participation, so that learners will benefit from a richer learning experience.

The domestic literature on technology integration in the classroom needs to report on a larger scale on the affordances of the IWB in the Foundation Phase classroom. Such research can contribute to the debate on the effectiveness of the IWB as a digital artefact that can support dialogic pedagogies.

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The Application of 21st Century ICT Literacy Model among Teacher Trainees

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ABSTRACT

Malaysian Ministry of Education (MOE) plans to utilize ICT in improving the quality of learning in Malaysia. This aspiration is clearly stated in Malaysian Education Blueprint 2013-2015. Hence, teaching profession of today has demanded teachers to acquire certain ICT skills as a way of exploring, discovering and accessing information besides applying such knowledge for teaching purpose in the classroom. Regardless of how advanced technology is, in ensuring its effectiveness to take place in the classroom, as a teacher, one needs to have a great fundamental of knowledge and confidence. This paper intends to report the level of ICT competency among teacher trainees. In this study, the ICT competency of participants (teacher trainees) was assessed using the *21st Century ICT Literacy Model*. This quantitative study involved approximately 104 teacher trainees who registered at *Universiti Kebangsaan Malaysia (UKM)* (National University of Malaysia) for 2015/2016 session. All data was collected using the determined questionnaire, and statistically analyzed with *Statistical Package for the Social Sciences (SPSS)*. The result indicates that teacher trainees in UKM have great ICT skills by scoring well in five out of seven domains in 21st Century ICT Literacy Model.

Keywords: ICT competency of teachers, teachers' ICT skills, ICT literacy among teachers, 21st Century ICT Literacy Model, Rasch Measurement Model

INTRODUCTION

It is undeniable that ICT in modern education context needs certain relevant rectifications and displacements. It requires a progressive evaluation in various aspects including teaching method, administration, approach as well as learner's learning style in both school and higher learning institutions. The effectiveness of selected efforts must also be consistently monitored and studied; therefore, the effectiveness of every determined effort could be ensured. Teacher' ability in managing ICT tools should not be only limited to how it is being implemented in teaching and learning process, but it should encompass all aspects in daily life. Well-prepared technology facility is not perceived as a promising platform to effective teaching and learning process, as it relies heavily on teacher's preparedness in handling and applying the tools in the learning activity. The following are several factors that explain the importance of ICT among teacher trainees.

Becoming a Knowledgeable Workforce

In a national plan called '*Rancangan Rangka Jangka Panjang Ketiga*' (Third Long Term Plan), Malaysia has made significant changes pertaining to economy management. It has put emphasis on the economy development based on knowledge or k-economy (Abdullah Ahmad Badawi, 2001). According to Ramlee *et al.* (2007), k-economy involves a knowledgeable workforce (*knowledge workers*) who could apply and utilize the knowledge effectively for certain purposes. ICT on the other hand, plays pertinent role as a platform in the era of k-economy, as it is seen as a catalyst and stimulator to the existence of knowledgeable and motivated community (OECD 1996; Mahathir Mohammad, 2001; Abdullah Ahmad Badawi, 2001). In addition, ICT also helps in transforming ordinary workers to better knowledgeable individuals. Skills and information of these working individuals could be easily enhanced via the use of certain systems or applications in daily life besides interacting with other parties using internet. Hence, considering ICT competence has important role in ensuring that k-economy could take place, as the community in this country regardless social background is encouraged to understand and master ICT area by being able to communicate using electronic and computer. (Mahathir Mohammed, 2001).

ICT skill is significantly crucial to many learners in higher learning institutions. Among the reasonable factors of having ICT competency are allowing learners to seek and obtain information from unlimited sources, communicating via computer and manipulating particular information for various purposes such as completing the tasks, presentation and data analysis (Lin, 2000; Norizan and Mohamed Amin, 2003). Information technology is also vital for various learners' social needs such as interacting in social media, enhancing hobby, inventing creative ideas and finding learning-related information. While the nation is accelerating to the creation of information and value-based information society, learners who fail to acquire ICT are seen as 'outdated' learning individuals who have poor knowledge level in academic performance. This indirectly means that each learner in higher learning institution including teacher trainees should acquire certain understanding and ICT skills as a way of allowing them to enjoy and diversify the unlimited information sources apart from creating creative and higher order thinking culture in learning process. Teachers are indeed the agents of transformation who could help to achieve the national vision. Therefore, teacher trainees need to own high level of ICT competency in order to enhance and professionally develop themselves, and simultaneously become a knowledgeable worker. A comprehensive understanding and great ICT competency would benefit teacher trainees in becoming effective educator. This effective educator is seen as an individual who could effectively deliver the teaching process and produce successful learners who could compete and productively work for the betterment of country.

Demand for Human Capital Programs

Developing human capital is indeed one of significant objectives which Education Development Master Plan 2006-2010 (PPIP 2006-2010) would like to achieve (KPM, 2006, 2013), and it is among the vital elements in the Ninth Malaysian Plan. A comprehensive human capital is seen as one who demonstrates the quality of having great knowledge repertoire, skilful and acquires a great personality. Hence, Ministry of Higher Education has advised every public higher institution to implement and conduct the soft-skills based program as a way of producing graduates who own first class mind-set (Aminah Ayob *et al.*, 2007). National strategic plan of higher learning has been altered as a way of ensuring a competent graduate with exceptional capability wherein knowledge use could be effectively produced. This holistic graduate is also seen as one who has a very high cognitive ability with creative-innovative mind and masters various languages for varieties of communication purposes. It is also expected that the changes made in the mentioned strategic plan could lead to the development of an ICT literate graduate who practises good values in life besides being able to contribute to community, nation and world (KPT, 2007).

Nowadays, teaching profession requires teachers to acquire ICT skills for many reasons - exploring, seeking and accessing information for the benefit of teaching and learning process in the classroom. In addition, teachers have also been asked to own knowledge and skills related to the use of computer besides understanding its educational software or applications as well as internet. Teachers should also learn on how to manage and imply the technology tools and understand certain new approaches and skills (Tapscott, 2003; Pachler, 2001). Regardless of the advancement of technology, teachers must be seen as an independent technology practitioner, as technology will not promise any positive change to teacher's learning and teaching without any knowledge and confidence. One should be able to handle and integrate the ICT tools effectively in the classroom (Davis, 2001) besides feeling convenient to use them (Norhayati, 1995).

Human capital based programs have determined ICT skill as one of generic skills which higher learning institution learner must grasp. Such skill needs to be comprehensively mastered aligned with other generic skills such as creative thinking, problem solving, communication, and working in group (Rodiah, 2010). As a future

graduate, teacher trainees from higher learning institution should be portrayed as an individual who own high competency in ICT skill, as it is a part of aspiration of both human capital based programs and PIPP which was introduced in early 2007. PIPP has put a lot of emphasis on the aspect of curriculum as well as teaching courses in order to ensure that teachers could be a competent classroom instructor and able to widely use ICT as a pedagogical approach in both teaching and learning process (KPM, 2006). Including ICT as one of generic skills to be mastered by higher learning institution learners is believed to prepare the teacher trainees with great skill which allows them to maximize the use of ICT in the classroom in the future.

Effective Teacher

Smart school was firstly introduced in 1999, and it mainly aims to produce a comprehensive ICT literate generation apart from maximizing the use of ICT itself in national education system. Smart school also intends to produce knowledgeable workforces for Malaysian high technological industry; as it has been designed to equip national school leavers with certain skills, so hopefully they could manage and cope with possible IT challenges in 21st century. In smart schools generally, a lot of focus has been given to several domains which are optimizing the learner's potential and enhance teaching and learning process with ICT aids (KPM, 2001). Teaching and learning process should be conducted based on the need and learner's preparedness, and it definitely may need substantial different learning resources. With computer and internet connection as aids for instance, various applications and software available at the market could be implied as alternative to help learners to become independent. It would also support and simplify smart learning process in the school. Such sources would indeed assist learners to expand their potential according to their preferences and abilities (KPM, 2004).

The use of ICT in teaching and learning process could be simply defined as a way of applying relevant ICT approach according to the determined plan with an objective of enhancing and creating positive impact in both processes (PPK, 2001). According to Ahmad Fuad (2003), information technology in the context of education is seen as an electronic link which assists the information to be obtained, collected, kept, processed, directed and delivered for certain purposes such as in teaching and learning process. Halimatun Saadiah and Nor Azilah (2003) on the other hand, have discovered that the effectiveness of ICT in education does not only rely on the technology itself, but it depends on several other factors such as pedagogical approach, teaching subject, type of learners, learner's proficiency, learner's need, teachers as well as learning environment.

Pertaining to the consideration given to the big role of ICT in the context of smart school education, all teachers have been advised to maximize and diversify the use of ICT in their teaching; therefore, learners would experience and enjoy effective learning in the classroom. Teachers in addition, should acquire certain ICT skills and master in each of it, so learners could be easily guided to explore the benefits of current ICT technology for their learning process especially outside of the classroom.

Creating Knowledgeable Worker

In the context of education particularly secondary school, teachers should be highly responsible at exposing learners to ICT skills. They should educate and prepare learner's mind to be more creative and critical apart from having employability skills for future purpose (KPM, 2001). By doing so, it would enable learners to pursue their education to higher level and allow them to practice such skills for their future careers (Robiah et al, 2003). Looking at the current and upcoming situation, working in Malaysia seems to not only require workers who have strong fundamental of ICT knowledge, but it might demand one to be able to apply and practice the knowledge and skills effectively at the workplace. Therefore, it is indeed challenging for teaching trainee institutions to prepare professional teaching courses which help in producing future effective secondary teachers who could ensure that learners would acquire at least ICT skill before they enter higher learning institutions.

21ST CENTURY ICT LITERACY MODEL

Great assessment always begins with clear learning objectives and measuring domain (Nitko, 2003; McMillan, 2007). Learning objective or measuring domain will definitely help in determining elements to be assessed and ways of assessing learner's performance. They will clearly explain and provide explicit information which needs to be known, understood and what could be done by learners as a part of evaluating learner's performance.

Previous researches related to ICT competency have shown that the level of ICT competency is commonly measured based on knowledge and skill according to variety of relevant domains. However, many identified studies measure the level of ICT competency using popular domains such as word analysis, electronic presentation, electronic database, Internet and email.

In 2001, a group of ICT experts called International ICT Literacy Panel has invented a literacy model called 21st century ICT Literacy Model (ETS, 2002). This model determines the level of ICT competency based on learner’s ability in seven different domains – defining, accessing, evaluating integrating, inventing and communicating (ETS, 2002). These seven skills are significantly crucial, and appear as keys for one to become successful in the community (ETS, 2002). According to International ICT Literacy Panel, the use of effective ICT, at the moment, requires several important skills namely cognitive and technical skills. Therefore, it is understood that the assessment of ICT competency does not only focus and rely on the technical skills such as tools, software and connection, but it also highly considers certain cognitive skills for the purpose of managing, integrating and evaluating information (ETS, 2002). In this 21st century, assessing ICT should be more on cognitive oriented. It should focus heavily and emphasize on problem solving and thinking skill where each emphasis should be related to the use of technology across seven achievement aspects (domains) (Kazt dan Macklin, 2006).

In table 1, the researcher has adapted the definition of domains of 21st century ICT Literacy Model as its operational definition.

Table 1: Domain Definition and Operational Definition

| Cognitive Skills | Technical Skills |
|---|--|
| <p>Defining Understanding and explaining the concern which needs to be solved using ICT.</p> <p>Operational Definition</p> <ol style="list-style-type: none"> 1. Identify problem which needs to be addressed and solved using ICT 2. Identify ICT tools which appear appropriate to be used in managing the problem. 3. Identify ICT operations which appear appropriate for problem solving. | |
| <p>Accessing Identifying information sources in digital environment.</p> <p>Operational Definition</p> <ol style="list-style-type: none"> a. Identifying sources of information in digital environment such as website, group discussion, email and other possible online sources. b. Producing and combining keywords to fulfill the need of task. c. Determining the type of source that could possibly produce useful information for the need of task. | <p>Accessing Using ICT tool for the purpose of collecting and discovering information in digital environment.</p> <p>Operational Definition</p> <ol style="list-style-type: none"> a. Using internet as a way of discovering information in digital environment such as website, electronic database, group discussion, email and other possible online sources. b. Using search engine to find data for the requirement of task. c. Browsing the sources effectively in seeking for required information. d. Download the required information as a way of solving the problem. |
| <p>Evaluating: Evaluating type of information which matches the problem by determining the power, unfairness,</p> | |

| Cognitive Skills | Technical Skills |
|--|--|
| <p>relations and other aspect of material.</p> <p>Operational Definition</p> <ol style="list-style-type: none"> Identifying source of information such as website and database which matches the need of problem solving. Determining whether information such as article, picture or music is recent and relevant with problem intended to be solved. Determining the amount of information sources, so it would be adequate in completing task, | |
| <p>Managing: Standardizing the information, so it could be easily retrieved in future.</p> <p>Operational Definition:</p> <ol style="list-style-type: none"> Arranging the source of information such as files, email, pictures and music according to certain classification. This includes tasks and types of information based on critical assessment towards the content of information source. Using the file name, email or database which is relevant to the content and easily to be understood. | <p>Managing: Using operational system to store the information, so it could be effectively retrieved in future.</p> <p>Operational Definition:</p> <ol style="list-style-type: none"> Formulating an organizational folder according to identified classified information. Apart from having relevant content. Creating the file name correctly, email, presentation, sheets, database or folder, so it would be easier to comprehend. |
| <p>Integrating: Synthesizing the information from various sources in order to invent something new and in decision making.</p> <p>Operational Definition</p> <ol style="list-style-type: none"> Combining and simplifying information from varieties of sources as a way of producing answers to the task. Comparing the information from different sources for task completion purpose. Arranging the information according to certain criteria based on the requirement of task. | <p>Integrating: Using certain operations in application or software to synthesize the information such as:</p> <p>Operational Definition:</p> <ol style="list-style-type: none"> Using operation in Microsoft Access to generate report based on certain criteria. Using operation in Microsoft Word and Microsoft Excel for the purpose of arrangement according to certain criteria. |
| <p>Creating: Designing and adapting information in digital environment.</p> | <p>Creating: Using ICT tools in creating information in digital native environment.</p> |

| Cognitive Skills | Technical Skills |
|--|--|
| <p>Operational Definition:</p> <p>a. Designing products according to the specifications which have been determined in task.</p> | <p>Operational Definition:</p> <p>a. Creating products relevant to the task requirement such as document file, electronic presentation, database, email and so forth.</p> <p>b. Using certain operations which could be found in particular application in producing products parallel to the specification of required task.</p> |
| <p>Communicating: Spreading effectively the information in digital form.</p> <p>Operational Definition:</p> <p>a. Determining the method of digital communication relevant to the requirement of task.</p> | <p>Communicating: Using ICT tools to effectively spread information.</p> <p>Operational Definition:</p> <p>a. Spreading information via email, electronic group discussion, tele-conference or social website.</p> |

Adapted from 21st Century ICT Literacy Model (ETS, 2002)

21st Century Literacy Model determines the level of ICT literacy based on seven different domains namely defining, accessing, evaluating, managing, integrating, creating and communicating. This study however, measures the aspect of technical skill based on solely five domains of ICT competency – accessing, managing, integrating, creating and communicating – with the integration of ICT components such as applying the word processing, electronic presentation, electronic sheet, electronic databased, Internet, e-mail and search engine in provided tasks as major part of developing ICT competency assessment. These components were selected mainly because of previous studies which used knowledge and skills of six domains – software, tool, internet, connection and etiquette in ICT – in measuring the level of ICT competency (Hullick dan Velentine, 2008; Morris 2010). These six domains are also seen as fundamental ICT skills which need to be acquired by learners in effective learning (Morris, 2010), besides playing major role in informational society (Hullick dan Velentine, 2008; Morris 2010) especially in education and business. Important skills such as word processing, electronic sheet, electronic databased and electronic presentation are seen pertinent which most university learners are advised to master (Hardy, 2005.; Wilkinson, 2006; Hullick dan Valentine, 2008; Morris 2010). However, research has found that unfortunately majority of learners fail to pass in ICT competency test (Hardy, 2005; Wilkinson, 2006; Hullick dan Valentine, 2008; Grant *et al.*, 2009). As such, this study hope to see the dimension of learner’s technical skills based on knowledge, capability of using word processing, electronic presentation, electronic sheet, electronic database, the Internet, email and search engine.

OBJECTIVE

This study intends to survey the level of ICT competency among new teacher trainees who registered for 2015/2016 session. It is specifically aimed to:

1. Identify the level of ICT competency among teacher trainees in the domain of accessing, managing, creating, integrating and communicating,
2. Recognize the level of ICT competency among teacher trainees, and
3. Find the difference of ICT competency level of teacher trainees according to courses.

METHODOLOGY

This study is a quantitative study, and it utilized survey as its research design. The questionnaires were distributed to 130 students of 2015/2016 session who were registered at Faculty of Education, National Universiti of Malaysia.

The questionnaire consists of 44 items designed by the researcher based on determined operational definitions of ICT competency. The capability of teacher trainees in performing the determined operations or process was measured according to Likert Scale. The following is the Likert scale used in this study:

Table 2: Likert Scale of ICT competency

| Scale | Level of Skill | Definition of Skill |
|-------|--------------------|--|
| 1 | Not At All Skilled | : CANNOT or NEVER perform before |
| 2 | Not Very Skilled | : CAN perform WITH guidance. |
| 3 | Somewhat Skilled | : CAN perform INDEPENDENTLY but require guidance at times. |
| 4 | Skilled | : Can perform independently WITHOUT guidance. |
| 5 | Highly Skilled | : Can perform independently without guidance and able to TEACH others. |

The quality of item in the questionnaire had been analyzed based on The Rasch Measurement Model. Statistical measurement of Rasch model could be seen below in Table 4:

Table 3: Statistical measurement of Rasch model towards item in each domain.

| Domain | Amount of Item | Index of Item Reliability |
|----------------|----------------|---------------------------|
| Accessing | 4 | 0.96 |
| Managing | 5 | 0.95 |
| Creating | 26 | 0.98 |
| Integrating | 2 | 0.82 |
| Communicating | 7 | 0.81 |
| ICT Competency | 44 | 0.98 |

Level of ICT competency among teacher trainees in each domain as well as overall domains were measured using the descriptive analysis – mean, frequency and percentage. Meanwhile, comparison of ICT competency among teacher trainees according to program was measured and analyzed using one-way ANOVA. Table 5 shows the interpretation of mean level for ICT competency of teacher trainees.

Table 4: Level of ICT competency among teacher trainees.

| Range of Min | Competency Level |
|--------------|------------------------|
| 0.00 – 1.88 | Not At All Skilled |
| 1.89 – 2.60 | Not Very Skilled |
| 2.61 – 3.40 | Average Level of Skill |
| 3.40 – 4.20 | Skilled |
| 4.21 – 5.00 | Highly Skilled |

FINDINGS

There were approximately 104 students who have completed the questionnaire; 45 students of Special Education program, 29 students of Sport and Recreational program and 30 students of TESL program.

Identifying the Level of ICT Competency among Teacher Trainees in The Domain of Accessing, Managing, Creating, Integrating and Communicating

Table 6 shows the level of ICT competency of 105 teacher trainees of UKM in four different domains – access, manage, create, integrate and communicate. Information in table 6 shows that there is one teacher trainee (1%) who does not have the capability to manage and communicate. 6.7% which equals to 7 teacher trainees do not have capability or skill to create and integrate ICT.

Table 5: Level of ICT competency among teacher trainees in each domain

| Level of Skill | Access | Manage | Create | Integrate | Communicate |
|--------------------|--------|--------|--------|-----------|-------------|
| Highly Skilled | 38.5 | 30.8 | 8.7 | 12.5 | 40.4 |
| Skilled | 37.5 | 44.2 | 32.7 | 31.7 | 39.4 |
| Somewhat Skilled | 20.2 | 19.2 | 39.4 | 26.0 | 14.4 |
| Not Very Skilled | 3.8 | 4.8 | 12.5 | 23.1 | 4.8 |
| Not At All Skilled | - | 1.0 | 6.7 | 6.7 | 1.0 |

Table 6 shows that the teacher trainees have average level (*somewhat skilled*) in creating and integrating domain, seem skillful in both accessing as well as managing domain and highly skillful in using ICT to communicate. Overall, the level of ICT competency among teacher trainees of UKM is marked at *skilled* level.

Table 6: Mean of ICT competency in each domain

| Domain | Mean | Level of Competency |
|----------------|------|---------------------|
| Access | 3.96 | Skilled |
| Manage | 4.13 | Skilled |
| Create | 3.23 | Somewhat Skilled |
| Integrate | 3.20 | Somewhat Skilled |
| Communicate | 4.24 | Highly Skilled |
| ICT Competency | 3.46 | Skilled |

Identifying the Level of ICT Competency among Teacher Trainees

Overall, the level of ICT competency among teachers could be seen in table 7. Generally, half of the teacher trainees have various ICT competency levels – *highly skilled* (11%), *skilled* (47%) and *somewhat skilled* (30%). There were only 14% of teacher trainees who were marked as *not very skilled* and *not at all skilled* in ICT competency level.

Table 7: Overall ICT competency among teacher trainees of UKM

| Level of Competency | Quantity (%) |
|---------------------|--------------|
| Highly Skilled | 11 (10.6) |
| Skilled | 49 (47.1) |
| Somewhat Skilled | 30 (28.8) |
| Not Very Skilled | 12 (11.5) |
| Not at All Skilled | 2 (1.9) |

Determining Possible Significant Difference of the Level of ICT Competency among Teacher Trainees based on Courses

Faculty of Education in UKM offers three undergraduate programs namely Special Education program, Sport and Recreation program and Teaching English as Second Language (TESL). There were 45 teacher trainees who managed to complete the questionnaire. They came from different groups – 45 from Special Education program, 29 from Sport and Recreational program and 30 from TESL program.

Table 8: Level of ICT competency among teacher trainees according to courses

| Program | N | Min | Standard Deviation |
|------------------------|-----|------|--------------------|
| Special Ed. | 45 | 3.36 | .65 |
| Sport and Recreational | 29 | 3.55 | .59 |
| TESL | 30 | 4.03 | .56 |
| Total | 104 | 3.61 | .67 |

One-way ANOVA test was conducted to determine the mean difference for three different programs apart from identifying if it is significant. Result of one-way ANOVA test is presented in Table 10.

Table 9 shows F (df_(2,101), α=0.05) is 11.326 and its significant value is 0.00 (p < 0.05). This indicates that there is a significant difference of mean values of ICT competency among the three programs – Special Education, Sport & Recreational and TESL.

Table 9: ANOVA Test of ICT competency of UKM teacher trainees based on program

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|--------|------|
| Between Groups | 8.511 | 2 | 4.255 | 11.326 | .000 |
| Within Groups | 37.949 | 101 | .376 | | |
| Total | 46.460 | 103 | | | |

Next, in Table 11, it is indicated that the mean of ICT competency for TESL teacher trainees is higher than the other two groups which are Special Education (mean difference: 68081, sig=0.00) and Sport & Recreational (mean difference: .49807, sig=.007).

Table 10: Tukey Table

| (I) program | (J) program | Mean Difference (I-J) | Sig. |
|------------------------|------------------------|-----------------------|------|
| Special Education | Sport and Recreational | -.18274 | .426 |
| | TESL | -.68081* | .000 |
| Sport and Recreational | Special Education | .18274 | .426 |
| | TESL | -.49807* | .007 |
| TESL | Special Education | .68081* | .000 |
| | Sport and Recreational | .49807* | .007 |

DISCUSSION

This study intends to survey the level of ICT competency among UKM teacher trainees based on five out of seven domains which are highlighted in 21st Century ICT Literacy Model.

In the aspect of accessing, there is only 3.8% of 104 teacher trainees who seem not very skillful (*not very skilled*) to retrieve information in digital environment. Conversely, the other teacher trainees do not have issue to get information especially from the internet. It is also found that about 38.5% of teacher trainees are highly skilled in using ICT as a way of looking for information in digital environment.

Less than 5% of 104 teacher trainees are not very skilled or not at all skilled in managing information as well as ICT tools in digital environment. Most teacher trainees have skills, and in fact there are 31% of teacher trainees who seem to be highly skilled in standardizing and managing information aspects using ICT in digital environment.

However, this study has also found that teacher trainees have slight problems to use ICT in creating and integrating aspects. Collected data has shown the percentage of teacher trainees who are not skillful in both aspects which is 6.7%. It was also found that about 12.5% of teacher trainees were identified to have no skill in integrating and 8.7% for creating aspect. This research data has indirectly implied that lecturers should be able to design activities that could enhance the competency of teacher trainees in managing ICT. This is because, by doing so, it could hopefully encourage these teacher trainees to create new products which could be used in their teaching and learning process.

In this study, the data has also shown that there are about 40.4% of teacher trainees who are highly skilled in the aspect of communication. Although there might be 1% of teacher trainees identified as not skillful in using ICT to communicate, many teacher trainees in this study are still capable to share the information in digital environment.

In the five identified domains which have been mentioned earlier, it is shown that many teacher trainees were marked to have the highest competency in communication domain. It is then followed by the domain of managing, accessing, creating and integrating. Although the overall competency of ICT is only ranked at the 'skilled' level, analysis of collected data has reflected that teacher trainees could be categorized as *highly skilled* in communication domain, *skilled* in accessing domain and *somewhat skilled* in both creating and integrating domain.

Comparison of ICT competency among teacher trainees based on learning courses has shown that there is a significant mean difference of ICT competency among three programs namely Special Education, Sport and Recreational as well as TESL. TESL teacher trainees managed to obtain higher mean than teacher trainees of the other two programs – Sports and Recreational as well as Special Education. There are many factors which might contribute to the individual capacity. Gagne (2013) has highlighted several factors such as natural talent, environment and intrapersonal factor which could be the possible reasons. However, further studies might be needed if the researcher intends to discover the actual factor which might contribute to such level of ICT competency in this study.

CONCLUSION

In 2013-2025 Malaysia Education Blueprint, MOE has highlighted their hope to imply ICT as a way of enhancing the quality of learning in Malaysia. This aspiration is stated as the seventh shift in the program of transforming the education as aspired by MOE. The finding of this study in many ways might provide guidance in improving the ICT competency of teachers; therefore, the hope of MOE could be realized by the end of 2025.

Also, the finding of this study has found that teacher trainees who recently registered at the Faculty of Education already have the skills to imply ICT in several aspects namely communicating, accessing and managing information in digital environment. However, to ensure teacher trainees would have great ICT competency as aspired by MOE, the faculty has been encouraged to:

- a. Improve the ICT module in education by focusing on way of enabling teacher trainees to produce materials or products which could be beneficial for teaching and learning purpose in the future.
- b. Enhance ICT facilities in faculty, so the learner's ICT competency could be continuously developed.
- c. Offer various courses which involve or are related to the use of ICT, so teacher trainees would be exposed more to opportunities to enhance their ICT skills.
- d. Conduct further studies in order to identify certain factors which contribute to the level of competency among teacher trainees.

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The Effect of 3D Virtual Learning Environment on Secondary School Third Grade Students' Attitudes toward Mathematics

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ABSTRACT

With this research, in Second Life environment which is a three dimensional online virtual world, it is aimed to reveal the effects of student attitudes toward mathematics courses and design activities which will enable the third grade students of secondary school (primary education seventh grade) to see the 3D objects in mathematics courses in a concrete way, access the information outside of the school and provide them with an education through games.

In order to achieve this aim, this research was carried out with 28 secondary school third grade students having their education in Istanbul province, Uskudar district, in Fatih Secondary School in 2014-2015 academic year. Research data was collected by Mathematics Attitude Scale which is prepared by Ministry of Education. The data collected in the research, analyzed with nonparametric statistical methods as the group number is less than 30. In order to compare the pretest and posttest total scores of the experiment group, Wilcoxon signed rank test, which is considered appropriate to be used in relational measuring, was used and quantity analysis of the research was carried out by "SPSS 21 for MacOS X" package program. Wilcoxon signed rank test results related to whether the students' pre-experimental and post-experimental attitudes towards mathematics have a significant difference or not, is shown on the table. The analysis result has shown that there is a significant difference between the students' pre-experiment and post-experiment scores, taken from Mathematics Attitude Scale ($z=2.95$, $p<.05$). When the mean rank and rank sums of the difference scores are taken into account, this difference is in favor of positive rank, namely in favor of post-test score. According to these results, it can be stated that Mathematics robot developed in Second Life environment has an important effect on students' attitude towards mathematics.

Keywords: Mathemnatcs Educaiton, Three-dimensional Virtual Worlds, Second Life, Education Principles, Mastery Learning, Cartesian Coordinate System

INTRODUCTION

The rapid change in science and technology made information more valuable in the information age we live in. Rapidly evolving technology and accompanying increasing informaiaon flow require the change of stereotypes and shallow knowledge with renewable and improving generations. For this reason possession of information is not enough solely, it is necessary to use the information correctly, transfer it into new situations and produce new information. Accordingly, together with the information it is a necessity to equip individuals with skills enabling them to adapt new situations. Thanks to these skills, named under creative thinking and problem solving, besides adapting to the innovations, individuals will be able to cope with the difficulties they face and produce new information. The inventions and the discoveries leading to the improvement of the societies came as a result of creative thinking and problem solving. In this context in order to raise creative individuals, education programs need to be rearranged in such a way (Akdağ ve Güneş, 2003; Senemoğlu, 1996). In this century, the graduated individuals are expected to define the problems encountered, solve them and contribute to the society they live in. Therefore current education system adopts a student-based and structural learning understanding through which students form the information. In the frame of this understanding, context and methods of the education need to be reorganized in a way to gain critical thinking, scientific thinking, relational thinking, reasoning and creative thinking skills. Providing students with learning opportunities suitable to their skills and expectations and raising man power equipped with the qualities required in our age is only possible through a technology based structure within the education system. Since raising individuals and ensuring the creative thoughts to emerge, is only possible with a contemporary education perception (Özden, 1997; Alkan, 2005).

Under the light of these ideas technology has started to take its place in learning-teaching process. During this period, computer technologies has also begun to be used in material development in order to provide more effective education as used in consulting and assessment-evaluation services. The rapid improvement of science

and technology bound to affect computer technologies which is used in education process and it also provides possibilities to overcome the limitations which can occur in computer based learning environments. In the current period a transition started from internet based learning to three dimensional, multiple user, online virtual learning environments. These three dimensional online environments allow multiple users to do activities and communicate other users with the help of virtual self (avatar) that represent them in the same environment at the same time. These environments provide a powerful visual interface structure that evokes the sense of reality in social communication, which becomes an alternative for them by eliminating the drawbacks of other Internet-based systems. These environments eliminate the distance concept as it can bring the users together in remote places. In addition, according to Barkand and Kush, virtual learning environments are described as: instant messaging, discussion boards, e-mails, blogs and podcasts (Dickey, 2005; Dede et al., 2004; Mennecke et al., 2011; Barkand and Kush, 2009).

Sert (2009), in his research, defines game based learning environments as: the environment that learning is carried out through games to ensure the learning process to be more fun and highly motivational. In the study by Salmon et al. (2010) due to the environment designs made by the participants, it is found out that they entertain and have a higher motivation for studying in the environment. In another study, researchers state that student-student interaction in virtual environments is very important for the formation of social learning (Beldarrain, 2006; Kongmee et al., 2011; Can & Şimşek, 2015).

The methods and the techniques used in learning-teaching process in our country are inefficient especially in the courses with abstract subjects like in mathematics. According to Piaget, cognitive development of the individuals is completed in four phases and these are: Sensorimotor Stage, Preoperational Stage, Concrete Operational and Formal Operational Stages. Concrete operational stage: It applies to the individual's age range 7-11 and this age range corresponds to the span between the primary school third grade and secondary school third grade. In this stage individual can achieve the basic operational series on condition that every step is clearly explained. Additionally, individual improves the concepts of the substance amount of the objects, reversibility and conservation of length and weight. Next stage, Formal Operational Stage applies to the age 11 and above, and this corresponds to the secondary school fourth grade and above in educational life. In this period individual improves the skills of hypotetico- deductive reasoning, identification and control of the variables, imagining, comprehending abstract events and concepts by interpreting them (Gültekin, 2005; Özmen, 2004).

Upon examining the mathematics curriculum of the schools, by the second grade of secondary school, an abstract subject like algebraic expressions has been taught to the students. The students are in concrete operational stage at this age and comprehension of abstract subjects like this is made impossible by the methods and techniques used while teaching. Furthermore, for example presentation of cube, a three dimensional object, on a two dimensional board creates a separate paradox. The low number of the materials designed to present the abstract subjects to the student in concrete operational stage do not allow each student to use them and the users are also limited with the school. In this context three dimensional online virtual learning environments are needed. The materials formed in three dimensional interfaces provided by these environments not only concretize the subject but also provide the opportunity to use them in required place and time. Besides the cost and the time spent for copying these materials according to the number of the students are being close to zero, it also serves the educational policy of cost saving (economy) policy. (Küçükahmet, 2006; Ergün ve Özdaş, 1997).

THE STUDY

In this study "One group Pre-test - Post-test Experimental Model of the Experimental Design (Balci, 1997; Captain, 1998)" is used. As experimental design is used in the research, population and sample are not assigned. The working group of the research is formed by 28 students studying at the third grade of Fatih Secondary School in 2014-2015 academic year.

Data Collection

Test, as a word meaning, is described as a tryout used for evaluating and understanding natural or acquired abilities, knowledge and skills of a person or a group. Tests are benefited in two ways in educational period. First one is a diagnostic test benefited for defining the insufficiencies in a unit (subject or activity) and making up the lacks before passing to a new unit. Another purpose is to determine the learning level of the student in a section covering several units of the course. On one hand these are achievement tests that are putting forth the success of the students and on the other hand they help to take precautions in order to eliminate the problems to be faced

(Özçelik, 2010).

In the context of this research, Mathematics Attitude Scale, developed by Ministry of Education, is used to measure the attitude toward Mathematics.

Process

The steps followed during the research can be listed as follows:

- Three dimensional Mathematics Robot was developed in Second Life environment to be used in the research.
- Practicality tests of the system were carried out before usage and the necessary improvements were done to make it operational.
- A written exam was prepared by the researcher, covering the objective ‘Student is able to explain two dimensional Cartesian coordinate system and use it.’ which takes place in the education program of 3rd grades’ mathematics courses.
- Permission was granted by the principle of Uskudar Fatih secondary school which is identified as the practice school for the research to be carried out in 2014-2015 academic year.
- Parent permission forms were taken from each of the 28 students’ families to allow them partake in the application.
- Before the application started, first the written exam prepared by the researcher and Mathematics Attitude Scale prepared by the ministry of education, applied as pretest.
- A field trip was organized to Istanbul University for working group to observe the similarities between the SL and real environment and to understand how the application, prepared in SL environment, works.
- As the duration of the objective, defined by the ministry, was 3 hours; the course was carried out at a defined day and time with the working group by logging into SL environment from their houses.
- At the end of the application the same achievement test and the attitude scale were applied to the students as post-tests.

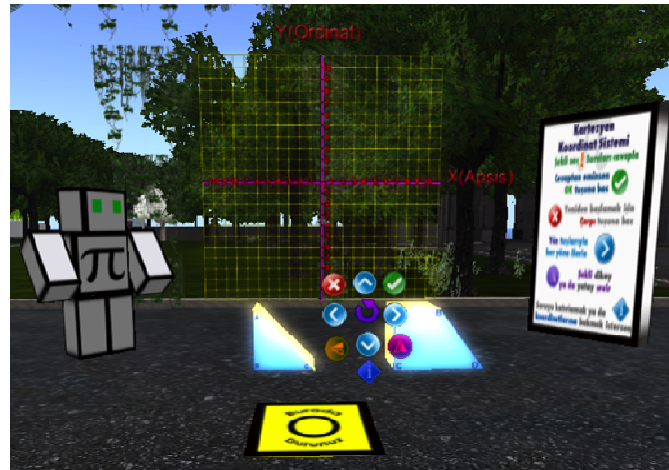


Figure1. 3D Mathematic Robot in Second Life.

Data Analysis

Wilcoxon signed rank test is used to identify whether there is a significant difference among the distributions by comparing the distributions of two relational variables. The data related to the dependent variable is as follows; It needs to be expressed in numeric characters.

- It has to be permanent data.
- It has to be in interval or ratio scale.

Wilcoxon signed rank test is used instead of T-test for relational measurements in case the conditions related to the usage of parametric tests are failed to be provided (Ural ve Kılıç, 2006). In this research the effect of mathematics course taught with Mastery learning and supported by Second Life on student success is examined. The data collected from the research is analyzed with nonparametric statistical methods as the group number is less than 30. In order to compare the pre-test and post-test total scores of the experiment group, Wilcoxon signed rank test is used, which is considered to be appropriate to use in relational measurements (Wilcoxon, 1945; Wilcoxon, 1957; Wilcoxon, 1965; Wilcoxon, 1970; Wilcoxon, 1975; Wilcoxon, 1980; Wilcoxon, 1985; Wilcoxon, 1990; Wilcoxon, 1995; Wilcoxon, 2000; Wilcoxon, 2003).

FINDINGS

Findings of the research are as follows:

In accordance with the experiment, Wilcoxon signed rank test results, as to whether the answers taken from the

Mathematics Attitude Scale which is applied before and after the training with the Mathematics Robot developed in SL environment show a significant difference or not, are given in Table 1.

Table 1. Wilcoxon Signed Rank Test Results of Pre-Experimental and Post-Experimental Mathematics Attitude Test Scores.

| Second Life Education After-Before | n | Mean Rank | Sum of Ranks | z | p |
|------------------------------------|----|-----------|--------------|-------|------|
| Negative Ranks | 11 | 13.27 | 146.00 | | |
| Positive Ranks | 12 | 10.83 | 130.00 | | |
| Ties | 5 | | | -.245 | .806 |
| Total | 28 | | | | |

*Base of negative ranks

According to the test results in Table 1, it is noted that there is no significant difference between the answers given to the questions in attitude scale before and after the SL learning application ($z=0.25, p>.05$). Items chosen among the attitude pre-test and post-test applied to the SL learning group in the research are as below;

Mathematics is not interesting for me,

- I would like to reserve most of my time for Mathematics
- I am not afraid of Mathematics,

and the item groups formed by these items are as below;

- Mathematics is not interesting for me - I love Mathematics
- I can learn Mathematics - I am afraid of Mathematics,
- I would like to reserve most of my time for Mathematics- I would like to have advanced level information about Mathematics.

These items and item groups are observed separately and findings of the observation are given below.

Wilcoxon signed rank test results, in relation to whether answers to the question ‘Mathematics is not interesting for me.’ in the test applied in order to evaluate pre-experimental and post-experimental mathematics attitudes of SL learning group show a significant difference or not, are given in Table 2.

Table 2. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the item of ‘ Mathematics doesn’t attract my attention’.

| Second Life Education After-Before | n | Mean Rank | Sum of Ranks | z | p |
|------------------------------------|----|-----------|--------------|--------|------|
| Negative Ranks | 18 | 10.92 | 196.50 | | |
| Positive Ranks | 3 | 11.50 | 34.50 | | |
| Ties | 7 | | | -2.951 | .003 |
| Total | 28 | | | | |

*Base of negative ranks

According to the results shown in Table 2, the difference between the answers given to the item ‘Mathematics is not interesting for me.’ before and after the SL learning application indicates .05 significance level ($z=2.95, p<.05$).

Mean rank in Table 2 shows that the scores of the answers given after the application are higher. In other words the difference is in favor of positive rank, namely in favor of post test score. This result can be interpreted as Mathematics robot that is developed in SL environment, has a positive effect on Mathematics attitudes of SL learning group.

Wilcoxon signed rank test results, in relation to whether answers to the item ‘I would like to reserve most of my time for Mathematics’ in the test applied in order to evaluate pre-experimental and post-experimental Mathematics attitudes of SL learning group show a significant difference or not, are given in Table 3.

Table 3. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the item of ‘ I would like to reserve most of my time for Mathematics’.

| Second Life Education After-Before | n | Mean Rank | Sum of Ranks | z | p |
|------------------------------------|---|-----------|--------------|---|---|
| Negative Ranks | 2 | 6.50 | 13.00 | | |

| | | | | | |
|----------------|----|------|--------|--------|------|
| Positive Ranks | 15 | 9.33 | 140.00 | | |
| Ties | 11 | | | -3.139 | .002 |
| Total | 28 | | | | |

*Base of negative ranks

According to the analysis results shown in Table 3 , the difference between the answers given to item 'I would like to reserve most of my time on Mathematics.' before and after the SL learning application indicates a .05 significance level ($z=3.14, p<.05$).

When the mean rank and rank sums of the difference scores are taken into account, this indicates that the observed difference is in favor of positive rank, namely in favor of post-test scores. This result can be interpreted as Mathematics robot that is developed in SL environment has a positive effect on Mathematics attitudes of SL learning group.

Wilcoxon signed rank test results, in relation to whether answers to the item 'I am not afraid of Mathematics.' in the test applied in order to evaluate pre-experimental and post-experimental Mathematics attitudes of SL learning group show a significant difference or not, are given in Table 4.

Table 4. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the item of ' I am not afraid of Mathematics'.

| Second Life Education | n | Mean Rank | Sum of Ranks | z | p |
|-----------------------|----|-----------|--------------|--------|------|
| After-Before | | | | | |
| Negative Ranks | 8 | 6.75 | 54.00 | | |
| Positive Ranks | 13 | 4.00 | 12.00 | | |
| Ties | 17 | | | -1.925 | .054 |
| Total | 28 | | | | |

*Base of negative ranks

According to the analysis results shown in Table 4, no significant difference was found between the answers given to item 'I am not afraid of Mathematics' before and after the SL learning application ($z=1.93, p>.05$).

Upon examining the research findings, it is noted that the students find SL activities more interesting and different compared to the activities in the classroom. These results show similarities with the results of Koenraad (2008) indicating that participants consider the courses more interesting and different compared to the routine courses.

Wilcoxon signed rank test results, in relation to whether answers to the items 'I am not interested in Mathematics' and 'I love Mathematics.' in the test applied in order to evaluate pre-experimental and post-experimental Mathematics attitudes of SL learning group show a significant difference or not, are given in Table 5.

Table 5. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the item of ' I am not afraid of Mathematics'.

| Second Life Education | n | Mean Rank | Sum of Ranks | z | p |
|-----------------------|----|-----------|--------------|--------|------|
| After-Before | | | | | |
| Negative Ranks | 14 | 8.86 | 124.00 | | |
| Positive Ranks | 2 | 6.00 | 12.00 | | |
| Ties | 12 | | | -3.011 | .003 |
| Total | 28 | | | | |

*Base of negative ranks

According to the test results shown in Table 5 , the difference between the answers given to items 'Mathematics is not interesting for me' and 'I love Mathematics' before and after the SL learning application indicates a .05 significance level ($z=3.01, p<.05$).

Mean rank in Table 5 indicates that the scores of the answers given after the application are higher. In other words the difference is in favor of positive rank ,namely in favor of post test score. This result can be interpreted as Mathematics robot that is developed in SL environment has a positive effect on Mathematics attitudes of SL learning group.

Wilcoxon signed rank test results, in relation to whether answers to the items 'I can learn Mathematics' and 'I am not afraid of Mathematics' in the test applied in order to evaluate pre-experimental and post-experimental

Mathematics attitudes of SL learning group show a significant difference or not, are given in Table 6.

Table 6. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the items of ‘I can learn Mathematics’ and ‘I am not afraid of Mathematics’.

| Second Life Education | n | Mean Rank | Sum of Ranks | z | p |
|-----------------------|----|-----------|--------------|--------|------|
| After-Before | | | | | |
| Negative Ranks | 8 | 7.75 | 62.00 | | |
| Positive Ranks | 4 | 4.00 | 16.00 | | |
| Ties | 16 | | | -1.847 | .065 |
| Total | 28 | | | | |

*Base of negative ranks

According to the test results shown in Table 6 , no significant difference was found between the answers given to items ‘I can learn mathematics’ and ‘I am not afraid of Mathematics’ before and after the SL learning application (z=1.85, p>.05).

Wilcoxon signed rank test results, in relation to whether answers to the items ‘I would like to reserve most of my time for Mathematics’ and ‘I would like to have advanced information about Mathematics.’ in the test applied in order to evaluate pre-experimental and post-experimental Mathematics attitudes of SL learning group show a significant difference or not, are given in Table 7.

Table 7. Wilcoxon Signed Rank Test Results of Pre- experimental and Post-experimental Mathematics Attitude Test Scores regarding the items of ‘I would like to reserve most of my time for Mathematics’ and ‘I would like to have advanced information about Mathematics’.

| Second Life Education | n | Mean Rank | Sum of Ranks | z | p |
|-----------------------|----|-----------|--------------|--------|------|
| After-Before | | | | | |
| Negative Ranks | 5 | 8.30 | 41.50 | | |
| Positive Ranks | 17 | 12.44 | 211.50 | | |
| Ties | 6 | | | -2.824 | .005 |
| Total | 28 | | | | |

*Base of negative ranks

According to the test results shown in Table 7 , the difference between the answers given to items ‘I would like to reserve most of my time for Mathematics.’ and ‘I would like to have advanced level information about Mathematics.’ before and after the SL learning application indicates a .05 significance level (z=2.82, p<.05). Mean rank in Table 7 indicates that the scores of the answers given after the application are higher. In other words the difference is in favor of positive rank ,namely in favor of post test score. This result can be interpreted as Mathematics robot that is developed in SL environment has a positive effect on Mathematics attitudes of SL learning group.

CONCLUSIONS

When the findings of the research are examined, thanks to the three dimensional Mathematics Robot developed in SL environment, affective qualities are improved; for instance students’ interests toward Mathematics increased, they started to like Mathematics, they would like to reserve more time for Mathematics and they would like to have advanced level information about Mathematics. Besides, an increase of academic success regarding the objectives, which is a cognitive quality, has been noted. It can be stated within the light of this finding that the increase in the sympathy and the motivation toward mathematics mobilized the academic success in a desired course. Furthermore having an independent environment from the school and encouraging them to ask questions to each other, sharing more things enable social learning by increasing student interaction. And these results also support the researches of Sert (2009), Salmon et al. (2010), Beldarrain (2006) and Kongmee et al (2011)

As a result;

It is determined that there is no significant difference between the attitude pretest and posttest scores, through which the effect of mathematics courses, taught by three dimensional Mathematics robot on students attitudes. However when the items chosen from the attitude test examined the following results are obtained:

1. Mathematics courses taught with “Three dimensional Mathematics Robot” increase the interest of students toward Mathematics at a significance level of (p<.05) .

2. The courses taught with “Three dimensional Mathematics Robot” increase the duration of the working hours that the students reserve for Mathematics at a significance level of “ ($p<.05$)
3. The courses taught with “Three dimensional Mathematics Robot” have no effect on Mathematics fear of the students.
4. With the help of “Three dimensional Mathematics Robot” developed in SL environment, the sympathy and the interest of the students toward mathematics increase at a significance level of ($p<.05$).
5. The courses taught with “Three dimensional Mathematics Robot” have no effect on the belief of learning Mathematics and mathematics fear.

With the help of “Three dimensional Mathematics Robot” developed in SL environment, the duration that the students would like to reserve for Mathematics and the wish to have advanced level of information about Mathematics increase at a significance level of ($p<.05$)

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The Effect of Digital Badges Specialization Level of the Subject on the Achievement, Satisfaction and Motivation Levels of the Students

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ABSTRACT

Digital badges are the components demonstrating competency and knowledge of the learners. The use of digital badges used to reflect the skills of learners is becoming increasingly widespread in the teaching environments. In addition, these badges are starting to take their places among documents such as certificates and diplomas. In this study, the relationship between digital badges rated in accordance with specialization levels of the same subject and achievement, satisfaction and motivation levels of the students has been investigated. In addition, the relationship between learning styles of the students participating in the study and their academic achievement and satisfaction levels were also presented. In this study, in which proximal parallel pattern of mixed research methods was used, quantitative and qualitative data were reviewed together. The sample of study consists of junior students of Ataturk University, Kazım Karabekir Education Faculty. 13-week study was conducted with a total of 51 participants including 26 female and 25 male students. The data of the study were obtained by academic achievement form, Kolb's learning style inventory III and semi-structured interview form. According to the results of study, it has been seen that digital badges improve academic achievement, students' motivation to learn, attendance to lesson and satisfaction of the students. They also motivate students to make them ready for class, show level of the learners, provide the possibility of self and peer-assessment and they can be also used to demonstrate the level of competence and achievement along with some other documents such as diploma or certificate. As a result, digital badges can be used to better organize the learning process and make students more active learners.

Keywords: Digital badges, Badges, Badge-based teaching

INTRODUCTION

Learning experiences are encountered with their changing structures every day. Technological developments made it possible to create alternative learning environments and perform different teaching practices at various levels in these environments. Developments of computer and internet technologies create the existing infrastructure for both face to face and distance courses to be conducted in a quality manner and allow learning environments to be improved. In this way, learners obtain their alternative learning environments. In addition, today, it is possible to participate in educational activities carried out simultaneously or separately regardless any time, place or platform.

One of the important aspects in the conduct of the learning processes is evaluation. Evaluation is used to reveal what gains learners achieved from learning process, identify deficiencies and make improvements. There are different evaluation approaches used to evaluate the learning status during and end of the learning process. Classically, at the end of evaluation procedures carried out in today's learning environment, learners receive some documents such as certificate or diploma. These documents are used to demonstrate proficiency of the learners. In addition to learning developments, evaluation processes had also some alternative approaches along with technological advancements. Especially advancements experienced in Web 2.0 environments made

significant contributions to the e-learning environments. One of these contributions can be said that the concept of digital badges took their place in the literature (McDaniel, 2012).

Badges, which had existed since the ancient times, were used as icons showing skills of an individual in terms of success, experience and expertise in the area of any case. In this regard, badges can be seen as indicators of identity, experience, expertise and authority (Halavais, 2011). Badges used in military field for centuries show the competence and success of soldiers. Similarly, various badge practices are used in many sport branches. In addition to different areas, badges are also used in learning environments. In the primary education, ribbons given to the students began reading are the most well-known examples of badge practices.

The changes experienced in the learning environment have brought a new dimension to the classic badge understanding. The idea of using digital badges in the evaluation of each learning process and certification of the achievements accomplished at the end of each evaluation process becomes more common. Digital badges are used to certificate the qualifications accomplished by the learners and allow sharing of these qualifications easily in the digital media. Despite being very new, digital badges are seen to have the same functions in several ways with real-world examples. Digital badges are the tools that have metadata providing the information of content, progress and activity results, which can be accessed online, and presenting achievements, interest and status of membership in a visual form (Gibson, Ostashevski, Flintoff, Grant and Knight, 2013). In this respect, digital badges can be considered as a virtualized representation of the badges used for centuries (Halavais, 2011). However, it can be said that these badges can be used more commonly in the learning environments with their new interpretations.

Digital badges are used not only to indicate the level of learning but also to show other qualifications achieved. In particular, they become widespread on social networks and forums. Advancements and growth experienced in the social networks enabled digital badges to be used in many social platforms (foursquare, Google News, theHuffington Post and StackOwerflow etc.) over time (Halavais, 2011; De Paoli, De Uffici, and D'Andrea, 2012). The aim of these digital badges is presenting situations such as use level or sharing rates rather than showing level of learning.

In the literature, some studies have focused on some basic concepts of digital badges. These concepts can be summarized as follows (Bani and De Paoli, 2013; Gibson et al. 2013 Forester 2013-a; Forester 2013-b);

- Developer: Developers determined and develop the standards of digital badges.
- Issuer: They propose digital badges and identify the rules and processes required for providing digital badges.
- Receiver/Earner: Persons entitled to receive badges from the issuer.
- Displayer: These are the 3rd party platforms used for the exhibition of digital badges.
- Ecosystem: Groups consist of all individuals and platforms aware of digital badge system.
- Metadata: Sum of all information including ways, activities and events to gain these badges and their results. In this structure, standards, activities, process, experience, performance or the quality information of experiences take place.

A new understanding of proficiency certification has been emerged along with the use of digital badges in learning environments. The adequacy of the outcomes such as diploma and certificates has been a matter of debate although they are considered as a representation of achievement accomplished in the learning environments. In this context, digital badges are determined to be used in business environments and education institutions as an alternative to the existing evaluation methods (Halavais, 2011). Evaluation tools such as diplomas and certificates can be a wealth of information about the process. However, they cannot give complete information about skills of the people. In certificates such as high school diploma or computer operator certificate, there isn't sufficient information about skills and knowledge of the student (workers, craftsmen, developers, etc.). Therefore, digital badges help individuals to be better evaluated in the business environments and give them to show their skills that can be useful in the business world (Watters, 2012). In addition, it has been thought that digital badges are able reveal knowledge of the students better than standard test and letter grades (Katie, 2012).

Digital badges in learning environments can be presented in different ways. Various badges can be prepared that can categorized individuals based on their knowledge level of a topic or course as beginner, intermediate, advanced or expert. There are also single-level badges showing expertise or skills of people on various subjects. In addition, issuance of badges can be differentiated. Digital badges can be given either phase by phase during the education process or at the end of the process.

Today, although the use of digital badges in the learning environments is not that much, they are believed to be used more widely in the future. It is quite possible to use badges obtained from institutions and organizations in recruitment and promotion processes. In addition, badges obtained in different settings can be kept (Katie, 2012) and used as certificates and diplomas in some applications such as university admissions or recruitment processes requiring applicants to show their qualifications. For example, it has been recommended to fill the gaps of the students having difficulties about finishing the school on its regular time by accepting equivalence of the certificates and digital badges (Watters, 2012). For such a process, digital badges should be issued credibly and the institutions issuing these badges should be supervised by an accredited organization.

Digital badges have some aspects that require attention to be paid such as necessity of standard evaluation as well as reliability in addition to its positive features like availability and more descriptive presentation of competence. Lindgren and McDaniel (2012) have stated that digital badges can be used for increasing the responsibilities of students and affecting their learning motivations in a positive way. Similarly, Halavais (2011) says that the power of badges in terms of ensuring the learning motivation can be used for teaching a certain behaviour or proficiency. According to the results of the study conducted by McDaniel (2012), badges have positive impacts on the motivation and performance when they are used to reward interaction and high level of social behaviors. In addition, Mahle (2011) indicates that badges improve attendance rates of the students.

There are a limited number of studies regarding scientific information of digital badges and their effects on learning processes. Therefore, determination of the effect of digital badges to learning processes and views of learners towards this certification and grading structure is important. This study mainly aims to put forward the views of learners, who were graded with digital badges. Within the scope of study, the effect of digital badges obtained based on level of expertise on achievement, motivation and satisfaction of the learners was investigated. For this purpose, the following research questions were asked;

1. What are the effects of digital badges on the academic achievement levels of the participants?
 - a. What is the level of the participants' academic achievement?
 - b. Is there any difference between the academic achievements of the participants in terms of gender?
 - c. What is the status of the participants in terms of earning badges?
 - d. Is there any relationship between academic achievements and status earning of a badge of the participants?
 - e. Does the relationship between status of earning a badge and academic achievement of the participants differentiate by their genders?
 - f. Does the relationship between status of earning a badge and academic achievement of the participants differentiate by their learning styles?
2. What are the views of the participants regarding digital badges?
 - a. What are the views of the participants towards the advantages and disadvantages of digital badges?
 - b. What are the views of the participants regarding impacts of digital badges on their levels of motivation?
 - c. What are the views of the participants regarding impacts of digital badges on their academic achievements?
 - d. What is the meaning of digital badges for the participants?
 - e. What are the views of the participants towards to use of digital badges as an evaluation tool in classrooms?
 - f. What are the views of the participants towards the relationship between digital badges and other achievement certification methods?

METHOD

In this study, the effect of digital badges, which are received according to the level of expertise in a course, on achievement, motivation and satisfaction levels of the learners is investigated. In addition, the relationship between learning styles and achievement and satisfaction levels of the students participated in this study was also revealed. In this study, one of the mixed research methods; proximal parallel pattern was employed. Proximal parallel pattern is a method used where qualitative and quantitative research processes are conducted together, an independent resolution process is realized and a general interpretation process is done (Creswell and Plano Clark, 2011).

Sample




The sample of study consists of junior students of Ataturk University, Kazım Karabekir Education Faculty. 13-week study was conducted with a total of 51 participants including 26 female and 25 male students. The study

group was determined according to the method of selection purposes. Büyüköztürk, Çakmak, Akgün, Karadeniz and Demirel (2010) define the purposive sampling method as a method without any possibility and selection. In addition, it is considered as an ideal method for in-depth studies (Büyüköztürk et al, 2010).

Badges

Badges in three different levels were issued within the scope of this study. The levels were identified based on knowledge covered by the badge. These badges were classified as beginner, intermediate and advanced. Levels of the badges were determined based on the opinions of course curriculum and experts. Levels and contents of the badges are given in Table 1.

Table 1. Digital Badge Levels and Basic Subjects Included in These Badges

| Beginner Level Badge | Intermediate Level Badge | Advanced Level Badge |
|--|--|---|
|  4 Weeks |  4 Weeks |  4 Weeks |
| <ul style="list-style-type: none"> • Basic Knowledge <ul style="list-style-type: none"> ○ Internet and Its Features ○ Server-Client Structure ○ What is HTML? ○ Versions, tags and features ○ Special characters ○ Main structure of HTML page • Basic level tags <ul style="list-style-type: none"> ○ Head tags ○ Body tags • What is Asp.Net? <ul style="list-style-type: none"> ○ .Net Framework and its components • Installing Visual Studio • Visual Studio window and its features <ul style="list-style-type: none"> ○ Creating a new project ○ The concept of Web Form and its use ○ The Concept of User Control and its use • C# • The most common C# codes used in the Asp.Net form <ul style="list-style-type: none"> ○ Page routing ○ Changing the font of a control in the page • The most common C# codes used in the Asp.Net form <ul style="list-style-type: none"> ○ Displaying the date ○ Sending E-mail ○ Adding html code on the form ○ Creating a warning message window ○ Auto page routing ○ New features come with C# 5 | <ul style="list-style-type: none"> • Standard Asp.Net Controls <ul style="list-style-type: none"> ○ Advertisement Controls ○ Lists ○ Buttons ○ Calendar ○ Check Box ○ Opened check box • Standard Asp.Net Controls <ul style="list-style-type: none"> ○ Uploading a file ○ Hidden files ○ Link control ○ Picture control • Standard Asp.Net Controls <ul style="list-style-type: none"> ○ Button with picture ○ Picture map ○ Displaying text ○ Link button ○ Listing control ○ HTML displaying • Standard Asp.Net Controls <ul style="list-style-type: none"> ○ Building wizard ○ Packaging controls ○ Creating dynamic control ○ Selection button ○ Selection button list ○ Placing dynamic domain to the page that can be displayed from cache ○ Dynamic table control ○ Text entry box ○ Advanced wizard ○ Displaying XML file on the form | <ul style="list-style-type: none"> • Data controls <ul style="list-style-type: none"> ○ Calling data from database ○ Calling data from XML file ○ Data inquiry by Linq and SQL ○ Site map data source ○ Creating graphical report ○ Listing data by HTML design • Data controls <ul style="list-style-type: none"> ○ Listing data ○ Displaying record details ○ Form view ○ Displaying the data by pages ○ Inquiry of data by controller • Verification controls <ul style="list-style-type: none"> ○ Comparison control ○ Controls that can be customized ○ Range control ○ Regular expression control ○ Necessity control ○ Validation • Navigation Controls <ul style="list-style-type: none"> ○ Creating a menu ○ Creating site map menu ○ Tree menu • User login controls <ul style="list-style-type: none"> ○ Creating database of the members ○ Creating new membership ○ Login to the site ○ Displaying user name ○ Log into and log out of the site |

Implementation Period

The study lasted 13 weeks. 4-week periods were designed for each badge. To earn the badge, a student is required to be successful at the end of a 4-week training program. In the first week, students were informed about the characteristics of each badge, acquisition processes, evaluation criteria and implementation steps.

The study was conducted on the Internet Based Programming course. This course has a very broad curriculum containing elements from advanced C# commands to basic HTML knowledge, which are required for development of static or dynamic web projects. It also includes a variety of web applications. Digital badge application was carried out throughout the course. From the second week of the course, necessary training activities to earn badges were conducted. Training practices were performed by presenting theoretical knowledge and performing application activities.

Badge application assignments and practical exams including achievements of all students were performed for acquisition of each badge. Badge application assignments were given in the first week of the period of winning each badge. In addition to these assignments, students were also informed about, description, scope and applications of the badge. Evaluation exam was performed at the end of the 4th week of badge winning period. This exam consists of multiple-choice and open-ended questions that contain all the gains. Open-ended questions were answered by an application on the computer. The practical exam taken by all participants at the same time was evaluated by two experts. The success score was determined as at least 85 points out of 100 points for badge application assignment and practical exam. The average score a student should be 85 in order to earn a badge. The evaluation processes were conducted separately for each badge with similar steps.

Data Collection Tools

In the study, one of the qualitative data collection tools; the interview method was used in order to obtain the views of participants towards the application. Büyüköztürk et al. (2010) have stated that they use the interview method to collect in-depth information about a research. These interviews can be used with other data collection tools as well (Büyüköztürk et al., 2010). A semi-structured interview form including 7 questions was prepared within the scope of study. The interview form was preferred since it has a flexible structure and it allows us to conduct an in-depth research (Büyüköztürk et al., 2010).

Learning Style Inventory developed by Kolb and translated by Gencil (2007) into Turkish was used to determine learning styles of the participants. The reliability coefficients of Turkish inventory ranged from 0.76 to 0.84.

In this study, the academic achievements of participants were evaluated by midterm and final exams prepared by researchers and faculty members within the subjects of the course. The midterm exam covers the contents of beginner and intermediate level badge. The subjects of final exam cover the contents of all badges. The scores of midterm and final exams were calculated separately based on the average performances showed in these periods. Two-level academic achievement assessment processes were applied to determine the success of the participants. In the first step, a written exam was performed. The written exam consists of 5 multiple-choice and 20 open-ended questions. In the second step, a practical exam is conducted. Both in midterm and final exams, questions within same taxonomic levels were asked.

Data Analysis

The data obtained through interviews with the participants involved in this study were analyzed using content analysis method. Content analysis is an analysis method often preferred for analysis of interviews and observations (Büyüköztürk et al., 2010). In addition, content analysis is used as an effective research technique for arrangement, classification of the texts and producing theoretical results from these texts (Cohen, Manion and Morrison, 2007).

The learning styles of participants were determined based on the analysis of the learning styles inventory developed by Kolb. The academic achievements of participants were evaluated by midterm and final exams. The quantitative data was analyzed by SPSS 18 software package; while statistics such as percentage and frequency were analyzed by Shapiro Wilk normality test, Mann-Whitney U test and t-test. The findings were generated by analyzing qualitative and quantitative data separately. These findings were brought together in the interpretation period.

Limitations of the Study

This study was conducted within the scope of face-to-face classes. Today, considering comprehensive changes occurring in e-learning environments, these face-to-face classes can be considered as a limitation. In addition, the study group consists of undergraduate students.

FINDINGS

In this study, the effect of digital badges received based on the level of expertise in the course on the motivation, satisfaction and achievement levels of the students and views of learners towards these digital badges were investigated. The sample of study consists of junior students of Atatürk University, Kazım Karabekir Education

Faculty. The study was conducted with a total of 51 participants including 26 female and 25 male students within the range of 22-26 years old. Qualitative and quantitative data in the study were analyzed separately. In the quantitative findings of the study, the statistical significance level was accepted as 0.05 for each statistical test. Results are organized considering the research questions.

Academic Achievement

1. What is the effect of digital badges on the academic achievement levels of the participants?

1.1. What is the level of the participants' academic achievement?

The academic achievements of participants were evaluated by midterm and final exams prepared by researchers and faculty members. Each exam was performed in both written and practical ways. Achievement scores were calculated by averaging the scores obtained from the written and practical exams. Academic performances of the participants are given in Table 2.

Table 2. Academic Scores of the Participants

| Participants | | Midterm Score | Final Score |
|--------------|------|---------------|-------------|
| Male | X | 56.04 | 77.48 |
| | Std. | 12.58 | 25.67 |
| Female | X | 58.27 | 77.84 |
| | Std. | 12.62 | 15.03 |
| General | X | 57.18 | 77.67 |
| | Std. | 12.53 | 20.72 |

As it can be seen in Table 2, the average scores of the participants are 57 and 77 for midterm and final exams, respectively.

1.2. Is there any difference between academic achievements of the participants by their genders?

Academic achievements of the participants were investigated within the scope of gender variable. As it can be seen in Table 2, academic achievements of the participants were similar to each other by their genders. Before performing the comparison, distribution of the midterm and final scores was analyzed and Shapiro Wilk normality test was performed on success scores. According to test results, midterm exam scores showed normal distribution, while final exam scores showed abnormal distribution (Table 3).

Table 3. Normality Test Results of Midterm and Final Scores by Gender (Shapiro Wilk)

| | Male | | | Female | | |
|---------------|-----------|----|------|-----------|----|------|
| | statistic | sd | p | statistic | sd | p |
| Midterm Score | .951 | 25 | .261 | .976 | 26 | .789 |
| Final Score | .664 | 25 | .000 | .919 | 26 | .043 |

The relationship between midterm scores by gender was analyzed by t-test. T-test results are given in Table 4.

Table 4. T Test Results of Midterm Scores by Gender

| Sex | N | \bar{X} | S | sd | t | P |
|--------|----|-----------|-------|----|-------|------|
| Male | 25 | 56.04 | 12,58 | 49 | 0,631 | .531 |
| Female | 26 | 58.27 | 12,63 | | | |

As it can be seen in Table 4, there is no significant difference between midterm scores of the groups by gender variable ($t(49) = 0.631$ $p > .05$).

The relationship between final scores by gender was analyzed by Mann-Whitney U test which do not require parametric test assumptions. The analysis results are given in Table 5.

Table 5. Mann Whitney U Test Results Final Scores by Gender

| Group | N | Mean | Sum | U | p |
|--------|----|-------|--------|--------|------|
| Male | 25 | 27.80 | 695.00 | 280.00 | .394 |
| Female | 26 | 24.27 | 631.00 | | |

As it can be seen in Table 5, there is no significant difference between final scores of the groups by gender variable ($U = 280.00$, $p > .05$).

1.3. What is the status of the participants in terms of earning badges?

Another information indicating the level of success of the participants is the badges that they have earned. Each participant is required to reach a certain level of success to be able to have badges. The badges, which are categorized as beginner, intermediate and advanced levels, reflect the theoretical knowledge and practical skills of the participants. Beginner and intermediate level badges cover the subjects of midterm exam, while advanced level badge covers the subjects of final exam. The statuses of earning the badges are given in Table 6.

Table 6. Status of Participants in terms of Earning Badges

| Status | Badge Level | | | | | |
|-----------------------|-------------|--------|--------------|--------|----------|--------|
| | Beginner | | Intermediate | | Advanced | |
| | Male | Female | Male | Female | Male | Female |
| Badge Earners | 8 | 19 | 17 | 22 | 7 | 7 |
| Couldn't Earn a Badge | 17 | 7 | 8 | 4 | 18 | 19 |

As it can be seen in Table 6, female participants are much more successful than male participants in terms of earning beginner level badges, which require basic knowledge of the subjects. This achievement level got closer in intermediate level badges and balanced in advanced badges. A total of 27 participants earned to have beginner level badges. On the other hand, 39 participants earned intermediate level badges. However, only 14 participants gained advanced level badges that require advanced level skills.

1.4. Is there any relationship between academic achievements and statuses of earning a badge of the participants?

In the study, the academic achievements of the participants depending on winning a badge were investigated. First, their midterm and final scores were analyzed by their statuses of winning badges. Shapiro Wilk normality test results are listed in Table 7.

Table 7. Normality Test Results of Midterm and Final Scores Who Earn Badges by Condition (Shapiro Wilk)

| Academic Achievement | Beginner Badge Level | | | | | | Intermediate Badge Level | | | | | | Advanced Badge Level | | | | | |
|----------------------|-----------------------|----|------|---------------|----|------|--------------------------|----|------|---------------|----|------|-----------------------|----|------|---------------|----|------|
| | Couldn't Earn a Badge | | | Badge Earners | | | Couldn't Earn a Badge | | | Badge Earners | | | Couldn't Earn a Badge | | | Badge Earners | | |
| | ist. | sd | p | ist. | sd | p | ist. | sd | p | ist. | sd | p | ist. | sd | p | ist. | sd | p |
| Midterm | .929 | 24 | .092 | .980 | 27 | .860 | .863 | 12 | .053 | .975 | 39 | .540 | | | | | | |
| Final | | | | | | | | | | | | | .783 | 37 | .000 | .792 | 14 | .004 |

As seen in Table 7, the academic achievement scores analyzed depending on gaining an advanced level badges didn't show normal distribution. On the other hand, the academic achievement scores analyzed depending on gaining beginner and intermediate level badges showed normal distribution.

Within the scope of study, the relationship between academic achievement and status of earning beginner and intermediate level badges has been analyzed and academic success scores of the participants were analyzed using independent sample t-test. The analysis results are given in Table 8.

Table 8. T-Test Analysis Results of Midterm Scores by the Status of Earning Beginner and Intermediate Level Badges

| Badge Earning Status | | N | \bar{X} | S | sd. | t | P |
|--------------------------|-----------------------|----|-----------|-------|-----|-------|------|
| Beginner Badge Level | Badge Earners | 27 | 59.52 | 12.28 | 49 | 1.431 | .159 |
| | Couldn't Earn a Badge | 24 | 54.54 | 12.54 | | | |
| Intermediate Badge Level | Badge Earners | 39 | 59.54 | 12.02 | 49 | 2.558 | .014 |
| | Couldn't Earn a Badge | 12 | 49.50 | 11.42 | | | |

As it can be seen from the results given in Table 8, there is a difference of 5 points between those who received beginner level badges and those who didn't earn these badges in terms of their average academic achievements. Although, those who earned these badges seem more successful, the difference between these two groups is statically insignificant ($t(49) = 1.432, p > .05$). There is a difference of 10 points between those who earned intermediate level badges and those who didn't earn these badges in terms of their average academic achievements. Those who earned these badges achieved better scores. In addition, there is a statically significant difference between these two groups in terms of academic achievement scores ($t(49) = 2.258, p < .05$).

The relationship between academic achievement and status of earning a badge of the participants was analyzed by Mann Whitney U test which does not require assumptions of parametric tests. The analysis results are given in Table 9.

Table 9. Mann Whitney U Test Analysis Results of Final Scores by the Status of Earning Advance Level Badges

| Group | n | \bar{X} | Mean Rank | Sum Rank | U | p |
|-----------------------|----|-----------|-----------|----------|--------|------|
| Badge Earners | 14 | 89.21 | 37.11 | 519.50 | 103.50 | .001 |
| Couldn't Earn a Badge | 37 | 73.30 | 21.80 | 806.50 | | |

As presented in Table 9, the academic scores of those who earned advanced level badges are 17 points higher than those who didn't earn these badges. There is no statically significant difference between academic achievement scores of these two groups ($U=103.50, p<.05$).

1.5. Does the relationship between status of earning a badge and academic achievement of the participants differentiate by their genders?

The relationship between status of earning a badge and academic achievement of the participants was analyzed by their genders. The relationship between status of earning beginner and intermediate level badges and academic achievement of male students in addition to the relationship between midterm scores, status of receiving advanced level badges and their academic achievements were analyzed by Mann Whitney U test using their final scores. The analysis results are presented in Table 10.

Table 10. The Relationship between Academic Achievement of Male Participants and Their Status of Earning Beginner, Intermediate and Advance Level Badges, Mann Whitney U Test

| Group | | n | Mean | Sum | U | p |
|--------------|-----------------------|----|-------|--------|-------|------|
| Beginner | Couldn't Earn a Badge | 17 | 12.21 | 207.50 | 54.50 | .430 |
| | Badge Earners | 8 | 14.69 | 117.50 | | |
| Intermediate | Couldn't Earn a Badge | 8 | 8.56 | 68.50 | 32.50 | .038 |
| | Badge Earners | 17 | 15.09 | 256.50 | | |
| Advanced | Couldn't Earn a Badge | 18 | 10.47 | 188.50 | 17.50 | .006 |
| | Badge Earners | 7 | 19.50 | 136.50 | | |

As given in Table 10, there is no statically significant relationship between midterm scores and status of earning a beginner level badge of the male students ($U=54.50, p>.05$). On the other hand, there is a significant relationship between midterm scores and status of earning an intermediate level badge of the male students ($U=32.50, p<.05$). Similarly, there is a significant relationship between final scores and status of earning an advance level badge of the male students ($U=17.50, p<.05$).

The relationship between status of earning beginner and intermediate level badges and academic achievement of female students in addition to the relationship between midterm scores, status of receiving advanced level badges and their academic achievements were analyzed by Mann Whitney U test using their final scores. The analysis results are given in Table 11.

Table 11. The Relationship between Academic Achievement of Female Participants and Their Status of Earning Beginner, Intermediate and Advance Level Badges, Mann Whitney U Test

| Group | | N | Mean | Sum | U | p |
|--------------|-----------------------|----|-------|--------|-------|------|
| Beginner | Couldn't Earn a Badge | 7 | 10.79 | 75.50 | 47.50 | .271 |
| | Badge Earners | 19 | 14.50 | 275.50 | | |
| Intermediate | Couldn't Earn a Badge | 4 | 9.88 | 39.50 | 29.50 | .302 |
| | Badge Earners | 22 | 14.16 | 311.50 | | |
| Advanced | Couldn't Earn a Badge | 19 | 11.53 | 219.00 | 29.00 | .029 |
| | Badge Earners | 7 | 18.86 | 132.00 | | |

There is no significant relationship between midterm scores and status of earning a beginner or intermediate level badge of the female participants ($U=47.50, p>.05$; $U=29.50, p>.05$, respectively). However, there is a significant relationship between raw final scores and status of earning an advanced level badge of the female participants ($U=29.50, p<.05$).

1.6. Does the relationship between status of earning a badge and academic achievement of the participants differentiate by their learning styles?

Another variable focused on within the scope of the study is learning style. In Table 12, learning styles of the participants and their academic achievements by their learning styles are given.

Table 12. Learning Styles of Participants and Academic Achievement Status

| Learning Style | | Midterm Score | Final Score |
|----------------|-----------|---------------|-------------|
| Converger | \bar{X} | 62,00 | 78,50 |
| | N | 2 | 2 |
| | Std. | 2,83 | 12,02 |
| Assimilator | \bar{X} | 51,78 | 75,00 |
| | N | 9 | 9 |
| | Std. | 10,34 | 14,26 |
| Diverger | \bar{X} | 58,78 | 78,94 |
| | N | 32 | 32 |
| | Std. | 13,28 | 19,99 |
| Accommodator | \bar{X} | 55,62 | 75,37 |
| | N | 8 | 8 |
| | Std. | 12,57 | 31,95 |
| General | \bar{X} | 57,18 | 77,67 |
| | N | 51 | 51 |
| | Std. | 12,53 | 20,72 |

As it can be seen in Table 12, the majority of the participants have diverging learning styles. In addition, only two participants have converging learning styles.

The midterm and final scores of the participants by their learning styles were analyzed by Kruskal Wallis H Test. Kruskal-Wallis H Test results are listed in Table 13.

Table 13. The Kruskal Wallis H Test Results

| | Learning Style | N | \bar{X} | sd | χ^2 | p |
|---------|----------------|----|-----------|----|----------|------|
| Midterm | Converger | 2 | 35.75 | 3 | 3.70 | .295 |
| | Assimilator | 9 | 18.50 | | | |
| | Diverger | 32 | 27.83 | | | |
| | Accommodator | 8 | 24.69 | | | |
| Final | Converger | 2 | 22.00 | 3 | 1.685 | .640 |
| | Assimilator | 9 | 20.67 | | | |
| | Diverger | 32 | 27.27 | | | |
| | Accommodator | 8 | 27.94 | | | |

According to Kruskal-Wallis H test results, there is no significant difference bot in midterm and final exam scores in terms of learning styles of the participants (Midterm: χ^2 (sd=3 n=51) =3.70, $p>.05$, Final: χ^2 (sd=3 n=51) =1.68, $p>.05$).

2. What are the views of participants regarding digital badges?

Within the scope of the study, the views of participants for badge-based assessment activities were obtained. Their views were categorized as advantages, disadvantages, motivation, academic achievement, meaning, badge sharing, satisfaction and assessment tool.

2.1. What are the views of the participants towards the advantages and disadvantages of digital badges?

The participants stated that the using of digital badges have some advantages in the learning environments. Participants views were grouped under headings such as motivation, competition, self-assessment and participating in the class. They also state that digital badges improve the motivation, interest to teaching activities and competition among peers of the students. In addition, according to participants, digital badges have a role of encouraging students to re-organize their own learning processes. Some examples of the views of participants regarding advantages of digital badges are as follows;

Badge-based assessment is an encouraging evaluation method that allows students to see their progress and make necessary changes in their behaviors.

These badges have an advantage of motivating students for active participation in the course. At the same time, students can see their progresses in the course by the badges they earn.

Earning badges as a result of the scores collected weekly provided a better understanding of the course and the growing interest towards the course.

It motivates students to the course. Students compete with each other for these badges; therefore, they pay more attention to the course.

The person needs to be in an effort to get the badge. Therefore, students have to do their bests to earn these badges and plan their own learning processes.

Participants discussed some of the disadvantages associated with digital badges. These disadvantages are categorized as stress, jealousy, loss of motivation and losses incurred as a result of failing to meet the criteria. Some participants could not be included in the evaluation activities due to various reasons and so they couldn't get any badges. They have said that they get upset because of a failure to earn badges in such cases. One participant implied that the process of earning a badge is stressful. A few participants argued that the case, in which there is a possibility of not earning any badges, may have negative impacts on the motivation of the student. Some examples of the views of participants regarding disadvantages of digital badges are as follows;

We lose our chance to receive a badge when we fail to attend a practice...

Although it seems simple to have a weekly exam, it is stressful indeed. In fact there is plenty of time, but still affecting.

Competition between individuals can go further. It reduces the solidarity between individuals. A sense of jealousy can occur in those who didn't receive a badge.

The motivation of students can drop down in case they don't receive any badges.

2.2. What are the views of the participants regarding impacts of digital badges on their levels of motivation? In the study, the views of participants regarding the effect of digital badges on their motivation levels were investigated. The majority of the participants stated that these badges affect their motivation positively, award themselves and they realize that they learn. They also stated that finding a chance to see their progress by practices motivate them, digital badges encourage them to study in a planned way and participate in the course and finally a competition occurs between peers to earn these badges. The examples of views of participants towards motivation are as follows;

Digital badges increase my motivation for the course. We have taken programming classes before, but I come to this one more willingly compared to previous classes.

I get prepared for the class before the practice to receive a higher score.

Since these badges make it mandatory to attend the class, we don't miss any subjects and even though the award received is a digital badge, it is another source of motivation because students enjoy receiving such awards.

I'm looking at the subjects again before coming to class. Furthermore, I understand the subjects better by exercise activities. In addition, the badge that I received increased my attention for the course.

Since earning a badge shows how we are specialized in the course, they make me feel I learn the subject, so I become well-motivated.

At least I study for the course every week regularly.

It motivates because competing with other students for badges leads us to turn in better homework assignments.

According to participants, digital badges have also some disadvantages on their motivation level. Two of the participants stated that their motivations were reduced since they couldn't earn any badges. The examples of views of the participants regarding disadvantages of digital badges are as follows;

My motivation drops down when I can't earn a badge.

Since there is a competitive classroom environment, you fall behind other when you miss something.

2.3. What are the views of the participants regarding impacts of digital badges on their academic achievements?

In the study, the views of participants regarding the effect of digital badges on their achievement levels were analyzed. Almost all of the findings indicate that digital badges positively affect the academic achievement. Participants stated that they perform more active participation in the course and get prepared for the course before coming to the class to earn a badge; so this increases their achievement. Two of the participants stated that their attendance rates are higher for this class compared to other courses to earn badges and higher attendance rates increase their academic achievement. There was no participant stated that digital badges negatively affect the academic achievement. The views of participants regarding academic achievement are as follows;

It affects my success positively. Because it motivates me and at the same time, I learn everything step by step by exercise activities in the course.

It affects my achievement in a positive way, because it allows us to come to the class well-prepared. We get prepared for the course before the class to earn a badge.

Students pay more attention to the class to earn a badge and turn in better assignments. Therefore, it is a beneficial assessment tool.

It improves my academic achievement level since I don't miss any classes. I think they don't have any other advantage for my success.

2.4. What is the meaning of digital badges for the participants?

In the study, the views of participants regarding what digital badges mean for them were analyzed. Those who earned digital badges state that these badges represent their achievement levels and show their progresses compared to other students. They also consider these badges as an award. Those who couldn't win badges couldn't attribute any meaning to these badges. The examples of views of participants regarding what meaning they attribute to digital badges are as follows;

The badge I earned represents my achievement in the course.

It makes me think that I am successful in the course and I consider it as a gift from my teacher.

It affects my success and status in the class.

I didn't feel anything since I haven't earned any badges.

2.5. What are the views of the participants towards the use of digital badges as an evaluation tool in the classroom?

In the study, the views of participants regarding the use of digital badges as an evaluation tool in the classroom were analyzed. The majority of the participant stated that digital badges can be used as an evaluation tool especially in practice-based classes and they might be willing to attend these classes. One of the participants stated that he doesn't want to attend the class conducted with digital badge applications. He says that such applications cause a stressful environment. The example views are as follows;

Yes, I want; however, not for all the classes. They would be more useful in software courses such as programming.

I think they would be quite useful for classes that have a programming logic, and I want them to be used in such classes.

They should be applied to other classes as well to have a better understanding of the courses.

Yes, I absolutely want it; because, it facilitates the learning process.

We are under a lot of pressure, but maybe I pay more attention to the class and understand the subjects better.

2.6. What are the views of the participants towards the relationship between digital badges and other achievement certification methods?

Considering the relationship between digital badges and other achievement certification methods; some of the participants stated that digital badges can be used instead of some other certification methods such as diploma and certificates. On the other hand, some of the participants indicated that since digital badges have different levels, they reflect the status of achievement better and give more detailed information compared to other certification methods. They also stated that if these badges are given by official institutions, they would be more valuable. The example views are as follows;

I think digital badges represent the achievement or failure of the students as much as certificates and diplomas do. Of course the issuer of the badge should be neutral and objective.

It does make more sense to use badge-based evaluation methods rather than certificate or diploma documents. Certificates and diplomas are issued for the whole training program, whereas digital badges are issued step by step for each subject.

It is better to progress level by level. For example, those who score 85 and 90 points from the same exam receive the same certificate, respectively. However, different digital badges are given based on different success levels.

Diplomas and certificates have a validation. Digital badges have no validity. I think they are not equal to each other.

I don't want a badge-based application to be used instead of diploma. However, I would like to have them instead of certificates so I can use them for my job applications.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

In this study, the effects of digital badges on the course achievement and motivation of the students and views of students regarding these badges were investigated. During the process, academic achievement of participants has increased. Considering the views of participants and results of the exams containing questions within the same taxonomic level, we can say that teaching activities performed with digital badges increase the achievement level of the students. Similarly, McDaniel, Lindgren and Friskics (2012) indicated that digital badges increase the achievement level of the students, while Davidson and Goldberg (2009) stated that these badges both increase and improve the academic achievement levels of students. In addition, since there is no difference between different genders in terms of academic achievement, it can be said that the effect of digital badges on both gender groups are same.

Learning styles have no impact on the achievement level of the learners during teaching activities conducted with digital badges. There was no significant difference in terms of academic achievement of the students by their learning styles in the group, which includes mostly students with diverging learning style. This shows that learning styles have no effect on the academic achievement level of the learners during teaching activities conducted with digital badges. Speece (2012) implies that the effect of learning style on success is so little.

Earning a badge can be a true indicator of academic achievement. Students study harder in order to gain digital badges and they get prepared for the course before coming to the class. They also make an effort to attend the course and classroom activities. Similarly, Bani and De Paoli (2013) argued that digital badges reflect the improvements. Katie (2012) indicates that training programs performed with digital badges are effective for evaluations. In addition, it can be also noted that digital badges may change study habits of the students in the direction wanted. Digital badges are objects that are desired by the students. Students make various changes in their lives to earn these badges and review their study habits. Students identify ways to earn badges according to their preferences in general and they implement their decisions. Gibson et al. (2013) have stated that digital badges provide a continuous improvement for students and support their performance of the students.

Teaching activities that use digital badge affects the motivation of the students in a positive way. It can be said that digital badges have positive effects on motivation of the learner with its features such as they are considered as awards of the course, they provide students to be aware of what they are learning, allow them to review their peers and trigger competition in the classroom. This may be caused by that learners can see what badges their peers earn and what knowledge-skill level these badges represent. Gibson et al. (2013) and Abramovic, Schunn and Higashi (2013) stated that the motivation of learners are positively affected by digital badges. In addition, digital badges help learners to be satisfied and realize their achievements. This may be associated with that students may certify their achievements with digital badges whenever they want.

Digital badges create a competitive environment in the classroom, encourage students for course participation and give the opportunity of self-evaluation. This may be associated with considering digital badges as a reward earned and educational efforts spent to obtain these badges. Similarly, Ash (2012) indicates that digital badges are that perceived by learners as rewards. Achievements and peer competition affect learners' study habits. Learners spend more efforts and study harder to obtain badges. Davidson and Goldberg (2009) argued that digital badges help to create desired learner behaviors. According to Flemming and Levie (1993), more cognitive effort spent affect learning in a positive way. However, due to some reasons other than academic limitations, some negative situations such as stress and loss of motivation can be seen in learners in case of failures to receive a badge.

Digital badges constitute positive attitudes toward learning processes. The desire of learners to use digital badges in their future learning lives and their expectations of having these badges in application-based courses support this argument. Similarly, McDaniel, Lindgren and Friskics (2012) stated that learners exhibit a positive attitude towards digital badges.

Digital badges issue by accredited institutions can be used as achievement certificates. Digital badges reflect the adequacy of a course or knowledge of expertise. Therefore, it seems possible to use these badges like other certification methods showing the level of achievement and expertise. Digital badges are considered as tools that can fill the deficiency of other certification methods and reflect the achievements of students correctly (Watters, 2012). Gibson et al. (2013) stated that digital badges have become an alternative grading system. In addition, digital badges can be used to depict individual skills and abilities (Foster, 2013-b).

As a result, digital badges;

- Increase the success of the student in the course. Digital badges are attractive as they strive to achieve an engagement of students. Therefore, students spend effort to achieve these badges and their achievement levels increase. Learning style does not constitute any differences in academic achievement. In this regard, digital badges can be used for improving attendance and achievement of the students in addition to the level of readiness for the class.
- Increase learner motivation. The motivation of students who earn a badge increases. The badges earned make students feel that they are successful, their achievement is rewarded, and they earned this reward in a fair and valid process. Therefore, digital badges can be used to increase motivation of students, create a happier learning environment and make students more active in the learning process.
- Show the level of academic achievement. Since digital badges are earned by those who meet the specific learning objectives, these badges indicate the level of success. Digital badge holders can easily evaluate the success of their own levels and peers. Digital badges can be used to reflect achievement levels of learners, prepare different instructional practices based on different levels of achievements and create competition among peers.
- Regulate the study habits. Digital badges are objects that are desired by the students. Students make various changes in their lives to earn these badges and review their study habits. Students identify ways to earn badges according to their preferences in general and they implement their decisions. Therefore, digital badges can be used to improve study habits of the students and as a tool that encourage them to demonstrate their self-regulation behaviors.
- The views of students toward digital badges and their satisfaction levels are positive. In addition, they want to be a part of badge-based teaching activities to be conducted in the future. This indicates that students attribute positive meanings to digital badges in general. These emotions can be used to organize courses and as encouraging tools while performing activities both in and out of classroom.
- Used as a certificate showing the achievement and rank of the student. Digital badges are considered to have similar properties as diplomas, certificates and achievement letters showing the achievements and ranks of the holder. In this regard, digital badges can be used instead of certificates and diplomas showing the competency. However, it is important to remember that digital badges should be issued by

accredited institutions. Digital badges with these specifications can be used as competence documents in the personnel selection processes of public or private institutions.

In this study, the effect of digital badges on teaching processes and views of the students investigated. According to results of the study, digital badges are powerful factors that can affect activities conducted in and out of classroom in a positive way. This study, in which effect of badges given based on different levels of a subject is investigated, can be diversified by activities containing evaluations of badges belonging different subjects. In addition, studies to be conducted in different groups will be useful in the evaluation of the results.

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The Effects of Maple Integrated Strategy on Engineering Technology Students' Understanding of Integral Calculus

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ABSTRACT

The objective of this research is to investigate the effectiveness of a learning strategy using Maple in integral calculus. This research was conducted using a quasi-experimental nonequivalent control group design. One hundred engineering technology students at a technical university were chosen at random. The effectiveness of the learning strategy was examined through three variables on two groups of these students. Data were analyzed using Hotelling's T^2 and explained by interview data. The advantages offered in Maple enable students' thinking to be amplified. Students benefit from the conceptual and procedural understanding of integral calculus. However, they need more time to improve their metacognitive awareness. The transformation of the integral calculus learning approach using Maple has the potential to overcome engineering technology students' under-preparedness. As a result, the nation's inadequacy in the related workforce may be overcome.

Keywords: Integral calculus, conceptual understanding, procedural understanding, metacognitive awareness, technology integration, Maple software

INTRODUCTION

The focus of Malaysian industries has shifted toward emphasizing research and development, thus innovating and producing high-technology products ahead of other countries (Board of Engineers Malaysia, Institution of Engineers Malaysia, & Federation of Engineering Institution of Islamic Countries, 2003). Hence, the type of workforce required has also moved from cheap labor to the highly skilled. In this sense, Malaysia has to produce enough science, technology, engineering, and mathematics (STEM) majors to meet the country's industrial needs. With this vision, the Malaysian government has urged universities to produce engineers who are competitive in the global market (Ismail & Puteh, 2008). Furthermore, in complementing engineers' work, engineering technologists are needed to help Malaysia become a more industrialized nation.

The fields of engineering and engineering technology greatly differ. Nevertheless, they are strongly associated professions. Engineering education frequently focuses on theory and conceptual design, while engineering technology education focuses on science and mathematics application aspects. Graduates of engineering programs are called engineers. Engineering technology programs, which are completed in four years, produce graduates known as technologists. Graduates who have completed any two-year engineering technology programs are called technicians (ABET, 2011). Engineers often enter the workforce as conceptual designers or researchers in developing new technologies. Instead, engineering technologists are responsible for transforming engineers' designs and ideas into practical devices and products (Mynbaev et. al., 2008). In that view, engineering technology education aims to prepare graduates for the practice of improvement and manufacturing of products to accommodate the needs of the engineering field.

In Malaysia, the engineering technology field does not compete with the conventional engineering field. Instead, it compensates the workforce produced by the engineering field to realize the country's vision. Thus, an adequate number of technologists is required to achieve the vision. This implies that an increased number of students choosing STEM majors is required. The ideal ratio between technologists to engineers needed by Malaysia to be an industrial country is 2:1 (Othman, 2010). However, the current ratio is 1:3, which has led to an 80% shortage of engineering technologists (Ali et Al., 2009; Othman, 2010). To overcome the problem, universities producing graduates in the field of engineering technology have to ensure an adequate number of graduates to cater to the country's industrial needs. The need to increase the number of students choosing STEM majors and graduate on time has led to better preparation and performance in regards to the subjects related to

STEM (LeBeau et al., 2012). One of the required subjects to successfully complete STEM majors is mathematics, particularly calculus (LeBeau et al., 2012).

However, the prevailing obstacle that inhibits students from graduating on time is poor performance in mathematics (Mynbaev et al., 2008). One possible reason why students perform poorly in this subject is because they are not well versed with the threshold concepts in this subject. One important threshold concept in mathematics for engineering technology courses is calculus. However, students entering the courses at the university were found to be underprepared on this topic. This under-preparedness has been portrayed by the remedial courses offered to bridge the gap in students' understanding (Henderson & Broadbridge, 2007; Lavicza, 2010; Selden, 2005). The university involved in this research also faces the same problem. In order to tackle the problem, the university has practiced its own designed remedial mathematics courses. Even with the measures taken, students in this university still face problems with the threshold concept of integral calculus.

The inability to get through this topic has an effect on higher mathematics and other technical subjects, as this topic serves as a prerequisite. It is important to maximize the number of students that graduate on the time scheduled because their service is needed in developing our nation. If they fail to complete their studies on time, the effect is not only their future but also the nation's growth in general. The country's economic growth depends on advances in industrial activities. The industrial activities will grow healthier when engineers and engineering technologists work together. To make this vision a reality, the number of workforce in both areas has to remain sufficient. With that in mind, suitable measures to handle the problem require proper planning. Any teaching and learning situation is a product of three elements: curriculum, pedagogy, and assessment (Osborne, 2007). Thus, in this research, to ensure students' engagement and high successful rate in the engineering technology field, a new pedagogical approach in integral calculus has been designed and implemented.

Integral calculus is one of the subtopics in calculus to be mastered by students majoring in science, technology, engineering, and mathematics (STEM) (Bryant et al., 2011; Haripersad, 2011). However, many students have difficulties in comprehending this topic (Bryant et al., 2011; Grove, 2012; Haripersad, 2011; Kashefi, Ismail, Yusof, & Rahman, 2012; Mynbaev et al., 2008; Özkan & Ünal, 2009; Salleh & Zakaria, 2012a; Yates, 2012). Furthermore, in the university involved in this research, students' learning philosophy is geared toward dependently receiving help and guidance from others during the learning process rather than independently exploring the possibilities by themselves.

Besides, students expect to receive rewards on each successful task done where they define rewards as marks. They seem not to realize the importance of conceptual understanding as a meaningful reward. This frame of mind is the result of their under-preparedness in this subject, where they previously acquired knowledge through rote learning rather than understanding (Blank, 2000). Furthermore, they will only gain confidence in solving mathematical problems if they are given the final answer to refer to. In this sense, generally, students are more concerned about the final product than the process toward solving/creating the product. Without a solid understanding of this topic, students may face difficulties in learning calculus-related application subjects during their studies (Özkan & Ünal, 2009). Under-preparedness in school calculus can affect first-year university students' understanding (Burton, 1989). To ensure a smooth transition between school mathematics with the mathematics at the university, the gap has to be closed. Thus, a careful strategy has been planned and implemented.

To succeed in mathematics, students must become fluent in the process and understand the mathematical concepts. In cultivating the culture of learning with understanding at this university, a new teaching strategy has been designed and implemented. The strategy was developed to close the gap of students' under-preparedness on this topic. This measure is important in order to maximize the number of students that graduate on time. In the first stage of the strategy development, a needs analysis has been carried out. The results indicated that students' active involvement in the learning process using hands-on activities led to meaningful learning in integral calculus. Conversely, the existing teaching practice still focuses on the teacher-centered method. A new paradigm of teaching practice focuses on student-centered needs in order to maximize students' potential. Student-centered learning requires the active involvement of students, which can be implemented based on constructivism theory (Bergsten, 2008; Dubinsky, 1991, 2001). Studies have shown that the constructivism theory is effective in a computer-technology-integrated environment (Colonna & Easley, 2011; Ward, 2003). With technology, students are flexible in adjusting their learning strategy based on their learning style (Salleh & Zakaria, 2012b).

Learning mathematics using technology yields a positive impact in terms of student understanding (Ayub,

Mokhtar, Luan, & Tarmizi, 2010; Fox-Turnbull, 2012; Highfield & Goodwin, 2008; Lee, 2004; Noinang, Wiwatanapataphee, & Wu, 2008; Wiwatanapataphee, Noinang, Wu, & Nuntadilok, 2010). However, these studies have not emphasized the importance of students' learning style in developing a mathematics teaching strategy using technology. In addition, not many studies have discussed the advantages of technology on conceptual understanding, procedural understanding, and metacognitive awareness in learning integral calculus. In this research, the current teaching method has been enhanced with the integration of enhancement of technology. This teaching strategy was designed to promote students' understanding through exploring integral calculus using mathematics software, known as Maple.

The teaching strategy developed emphasizes the understanding of where the elements of conceptual understanding function as the core components. However, the importance of the procedural fluency has not been ignored. This element also was given equal weight in designing the strategy. Fluency in the process may entail certain memorization of crucial steps. Nevertheless, the combination of memorization and understanding are optimum in a continuing nature rather than in two isolation aspects (Kember, 2000). In this sense, learning commences with a surface approach, which gradually transforms into a deeper understanding through activities, class discussions, reflections, and exercises. Therefore, the enhanced teaching strategy aims to help engineering technology students to understand integral calculus by learning this topic using Maple-integrated strategies.

Explicitly, this research focuses on investigating the effectiveness of Maple-integrated learning strategies in integral calculus. The effectiveness of the strategy has been determined based on three variables, which focus on understanding and metacognitive awareness. The understanding of integral calculus has been investigated through students' conceptual and procedural understandings. The findings of this research inform mathematics educators, generally, and mathematics educators in the field of engineering technology, specifically, about a suitable strategy to teach integral calculus at the university.

METHODOLOGY

Two groups of Technical Mathematics 2 with various mathematics backgrounds, consisting of 100 students, were randomly chosen. One lecturer was appointed by management to handle the tutorial classes for these 100 students. A quasi-experimental nonequivalent control group design was employed as the main research design. The researchers randomly chose the experimental and control groups. The former group underwent integral calculus lessons using Maple software. The intervention is known as "Maple as a Learning Tool Strategy." In this strategy, both lecture and tutorial modes were practiced during the teaching and learning of integral calculus. In the lecture, the topic was taught using PowerPoint presentations. In this mode, the lecturer played an important role to teach students the lessons. However, students were encouraged to interact when lecturers consistently posed questions to them in order to trigger their thinking processes.

During the tutorial sessions, students used Maple software as a learning tool to assist in their learning process. Throughout these sessions, students were independently responsible for doing the tutorial questions in which the lecturer played a role as the facilitator. Thus, students were encouraged to collaboratively work in a group to do their tasks within the given time frame. The learning strategy was developed based on a constructivism theory, known as APOS (action, process, object, and schema), pioneered by Dubinsky. The assumption of APOS theory is as follows:

Assumption of mathematical knowledge: An individual's mathematical knowledge is his/her tendency to respond to perceived mathematical problem situations and their solutions by reflecting on them in a social context, and constructing or reconstructing mental structures to use in dealing with the situations (Dubinsky & McDonald, 2001; Maharaj, 2010; Weller, Arnon, & Dubinsky, 2011).

The activities during tutorial sessions were executed based on the ACE (activities, class discussions, and exercises) teaching cycle. In this cycle, activities were conducted with a great emphasis on reflective element. This element was highly considered because reflective activities are able to trigger students' thinking skills and, hence, develop their metacognitive awareness in learning (Salleh & Zakaria, 2012b; Vos & Graaff, 2004). In addition, the quality of reflection activities affects students' achievement (Chang & Chou, 2011). Students who are stimulated with learning awareness and act on it are inclined to learn better (Pintrich, 2002).

On the other hand, students representing the control group underwent the integral calculus lessons as usual. Similar to the experimental group, this group also practiced lectures and tutorials as the means to disseminate the information. PowerPoint presentations were also used as an aid to learning. However, the teaching approach in this group lacked the explanation about the integral calculus concepts. Instead, it highlighted the fluency of the mechanical parts, which involve the calculation processes. Students were given samples of past years'

examination questions as an exposure for them to recognize patterns of questions. They were encouraged to memorize the patterns as a method to prepare them for the examination. In this group, the lecturer played an important role in explaining the methods of solving integral calculus questions, while student passively listened and copied the notes. This approach was adopted because the thinking paradigm of the lecturer involved remains geared toward the philosophy that he or she is the only knowledge expert (Zakaria & Iksan, 2007). Therefore, lecturers typically believe that learning will only take place when students are clearly told what and how they can learn. In the tutorial classes, students in the control group completed their tutorial activities manually without any mathematics software.

Instruments

In this research, the instruments used to gather the data are a set of integral calculus questions and a metacognitive awareness questionnaire. The former set of instruments was built by the researcher based on the integral calculus curriculum at the university. The latter instrument, known as metacognitive awareness inventory (MAI), was adapted from Schraw and Dennison (Schraw & Dennison, 1994). Both instruments have been scientifically piloted to ensure its reliability and validity. A group of 79 engineering technology students was chosen at random to answer the integral calculus questions. They also agreed to answer the MAI. Two constructs were investigated in both instruments. In the integral calculus test, the constructs are conceptual understanding and procedural understanding. In the MAI, the constructs are knowledge of cognition and regulation of cognition. The reliability of both domains in the instruments was investigated using Rasch model analysis. In this analysis, two reliabilities were determined: item reliability and person reliability.

The item reliability for the two constructs in the integral calculus test was measured high with 0.95 for conceptual understanding and 0.96 for procedural understanding. The person reliability for both constructs was also proven as being adequate. The indices are 0.77 for conceptual understanding and 0.86 for procedural understanding. The item reliability for the two constructs in MAI was also high (0.97 for knowledge of cognition and 0.96 for regulation of cognition). Similarly, the person reliability for both constructs was acceptably adequate, which is 0.71 and 0.87, respectively.

Data Collection

The data collection started with a pretest, which was given to ensure the homogeneity in both the experimental and control groups. It also provides the information related to students' pre-knowledge of integral calculus. Measurement of pre-knowledge is an important element in helping students to develop new meaningful ideas based on their prior knowledge (Davis, 1986). The information about integral calculus background of the students involved is important, as they had entered the university with various mathematics preparations. Consequently, the information obtained is used to design activities in learning this topic. Also, based on the information gathered, three students were selected from each group to represent three different levels of pre-knowledge on this topic. This step is crucial in identifying similarities and differences in students' understanding of these three pre-knowledge levels after the use of the software at the end of the integral lessons.

The integral calculus lessons took place in a 40 hour period, which is equivalent to four hours of face-to-face lessons and four hours of self-learning time in a five-week duration. After the intervention, a post-test was conducted to investigate the effectiveness of the Maple integration intervention approach. Three students from three different pre-knowledge levels, determined at the beginning of the lessons, were interviewed. Their interview sessions were audio and video recorded. Prior to the interview session, they were given an information sheet and a consent form to sign. All of them agreed to participate in the interview session. They also gave their agreement to all the conditions stated in the consent form.

The quantitative data were analyzed using the statistical package PASW Statistics 18. To minimize the statistical error Type 1, Hotelling's T² multivariate test was employed. The test was applied to investigate the effectiveness of the Maple integration strategy on students' conceptual understanding, procedural understanding, and metacognitive awareness. Consequently, the independent t-tests were conducted in determining the effect of each dependent variable. The quantitative data were explained by the interview data, which was analyzed qualitatively.

RESULTS

Statistical Results

Table 1 shows the outcomes of Hotelling's T² and the independent t-tests for both dependent variables.

Table 1. Multivariate and univariate test results

| Variables | Hotelling's T^2 | t -test | Probability, p | Effect size, η^2 |
|---------------------------|-------------------|-----------|------------------|-----------------------|
| Maple Integrated Strategy | 0.26 | | 0.00 | 0.20 |
| Conceptual Understanding | | 4.64 | 0.00 | 0.18 |
| Procedural Understanding | | 4.42 | 0.00 | 0.17 |
| Knowledge of Cognition | | 0.08 | 0.94 | |
| Regulation of Cognition | | 0.31 | 0.76 | |

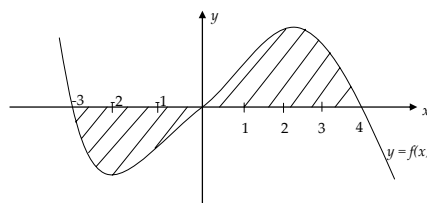
Table 1 shows that the statistical significance is supported by the large effect size in order to imply the significance effectiveness of the whole treatment. Based on the reported effect size value, the effectiveness of the whole Maple integrated strategy is considered large. Eta squared value (η^2) for the whole treatment is $0.20 > 0.14$, which is equivalent to Cohen's d of $1.01 > 0.80$. This value is considered as a large effect size value (Cohen, 1988). Further investigation, which was done using a t -test, shows that students in the experimental group outperformed their peers in terms of conceptual understanding and procedural understanding of integral calculus. These two dependent variables were found to largely contribute to the significant differences between those using Maple software with those using the conventional method in learning integral calculus with the η^2 value of 0.18 and 0.17, respectively (Cohen's $d = 0.94$ and 0.89). However, the results for MAI differ, where both constructs of students' metacognitive awareness in both groups were not significantly different.

Interview Data

In order to explain how the new strategy implemented has successfully improved students' understanding of integral calculus, interview sessions were conducted. In this paper, the discussion was made based on the analysis of two questions measuring students' conceptual understanding in integral calculus. The first question analyzed was Question 4 (Figure 1), which was designed to measure students' understanding in the application of a definite integral (area under the curve). In this question, students were expected to recognize and write the correct formula to evaluate the area of the shaded region.

Question 4

The following diagram shows the area between the x -axis and the function $y = f(x)$.



Write down the integral to evaluate the shaded area in the diagram.

Figure 1. Question 4 in the integral calculus test.

In this part, two application questions will be discussed. The questions are Question 4 and Question 12. Both questions were about evaluating an area between curves. In Question 4, the diagram is given to assist students to interpret the question easily.

The second question, Question 12 (Figure 2), requires the student to interpret the information given in order to correctly answer the question. In this question, students were tested on their ability to apply the definite integral properties to calculate the area. In this case, students are required to understand the difference between the upper and lower limits. Most importantly, they need to be aware that there are at least two different cases of $f(x)$ available. Finally, they need to be able to correctly write the two different area formulas.

Question 12
 Given a function $f(x)$ defined on $[a, b]$. How to determine the area of the region bounded by curves $y = 0, y = f(x)$, and the lines $x = a, x = b$?

Figure 2. Question 12 in the integral calculus test.

Interview Data 1

Interview with a student from a low integral calculus pre-knowledge (EL1)

Researcher: Do you know why didn't you get any marks for Question 4?

EL1: We cannot integrate directly from -3 to 4 because there is an area below the x-axis, and there is an area above the x-axis ... oh dear... I didn't have an idea to do it ... I didn't have any thought ... I didn't know what to write ... I knew it cannot be done directly ... if it is done directly ... we will not get the answer.

Researcher: What kind of question do you think can be evaluated directly?

EL1: It is not like this ... it is ... (He paused and did not continue his sentence.)

Researcher: Let me rephrase the question, in terms of the graph, how will the graph of a function that can be integrated directly look like?

EL1: Uhhh ... how to say ...

Researcher: Based on the graph given, what will happen if we directly evaluate function in Question 4?

EL1: Hmmmm ... you take the graph directly ... I think so.

Researcher: What do you mean?

EL1: Hmmmm ... I don't know ... that's why I cannot get the answer ...

EL1 flipped through the test paper and sighed

I was careless in doing a lot of questions. This one with four marks (referring to Question 12), this one maybe I forgot; that's why I lost two marks for this question.

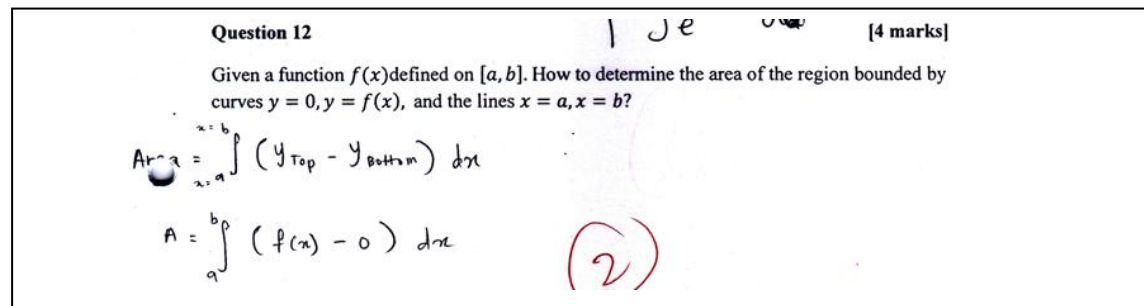


Figure 3: EL1's Answer to Question 12 in the Integral Calculus Test

Figure 3. EL1's answer to Question 12 in the integral calculus test.

Researcher: In Question 12, you have shown that you understand the method involved in evaluating an area. However, you only considered one case.

EL1: Sometimes the $y = 0$ is above the function given, but its limit remains as a and b right?

Researcher: Can you look at the Question 4 again. For the region $x = 0$ to $x = 4$, which one is the upper function?

EL1: $y = f(x)$

Researcher: In this case, is there any lower function?

EL1: This one, x ... x -axis.

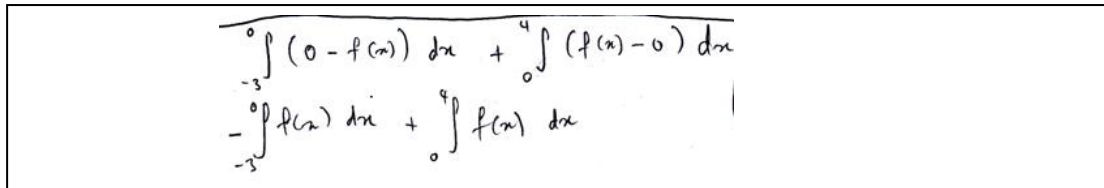
Researcher: What is the equation of the x -axis?

EL1: $x = 0$...

Researcher: Are you sure $x = 0$?

EL1: y value. $y = 0$.

- Researcher: Okay, actually what is the upper function in this question?
 EL1: $y = f(x)$
 Researcher: What about the lower function?
 EL1: $y = 0$
 Researcher: What about this part of the function (pointing to $x = -3$ to 0)
 EL1: y upper, $y = 0$, y bottom $y = f(x)$
 Researcher: Can you try to answer this question again?



$$\int_{-3}^0 (0 - f(x)) dx + \int_0^4 (f(x) - 0) dx$$

$$- \int_{-3}^0 f(x) dx + \int_0^4 f(x) dx$$

Figure 5. EL1's answer during the interview session.

- EL1: Writing line one (refer to student's test paper [Figure 4])
 Researcher: Can you simplify?
 EL1: Writing line two (refer to student's test paper [Figure 4])
 Researcher: Here you go ...
 EL1: Last minute study ... argh ... this is the result of the last minute study ...

Interview Data 2

Interview with a student from a medium integral calculus pre-knowledge (EM1).

- Researcher: How did you find the test this morning?
 EM1: I can do, but there are some hard questions. The area part that requires us ... $y = 0$, $y = f(x)$. The one that provides a graph (referring to Question 4) ... how to do it ... usually, my lecturer gives, what, there are numbers given. And then it stated ... bounded to x . Bounded to uhh ... but this time, the question did not specifically give the values. The question does not provide specific functions, it only gives, it gives you $y = f(x)$, it is confusing. $y = 0$. Confused, and then ... ok... it's okay, I just remember the basic, I just wrote the answer.
 Researcher: Have you seen this type of question before?
 EM1: I'm not sure ... maybe I've seen this type of question before, but maybe I didn't attempt ... it was difficult ... One more question is number 12. I think, I saw, there are two functions, the question gives the function $y = f(x)$, because this one 0 , but it calculates what ... the function, too... and then $f(x) dx$ and then, there are two points meaning if we draw the graph, there should be an intersection point, and then I ... how to say, but I remember my lecturer taught in class, there is one function above, the area is above, and area under the graph, I managed to recall the steps ... uhh ... and then I tried to apply the concept, and then there was a line ... this one actually to find x value, right?
 Researcher: It's given.
 EM1: Ohh ... like last time, to find x values we have to equate both... in the graph there are two functions, $y = x$ and one more $y = x^2$, $x = x^2$, we equate and transfer, and then solve the equation ... uhh ... how ... factorize and get the x value, and then substitute the x value in a and b .
 Researcher: What is the objective to find x value?
 EM1: To find the area. x is the value ... the limit value I think ... or ... I don't know how to explain.
 Researcher: What is the meaning of the x value?
 EM1: Limit. The limit for finding the area. For example (drawing a graph) ... I don't know how the graph looks like, but, for example (drawing a graph), but the question gives the intersection points ... (solving for the intersection point). Equate, and then we transfer... wait... can we solve this (Thinking how to factorize ... talking to himself... $x^2 + 1... x$). We equate to zero. We can factorize right? We get two values ... and then ... they will become the limit values ... limits for this graph ... for example, the limits are -2 and 1 . And then, we substitute in a and b .
 Researcher: In our case, in this Question 12, what do you understand about this question? Can you explain to me?
 EM1: The question asks us to find an area, curve, to find the area under the graph... we don't have to find the values. We need to solve based on the concepts. Based on the first step, we will get, what ... step ... step to find the answer.
 Researcher: When you wrote the first answer (pointing to the first answer written), what did you actually think about? Can you explain to me?

EM1: Uhh ... I think there are two ... how should I explain ... (pause) ... I think its graph. How did I answer? I think how the graph looks like ... there is one graph below the x -axis and there is another graph above the x -axis. Therefore, if the graph is below the x -axis, the zero value minus $f(x)$.

Researcher: Value?

EM1: What ... uhh ... it is this function ... the one that we ... and then, for the upper graph, uhh ... what ... $f(x)$ minus zero, and then lastly we add.

Researcher: Are you sure that we have to add?

EM1: That's right ... actually, I didn't expect my answer is correct. Because at the time I wrote the answer, it's okay, it seems ... This question was actually the last question that I answered. Because I don't know... just follow ... what... my heart ... follow my instinct ... I didn't expect my answer is correct.

Researcher: Your instinct is correct this time ...

EM1: I read many times, but I still didn't know what the question wants us to find ... do we have to find the limit? ... what was actually the question ... because I thought the question asks us to find the intersection point or the limits ... I'm very weak in the part involving area. In fact, many of us do not understand the concept ... I looked ... okay ... how to do this because ... I'm weak in math especially the word problems, I have to write again; for example, the part involving volume ...

Interview Data 3

Interview with a student from a high integral calculus pre-knowledge (EH1).

Researcher: You managed to get full marks for Question 4. How did you do this question, can you explain to me?

EH1: Based on what did I learn, based on what did I remember ... lower than x -axis, negative. I know why it is negative because 0 minus $f(x)$.

Researcher: What is 0 ?

EH1: 0 because that line ... y is zero at the x -axis.

DISCUSSION

In the interview, EL1 realized the reason behind his unsuccessful attempt in gaining any marks in Question 4. In this case, he understood well that he cannot evaluate the area from $x = -3$ to $x = 4$ directly. He knew it was the reason why he did not score any marks for this question. He has shown his understanding of the concept of evaluating an area with two regions by dictating an important point on the existence of two different regions. Also, he managed to identify that the process of evaluating an area involving two different regions is not directly doable. However, he is unable to link between the evaluations of two isolate areas with a combination of two areas or regions.

Additional questions were posed in order to further investigate the reasons why he was unable to answer Question 4, although he has shown an understanding of the concept involved. Based on the answer written on the test paper, it is obvious that EL1 understands the method of evaluating an area. He correctly wrote the definition, where he knew about evaluating an area; thus, the method involved is by subtracting the lower function from the upper function. His statement "*Sometimes the $y = 0$ is above the given function, but its limit remains as a and b right?*" clearly indicates that he understands there are cases where the function given is below the x -axis. Even though he did not write both cases to evaluate an area between two curves, he realized the existence of two different possibilities. He understands that the method involved to evaluate such an area will use the same limits, as in the case where the function is above the x -axis. However, he did not write the answer in the case when the graph is below the x -axis. He claimed he was careless in a lot of questions and forgot the lessons learned for not writing the second case. But is he really careless? Has he actually forgotten what he has learned in class? To affirm his claims, the following questions were posed to him.

In general, EL1 claimed his unsuccessful attempts were due to his carelessness. However, for Question 12, he specifically relates his incomplete solution to his forgetfulness. Nevertheless, his interview dialogue tells the opposite, where he has not forgotten everything that he has learned. His responses imply his understanding about the concept of evaluating areas in two different regions. Unlike the answer written in his answer sheet, he was able to write a complete and perfect solution during the interview session. He knew how to evaluate an area separately, and he also understood how to evaluate a combination of more than one region. He managed to use the correct operation in combining the two regions, where he used an addition operation to combine them. In fact, he has also admitted that his poor performance in answering questions involving area was the result of last-minute test preparation. Waiting until the last minute to study implies cramming information. This tactic may sound ineffective, but Nonis and Hudson (2010) discovered the opposite finding in their research. Similarly, in this research, even though EL1 did not fully answer Questions 4 and 12, he managed to recall the related concept behind the idea of evaluating area between the curves.

Based on EL1 answers, it is logical to claim that the concept was internalized within his mind when he did the activities with the help of Maple software during the tutorial sessions. When asked about his experience after learning math with Maple, he said “... *I understand better whatever my lecturer has taught me because during the tutorial, my lecturer asked us to try all the activities using Maple, and followed by our own manual working... so when I revised them at home, I managed to understand.*” He added “... *also, all the basics help me a lot, when I understand the basic... if its limits are 1 to 3, for example, 0 to 1 plus 1 to 3..., at first, I didn't understand, I used Maple ... ohhh ... I got it. “Get Hint” in Maple Tutors is really helpful ...*” Upon experiencing both strategies (learning mathematics with Maple and without Maple), he claims that the constraint of normal tutorial classes is in term of time limitation. On the other hand, the learning strategy using Maple software encourages the understanding of important concept according to his time management structure.

Other than EL1, a student in a high pre-knowledge integral calculus level (EH1) has also mentioned the advantage of using Maple in learning integral calculus. He has compared his friends' learning style before and after using Maple. “*I think Maple benefits all students. I observe, my friends who are weak ... not actually they are really weak in learning, but they are actually lazy ... they are not unintelligent, but they are not hardworking; they do not bother to concentrate, to focus ... they don't even bother to ask even though they didn't understand anything at all ...*” When asked about the effect of Maple on students' learning style, he added, “*They always say, math class is boring ... sleepy ... but with Maple, they have changed, they love to ask questions even for simple basic problems ... hey ... how to do this? ... how to do this? ... They even make their own effort to try.*”

What is lacking in the EL1 answer for Question 4 was the uncertainty of the suitable process involved. This case could be related to the argument made by Star (2000): “Knowledge of procedures is measured by what a student does or does not do.” In this case, EL1 has a problem with procedural understanding in answering Question 4. His inability to fully write the solution is well explained by his last minute study habits. Students need extra rehearsals to be fluent in mathematics (Hartlep, 2009). Thus, the fluency of procedural involved will be developed through consistent revisions. Obviously, last-minute preparations limit the number of questions attempted and, hence, restrict the amount of rehearsals done. A student from medium pre-knowledge integral calculus level (EM1) also commented that his friends prefer to study at the very last minute, “*I observe my friends' study at the very last minute, last night (a night before the test); they have just started to study lesson for week 9 (the introduction of integral calculus). There are a lot more subtopics ... week 10 until week 1 ... to start week 10; it was too late at night already ... they love to study last minute.*” EH1 also mentioned “...*normally they (referring to his friends) say, math is so difficult... actually, they like to study last minute, and in my case, actually there is one problem, last time I think math is difficult ... the actual reason is, I did not do the exercises consistently ... that is the actual problem.*” To impose consistent study habits, Hartlep (2009) noted that students need to be given homework. EL1 also admitted that, when he was given an assignment, he will study more than usual. However, other than giving a regular basis assignment, in this study, students' study habits were also improved by changing the strategy in learning. In this case, EL1 agreed that tutorial sessions are helpful and the activities have helped him to better understand the concepts. As a result, his interest to revise the material at home has been developed.

Unlike EL1, EM1 is not clear about Questions 4 and 12. He found both questions confusing because, according to him, the questions did not provide complete information. He claimed that Question 4 did not provide the information regarding the boundary values of the given region. However, he managed to correctly write the answer by relating the question to the basic information learned in class. In other words, he was able to flexibly link the known information with his current situation's need. The two pieces of information were successfully combined to indicate the conceptual knowledge successfully developed in a student's mind (Hiebert & Lefevre, 1986). In this sense, his ability could be defined as his conceptual understanding about the substance involved in the evaluation area of regions.

He also found it difficult to interpret the information given in Question 12. He was unable to comprehend the information given and did not know what he supposed to find, despite reading the question many times. Even so, he managed to write a complete and correct solution for the question. He noted, “*but I remember my lecturer taught in class, there is one function above, the area is above, and area under the graph, I managed to recall the steps,*” thus indicating that he mechanically solved the problem by visualizing the information. In this sense, he translated the written information into familiar visual interpretations learned in class. He responded consistently when he was asked to explain what he was thinking about when he wrote the first answer to Question 12. Once again, his response implies that his thinking is inclined toward translating words into visual form by saying, “*I think how the graph looks like ... there is one graph below the x-axis and there is another graph above the x-axis. Therefore, if the graph is below the x-axis, the zero value minus $f(x)$.*”

His thinking process indicates that, by using Maple in learning, the visual inputs fossilized in his mind faster than word inputs. Thus, these visual inputs seem to remain longer in his mind. In this sense, the advantage of using the technology has enhanced his thinking ability. He was able to develop a connection between known visual inputs with new word problems to make the problem into meaningful pieces of information. With that, he was able to reach a conceptual understanding of the related substance involved in evaluating the area between curves. In this sense, the conceptual knowledge was formed as a result and not as an initiator of learning (Aufschnaiter & Rogge, 2010). In this case, prior experiences have successfully promoted the intended concept formation. Nonetheless, his conceptual understanding was not developed visually per se but through a combination with his procedural fluency. His responses “... *I tried to apply the concept, and then there was a line ... this one actually to find x value, right?*” and “... *To find the area. x is the value ... the limit value I think,*” when he was asked about the objective of his explanation on finding the x value indicates his preference to solve the problem procedurally. His responses explain that his thinking style started with procedural fluency and gradually transformed into conceptual understanding.

EH1 responses toward the questions posed during the interview session indicate his confidence level is high. He knows what he is doing and understands why he took certain measures in evaluating the area. He shows his consistent revisions based on his responses “*Based on what did I learn, based on what did I remember...*” His constant rehearsals foster his procedural fluency and his conceptual understanding. He not only understands the process involved in evaluating an area but also is able to rationalize the reason why the first part of the answer has a negative sign. He indicates realizing the importance of consistent revisions when he said, “... *in my case, actually there is one problem, last time I think math is difficult ... the actual reason is, I did not do the exercises consistently ... that is the actual problem ...*” He started to engage more in learning mathematics with the help of Maple software “... *at home if couldn't get the answer, I use Maple, using Maple Tutors to integrate product, I can detect if I didn't do it correctly ... if I couldn't fully understand the steps, at least, I have the final answer ...*” he added, “*but I will try to solve the question until I get the answer.*” In this case, Maple offers him a handrail to hold on building his confidence in solving problems in the new topic. However, he has suggested that, in order to maximize the potential of the software, the strategy should be introduced in other topics before integral calculus as well. Similar opinions have been suggested by EL1 and EM1, where they admitted to needing extra time to learn effectively. Lack of time provided has blocked the opportunity for students to develop their metacognitive awareness. Therefore, with a longer intervention period, students' metacognitive awareness may be improved.

CONCLUSION

Students who underwent the integral calculus lesson using Maple software as an aid in learning were found to benefit in procedural and conceptual understanding. Newly developed strategies have the objective to enhance students' conceptual understanding through class discussions and reflection activities. Maple software offers visual inputs that help students to translate the symbolic inputs into meaningful information. These visual inputs were found to absorb better in students' minds, and they reside longer in students' memories. These advantages were fully utilized by students involved in maximizing their potential in learning integral calculus. They were found to engage in learning activities voluntarily with their own initiatives. Also, Maple software gives them freedom to manage their own study time and, thus, increase their interest in learning. Although there are cases where students committed to last-minute study habits, they were still able to perform conceptually but still had problems with procedural fluency. The conceptual understandings were internalized during activities with Maple in class. Undoubtedly, students will face problems in performing the procedural part of the evaluation due to lack of rehearsal. As a result, students' metacognitive awareness cannot be optimized in this research. Students' metacognitive awareness may be enhanced if the learning time is longer. Furthermore, if these activities are implemented in other topics in engineering technology mathematics, students' mathematics performance, in general, may be improved and, thus, can help to increase the number of students who graduate on time. Therefore, the issue of inadequacy of numbers in the workforce related to developing the nation's industrial growth eventually will be reduced.

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