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# Message from the Editor-in-Chief

Dear Colleagues,

TOJET welcomes you. The Turkish Online Journal of Educational Technology, Governors State University, Sakarya University and School of Education Indiana University will organize International Educational Technology Conference (IETC) between August 08-10, 2018 at Indiana University, Bloomington, IN, USA.

The Turkish Online Journal of Educational Technology is online journal and published only through internet. In online system, accessing articles is available in one place are delivered to all over the world using internet. TOJET`s quality research papers on theory, applications and development of educational technology can be reached easily from Asia, America, Europe, Australia, and others through internet.

The Turkish Online Journal of Educational Technology is the center of research about educational technology used in instruction. The main goal of TOJET is to establish a bridge for the gap between theory and practice. To help bridge the gap, TOJET provides readers with the new developments in educational technology world-wide and a main source for academics and professionals in the expanding fields of educational technology. Articles consist of all kinds of quality research on theory, applications and development of educational technology.

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.

I am always honored to be the editor in chief of TOJET. I am always proud of TOJET for its valuable contributions to the field of educational technology.

TOJET thanks and appreciate the editorial board who have acted as reviewers for one or more submissions of this issue for their valuable contributions. TOJET's reviewers are drawn quite widely from all over the world.

**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.

July 01, 2018
Prof. Dr. Aytekin İŞMAN
Sakarya University

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# Attitudes of Faculty Members and Students towards the Use of the Learning Management System in Teaching and Learning

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## ABSTRACT
This study aimed to identify the attitudes of university faculty members and students towards the use of the Learning Management System (LMS) in teaching and learning. The descriptive analytical approach was used, and the data were collected using two different tools constructed by the researchers. The first is related to the attitudes of faculty members towards the use of the Learning Management System in teaching, and the other is linked to the students' attitudes towards using the Learning Management System in learning. The sample included 95 university faculty members and 307 students. Calculation Means, standard deviations and ANOVA were calculated. The study revealed that the attitudes of university faculty members and students towards using the Learning Management System in teaching and learning were positive. The results showed statistically significant differences in the attitudes of university faculty members due to gender and in favor of the males. The results did not show significant statistical differences due to the faculty members' experience and the academic track. The results also indicated that there were no statistically significant differences in students' attitudes towards using the Learning Management System in learning due to their gender. Nonetheless, the results indicated that there were statistically significant differences in students' attitudes due to the academic year and for the first-year students. The positive attitudes were decreasing as the years gradually progressed. The results also evidenced differences of statistical significance in students' attitudes towards the Learning Management System attributed to the academic track and for the benefit of applied and humanities studies and then the medical track and finally the engineering track. In the light of these findings, the researchers recommended intensive training of university faculty members and students in the employment of the Learning Management System in an optimal way to increase its effectiveness in teaching and learning. They also pressed the need for conducting further studies on the impediments facing the parties in the use of the Learning Management System and revealing the ways to solve them.

**KEYWORDS**: Learning Management System, Attitudes, Faculty Members, University Students, Higher Education, Teaching and Learning.

## INTRODUCTION
In recent years, universities around the world have become increasingly interested in e-learning to meet the growing student population, provide a broad and fast information base, and open up other areas of communication between students and faculty teachers on the one hand and among students themselves on the other hand (Khaddash and Al-Hadhrami, 2006)**.** It is worth mentioning that the information and technological revolution that shook the whole world entered the university teaching via the widest doors, and imposed itself on all parties of the educational learning process. This fact led the Department of Higher Education to implement e-learning and consider it as an ultimate priority to save time and effort despite the high cost and necessary infrastructure required for this operation (Al-Mutairi, 2015; Aljarrah, 2011).

If there is a real desire on the part of students and faculty members concerned with employing technology in university classrooms, this will have a positive impact on transforming university education from tradition, simulation and retreat to creativity and development. This endeavor will also allow them to respond to the requirements of the present age through gaining speed and openness to other cultures.

As has been noticed for many years, there have been constant calls for the use of technology in higher education. This led most universities to embark on using technological software both in the classroom and in the administration Balta & Duran (2015). The rationale behind this undertaking lies in promoting the efficiency of university teaching, ensuring its flexibility and linking it to the reality in which students live. One such software

is the Learning Management System (LMS) (Jayson, 2006). The Learning Management System allows learners to communicate and interact with their teachers in order to work together in a new and enjoyable way. It helps educational institutions transform the Internet into a strong medium in the process of teaching and learning (Aljarrah, 2011).

The results of many studies (Khaddash and Al-Hadhrami, 2006; Al-Mutairi, 2015; Alqadere, 2011; Mashaqbeh, 2009) indicate the effectiveness of using the Learning Management System in university teaching as a modern electronic system with several programs that improve the efficiency of university teachers and help them cope with the course and the sources of self-learning as well as to manage the discussion among students themselves. This is confirmed by the results of the study conducted by Bowdoin College (2005) that more than 61% of the students indicated the usefulness of using the Learning Management System software as it increases the opportunities to learn and interact with the subjects and with teachers as well as among themselves.

Duke University students also believed that the Learning Management System software facilitated their access to the prescribed programs (Belanger, 2004). Similarly, Aljarrah (2011) suggested that the use of software programs such as the Learning Management System spawned positive attitudes among learners and increased their achievement and thrill.

Abdulrahman Bin Faisal University in Saudi Arabia adopted the software Learning Management System and encouraged faculty members to activate the elaboration of their educational materials and make them compatible with this software for both male and female students. Teachers encourage students to use the Learning Management System by putting learning materials on the software. They also provide assignments, correct them, provide feedback, and encourage effective discussions with students. In order to highlight the role of the use of the Learning Management System, it was necessary to know the attitudes of students and faculty members towards the use of this software.

Learning Management System Software has a range of functions that make it a concrete and efficient tool in university education.

1- Providing tools for interaction: These are the tools that learners interact with during their study, and they are summarized as follows:

- Announcements: This tool provides students with the latest news or announcements that a faculty member wants to send to learners or to a group of them and review their content either alphabetically or historically by simply clicking on the icon.
- Timetable: This tool informs students about the timing of events related to the subject of learning and alerts them in time, such as lectures and meetings on the network or face-to-face meetings in the university, etc., and learners can add the events they want.
- Tasks: They tell students what tasks they should perform and allow them to organize those tasks according to the subject or to their personal vision. The teacher can send any learner a task that he does not send to the others.
- Estimates: This task is concerned with the student's assessments, whether in the intermediate or final tests.
- User Guide: This tool works to create a guide for students' participating in the course to get to know each other.
- Address book: It is a personal notebook for the student to put data about the person who wants to communicate with him through the system. It may contain hundreds of students, but the address book contains the addresses added by the student himself.

2. Presentation of content: The basic function of the educational materials delivery system is to provide the content of the educational material to the learners. In this regard, the Learning Management System offers the content display function within the Course Content Option. When the student selects this function, the system will review the content in the following images:

- Display textual information accompanied by pictures, animations and other elements organized according to the required educational organization.
- Documents and files related to the decision.
- Books and references available on the network or recommended by the teacher to read them.
- Links to important sites.

3. Communication function: The system provides three ways to communicate between students and among students and teachers as follows:

- Sending and receiving mailings: This provides a directory of students' names and addresses.
- Discussion Board: Also called Bulletin Board, is an asynchronous interactive tool where the student can express his opinion on any issue or ask a question to be reviewed by peers later.
- Virtual Classroom: This represents the network meeting system used by the software. This system allows the learner to interact with his / her colleagues and teachers in a similar way to the virtual classroom through the Chat Panel dialog box which enables the learner to write what he wants via the keyboard and to see everyone who connects to the meeting system currently. It also provides a whiteboard-like graphic board and transfers texts, images and graphics to the learner or teacher.

## LEARNING MANAGEMENT SYSTEM CHARACTERISTICS

Some researchers (Tekinarslan, 2009; Bradford. et.al, 2007; Balta & Duran, 2015) point out that the Learning Management System is characterized by a number of features:

- Easy access: This code allows users to communicate with what it contains by simply connecting with the Internet at any time and place.
- Providing fast and continuous feedback: This program provides updated feedback on the course, students, test dates, results, and everything related to the student's program and questions.
- Facilitating and improving communication: This program provides several options for students and teachers to connect such as announcements, discussions, virtual classes, e-mail.... etc.
- Follow-up: The teacher can track students' use of the software and delivery of assignments through the availability of a statistical file of all the assigned activities.
- Skills development: This software promotes many skills for learners such as good time management.
- Taking account of differences among students: This program provides several options to provide content, including audio, video, animation, images, games and others, which work to take into account individual differences between students and their various intelligence quotients.

## STATEMENT OF THE PROBLEM

lthough the age of Abdulrahman Bin Faisal University did not exceed six years, it adopted the use of e-learning and software programs in the management of learning such as the Learning Management System program. In addition, the university has spent large amounts of money on these projects. The two researchers of this article were aware of the methods of teaching used by some faculty members at Abdulrahman Bin Faisal University, and they kept in contact with the students through the lectures they were teaching. We remarked that there were some proponents and opponents of the idea of e-learning using the Learning Management System in teaching among students and teachers. We find a discrepancy in the attitudes towards the application of the Learning Management System in university teaching. Specifically, there are those oppose to some of the parts of the Learning Management System and agree on its other parts. This results in turmoil at the level of the administration and officials whether to keep or dispense with the Learning Management System and replace it by another software. The study aims to identify the attitudes of faculty members and students towards the use of the Learning Management System in university teaching. It is hoped that the results of this study will provide data and information to help decision-makers in taking necessary actions for general public interest.

## RESEARCH QUESTIONS

This study attempted to answer the following questions:

1. What are the attitudes of faculty members at Abdulrahman Bin Faisal University towards the use of the Learning Management System in their teaching?
2. What are the attitudes of students at Abdulrahman Bin Faisal University towards the use of the Learning Management System in their learning?
3. Do the attitudes of faculty members differ about the use of the Learning Management System in their teaching according to gender, academic track, and experience?
4. Do students' attitudes towards the use of the Learning Management System in learning differ in terms of gender, academic level, and academic track?

## AIMS OF THE STUDY

The aim of the study was to examine the attitudes of faculty members and students at Abdulrahman Bin Faisal University towards the use of the Learning Management System in teaching and learning.

## IMPORTANCE OF THE STUDY

The importance of this study lies in the fact that it is related to a modern education system: the Learning Management System. Abdulrahman Bin Faisal University adopted this program and considered its use mandatory as an official Means of communication by teachers and students. The importance of this study stems from the declarations of the decision makers and university administrators relative to the feasibility of e-learning

via the Learning Management System software in exchange for the university's payment of funds for developing and updating this software or replacing it by another system for the public interest.

## OPERATIONAL DEFINITION

***Attitudes*:** A state of mental readiness of students and faculty members organized through their previous experiences on their convictions of the effectiveness of the use of the Learning Management System in teaching.
***Abdulrahman Bin Faisal University***: It is a public university located in the eastern part of the Kingdom of Saudi Arabia, Dammam. It includes several scientific and literary colleges. It offers a Bachelor's degree, a Higher Diploma, a Master's Degree and PhD in some Departments.
***Learning Management System***: It is an electronic system that allows teachers to present the scientific material electronically and students to discuss through the electronic forum, and communicate with each other, as well as communicate with their teachers, and download some pictures and videos that facilitate understanding of the scientific material.

## LIMITS OF THE STUDY

1. This study was limited to three tracks from Abdulrahman Bin Faisal University: (Engineering, Health, and Applied and Humanities studies).
2. This study was limited to the second semester of the academic year 2016/2017.
3. The results of the study are determined by the degree of validity and reliability of the research tools employed in this article.

## PREVIOUS STUDIES

When reviewing the theoretical literature on e-learning and the use of the Learning Management System software in university education, we noticed that it was focused on students' attitudes towards using this software in the management of the teaching/learning process. The literature was also axed on the services that are used to facilitate learning and solve the problems facing the educational process whether temporally and spatially. It also dealt with the level of subjects' satisfaction with its application in university teaching.

Alblassi (2016) study aimed to identify teachers' attitudes towards the use of the Learning Management System in the academic year 2015/2016. The descriptive method was used. A trend scale of 32 points was applied according to the Likert quintile scale and was applied to a sample of 82 faculty members. The results indicated positive trends among faculty members at Hail University towards the Learning Management System although it was not sufficiently activated. The results showed that there were no statistically significant differences between faculty members pertaining to the faculty or staff gender.

AlShamary (2016) study aimed to identify the reality of using the Learning Management System by the faculty members at Hail University. The sample consisted of 284 teaching staff members who were randomly selected. The researchers sought to measure the extent of using the Learning Management System by the faculty members and the impediments that faced them. The results showed that the use of faculty members of the Learning Management System was high, and the results did not show any significant statistical differences due to the college variable or the academic rank in their use of the Learning Management System in teaching.

The study of Aljarrah (2011) attempted to identify the attitudes of the students of the University of Jordan towards the use of software Learning Management System in learning. 365 subjects were enrolled in the program of the Diploma in Information Technology and Communication in Education. The data was collected using a Likert Quintile Scale prepared by the researchers to this end. The tool consisted of 40 items. The results of the study showed that there were positive attitudes among the study subjects towards using Learning Management System software in learning as it increased their classroom participation and high achievement. The results indicated that the use of the Learning Management System software facilitated the teaching process and helped to provide distance learning opportunities for those interested. Based on these results, the researchers presented a set of recommendations, the most important of which is the adoption of this software or a similar one in all Jordanian universities.

As the Learning Management System software is an electronic tool that can be used in teaching, Alqadere (2013) studied the effect of teaching physics through the Learning Management System software on the achievement of the third-year students of the Physics Department at Al-Bayt University for the concepts of scientific electronics. The students were divided into two groups: one experimental and one control. The control group was taught in the traditional way, and the experimental group was taught electronically using the Internet for a full semester. The data were collected using an achievement test on some specific concepts after ascertaining its validity and relaibility. The results showed a statistically significant difference between the group that studied in a traditional

way and the group that studied electronically through the Internet in favor of the students who studied the course electronically via the Internet.

Khadash and Al-Hadrami (2006) studied the effectiveness of teaching the principles of accounting using educational materials based on the information network according to the Learning Management System software, where the educational material was prepared and presented electronically. The study sample included seventy students from the Hashemite University during the summer semester 2003/2004. A questionnaire was prepared to measure the effectiveness of teaching through the Learning Management System. The results of the study revealed high acceptance among the students to use the educational materials electronically. This use has had a positive effect on the level of skills and educational benefit gained by the students. The results have also shown that there are some technical difficulties that have emerged as a result of dealing with electronic educational materials.
Al-Zawaidi (2014) conducted a study to examine the extent to which social networking software is used in accordance with the project-based learning strategy and its impact on high and low achievers and motivation in learning with the Learning Management System. The results of the study indicated that there are statistically significant differences at the level of ($\alpha = 0.01$) and in favor of the trend towards learning through the Learning Management System. The researcher explained the reason for this by the students' access to different websites, a fact that prompted them to use new educational skills to facilitate the interaction with their instructor as well as their peers.

The study of Al-Saeed (2014) investigated the impact of a distance training program using the Learning Management System Collaborate in developing the teaching skills of social sciences teachers in Kuwait. Several results were reached, notably significant statistical differences: ($\alpha = 0.05$) between the Mean scores of the sample of the study sample on the identification of teaching skills before and during the training period and in favor of the post questionnaire. The researcher attributed this result to the impact of the training program when using the Learning Management System Collaborate system in improving the performance of social sciences teachers in Kuwait. The researcher recommended that educators in Kuwait should be sensitized to the importance and effectiveness of distance training using the virtual classroom system.

Mashaqbeh (2009) conducted a study that aimed at surveying students' views on Learning Management System software as a Means of assisting in the educational process and its correlation with some variables. The study covered the computer course and architecture course at Al-Bayt University. The results showed that there were no statistically significant differences between the students' opinions related to the gender variable, the school year, the type of course or the previous experience, and that most students felt pleasure while using the system. Nevertheless, the results showed that the students encountered other impediments such as the lack of clarity of evaluation methods used in the course and that the ways to communicate with students by the teacher was insufficient.

In Al-Mutairi (2015) carried out a study on the effectiveness of an electronic training program using a screen recording method to acquire some of the skills of the e-learning management system Learning Management System in the LRC's secretaries where the study sample was divided into two groups: control and experimental groups. An achievement test was conducted to measure the collection of learning resource centers' secretaries for the knowledge aspects associated with the Learning Management System and a note card to measure the skillful side of LRC secretaries. The results showed that there were statistically significant differences at the level of ($\alpha = 0.01$) between the control group and the experimental group and for the benefit of the experimental group. The results indicated that the electronic training program was effective and had a positive effect on skill development compared to the traditional method.

Mzrou. et al. (2013) prepared a study aiming at identifying the attitudes of faculty members at King Khalid University towards the use of the electronic learning department Learning Management System. Six colleges were selected at King Khalid University including 195 teachers. The use of the Learning Management System was found to be of medium degree, and there were statistical significance differences for the benefit of the Faculty of Science, the difference in age and in favor of younger groups.

In Salloum's study (2011) which aimed to identify the degree of integration between the virtual classrooms and the system of e-learning Learning Management System, the researcher compared the different virtual classroom systems in terms of integration with e-learning management systems. The study showed several results, including the need to use virtual classroom techniques in e-learning in general and in the live broadcast of lectures and tutorials in particular because of the benefits of many of these programs. The virtual classrooms provide many solutions, especially in an environment similar to the situation in Saudi Arabia, where there are

great numbers of students who are not absorbed by universities, and the crowded traffic congestion in cities and the nature of education policy in the Kingdom which separates sexes from each other's. The use of virtual classes allowed teaching female students by male faculty members, thus solving the problem of non-availability of specialized faculty members of the same sex of the students.

Ayad (2008) conducted a study that aimed at employing virtual learning environments in the elaboration of electronic courses in the Learning Management System in university education. It examined students' satisfaction with using the Learning Management System in university education and training students to employ learning technology in the learning process. The results showed that there were no statistically significant differences between the students of the experimental and the control group. This is due to the fact that female students who studied in the traditional method used all the methods of modern technology in the study, and the traditional method was focusing on achievement.

## SUMMARY OF PREVIOUS STUDIES

After studying the theoretical literature and previous studies, it was found that some studies dealt with the attitudes of students and faculty members towards the use of the Learning Management System in their teaching (Aljarrah, 2011; Mzrou. et al., 2013; AlShamary, 2016; The effectiveness of the Learning Management System in university teaching and the views of students and their teachers on its use and e-learning in general and its effect on students' achievement and understanding of content as well as motivation (Alqadere, 1433; Al-Mutairi, 2015; Al-Saeed, 2014; Salloum, 2011; Khadash and Al-Hadrami, 2006). Most of the above studies have confirmed the usefulness of using the Learning Management System in university teaching for increasing students' achievement, understanding and motivation.

However, the studies of Mashaqbeh (2009) and Ayad (2008) did not reach differences of statistical significance between traditional education and e-learning through the Learning Management System. The results of Mashaqbeh (2009) showed that there are no statistically significant differences in the students' opinions regarding the Learning Management System due to the gender of the students, the academic year or the college to which they belong.

On the other hand, the study of Mzrou et al. (2013) indicated that the attitudes of King Saud University teachers towards the Learning Management System were medium and that there were differences of statistical significance attributed to the difference of the faculty of the teacher as well as age. The latter was in favor of the younger age. This is confirmed by the study of AlShamary (2016) that there are no differences of statistical significance attributed to the faculty and the scientific rank although the study found that the reality of the use of the Learning Management System by university teachers was high. This is what was confirmed again by the study of Alblassi (2016) which found that the attitudes of teachers were positive towards the Learning Management System although there were no differences of statistical significance for both the sex of the teacher and his faculty.

## METHOD AND PROCEDURES

To achieve the objectives of the study, the researchers followed the descriptive analytical method.

## STUDY POPULATION

The population of the study is composed of all faculty members and students at Abdulrahman Bin Faisal University for the academic year 2016/2017. The number of faculty members was (2103), and the number of students was (37324). The study sample was selected by Stratified Random Sampling from both sides according to the study variables. The results were analyzed in the light of the sample as shown in the following tables: (1), (2).

Table (1): Study sample of faculty members

| | Variable | Number | % |
|---|---|---|---|
| Gender | M | 49 | 51 % |
| | F | 46 | 49 % |
| | Total | 95 | 100% |
| Track | Engineering | 27 | 28 % |
| | Health | 28 | 30 % |
| | Applied Studies and Humanity | 40 | 42 % |
| | Total | 95 | 100% |

| | | | |
|---|---|---|---|
| | 1 – 4 Ys | 30 | 31 % |
| Experience | 5 – 10 Ys | 33 | 35 % |
| | More than 10 Ys | 32 | 34 % |
| | Total | 95 | 100% |

Table (1) shows that the study sample included 95 faculty members- 49 males and 46 females. They were distributed as follows: Science track: 28%, Health track: 30%, Applied and Humanities Sciences track (42%). Teachers' experiences were divided into three levels: Level one (1 - 4 years) includes 30 teachers out of 95 with 31%. Level two (5-10) includes (35%). Level three (more than 10 years) includes 34%.

Table (2): Study sample of students

| Variable | | Number | % |
|---|---|---|---|
| | M | 177 | 58% |
| Gender | F | 130 | 42% |
| | Total | 307 | 100% |
| | 1st Year | 64 | 20% |
| | 2nd Year | 85 | 28% |
| Level | 3rd Year | 91 | 30% |
| | 4Th Year | 67 | 22% |
| | Total | 307 | 100% |
| | Engineering | 79 | 26% |
| Track | Health | 117 | 38% |
| | Applied Studies and Humanity | 111 | 36% |
| | Total | 307 | 100% |

Table (2) shows that the sample included 307 male and female students, of which 177 males and 130 females. They were distributed over the four years by 20%, 28%, 30% and 22%, respectively. They represent 26% from the science track, 38% from the health track, and 36% from the applied sciences track.

**RESEARCH INSTRUMENTATIONS**

The two researchers reviewed the theoretical literature related to teaching and e-learning that employs the Learning Management System. They elaborated the research tools according to Likert Scale. The first tool aimed at measuring the attitudes of faculty members towards the use of the Learning Management System in teaching. The second tool aimed at measuring the attitudes of university students towards the use of Learning Management System in learning.

**VALIDATION OF THE INSTRUMENTS**

To check the validity of the study tools, the initial version of the study was presented: the first of the faculty members consisting of 28 items on six experts who are members of the teaching staff at Abdulrahman Bin Faisal University. The student tool included 24 items and was also presented to the same experts. Some items of both instruments were deleted, and the wording of several items was amended. The number of items of the tool for students was 22, while the number of items of the tool for faculty members was 26 items. The latter was translated into English because some faculty members do not speak Arabic. It was also reviewed by a legal translator as well as some English teachers in the University.

**RELIABILITY OF THE INSTRUMENT**

To calculate the reliability of the research tools, the researchers followed the method of test and retesting (Test - Retest) with a difference of a two-week time. The student tool was applied to a group of 43 male and female students, and the reliability coefficient was 0.84. In addition, the questionnaire was applied to the members of the faculty on a random sample of (32) members. The reliability factor (0.87) was considered acceptable in the social sciences (Obiedat et al., 2016; Al-Kellani; and Al-Shraifeen, 2011).

**RESULTS**

To answer the question of the first study: "What are the attitudes of faculty members at Abdulrahman Bin Faisal University towards the use of the Learning Management System in their teaching?". The researchers calculated the Mean and the standard deviation of the instrument items prepared for this purpose, and the results were cast on Table (3).

Table (3): Means and SD for the faculty members (N=95)

| No | Items | Mean | SD |
|---|---|---|---|
| Q1 | I like to get more training on how to use Learning Management System (LMS) | 4.22 | .731 |
| Q2 | I asked for help from others in case I face a problem while I am using the LMS | 4.00 | 1.04 |
| Q3 | I discuss my colleagues about how to use the LMS | 3.98 | .792 |
| Q4 | Using LMS contribute to clarify the content of scientific material | 4.35 | .834 |
| Q5 | LMS helps the learner to learn without coming to the university | 3.71 | 1.15 |
| Q6 | I feel enjoyably when someone talking to me about the uses of LMS in teaching | 3.94 | .816 |
| Q7 | Using LMS Increase the interaction between teachers and students | 4.33 | .675 |
| Q8 | Using LMS provides interesting learning | 4.13 | .793 |
| Q9 | The learning by using the LMS will gradually replace the normal Education | 3.65 | 1.22 |
| Q10 | Using LMS increase student's achievement | 3.86 | .929 |
| Q11 | Using LMS facilitate teacher's role | 4.33 | .591 |
| Q12 | Using LMS offers a great benefit in teaching | 4.13 | .820 |
| Q13 | LMS leads to a new change in the courses practices | 3.84 | .866 |
| Q14 | I expect that - in the future - the use of LMS has become a necessity for all teachers | 4.26 | .774 |
| Q15 | LMS helps the teacher to organize his courses | 4.25 | .699 |
| Q16 | I feel that the use of LMS develops the teaching process | 4.22 | .717 |
| Q17 | I see that LMS reduce the role of the teacher in the classroom and increase the role of the student | 3.13 | 1.06 |
| Q18 | LMS makes it easy for teachers to provide students with individual learning environment | 4.09 | .669 |
| Q19 | LMS increase the capacity of the educational institutions | 4.03 | .706 |
| Q20 | LMS contribute in integrate the educational resources effectively | 4.24 | .725 |
| Q21 | LMS increase the flexibility in educational institutions systems | 4.16 | .724 |
| Q22 | LMS offers better results than the normal education | 3.65 | 1.137 |
| Q23 | LMS helps to achieve the effective and active teaching | 3.60 | 1.01 |
| Q24 | LMS helps to deliver the information to students quickly | 4.11 | .783 |
| Q25 | Learning by using LMS increases the chances for cooperation between educational institutions | 4.02 | .699 |
| Q26 | LMS encourage to change the competitive criteria of the educational environment | 4.22 | .731 |
| | (Overall) | 4.02 | |

The results on Table (3) show that the calculation Mean for the members of the university faculty is generally (4.02). This shows that their attitudes towards using the Learning Management System in teaching were positive. And that the highest average calculation Means for the faculty members is 4.35 corresponding to the fourth item, which indicates that the employment of the Learning Management System contributes to clarify the content of the scientific material. This was followed directly by the seventh and eleventh items and with a calculation Mean of 4.33. The seventh item indicates that the employment of the Learning Management System increases the constructive interaction between the student and the teacher, and the eleventh item indicates that the use of the Learning Management System makes it easier for teachers to work efficiently.

However, the seventeenth item came in the last order in terms of the calculation Mean of 3.13. This item addresses the roles of the student and the university teacher in the classroom. It shows that the use of the Learning Management System reduces the role of the instructor and increases the role of the student. Therefore, the calculation of the teachers' responses was the lowest among all the subjects of the study, simply because they wanted to maintain their active role in the classroom according to their standpoint.

To answer the second question: "What are the attitudes of students at Abdulrahman Bin Faisal University towards the use of the Learning Management System in their learning?" The researchers computed the calculation Mean and standard deviation of the instrument questions prepared for this purpose, and the results are indicated on Table (4).

Table (4): Mean and the standard deviation of the students' tool (N=307)

| No | Items | Mean | SD |
|---|---|---|---|
| 1 | Teachers encourage the use of LMS software in lectures. | 3.89 | 1.12 |
| 2 | My reading of the courses by using LMS software became better. | 4.21 | .916 |
| 3 | Making assignments through LMS software easier and faster. | 4.42 | .937 |
| 4 | Activities sent by LMS software are clear and useful. | 4.08 | .936 |
| 5 | LMS Software provides additional learning resources related to courses. | 3.75 | 1.11 |
| 6 | The amount of information obtained through LMS software is greater than the normal grade. | 3.70 | 1.08 |
| 7 | LMS software helps me see the new information for the courses before it is explained. | 3.95 | 1.11 |
| 8 | Learn more during classroom discussions about the new material for lectures on LMS. | 3.57 | 1.21 |
| 9 | LMS software helps me develop self-learning. | 3.98 | .949 |
| 10 | LMS Software helps me ensure long-life learning. | 3.53 | 1.11 |
| 11 | I would like to get more training on how to use the LMS. | 3.40 | 1.21 |
| 12 | I ask for help from others if there is any problem when using LMS. | 3.76 | 1.13 |
| 13 | My colleagues discussed how to use the LMS. | 3.44 | 1.21 |
| 14 | The LMS Software contributes to the clarification of the content of the subject matter. | 4.17 | .920 |
| 15 | The LMS software helps us to learn without having to attend university. | 4.12 | 1.17 |
| 16 | I would like to enroll in courses and training based on the use of the LMS. | 4.14 | 1.03 |
| 17 | The LMS software helps me learn without being committed to a specific place or time | 4.29 | .956 |
| 18 | I feel pleasure when talking to me about the LMS software and its uses. | 3.35 | 1.32 |
| 19 | The LMS software increases interaction between teacher and learner. | 4.01 | 1.01 |
| 20 | The LMS software helps provide enjoyable learning. | 3.93 | 1.06 |
| 21 | Learning with the LMS software will gradually replace traditional learning. | 4.35 | .960 |
| 22 | The cost of learning using the LMS software compared to normal learning is higher due to the use of the internet. | 2.38 | 1.24 |
| | **(Overall)** | **3.84** | |

The results on Table (4) show that the calculation Mean of the students' general identification sentences is 3.84. This shows that the students' attitudes towards using the Learning Management System in learning were positive and useful. The highest calculation Mean of the tool questions was 4.42 corresponding to the third item, which indicates that the employment of the Learning Management System in the students' assignments facilitates and speeds up solving and sending them to the instructors, followed immediately by the 18th item with 4.35 Mean indicating that the students enjoy dealing with the Learning Management System and talking about it among themselves. However, the last item (22) came in the last order in terms of the calculation Mean of 2.38, which deals with the material cost of the use of the Learning Management System as higher compared to conventional methods. This is logical because the item was negative, in other words the student sees the use of the Learning Management System as less expensive. It is also possible to explain that the student at this age does not focus much of his thinking on the material cost of university learning, especially in Saudi Arabia, which supports education at all levels and provides monthly rewards to university students. Students are more interested in the mechanisms that facilitate and accelerate their learning in an exciting manner.

To answer the third question: "Do the attitudes of faculty members differ about the use of the Learning Management System in their teaching according to gender, academic track, and experience?" The researchers calculated the statistical Means and standard deviations associated with sex, academic track, and experience, as shown on Table (5)

Table (5): Means and standard deviations of faculty members' attitudes towards Learning Management System

| Variable | | Mean | SD |
|---|---|---|---|
| Gender | M | 4.13 | .49 |
| | F | 3.89 | .53 |
| | Total | 4.02 | .52 |
| Track | Engineering | 4.18 | .54 |
| | Health | 3.97 | .44 |
| | Applied Studies | 3.94 | .55 |
| | Total | 4.02 | .52 |
| Experience | 1 – 4 Ys | 4.11 | .48 |
| | 5 – 10 Ys | 4.03 | .49 |
| | More than 10 Ys | 3.91 | .58 |

| | | | |
|---|---|---|---|
| | Total | 4.02 | .52 |

Table (5) refers to the calculation Mean and standard deviations of faculty members' attitudes towards using the Learning Management System according to the variables: gender, academic track, and experience.

We find a difference in the calculation Mean between males and females of 0.24 for males, where the calculation Mean of males is 4.13, and the standard deviation is 0.49, and the Mean of females is 3.89 with a standard deviation of 0.53. The results showed that the Mean of the faculty members in the engineering track was the highest among all the tracks with a score of 4.18 and a standard deviation of 0.54. The health track faculty members scored 3.97 with a standard deviation of 0.44. The lowest Mean (3.94) was attributed to the applied and humanities studies track with a standard deviation of 0.55.

Regarding the attitudes of faculty members according to their teaching experience, Table (5) indicates that the category of teachers with less teaching experience (1-4 years) is the most positive towards the use of the Learning Management System with Mean of 4.11 and a standard deviation of 0.48. Yet, the attitudes of the most experienced category of (10 years) were less positive with Mean of 3.91 and a standard deviation of 0.58. By reading the above results, we find that there are apparent differences in the calculation Mean of the attitudes of the faculty members at Abdulrahman Bin Faisal University according to the variables of gender, academic track and teaching experience. To ascertain the validity of the differences, the researchers performed the ANOVA analysis, and the results were presented on Table (6).

Table (6): ANOVA test of faculty members' attitudes towards Learning Management System

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 10.561a | 16 | .660 | 3.335 | .000 |
| Intercept | 1252.367 | 1 | 1252.367 | 6327.385 | .000 |
| Gender | 1.121 | 1 | 1.121 | 5.665 | .020 |
| Experience | .158 | 2 | .079 | .398 | .673 |
| Track | .770 | 2 | .385 | 1.946 | .150 |
| Error | 15.438 | 78 | .198 | | |
| Total | 1561.423 | 95 | | | |
| Corrected Total | 26.000 | 94 | | | |

a. R Squared = .406 (Adjusted R Squared = .284)

Table (6) shows that there are statistically significant differences in the attitudes of the faculty members at Abdulrahman Bin Faisal University towards the use of the Learning Management System due to gender and for male benefit with a value of ($\alpha$ = 0.05) and a statistical significance value (0.020, F = 5.665). However, the results indicate that there are no statistically significant differences in the attitudes of university teachers towards the use of the Learning Management System for the variables of the study: the number of years of experience and the academic track. The significance of experience reached (0.673, F = 0.398) and that of the academic track (F = 1.946, 5.665).

To answer the fourth question, "Do students' attitudes towards the use of the Learning Management System in learning differ in terms of gender, academic level, and academic track?" The researchers calculate the Mean and standard deviations associated with sex, level of study, and academic track as indicated on Table (7).

Table (7): Means and standard deviations of students' attitudes towards Learning Management System

| | Variable | Mean | SD |
|---|---|---|---|
| Gender | M | 3.93 | .57 |
| | F | 3.72 | .70 |
| | Total | 3.84 | .64 |
| Level | 1st Year | 3.99 | .62 |
| | 2nd Year | 3.95 | .51 |
| | 3rd Year | 3.80 | .62 |
| | 4Th Year | 3.59 | .74 |
| | Total | 3.84 | .64 |

| | | | |
|---|---|---|---|
| | Engineering | 3.35 | .72 |
| Track | Health | 3.92 | .52 |
| | Applied Studies | 4.09 | .49 |
| | Total | 3.84 | .64 |

The results on Table (7) indicate the Means and standard deviations of the research variables associated with the students. We find a difference in the calculation Mean between males and females of 0.21 for the benefit of males. The Mean for males was 3.93 and a standard deviation of 0.57. The Mean of females was 3.72 with a standard deviation of 0.70.

The results of Table (7) show that the Mean of the first-year students is the highest among all the years with 3.99 and a standard deviation of 0.62. For the second-year students, it was 3.95 with a standard deviation of 0.51. For the third-year students, it was 3.80 with a standard deviation of 0.62. For the fourth year, it was the lowest of all and reached 3.59 with a standard deviation of 0.74.

These results show that there are apparent differences between the calculations Mean according to the level of students. Table 7 also shows the calculation Mean according to the academic track of students. The calculation Mean of the applied and humanities studies students was the highest among the other tracks in the study. The Mean was 4.09 and the standard deviation was 0.49.

The Mean of the engineering track students was the lowest: 3.35 with a standard deviation of 0.72, while the Mean of the students of the health track was 3.92 and the standard deviation 0.52. This is indicative of the existence of apparent differences between the tracks in the students' attitudes towards their use of the Learning Management System. To ascertain the intrinsic differences in the calculation means of the research variables (gender, academic track, and level of study), the researchers performed the ANOVA test and the results are shown on Table (8).

Table (8): ANOVA test of students' attitudes towards Learning Management System

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 41.132a | 23 | 1.788 | 5.908 | .000 |
| Intercept | 1613.519 | 1 | 1613.519 | 5330.054 | .000 |
| Gender | .008 | 1 | .008 | .028 | .868 |
| Level | 5.437 | 3 | 1.812 | 5.987 | .001 |
| Track | 14.924 | 2 | 7.462 | 24.649 | .000 |
| Error | 85.670 | 283 | .303 | | |
| Total | 4659.862 | 307 | | | |
| Corrected Total | 126.802 | 306 | | | |

a. R Squared = .324 (Adjusted R Squared = .269)

Table (8) shows that there are no statistically significant differences in the attitudes of students towards the use of the Learning Management System due to sex at ($\alpha = 0.05$), and the statistical significance value was (0.868, F = 5.028). The results indicate that there are statistically significant differences in the attitudes of students towards the use of the Learning Management System for the study variable: the student's level of education. The value of the significance of the academic level reached (0.001, F = 5.908) for the first-year students followed by second-year students, third-year students, and eventually the fourth year students. The results also indicate statistically significant differences in students' attitudes towards using the Learning Management System for the academic track variable and for the students of the applied and humanities sciences track, followed by the health track students and finally the engineering track students. The significance of the academic track value is 0.000, F = 24.649.

## DISCUSSION OF THE FINDINGS AND RECOMMENDATIONS

### FIRST: RESULTS RELATED TO THE FIRST QUESTION

The results showed that the attitudes of faculty members towards the use of the Learning Management System in teaching were positive. The reason for this can be attributed to a number of reasons. The most important of these are: the awareness of faculty members of the usefulness of electronic programs and their added value in teaching, and the transfer of knowledge through the educational technology that has invaded the world of knowledge especially university teaching. The use of the Learning Management System in teaching contributes to clarifying the content of scientific material by providing students with a greater opportunity to prepare the content to be downloaded for presentations, references and related videos.

It also provides a prospect for constructive communication between the teacher, students and among students themselves through the discussion forum available on the Learning Management System. The latter also increases the ability of the teacher to organize the administrative work (attendance and absence of students, participation, grades, files of achievement ... etc.).

The Learning Management System provides the possibility of telling students what is new postponement or presentation of lectures, room number changes, test dates … etc.) regarding the course where the teacher informs students in advance. The Learning Management System software also helps the teacher to set time correctly among all the students in terms of delivering assignments electronically. The Learning Management System provides the opportunity to activate the strategy of the inverted classes by turning the roles of the parties in the educational process by making the role of students the center of the teaching and learning process.

The results of this study are consistent with many studies (Alblassi, 2016; AlShamary, 2016; Al-Mutairi, 2015; Mzrou, et al., 2013) that indicate that the attitudes of faculty members towards the Learning Management System are positive and effective in university teaching.

**SECOND: RESULTS RELATED TO THE SECOND QUESTION**

The results evidenced that the students' calculation Means for the use of the Learning Management System software were positive and achieved 3.84. This represents a high percentage, possibly due to students' desire and tendency to use technology, and their integration into university learning because they can be considered as numerically literate. The use of technology in learning increases students' excitement facilitates their integration into learning and makes it easier for students to learn by investing in smart devices that are in their reach by viewing the presentations and videos the teachers hold for their courses. This is confirmed by item (18) of the study tool, which indicates that students enjoy dealing with the Learning Management System and talking about it among themselves as an additional learning tool rich in expressive images and illustrative videos. This increases the attractiveness of the material and enhances students' interaction and motivation in learning.

The results of this study are consistent with many studies (Aljarrah, 2011; Al- Alqadere, 2014, Salloum, 2011; Mashaqbeh, 2009; Ayad, 2008; Khadash and Al-Hadrami, 2006) which pinpoint the efficiency of the Learning Management System in learning and reveal students' positive attitudes. The degree of students' satisfaction with the Learning Management System is very high because of its obvious impact on increasing their achievement and interaction and its potential options that allow them to communicate with their teachers and colleagues.

**THIRD: RESULTS RELATED TO THE THIRD QUESTION**

The results indicated differences between faculty members related to their attitudes toward the Learning Management System in university teaching due to sex and in favor of males. The reason according to the researchers lies in the fact that male faculty members have more freedom to attend training courses held by the university over the past years to raise the efficiency of teachers and to enhance their confidence in the implementation of modern technology such as the Learning Management System into the teaching environment.

Contrariwise female faculty members hold negative attitudes towards the use of the Learning Management System for many reasons. They often need a means of transport to the place of training sessions because the laws of the Kingdom of Saudi Arabia prohibit girls to drive cars. In addition, the time load of female teachers is less than that of male teachers as they have additional household burdens. This affected negatively their attitudes towards the Learning Management Systems. Above all, the program of the Learning Management System necessitates adequate training in its use and activation as required in the teaching process.

The results indicate that there are no statistically significant differences in the attitudes of faculty members towards the use of the Learning Management System due to the number of years of experience and academic track. This can be explained by the fact that most faculty members are trying to implement the Learning Management System software in their teaching, regardless of the years of experience and academic track. It is relatively a modern software that everyone tries to master and use in teaching. There is a competition among all the instructors in teaching, and they have enough enthusiasm and academic experience to generate the conviction of the importance of this program in reducing the burden on the faculty members. This helps students to shift from traditional learning to modern learning which is really funny, dynamic and interactive. In addition, the utilization of the Learning Management System is officially required by the University administration for all faculty members regardless of their experience and track. It is also considered as a fundamental criterion of academic performance evaluation.

The results of this study are in part consistent with the results of some studies and different from others. They match up with some studies (AlShamary, 2016; Alblassi, 2016; Mzrou et al., 2013) in the absence of differences of statistical significance according to the academic track. Yet, they differ from the study of Alblassi (2016) which did not find significant statistical differences due to the gender of university teachers.

**FOURTH: RESULTS RELATED TO THE FOURTH QUESTION**

The results of the study showed that there are no statistically significant differences in the attitudes of students towards the use of the Learning Management System due to sex. This can be explained by the fact that students are seeking to learn through this program regardless of their gender. Abdulrahman Bin Faisal University provided both sexes with modern computer rooms, computers and a network that can meet the needs of all the students at the same time. This contributed to building a knowledge base of computer systems, accessing the Learning Management System and enhancing students' capabilities in using e-learning. Added to that, students at this age enjoy learning that employs technology. On the other hand, male and female university teachers use the Learning Management System for transferring their teaching materials and requesting their students to access the presentations, videos and various references available on the Learning Management System and to use it for doing and submitting their assignments.

The results of the study indicate that the attitudes of the first-year students towards the use of Learning Management System were the most positive among all the four years. The attitudes of the second-year students occupied the second order, and then came the third-year students; and at last, fourth-year students came in the last order. This ranking is due to several reasons. New students are more in need of communication with university teachers. The Learning Management System software is a new technology for new students and is less attractive to students as they progress in the university. In addition, the number of the first and second year students is relatively larger than that of the third and fourth years. This Means that student's time in the class discussions and their meeting with their teachers during the office hours is much less than that of the advanced years. So, the Learning Management System represents a good opportunity to communicate with teachers as well as colleagues to exchange any views. In addition, the number of students in the third and fourth years is less, and their chance during the time of lectures and office hours is greater for discussions and inquiries about any issues related to the courses. This reduces their use of the Learning Management System software.

The results indicated that students' attitudes towards the use of the Learning Management System in the applied and humanities studies track were the most positive of all, and then came the health track and engineering track in the second and third rank respectively. The reason for this is that the programs of applied and human studies need to be discussed and maintained with the teachers more than the other tracks. The Learning Management System software facilitates communication compared to the other programs such as engineering, which contains calculations, measurements and field applications that cannot be obtained through Learning Management System. In addition, the number of students in the track of applied and humanities studies is greater. This Means that fewer opportunities for classroom discussions and meeting with teachers during their office hours, so they communicate with them through the Learning Management System. Yet, the number of engineering and medical students is less than that of the other tracks, and the opportunity for dialogue and class discussion and meetings in office hours is greater, thus reducing their use of the Learning Management System, and this is reflected in their attitudes towards this software. This may also be attributed to the fact that engineering and medical students use advanced and specialized software in their studies and this fact leads them to consider the Learning Management System as conventional and non-attractive software.

The findings of this study are consistent with the results of some studies (Aljarrah, 2011; Alqadere, 1433, Ayad, 2008; Khadash and Al-Hadrami, 2006). They also differ from the findings of the study of Mashaqbeh (2009) which hints no differences of statistical significance due to sex, academic year, program and previous experience. In addition, they differ from the study of Salloum (2011) which pointed to the difficulty of female enrollment in the necessary training to activate the Learning Management System because of the problem of transport as the Saudi government forbids females from driving cars as well as the teaching of males to females through the network without face to face communication. This difference may be due to temporal and spatial conditions, to various populations under scrutiny and to differing study procedures.

**RECOMMENDATIONS**

In the light of the results of the study, many recommendations are identified.

1. The need to conduct further studies on the impediments and challenges faced by university students and faculty members while using the software Learning Management System in learning and teaching and finding solutions to those problems.

2. The necessity to conduct more training sessions on the implementation of the Learning Management System software in university teaching for students and faculty members and to increase the efficiency of the services provided by this software.
3. Giving priority to appointing new faculty members who have knowledge of using the Learning Management System in teaching.
4. The necessary technical support is needed to find solutions that may occur when using the Learning Management System and to benefit from all the services provided by Learning Management System software.
5. Elaborating typical units for all courses and linking them to Learning Management Systems to make them easier to teach.

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# Constructing the Measurement of EFL Students' Core Competencies Practices in Learning Activities

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**ABSTRACT**
The study aims to develop an instrument of English students' core competencies practices in learning process. The development used qualitative and quantitative method in deferent steps and analysis. Sixth steps were applied in the instrument constructions; they were literature studies; defining constructs and sub-constructs; constructing indicators; assessing and judging indicators; defining face validity, confirming content validity, consistency testing and confirming constructs validity. The result came out with three main constructs; soft skills, hard skills and academic character. Soft skills classified into six sub-constructs with 45 indicators. Hard skill was classified into 10 indicators with no classification into sub-construct. While academic character classified into seven sub-constructs with 41 indicators. The instrument suggested to be used to monitor students' practices of Core Competencies in learning activities at Universities. Furthermore, the instrument were developed by refereeing to current literature from some countries, it is expected that the instruments and the method of its' development contribute to area of students' and graduates' core competencies.

**KEYWORDS**: 21st century skills, soft skills, hard skills, academic character, KKNI, skills measurement, learning strategy.

## INTRODUCTION

Indonesian Qualification Framework (KKNI) emphasized on core competencies Outcomes of graduate. Thought the Indonesian HE curriculum based on KKNI had been established since 2013, however the implementation of core competencies development in teaching and learning process at English Department of University of Jambi, has not been observed and evaluated. This caused by there is no yet instrument of how the core competencies be practiced in the classroom. Ristekdikti (2015; 2016) suggested core competencies development must be embedded in the teaching and learning process in undergraduate program. Every program needs to design and formulate how to embed core competencies development in the teaching and learning process as well as the instrument for evaluating the development of core competencies itself (Tim Kurikulum dan Pembelajaran Direktorat Pembelajaran dan Kemahasiswaan, 2014).

Helena & Thomas (2016) argue that those developing students' hard skills (technical skills) and soft skills should be blended in teaching and learning process. The strategies of learning should able to provide the students to acquire core competencies. Dikti (2011) stated that students' center Learning (SCL) should be applied in teaching and learning process at University. Some strategies of SCL such as group work, ICT usage, PBL, exploratory learning, e.tc are supposed to engage students to practice their core competencies through learning process. Furthermore, the students' practices of core competencies through their learning activities should be observed, measured and evaluated in order that to come to better quality output of students' core competencies.

Much research on students' core competencies including generic skills, life skills or interpersonal skills at university had been done and discussed broadly and hugely published since 1990 until today. Most of the research was conducted in field settings where the most commonly used method of data collection is the survey questionnaire. Unfortunately, the instrument developed and used often has lacked reliability and Validity which has led to difficulties in interpreting research results This is because of the procedure and the process of the instrument development was unexplained and unjustifiable (Esposito, 2002).

In relation to the issue, this study had developed instrument to describe the implementation of students' core competencies development in the teaching and learning process at English Department of University of Jambi. The instruments practices of core competencies will be used to search the implementation of core competencies in the classroom practices based on English Education lecturers and students' self-evaluation. This article reports and discusses the development process and outcomes of self-evaluation questionnaire of core competencies in each dimension and its indicators. Validity and reliability of the instruments are also reported in

detail and clear. It is expected that the study contribute to the practices of core competencies, key skills or others equivalence and related area of research.

## DEFINING CORE COMPETENCIES

Core Competencies are generally defined the set of skills or abilities essential to fulfilling the three potential outcomes of higher education, namely, the needs and requirements of employers in the marketplace, lifelong learning, and good citizenship It consists of seven skills: communication, numeracy, IT, learning how to learn, problem solving, working with others, and subject-specific competencies (Hadiyanto & Mohammed Sani, 2013; Hadiyanto, 2010; and Zalizan., et. al 2006). In this study, the definition of core competencies update and redefine as skills developed during teaching and learning process at University in order to provide students with three major competencies; Soft Skills, English Hard Skills and Academic Character. The update definition and dimensions of core competencies were extracted and synthesised from following resources; Hadiyanto, et. al (2017a), Hadiyanto, et. al (2017b), Ristekdikti (2016), Laura., et. al. (2016), The Ontario Public Services, (2016), Hadiyanto & Suratno, (2015), Bialik, et., al. (2015), Hassan., et. al. (2013), Hadiyanto & Mohammed Sani (2013), Person, Ann ., et. al. (2009) and Washer (2007), Farkas (2007), Zalizan., et. al. (2006) and Vezzuto (2004).

### Soft Skills

Commonly Soft skills are referred to interpersonal skills, leadership, communication, working in team, critical thinking problem-solving, decision-making etc. Hadiyanto, (2017a), ILO,2014; Partnership for 21st century skills. 2008). redefined soft skills as the ability of generating communication skills, IT Skills, numeracy skills, learning how to learn skills, problem solving skills and working with others in completing task and work (Hadiyanto, 2017a). Each soft skill is defined in the following.

*Communication skills* are defined as the ability of using English to express and exchange ideas by using feelings of thought a variety of verbal and non-verbal media, including speech and written text as also to synthesise information gained from relevant resources (Hadiyanto, 2017b).

*IT Skills*, that is the competence of using technology of computers as well as its' device and programme which is integrated with the computer itself, such as using Microsoft office, internet, website, email, messenger, downloading and uploading, applications, online conference etc. to access, gain, create, manage and expose information (Hadiyanto, 2017b).

*Numeracy skills* refer to the ability of using basic mathematic calculation, interpreting graphical information, timing, prioritizing tasks and sequencing of job or activities (Hadiyanto, 2017b).

*Learning skills* is defined as the ability of using strategies as well as doing evaluation on self-learning strategy, seeking for the weakness and coming to better way and output of learning goal, it includes gaining general and detailed information, knowledge, and skills in order to achieve the goal of learning (Hadiyanto, 2017b).
*Problem solving skills*, which is the ability to tackle problem systematically in appropriate manner and situation in order come out with an appropriate solution (Hadiyanto, 2017b).

*Working with others* refer to a capacity to interact effectively with other people both on a one to one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a goal. (Hadiyanto, 2017b).

### Hard skills

Hard skills relate to major and minor knowledge skills. Specifically in this study, it is defined the ability of students using and generating four major English skills and specific English skills in real context as blended with soft skills (Hadiyanto, 2017b; Dikti 2011).

### Academic Character

Academic Character is defined as the practical values which are automatically embed in the students learning activities to support their soft and hard skills performance. Academic character consists of honesty, appreciation, tolerance, disciplines, patience, confidence, and responsibility (Ristekdikti, 2016; Ristekdikti, 2015; Smith, 2103; Bialik, et. al 2015; Kamarudin, 2012; Dikti, 2011; Vezzuto, 2004). Each component of academic character is defined as follows;

*Honesty* refers to student's automatic action and expression in confessing and reporting a truth, facts, his/her shortcomings, friends' strengths as well as learning from authentic resources (Ristekdikti, 2016; Person, et. al 2009; Vezzuto, 2004).

*Appreciation* is about how the students show their positive attitudes, words and actions in appreciating their friends' ideas, contributions and works, and do not condescend or blame their friend (Bialik, et.al 2015; Dikti, 2011; Person, et.al 2009).

*Tolerance* refer to students reflection and action to accept the differences of personality, abilities, attitudes, gender, social status and change the differences to be more useful for achieving maximum learning objectives (Ristekdikti, 2015; Person, et.al 2009).

*Discipline* is students' consistency in a good time and work management, following the rules of academics, class attendance, completing and submitting task on time, and achieving learning goals and assignment standard output (Person, et.al 2009: Vezzuto, 2004).

*Patience* is about maintaining spirit of learning, and emotions sustainability in doing assignment and tasks, exchanging ideas in a discussion, facing and resolving learning problems until learning goals achieved. (Person, et.al 2009; Vezzuto, 2004).

*Confidence* is the student's ability to present him-self such as ability, ideas, skills, etc., and ability to relieve nervous, anxious, depressed and tense in learning activities, it includes giving writing and oral presentation (Ristekdikti, 2016, 2015; Person, et.al 2009).

*Responsibility* is defined as the action of students in completing assignments, tasks and learning outcomes by his own effort as well as taking and completing a part and as a group member, a group leader and a moderator in a discussion (Kamaruddin, 2012; Person, et.al 2009: Vezzuto, 2004).

## CORE COMPETENCIES PRACTICES IN TEACHING AND LEARNING

The literature stresses the importance of both theory and practice as necessary elements in the process of learning (and the development of core competencies through real practice, yet many writers assert that students have to learns transferring knowledge acquired in the classroom to practical applications in the workplace in areas as varied as aviation, all disciplines knowledge. For answering the issues some expert suggested that important opportunities for the development of core competencies must occur in the selection of delivery methods. Teaching contexts can provide an explicit focus on the development of core competencies, thus providing students with opportunities to develop them. The students'core competencies will be highly promoted if the large opportunity givento the students to practice these attributes within learning activities and otherwise (Hadiyanto & Suratno, 2015, Hassan., et. al. 2013, Hadiyanto, 2010).

Students learn most effectively when they have the opportunity to interact with other students. Interaction among students typically leads to group problem solving. When students are unable to meet together, appropriate interactive technology for learning such as E-mail, E-learning, Online learning, Online course some current ICT application, should be provided to encourage their it skills as well encourage their small group and individual communication. Assignments in which students work together and then report back or present to the class as a whole, encourage student-to-student interaction. Ensure clear directions and realistic goals for group assignments. Distant students need to reflect on what they are learning. They need to examine the existing knowledge frameworks in their heads and how these are being added to or changed by incoming information (Hadiyanto, 2010).

In short there are many ways of achieving the goals and learning outcomes or program objectives that have been set by each institution. Nevertheless the approaches used in designing the curriculum and the selection of the teaching-learning activities must be based on sound learning principles. Students learning activities should be designed with a view of encouraging students to actively participate in their process of learning. Priority is placed on lecturer setting goals and objectives for the students' engagement and activities related to the promotion of core competencies (Hadiyanto, 2013; Washer 2007; .Zalizan Mohammad Jelas & NorzainiAzman 2005)

## SELF-ASSESSMENT OF CORE COMPETENCIES PRACTICES

In relation to measuring instrument of core competencies practices in the process of learning was discussed in literature study at previous stage. Some theories were retrieved and characterized into practical statements of

core competencies. In daily teaching, hard skills are typically easy to observe, quantify and measure. The evaluation formally designs for this type of skills for every subject. However the hard skills in term practices in real contact were rarely measured by educator. Soft skills are typically hard to observe, quantify and measure by a test. Self- evaluation questionnaire model were developed to measure students' experience, learning activities, learning strategies and how they cope with E-learning, online learning and ICT based learning. Academic Character qualities are defined as distinct from soft skills, which represent the ability to fell, know, express and practice of humanism values in learning activities context. As elaborated and stated above, academic character encompasses into seven characters, honesty, appreciating, tolerance, discipline, patient, confidence and responsible (Ristekdikti, 2015; Bialik, et., al 2015; British Council, 2015;Tim Kurikulum dan Pembelajaran Direktorat Pembelajaran dan Kemahasiswaan, 2014; Lowden, et. al. 2011; Hadiyanto, 2010; Hadiyanto, 2011; Hadiyanto, 2013; Zalizan 2006; and Vezzuto, 2004)

Students' capacity to assess themself on practices of core competencies through learning activities must be measured with specific indicators. Individual students can monitor the relationship between the learning activities with core competencies achievement and goal of learning as whole. That is why that self-assessment of core competencies practices through learning activities is become an important part of evaluation toward learning goal, quality and process (Cajender, et al. 2011; Office of educational technology, 2014; Ramaligela 2013). Students will be able to judge the learning activities through specific core competencies indicators stated in the constructed questionnaire. Model self-assessment questionnaire help the students to assess their self and learning goal, how and what are the goal had been practiced and achieved.

Furthermore in line with Office of Educational Technology (2014) the students' self-assessment on practices core competencies enabling the teachers to:

- Align professional teaching and learning strategies to student learning and improvement core competencies.
- Use the evidence-based characteristics, described through core competencies components in the instrument, to determine the degree to which your current professional teaching and learning strategy or set of strategies is of high quality and aligned with standards of core competencies acquiring.
- Determine how teacher might refine and better integrate strategy or set of strategies to achieve your goal.
- Use the students' Self-Assessment core competencies practices again to rate how well teachers' refined strategy or set of strategies, connected between strategies and blended learning strategies

The students' Self-Assessment core competencies practices is not only use to assess the student practices of core competencies but also useful to assess students' learning strategies, teachers' current professional teaching learning strategies and refine them. Keep in mind that, even if a strategy or set of strategies does not address every indicator of core competencies, the use of strategy can be worth pursuing and refining over time.

**METHOD**

The development used qualitative and quantitative method and analysis was used in the construction of the instrument. Qualitative method was used at first step until the fourth steps of instrument construction. While quantitative method applied at fifth step and sixth steps of the construction or in try-out for consistency testing and confirmatory factor analysis (CFA) for testing constructs validity (Pallant, 2011 and Hair, et. al 2005). The study was conducted at English education department, Universitas Jambi with total students' population 488. Out of 488, 50 third year students were selected for pilot study, and 208 students were randomly selected as the samples of the research.

The procedures of instrument development as follows; first were analysis of HE curriculum, literature, and previous existing instrument. The second step was defining construct and sub-constructs based on literature review analysis. The third step was indicators development, assessment and judgment of researchers to see the appropriateness of each item under the belonging construct. The fourth step was holding a workshop to reach face validity and confirm content validity as well as check the language of the instrument. Twelve lecturers and 20 alumnus of English education participated in the workshop.

The fifth step was trying out the questionnaires and consistency testing with 50 respondents. Pallant (2011) and Hair, et. al (2009) suggested that Cronbach alpha coefficient .60 for a construct consists of 10 items and below, while coefficient .70 is recommended for a construct that consists of more than 10 items. And corrected item-total correlation at 0.30 is acceptable. And last step was investigating construct validity through confirmatory factor analysis (CFA). Pallant, (2011) states that sample size at 150 and above are sufficient to conduct

confirmatory analysis, while Myers at, al. (2011) suggests that sample size at 200 and above. The CFA in this study was conducted at sample size 206 and above.

## RESULT OF STUDENTS' CORE COMPETENCIES PRACTICES INSTRUMENT

The six steps of self-evaluation questionnaire development had been conducted successfully and the questionnaire come out with three main construct measuring instrument of core competencies practices, they are soft skills, hard skills and academic character. In the reliability process and validating of the instrument, some indicators had been revised by considering participants' suggestion, and as the result all indicators toward each sub-construct can be understood and agreed by the seminar participants. The number of indicator had been deleted based on sub-construct were one indicator of communication skills, four indicators of numeracy, three indicators of problem solving skills, and one indicator of working in team. While there was no indicator of hard skills deleted. In term of academic character, two indicators of honesty, three indicators of patient, three indicators of confidence and three indicators responsible were deleted. Total indicators of core competencies reduced from 103 to 96 indicators after the whole process. The result is reported specifically as follow.

### First Round: Reliability and Validity Result

The result of consistency analysis found that 10 indicators of Core Competencies yielded corrected item total correlation below recommended values .30 (Pallant, 2011, Hair, et. al 2009). However, seven of the 10 indicators obtained close to corrected item correlation value at .30, the indicators were not deleted but they had been revised in term of content and phrases. Three other indicators were deleted, one indicator of communication and two indicators of numeracy due to very low the Corrected Item-Total Correlation obtained. Then the content and indicators of questionnaire had been revised.

Revised questionnaire were distributed to 250 respondents and 206 returned. As Pallant, (2011) and Hair, et. al (2009) suggested that sample size at 200 and bigger is good to run CFA in order to confirm construct validity. The criterion for the construct validity was considered as acceptable if the items in each construct yielded loading factor at 0.50 or higher, in others way to say the statement used in the construct is measured what supposed to measure (Hair et al. 2009 & Pallant 2011). The first round of CFA conducted and found that three indicators did not meet loading factors at .500, one indicator of learning, one indicator of PBL and one indicator of honesty. The three indicators were deleted, the second round of reliability and CFA conducted.

### Second Round: Reliability and Validity Result (Final)

Second round of reliability analysis was conducted to the revised questionnaire with 206 samples. Overall core competencies Cronbach's alpha is .962>.70. Overall soft skills yielded $\alpha$ = .928>.70, hard skills $\alpha$ = .845>.70 and academic character $\alpha$ = .942>.70. And all sub construct of soft skills and academic character obtained $\alpha$ more than .60 (Pallant, 2011). All indictors of hard skills, sub-contracts of soft skills and academic character obtained higher item corrected total correlation value .30 as suggested by As Pallant, (2011) and Hair, et. al (2009). This findings imply that high reliability and consistency were obtained by the instrument. The instrument is reliable to be used for measuring students' core competencies practices in the classroom. Table 3 shows the result of the reliability analysis:

Table 1. Corrected Item-Total Correlation and Cronbach's Alpha if Item Deleted

| Construct | Number of Indicator | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| **CORE COMPETENCIES** | **96** | - | **.962** |
| **I. Soft Skill** | 45 | - | .928 |
| a. Communication | 8 | .362 - .458 | .738 |
| b. It Skills | 6 | .325 - .524 | .678 |
| c. Numeracy | 6 | .501 - .661 | .774 |
| d. Learning | 10 | .355 -.608 | .838 |
| e. Prob. Solving Skills | 7 | .530 - .672 | .830 |
| f. Working with others | 8 | .386 - 573 | .797 |
| **II. Hard Skill** | **10** | .367 - .612 | .845 |
| **III. Academic Character** | **41** | - | .942 |
| a. Honesty | 7 | .305 - .498 | .704 |
| b. Appreciating | 7 | .401 - .610 | .753 |
| c. Tolerance | 5 | .543 - .631 | .797 |

| | | | |
|---|---|---|---|
| d. Discipline | 8 | .371 - .607 | .793 |
| e. Patient | 8 | .441 - .637 | .842 |
| f. Confidence | 6 | .487 - .645 | .778 |
| g. Responsible | 7 | .410 - .555 | .761 |

**Result of Validity**

Face and content validity had been discussed above. Face validity and content validity obtained through workshop among English education lecturers and face validity obtained by workshop among alumni of English education. To obtain construct validity, second round of CFA had been conducted. Pallant (2011) that assumption prior to rotated component matrix value of KMO smaller then .05 should be obtained. In this study all of tested constructs yielded KMO and Bartlett's Test at sig. 000<.05.

Table 3 confirms that all of the items were related strongly with its construct. All indicators yielded loading factor more than .500. The indicators in communication skills yielded loading factor in the range .516 to .638, IT in the range .503 to .747, numeracy in the range .580 to .719, learning how to learn in the range .521 to .691, and problem solving in the range .640 to .794 and working with others within .504 to .700. Hard skills yielded loading factor .588 to .724. The loading factor of each indicator in its construct confirms that the indicators explain and measure what supposed to measure.

Table 2 Loading factor (L.F) of item upon component of core competencies

| Soft Skills | | | | | | | | | | | | Hard Skills | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Com. | | IT | | Num. | | LHTL | | PBS | | WT | | | |
| No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F |
| A1 | ,569 | B1 | ,503 | C1 | ,653 | D1 | ,614 | E1 | ,673 | F1 | ,693 | G1 | ,702 |
| A2 | ,516 | B2 | ,607 | C2 | ,668 | D2 | ,718 | E2 | ,766 | F2 | ,504 | G2 | ,699 |
| A3 | ,624 | B3 | ,664 | C3 | ,805 | D3 | ,691 | E3 | ,658 | F3 | ,699 | G3 | ,724 |
| A4 | ,638 | B4 | ,523 | C4 | ,691 | D4 | ,651 | E4 | ,648 | F4 | ,687 | G4 | ,635 |
| A5 | ,547 | B5 | ,670 | C5 | ,580 | D5 | ,521 | E5 | ,794 | F5 | ,649 | G5 | ,589 |
| A6 | ,605 | B6 | ,747 | C6 | ,719 | D6 | ,723 | E6 | ,746 | F6 | ,706 | G7 | ,709 |
| A7 | ,621 | | | | | D7 | ,617 | E7 | ,640 | F7 | ,515 | G8 | ,686 |
| A8 | ,627 | | | | | D8 | ,668 | | | F8 | ,700 | G9 | ,588 |
| | | | | | | D9 | ,527 | | | | | G10 | ,716 |
| | | | | | | D10 | ,635 | | | | | | |
| | | | | | | | | | | | | | |

Com. = Communication Skills; IT = Information Technology; Num. = Numeracy; LHTL = Learning How to Learn; PBS = Problem Based Learning; WT= Working in Team

Table 4 confirms that all of the indicators of academic characters were related strongly toward its construct. On other hand, the statements used to measure academic character are valid to measure its construct. The loading factors yielded are .517 to .668 for honesty, .547 to .765 for appreciation, .508 to .741 for discipline, .553 to .793 for patient, .670 to .801 for confidence and .558 to .715 for responsibility.

Table 3 Loading factor (L.F) of item upon component of core competencies

| Academic Character | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Honesty | | Appreciation | | Tolerance | | Discipline | | Patient | | Confidence | | Responsibility | |
| No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F | No. | L.F |
| H1 | ,654 | I1 | ,671 | J1 | ,742 | K1 | ,741 | L1 | ,665 | M1 | ,730 | N1 | ,713 |
| H2 | ,579 | I2 | ,573 | J2 | ,716 | K2 | ,531 | L2 | ,634 | M2 | ,801 | N2 | ,715 |
| H3 | ,569 | I3 | ,683 | J3 | ,789 | K3 | ,508 | L3 | ,553 | M3 | ,749 | N3 | ,634 |
| H4 | ,517 | I4 | ,655 | J4 | ,785 | K4 | ,661 | L4 | ,778 | M4 | ,694 | N4 | ,680 |
| H5 | ,668 | I5 | ,547 | J5 | ,687 | K5 | ,687 | L5 | ,793 | M5 | ,670 | N5 | ,575 |
| H6 | ,608 | I6 | ,551 | | | K6 | ,580 | L6 | ,663 | | | N6 | ,623 |
| H7 | ,583 | I7 | ,765 | | | K7 | ,711 | L7 | ,755 | | | N7 | ,558 |
| | | | | | | K8 | ,718 | L8 | ,667 | | | | |

**Final result of Core Competencies Components and Indicators**

**Indicators of Softs Skills**

In this study soft skills were classified into communication, IT Skills, numeracy, learning how to learn, problem solving skills, and working with others. As shown in Table 4 soft skills were coming with 49 indicators and categorized into six sub-soft skills. Eight indicators indicate communication skills, six indicators refer to IT skills, eight indicators are for numeracy, eleven indicators indicate learning how to learn, six indicators are for problem solving skills and eight indicators refer to working with others.

Table 4 Results of Sub-constructs and Indicators Development of Core Competencies

| Soft Skills | Indicators |
|---|---|
| A. Communication | 1. Doing presentation, 2. Using Different formats, 3. Using Vocabularies, expressions and body language, 4. Summarizing key issues (Oral), 5. Giving feedback, 6. Communicating some ideas in writing, 7. Writing a report, 8. Summarizing key issues. |
| B. It Skills | 1. Selecting relevant information, 2. Sharing references, resources and information, 3. Developing assignment in the form of text, image, chart, etc, 4. Presenting using some illustrations in power point, 5. Using software or application features, 6. Developing the structure of presentation. |
| C. Numeracy | 1. Reading tables, charts, graphs and numbers, 2. Measuring learning activities and outcome, 3. Presenting based on points but calculable, 4. Labeling tables, charts and graphs, 5. Managing time for working on assignment, 6. Identifying the relevant information sources. |
| D. Learning how to learn | 1. Improving academic performance, 2. Assessing the effectiveness and efficiency, 3. Identifying factors impacted on learning outcomes, 4. Setting realistic targets and plan, 5. Learning independently and be responsible, 6. Identifying ways my work best, 7. Reviewing what and how to learn, 8. Consulting with lecturers, 9. Adapting learning strategy, 10. Comparing information from various resources. |
| E. Problem Solving Skills | 1. Identifying a problem, 2. Solving problems with several ways, 3. Using different methods to analyses a problem, 4. Accommodating diverse perspectives, 5. Solving problems by resources provided 6. Presenting an approach to solve a problem. |
| F. Working with others | 1. Learning activities in a group, 2. Having conversations with different races in learning, 3. Working in team, 4. Resolving conflicts in team work, 5. Giving feedback to improve team work, 6. Keeping yourself and others motivated, 7. Respecting diverse perspectives, 8. Thinking and offering ideas to a group work. |

**Indicators of Hard Skills**

Core competencies in term of hard skills are indicated by 10 indicators. Hard Skill was not divided into sub-construct or sub-skills, due to hard skills practices had been embedded into soft skills practices. Moreover based on Indonesian Qualification Framework-KKNI (Dikti 2011) states that hard skills only 20% of total skills needed. In this case hard skills cover the general content subject practices. The indicators were presented in in Table 5.

Table 5. Result of Indicators of Hard Skills

| | |
|---|---|
| **Hard Skills** | 1. Applying specific knowledge and skills, 2. Discussing ideas specific knowledge of a course, 3. Connecting prior knowledge with topic of discussion, 4. Transfering knowledge based on into practices, 5. Interpreting subject-content into technical practices, 6. Practicing your subject-content knowledge, 7. Answering technical questions proposed, 8. Enhancing your technical skills, 9. Developing specific competence, 10. Representing specific competencies. |

**Indicators of Academic Character**

The academic character comes out with seventh sub constructs and 49 indicators. The seventh academic character sub-construct is honesty, appreciating, tolerance, discipline, patient, confidence and responsible. As presented in Table 6, Honesty have eight indicators, appreciating seventh indicators, tolerance five indicators, discipline eight indicators, patient five indicators, confidence six indicators and responsible seventh indicators.

Table 6. Results of Sub-construct and Indicators Academic Character

| **Academic Character** | |
|---|---|
| A. Honesty | 1. Telling what I can do and cannot, 2. Admit friends' strength, 3. Confessing my weakness, 4. Telling true resources, 5. Not to present and report a fictive data, 6. Not copying and pasting for assignment, 7. Not pretending to understand, 8. Giving a lie appraisal. |
| B. Appreciating | 1. Honoring friends' improvement, 2. Listening to friend, 3. Paying attention to a friends' presentation, 4. Respecting friends equally, 5. Encouraging less active friend, 6. Prioritizing harmony in giving different ideas, 7. Giving appraisal to friends' effort and work . |
| C. Tolerance | 1. Appreciating differences of ideas, 2. Appreciating the attitude of others, 3. Accepting the ways offriends in presenting, 4. Appreciating ways of a friend in completing assignment, 5. Accepting diversity in a group. |
| D. Discipline | 1. Following academic rules, 2. Coming to a class earlier, 3. Submitting assignment by the deadline, 4. Organizing learning activities daily, 5. Scheduling, timing and prioritizing activities, 6. Targeting learning output to be obtained, 7. Following rules set by classroom agreement, 8. Following a style in completing assignment. |
| E. Patient | 1. Self-Devoting, 2. Hearing long explanation, 3. Accepting the result, 4. Controlling emotion, 5. Staying motivated, 6. Working on assignment even under pressure |
| F. Confidence | 1. Pushing downnervousesness, 2. Encouraging to present, 3. Being confident, 4. Encouraging to participate, 5. Encouraging to be more confident to perform, 6. Assuring own ability. |
| G. Responsible | 1. Completing my own part as group, 2. Own involving in group discussion, 3. Taking a part as moderator, 4. Own Checking for some errors and mistakes, 5. Own revising of report, 6. Taking a role of group leader, 7. Completing assignment. |

**DISCUSSION**

A set of questionnaire was developed to acquire information of the practices of core competencies through the students' engagement and activities. Questionnaire academically is able to measure the students' core competencies practices in teaching and learning process. The instrument core competencies consist of three main scales soft skills and, hard skills and academic character. Soft skills and academic character was developed in multiple measures each of which consists of multiple items, while hard skills were developed on a single scale which consists of multiple items. The instrument was design in questionnaire form with 5 likert scale alternative answers. The number 1 to 5 was used to describe respondent core competencies practices. We should note that there are many different types of measures, but the vast majority of scales used by behavioral scientists in survey questionnaires are Likert scales that utilize an interval level of measurement.

It might be there is some similar instrument in measuring soft skills, generics skills, interpersonal professional skills, and character however it is not found yet the instrumentations developed in measuring core competencies practices in the process of teaching in learning.While many researchers may not be interested in measurement development per se, they just looking at and use an existing Instrument without knowing how the instrumentation developed as the result they often used inadequate, inappropriate or unreliable and could not measure what expected to measure.Some available questionnaire developed aims to measure graduates'soft skills, generic skills or interpersonal skills performance at work place, however this instrument developed to investigate the development of core competencies applied in the classroom setting, embedded between soft skills, hard skills and academic character.

The instrument development are following research ethic, logic, scientific and using both qualitative and quantitative data, in term of theory and practice. The procedure and steps applied in the development processed are very clear, academically responsibility and normally used and accepted and commonly understood by social scientist. In addition, it is true that this instrument developed to measure core competencies practices teaching and learning process for EFL students at English Department of Jambi University, however it is academically adaptable and usable for any field of courses in term of investigating core competencies practices in teaching and learning activities.

## CONCLUSION

Sixth steps of developmental process had been applied in the instrument constructions; they were literature studies; defining constructs and sub-constructs; constructing indicators; assessing and judging indicators; defining face validity, confirming content validity, consistency testing; and confirming constructs validity. The result of the development comes out with three main components of core competencies practices instrument, they are soft skills, hard skills and academic character. Soft skills is coming with 45 indicators and categorized into six sub-constructs; hard skills coming with 10 indicators, while Academic Character was coming with seventh sub-constructs with 41 indicators. Totally, core competencies practices have 96 indicators. It is concluded that the process of the instrument development had produced valid and reliable measurement of the students' practices of core competencies during their study at Universities. It is also expected that the instruments and the method of its' development contribute to area of students' and graduates' core competencies.

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# Development of E-Module Based on Problem Based Learning (PBL) on Heat and Temperature to Improve Student's Science Process Skill

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**ABSTRACT**
This study aims to develop an electronic module based on Problem Based Learning (PBL) as an implementation of information and communication technology in learning media for students of class XI-Science which tested by the validity and feasibility test in order to improve student's science process skill. The method in this research used research and development (R & D) with ADDIE model (Analysis, Design, Development, Implementation and Evaluation). The e-module was developed with five stages according to PBL which are: organizing problems, learning task, investigation, result development, analysis and evaluation. The developed e-module was validated in material aspect about heat and temperature subject by the material experts and gained score of 82.20%, the validation in media aspects by the media experts gained score of 75.78%, and the average score of the whole aspects by the learning experts was 94.36%, while the results of experiments at school by educators and students obtained scores of 86.31% and 80.78%, these scores mean that the e-module was categorized as very good. Based on the pre-test and post-test of students' science process skill with this e-module, the calculation of n-gain test was 0.6 which means moderate category.

**KEYWORDS**: e-module, Problem Based Learning, Science Process Skill

## 1. INTRODUCTION

Scientific learning required a process that can stimulate students to learn through various real problems in everyday life. The problem is often associated with knowledge that has been or will be studied. According to a research conducted by Serevina (Serevina, 2017), experience-based learning strategies which is an example of scientific approach can increase senior high school students' learning outcomes. Another learning model that uses a scientific approach is Problem Based Learning (PBL). PBL is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2015).

The PBL model is an effective way to engender a range of important skills such as communication skills, teamwork, enquiry-based learning, peer-learning, project management, collaborative and individual innovation and creativity (Lawlor, 2015). The inefficiency of traditional methods to aid in development and strengthening of these particular student abilities was the main reason to start considering and adopting various instructional approaches, including PBL (Wilder, 2014). PBL turned out to be highly effective, especially at highest levels of academic performance (demanding application and analysis skills) in which there are found substantial differences with regard of group of control (Suarez, 2017).

Since the implementation of The Revised 2013 Curriculum based on the results of the need of the teachers in some high schools, almost all respondents attempted to carry out the demands of the curriculum. But there are still obstacles in the implementation, one of which relates to teaching materials. Based on the result of student need analysis shows from 35 respondents students, 77% of students think physics is difficult, 85,7% student have difficulties in learning, 91,4% student have interest if teacher display software / simulation / animation / video / ppt in physics learning. And it turns out 85.7% of students feel more understanding learning physics concept by displaying software / simulation / animation / video / images / ppt. The average student now has a laptop / mobile phone, making it easier access related to the use of such digital tools.

These problems required a learning that can provide students to stimulate independent learning and find the physics concept of the problem. Providing issues related to the daily life can facilitate students to understand the concept so that students feel happy by learning physics. It is a part of learning with a scientific approach. According to Stockwell (Stockwell, 2015), a blended teaching approach, which uses video assignments in advance of each class to stimulate interest in the topic and provide foundational knowledge, coupled with lectures having in-class problem solving, is a more effective strategy for science education compared with traditional approaches.

Based on the results of these observations, it is deemed necessary to develop a teaching material in the form of a digital module to stimulate students to learn independently and find the physics concept of the problem. So that students feel challenged to study physics and finally students will feel happy by learning physics.

One of the important thing in the learning process is the teaching materials. An example of teaching materials is a module. Teaching material is made to be able to transfer the message of learning from the teacher to the students so as to stimulate thoughts, feelings, interests and the willingness of students to learn. The module is part of the teaching material in printed form. Digital module is good to be used in some abstract subjects in Physics. A research conducted by Shurygin (Shurygin, 2016) stated that the obtained results prove the importance and effectiveness of the developed electronic educational courses in the study of physics in the context of improving the efficiency of students' independent work when competency approach is used for training bachelors that enhances their competitiveness. According to Hill (Hill, 2015), a designed online resources used as pre-instruction can make a difference in students' conceptual understanding and representational fluency in physics, as well as make them more aware of their learning processes.

This e-module activity is one of the teaching materials that demands student’s independency to find a concept. This is supported based on the results of a research conducted by Febrianti (Febrianti, 2017) which shows that the developed physics digital modules is suitable for use as self-learning materials for students.

In a research conducted by Yulianti (Yulianti, 2017) the improvements in students' cognitive learning outcomes who have learned using the PBL physics worksheets are higher than those who are not. According to a research conducted by Isna (Isna, 2017), the application of PBL-based modules is highly recommended in physics learning since it can improve the students learning outcomes as well as their scientific attitudes. A research conducted by Gaikwad (Gaikwad, 2014) also stated that the students accepted the E-learning activity well as they perceived it to be innovative, convenient, flexible and useful. The interactive e-learning module in pharmacology was moderately effective and well perceived by the students. Based on the information from the preliminary study, it can be synthesized that a physics e-module based on PBL can be an alternative in presenting physics learning materials.

## 2. RESEARCH METHOD

The research used research and development method with consideration in accordance with the objective in this research is to produce product in the form of performance assessment instrument. The method used is ADDIE (Analyze, Design, Develop, Implemention and Evaluation) which was formulated by Reiser and Mollenda. The ADDIE method is adapted to the assessment instrument development procedure. In general, this research consists of five stages, namely Needs Analysis, Instrument Design, Instrument Development, Implementation, and Evaluation. In general can be described below:

### *2.1 Analysis (analisis) : Needs Analysis*

This stage is to analyze the need for development of teaching materials and analyze the feasibility and development requirements. The development of teaching materials is preceded by the problems in the existing learning which is not relevant to the needs of the target, learning environment, technology, student characteristics etc.

*2.2 Stage Design: E-module Design*

The results of the needs analysis will determine the product design to be developed. Product design should be realized in the form of pictures or charts. The product design stage involves determining the module component, the concept of delivery and the materials organization, the type of tasks assigned, the evaluation questions, the drawings, the articles, the examples, as well as the module layout. This stage will produce the initial product design in the form of a module which the preparation of product assessment instruments has been created to be a guide in designing the product.

*2.3 Stage Develop: E-module Development*

At this stage contains the realization activities of the product design. In the design stage, the conceptual framework of the application of the teaching material has been prepared. In the development stage, this conceptual framework is realized to be a ready-to-implement product.

*2.4 Stage of Implementation: Trial*

At this stage the developed design is implemented in real situations in the classroom. During the implementation, the design of the teaching material that has been developed is applied to the actual conditions. The material is delivered in accordance with the developed teaching materials.

*2.5 Evaluate Stages: Evaluate*

The evaluation stage is a process to see whether the learning system being built is successful and in accordance with the initial stage or not. The evaluation stage can occur in each of the four stages above. The evaluation in each of the four stages is called formative evaluation, because of its purpose for revision needs. Evaluation is a process to provide value to the learning process.

## 3. E-MODULE BASED ON PROBLEM BASED LEARNING (PBL)

E-Module based on Problem Based Learning is a digital-based teaching materials that are designed systematically and interestingly include the processes of the learning phase of Problem Based Learning in the material description stage and evaluation that can be used independently by the students in accordance with the expected competencies. Stages of the PBL model according to Fathurrohman (Fathurrohman, 2015) related to the teacher's behaviors in the learning process is as in the table below.

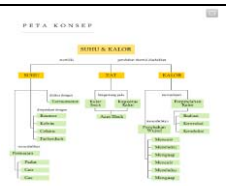
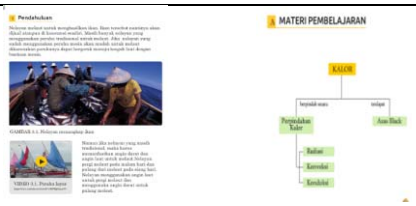
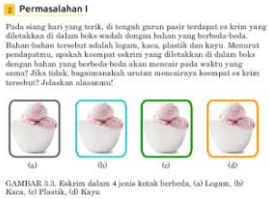
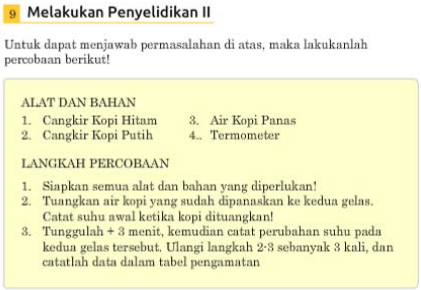
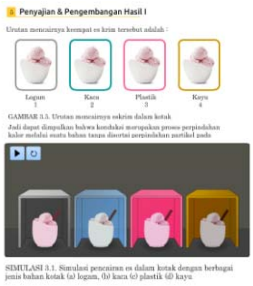
Table 3.1. Stages of Learning PBL

| Stage Of Learning | Teacher Behavior |
|---|---|
| Stage 1:<br>Organize students into problems | Teachers inform learning objectives, describe key needs, and motivate students to engage in problem-solving activities that they choose themselves. |
| Stage 2:<br>Organize students to learn | Teachers help the students to define and organize learning tasks that are related to the problem. |
| Stage 3:<br>Assist in independent and group investigations | Teachers encourage students to gather appropriate informations, carry out experiments, seek explanations and solutions. |
| Stage 4:<br>Develop and present works and exhibitions. | Teachers assist the students in planning and preparing appropriate work outcomes such as reports. |
| Stage 5:<br>Analyze and evaluate the problem-solving process | Teachers help the students to reflect on the investigations and the processes that they use. |

(Source: Fathurrohman, 2015)

The e-module was developed with Adobe Animate CC application. Adobe Animate CC is an excellent program for creating dynamic content that can be played on all media and even platforms. Adobe animate CC comes with a number of tools for creating graphics such as Photoshop to create graphical content. It comes with a new motion editor, WebGL for animation, supports file projection and HTML5 extensions, supports Action Script 3.0, is more flexible, dynamic and easier to create animations than ever before. The display of E-module based on Problem Based Learning per sub chapter can be seen in the following table:

Table 3.2 E-Physics Module Display in Learning Activities

| View E-Module | Information |
|---|---|
|  Concept Maps for 1 basic competence |  Introduction and Concept Maps of the learning process |
|  Stage 1 : Problems | Stage 1 *Problem Based Learning* (PBL). Form of problems presents for students to observe and explain hypotheses. |
|  Stage 2 : Learning | Stage 2 *Problem Based Learning* (PBL). Learning source that align with the materials that are taught in class. There is a session for student to ask questions. |
|  Stage 3 : Inquiry | Stage 3 *Problem Based Learning* (PBL). Simple inquiry activities related to the problems in stage 1 |
|  Stage 4 : Development of Result | Stage 4 *Problem Based Learning* (PBL). The form of presentation and development of results accompanied by answers to problems in the form of descriptions, simulations etc. |

| | |
|---|---|
|  <br>Stage 5 : Analysis and Evaluation Solution to problem | Stage 5 *Problem Based Learning* (PBL). Contains results of data processing and verification of whether or not the hypotheses is true. Answers are found in the analysis and evaluation. |

(Source: own source)

## 4. DATA ANALYSIS TECHNIQUE

The data or information that has been collected is selected and grouped according to the classification of work assessment and answering the questionnaire.

**1)** Instrument Validation of material experts, media, teachers and students

Authentic assessment of the given questionnaire refers to the benchmark values used on the basis of the assessment of the technical criteria of data analysis used in reference to the benchmark reference assessment and this conversion in the form of a scale. Assessment of conversions on a scale will determine the degree of validity of the tool. The scale is used as follows:

Table 4.1 Scale Assessment Instrument Research for material experts, media experts, learning experts, teachers and students

| No. | Answers | Score |
|---|---|---|
| 1. | Very good | 4 |
| 2. | Good | 3 |
| 3. | Enough | 2 |
| 4. | Not Good | 1 |

(Source: Sugiyono, 2013)

The data obtained then calculated the percentage of the score as follows:

$$Percentage\ Score = \frac{\sum Gained\ Score}{\sum Maximum\ Score} \times 100\%$$

The scores are obtained and measured by using the interpretation of the score for the likert scale, as follows:

Table 4.2 Interpretation of Likert Scale Scale

| Precentage | Interpretation |
|---|---|
| 0% - 25% | Very unfeasible |
| 26% - 50% | Unfeasible |
| 51% - 75% | Feasible |
| 76% - 100% | Very Feasible |

(Source: Sugiyono, 2013)

**2)** Science Process Skills Instrument

The science process skill instruments are measured using science process skill tests and science process skill sheets. Data obtained from the written test processed as follows:

**a. Score**

Each student's score is determined by counting the correct answers. Scoring method is based on the rights only method, which is the correct answers are scored one and wrong answers or items that are not answered are scored zero. Scoring is calculated using the following provisions (Munaf, 2001):

$$S = \Sigma R \qquad \text{..... eq. 1}$$

Score = number of correct answers

R = The correct student answers

**b. Calculating the mean**

To calculate the mean value of test scores both pretest and posttest, used the formula:

$$\overline{X} = \frac{\sum x_i}{n}$$ ..... eq. 2

$\overline{x}$ = average score or value of x; xi = scores or grades of students to i
$n$ = the number of students

**c. Determining the gain value**

Gain is the difference between the initial test score and the final test score. The gain value can be determined by the following formula:

$$G = S_f - S_i$$ .....eq. 3

$G$ = gain; $S_f$ = post test score; $S_i$ = pre test score

**d. Determine the normalized gain value**

Normalized gains are a comparison between the actual gain scores obtained by students with the maximum gain scores that are the highest gain scores that students might gain (Hake, 1997). To calculate the normalized gain value and classification it will be used equation as follows:

The normalized gains of each student (g) are defined as:

$$g = \frac{(\%S_f - \%S_i)}{(100 - \%S_i)}$$ …..... eq. 4

$g$ = the gain is normalized
$S_f$ = score post test
$S_i$ = score pre test

The normalized gain average (<g>) is formulated as follows:

$$< g > = \frac{(\% < S_f > - \% < S_i >)}{(100 - \% < S_i >)}$$ ..... eq. 5

($g$) = normalized gain average
($S_f$) = the average post test
($S_i$) = the average pre test

The obtained <g> values are then interpreted in accordance with Hake (1997) as in Table 5.3 below:

Table 4.3 Interpretation of Normalized Gain Values

| Normalized Gain | **Interpretation (Category)** |
|---|---|
| 0,00 <$g$ ≤ 0,30 | Low |
| 0,30 <$g$ ≤ 0,70 | Moderate |
| 0,70 <$g$ ≤1,00 | High |

(Source: Hake, 1997)

## 5. FINDING AND DISCUSSION

E-modules must be able to overcome the limitations of time, space, and sensory power for student and teacher or both of them (Widodo, 2008). It is used to improve and develop student's skills. The e-modul based on the problem based learning is able to improve the students ability especially the basic of science-level proven with the n-gain results is 0,6 which is in the moderate skills category.

E-module is an interactive learning material, where students not only read the text but also see the animation of a process resembling the actual process so as to facilitate students' understanding (Susilana, 2009). The e-module based on Problem Based Learning provides a diverse display of animation, simulations that students can run to facilitate students understanding of the materials presented.

The e--module material is divided into 3 sub chapters namely temperature and measurement, substances, heat and heat transfer. Each material is presented according to the stages of Problem Based Learning that includes:

problems, tasks of learning, investigation, development of results, and analysis and evaluation of problem solving.

Teaching materials presented on the e-module based on Problem Based Learning is equipped with video, animation, simulation and v-lab that support the material. Such e-modules can make students learn visually, even more with the interactive audio in the presentation. The developed e-module can provide motivation and passion for students to learn (Widodo, 2008).

This e-module comes with a question exercise consisting of 5 items. After being given practice questions, there are also questions for the formative tests. The formative test is presented in each sub chapter with the aim to measure the extent of student understanding and the development of the students' science process skills in each sub chapter. The questions presented require students to understand the concepts contained in each sub-chapter of the e-module. And in the last part there is a cognitive test of the science process skills. There's also a list of references to that was used in the development of this e-module. After this e-module is completed, product evaluation is performed. The evaluation aims to determine whether the e-module is feasible to use or not. Based on the material, media and the learning experts evaluation result, this e-module is interpreted as very good and feasible to use.

The research data can be used to analyze the quality of the developed physics e-module based on PBL. The data was obtained from the validation and field tests. The developed physics e-module based on PBL was validated by physics material experts, learning media experts and learning experts. The results of these assessments are used as a data to be analyze the developed e-module so that it becomes a viable product. Based on the validation results from media experts, materials experts and learning experts as well as the field tests on educators and students it can be stated that the developed e-module is feasible to be used in learning. The validation test sheet by the material expert contains 17 indicators that include the quality of the content and the language. The data obtained are as follows:

Table 5.1 Validation Test Results by Material Experts

| No. | Measured Aspects | Percentage | Interpretation |
|---|---|---|---|
| **1.** | Quality of content | 85.23% | Very good |
| **2.** | Language | 79.17% | Very good |
| | **Average of all aspects** | **82.20%** | Very good |

The histogram of e-module validation test results by physics material experts are as follows:

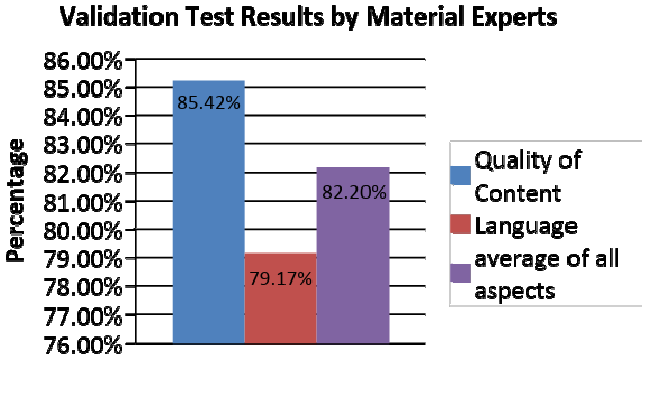



Figure 5.1 Histogram Test Results by Material Experts

From the graph of the validation result done by the physics experts, the average percentage of overall aspect achievement is 82.20%. based on Likert-scale interpretation, the figures show that the developed e-module in terms of quality of content, language and completeness of e-module is considered very feasible to be used as independent materials

Next is the assessment provided through a media expert validation test sheet. The validation test sheet by the media experts contains 21 items of statement from 4 aspects, namely content suitability, accuracy of E-module contents, E-module and Language Benefits. The data obtained from the media expert learning is as follows:

Table 5.2 E-module Validation Test Results by Media Experts

| No. | Measured Aspects | Percentage | Interpretation |
|---|---|---|---|
| 1. | content of e-module | 75.00% | Good |
| 2. | e-module accuracy | 75.00% | Good |
| 3. | language | 68.75% | Good |
| 4. | Interesting E-module | 87.50% | Very good |
| | Average of all aspects | 75.78% | Good |

The histogram of e-module validation test results by physics learning media experts shows that the developed e-module in terms of content conformity, e-module accuracy, linguistic and display design is considered very feasible to be used as a learning material independently.

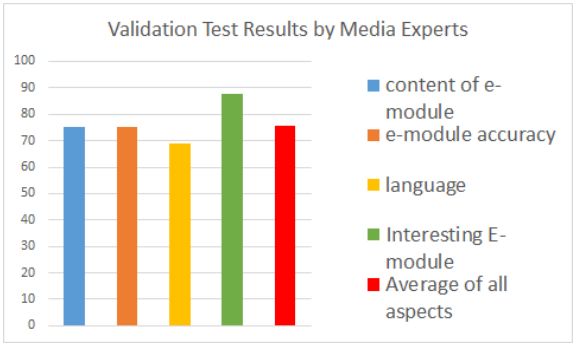



Figure 5.2 Histogram Test Results by Media Experts

The next assessment is provided through the learning experts validation test sheet. The validation test sheet by the learning expert contains 25 points of the five stages that are in accordance with the stages of Problem Based Learning (PBL), namely: organizing the problem, organizing the students to learn, assisting the experiment, developing and presenting the results and analyzing and evaluating the problem. The data obtained from the learning experts are as follows:

Table 5.3 E-module Validation Test Results by a Learning Expert

| No | Measured Stages | Percentage | Interpretation |
|---|---|---|---|
| 1. | Organizing students for problems | 95.31% | Very Good |
| 2. | Organize students to learn | 93.75% | Very Good |
| 3. | Help to experiments | 90.63% | Very Good |
| 4. | Develop and present results | 93.75% | Very Good |
| 5. | Evaluation and analysis of problem solving | 95.83% | Very Good |
| 6. | Compliance with Stages of Problem Based Learning | 96.88% | Very Good |
| | Average of all stages | 94.36% | Very Good |

The histogram of e-module validation test results by physics learning experts are as follows:

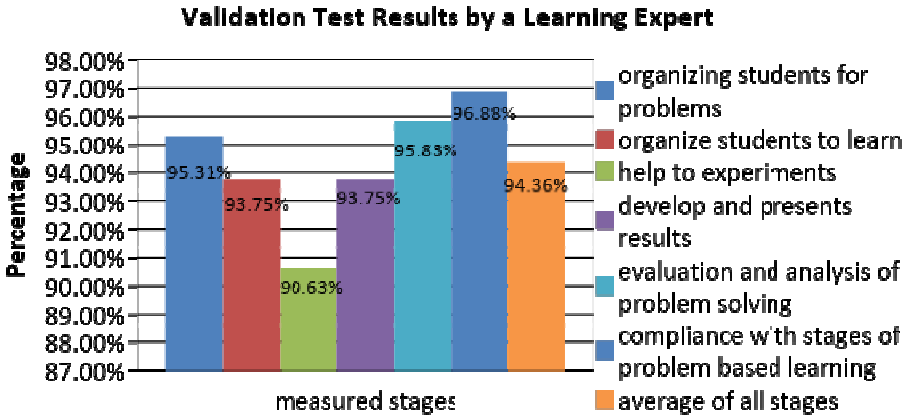



Figure 5.3 Histogram Validation Test Results by a Learning Expert

From the graph of validation result done by the physics learning expert, it is obtained the average percentage of overall achievement of 94.36%. Based on Likert-scale interpretation, the figures show that the developed e-module in terms of aspects covering the stages of organizing the problem, organizing students to learn, assisting in the investigation, developing and presenting the results, and analyzing and evaluating the problem are considered very feasible to be used as independent learning materials .

The results of the field test on the educators and students. The assessment is provided through experimental teacher test sheets and student questionnaires. The field test sheet contains 23 items from 4 indicators. The data obtained from educator experts are as follows:

Table 5.4 E-module Trial Results by Teachers

| No. | Measured stages | Percentage | Interpretation |
|---|---|---|---|
| **1.** | quality of content | 85.23% | Very Good |
| **2.** | language | 87.50% | Very Good |
| **3.** | accuracy of content | 85.00% | Very Good |
| **4.** | E-module view | 87.50% | Very Good |
| | Average of all stages | 86.31% | Very Good |

The histogram from the field trial results by teachers expert is as follows:

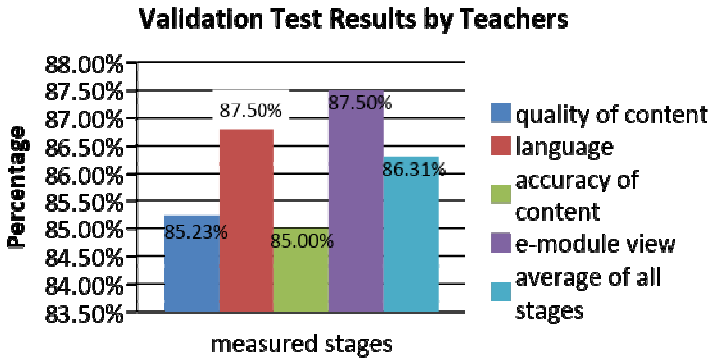



Figure 5.4 Histogram Test Results on Teachers

From the graph of the field test conducted to the teachers experts we obtained the average percentage of overall achievement of 86.31%. based on Likert-scale interpretation, the figures show that the developed e-module in terms of aspects including content quality, language aspect, content accuracy and display aspect are considered very feasible to be used as independent learning materials.

The next assessment is given through a test sheet for students in the form of questionnaires. The field test sheet contains 20 items from 4 indicators. The data obtained from expert students for large group trials are as follows:

Table 5.5 Results of E-module Trial by Students

| No. | Measured Aspects | Percentage | Interpretation |
|---|---|---|---|
| **1.** | Content of E-module | 86.61% | Very good |
| **2.** | E-module presentation | 84.07% | Very good |
| **3.** | E-module completeness | 87.42% | Very good |
| **4.** | Language | 64.92% | good |
| | Average of all stages | 80.78% | Very good |

The histogram of the field trial results of the students are as follows:

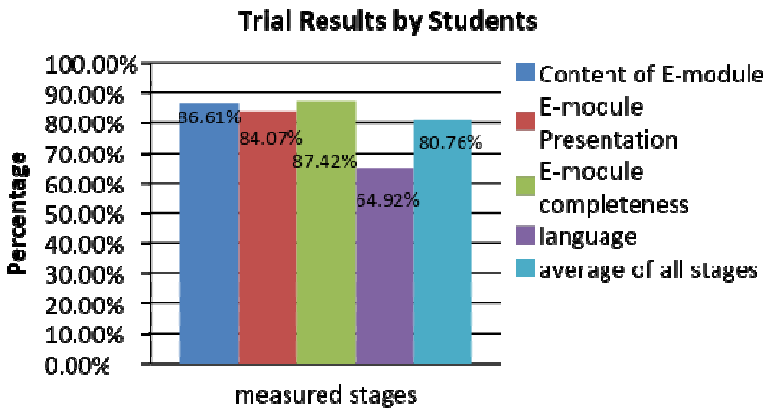



Figure 5.5 Histogram Results of Trial against Students

From the graph of field test results to high school students obtained average percentage achievement of 80.78%. Based on Likert-scale interpretation, the figures show that the developed e-module is viewed from aspects including quality of e-module content, presentation technique, e-module completeness are considered very good to be used as a learning material independently even if the language aspects are only considered good.

E-module effectiveness test aims to see the effectiveness of the use of the developed e-module in improving the ability of students' science process skills. The effectiveness test is measured with student learning outcomes of 31 students through the pre test and the post test. The pre test is given to the students in the form of multiple choice questions of 24 questions before the start of learning. While the post test is given in the form of the same problem with the pre test and is done after the student used e-module based on Problem Based Learning during the learning process.

The instrument used has been through the process of validity and reliability test. The highest pre test score is 62.50, the lowest is 20.83, and the average score is 40.19. While the highest post test score is 91.67, the lowest is 58.33, and the average is 75.81. Overall seems to be increasing. The following comparison of pre test and post test results.

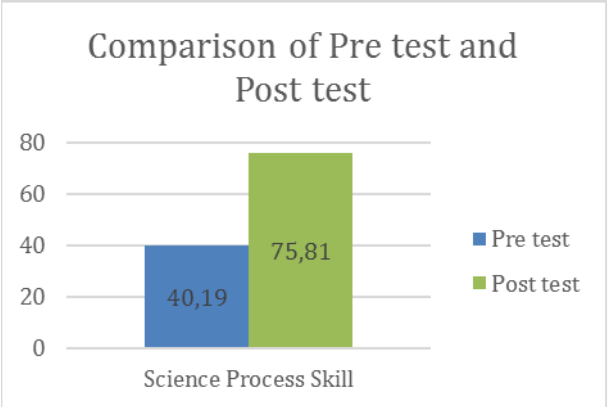



Figure 5.6 Histogram Comparison of Pre test and Post test

Based on the calculation of the n-gain test shows that the magnitude of the increase before and after the students learn with the developed e-module get the results of 0.6 with a moderate interpretation.

## CONCLUSION

The research was limited on heat and temperature subject in order to improve students' science process skill. The research was conducted at grade XI-Science of Islamic High School, Cipasung, Singaparna, West Java, Indonesia, in 3rd Semester, 2017. Based on the results of research that has been done, it can be concluded that the E-module based on Problem Based Learning (PBL) on the subject of heat and temperature is feasible to improve students' science process skill for high school students. This is based on feasibility test by material experts, media experts, learning experts and physics teachers. The scores obtained from material experts is 82.20%, from media experts is 75.78% and from learning experts is 94.36% while the results of the field test by the educators and the students obtained a percentage of 86.31% and 80.78%. The calculation of the n-gain test

shows that the magnitude of the increase before and after students' learning. The students who learn with the developed e-module get the ascension results of 0.6 with a moderate category.

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# Effectiveness of Learning Method Contextual Teaching Learning (CTL) for Increasing Learning Outcomes of Entrepreneurship Education

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## ABSTRACT
Entrepreneur is a process or a way to conduct a business that aims to obtain the expected results or profits by producing, selling or renting a product of goods or services. In college, entrepreneurship courses are given to equip the students so that after they graduate they can entrepreneurship. Entrepreneurship courses are still not effective because the learning process that took place is not optimal. This is because the method of learning used by lecturers is just a lecture. One of the learning models that can be used to achieve these three competencies is the Contextual Teaching Learning model. If someone has done the act of learning it will be seen a change in one or several aspects of the behavior. What is meant is the result of entrepreneurship learning is a manifestation of the ability achieved, controlled or owned by the individual in this case the student after receiving an entrepreneurial learning experience and the results can be knowledge, understanding and application of concepts, calculation of problem solving based on the subject.

## INTRODUCTION
Entrepreneur is a process or a way to conduct a business that aims to obtain the expected results or profits by producing, selling or renting a product of goods or services. While entrepreneurship is the creative and innovative ability that is used as the basis, tips, and resources to find opportunities for success. Something new and different is the added value of goods and services that become a source of excellence to be an opportunity. In Indonesia, entrepreneurship is only limited to certain schools or colleges. In line with developments and challenges such as economic crises, entrepreneurial understanding through both formal education and training in all walks of entrepreneurial society is evolving.

In college, entrepreneurship courses are given to equip the students so that after they graduate they can entrepreneurship. Entrepreneurship courses are still not effective because the learning process that took place is not optimal. This is because the method of learning used by lecturers is just a lecture. Learning is defined as the process of student interaction with lecturers, and learning resources, in a learning environment. Learning is a process of behavioral change from the results of an activity that is done repeatedly. In learning, students learn the material provided. Education is closely related to learning. If learning is modeled as a process, then education is an effort to achieve the process. Learning is not limited to the intellectual or cognitive aspect alone, but is the process of attitude formation or affective and behavioral or psychomotor, thus impacting the development of self, which is useful for self, society, nation and State. One of the learning models that can be used to achieve these three competencies is the Contextual Teaching Learning model. CTL is a holistic learning process that aims to educate learners in comprehending learning materials meaningfully related to real life context, whether related to personal, religious, social, economic, and cultural environment. So that learners acquire knowledge and skills that can be applied and transferred from one context to one problem to another.

### A. Enterpreneurship in College
The notion of the entrepreneur is often equated with entrepreneurship, as is the use of the term self-employment with entrepreneurs. Entrepreneurship is a key driver of our economy. Wealth and a majority of jobs are created by small businesses started by entrepreneurially minded individuals, many of whom go on to create large enterprises (Celuch, 2017). The terms Entrepreneurs and entrepreneurs are basically the same, although the formulation is different but the content and characteristics are the same. Entrepreneurs focus more on the object, there is an independent business while the entrepreneur is more emphasis on the soul, the spirit is then applied in all aspects of life. Entrepreneurship is a dynamic process of creating added value for goods and services and prosperity. The entrepreneur is an innovator who implements changes in the market through new combinations. The new combinations can be in the form of: (1) introducing new products, (2) introducing new production methods, (3) opening new markets, (4) obtaining new supply sources of new materials or components; and (5)

running a new organization in an industry. Still according to Schumpeter, entrepreneurship does not necessarily mean a view or a manager but a unique person who has the courage to take risks and introduce innovative products and new technologies into the economy and few entrepreneurs can feel the potential for new discoveries and then make use of them.

Entrepreneurship and enterprise skills are crucial to the future of world economies, especially as an agency to innovate and support the wealth creation process (Zheng & Callghan, 2016). So entrepreneurship is a process of creating something different by devoting all of its time and energy to be accompanied by financial, psychological, social, and receiving financial rewards in the form of money and personal satisfaction. In entrepreneurship the ability to create something new and different through creative thinking and innovative action to create opportunities in facing life's challenges. In essence entrepreneurship is the nature, characteristics, and character of someone who has the will to realize innovative ideas into the real world creatively. The application of creativity and innovation to solve problems and efforts to take advantage of the opportunities faced every day and is a combination of creativity, innovation and risk-taking courage, is done with hard work to form and nurture new ventures (Zimmerer, 1996). On the other hand, Identifying the factors influencing entrepreneurship is a key issue for policy makers in order to design effective self-employment policies and entrepreneurship initiatives. However, fear of failure and unwillingness to take risks were seen as the major obstacles facing university students in embarking on an entrepreneurial path (Ibrahim, et all. 2017).

From some of these statements it can be concluded that entrepreneurship is a process of creation by adding the value of something achieved through hard effort and timing with estimates of supporting, physical, social risk, and will receive rewards in the form of financial and personal satisfaction and independence. Entrepreneurship is not always synonymous with the behavior and character of the entrepreneur, because this nature is also owned by those who are not entrepreneurial entrepreneurs cover all aspects of the work. Entrepreneurs are those who make creative and innovative efforts by developing ideas and gathering resources to find opportunities. Entrepreneur is someone who organizes, operates and calculates risk for a profit-making business. There are seven essential elements of entrepreneurship, namely:

1. Entrepreneurship is the value embodied in a behavior that is used as a resource, driving force, goals, tactics, tips, processes and business results
2. Entrepreneurship is the ability to create something new and different.
3. Entrepreneurship is the process of applying creativity and innovation in solving problems and finding opportunities to improve life or business
4. Entrepreneurship is the value needed to start and grow a business
5. Entrepreneurship is the process of doing something new and useful and worth more
6. Entrepreneurship is an effort to create added value by combining resources through new and different ways to win the competition. The added value can be created by developing technology and science, producing goods and services more efficiently, improving existing products and services, and finding ways to provide satisfaction to consumers.

Enterpreneurs need leadership skills, while training and development of them and their employees around effective participation in decision making, communication of vision and goals and support for personal initiative is critical. The connection between experience, learning and enterpreneurial effectiveness has implications for the development of individuals and possibly teams of enterpreneurs (Barrett and Mayson, 2008).

Entrepreneurship is the dynamic process of creating additional wealth. Wealth is created by individuals who dare to take risks on terms of fairness, time or career commitment or the provision of value for various goods and services. The products and services may not be new or unique, but they must be highlighted by utilizing skills and resources. Entrepreneurship is a key competency to be developed from an early age. As attitudes and cultural references take shape at an early age, education can play an important part in successfully addressing entrepreneurial challenges. Therefore education should develop awareness of intrepreneurship from an early age. Introduce young people to develop entrepreneurial spirit and help them to be more creative and confident in whatever they do and act in socially responsible ways. Adaptive learning permits an organization to maintain its currently policies and act consistently with them; generative learning involves examination of an organization’s assumption and modification of the underlying norms, policies and objectives (Li, 2016). A wide provision of entrepreneurial courses requires a full consideration of the intrinsic learners’ needs, the perceived‘ targets’ and goals of educational agencies, the promoted theoretical background of the relevant courses, appropriate teaching models and other aspects in order to attain impact on trainees (Kakouris & Georgiadis, 2016).

The school curriculum should be revised to explicitly include entrepreneurship as an educational objective. Schools should also be provided with practical support and incentives to enter entrepreneurship in their curriculum through different instruments. Entrepreneurship educators must practice what they preach in the effort to drive change and improve educational outcomes (McGuigan, 2016). A corporate entrepreneurship perspective is used to construct a framework for understanding academic entrepreneurship at different ontological levels within a university context (Brennan & McGowan, 2006). While in college, entrepreneurship should be included in a variety of subjects, especially in scientific and technical studies, in order to provide students with specialized training on how to start and run a business. Support for teachers is also important, that teachers will be given initial training as well as practical experience. Awareness must also be enhanced between the principal to run, and evaluate the activities. Educational institutions and local communities, especially businesses must work together on the subject of entrepreneurship, and companies should regard this as a long-term investment and as an aspect of their social responsibility.

It is necessary to bring vocational education in line with the state's requirements in terms of its content and quality, which is connected with the development of mechanisms for forecasting the needs of the economy and the social sphere in specialists and workers, identification of trends in the development of the system with respect to the list of professions and specialties, as well as modernization of the content of education (Markova, et all. 2017). The most essential is to enhance the educational level of individuals with disabilities in order to actively involve them into work and enhance their competitiveness in the labour market (Movkebayeva. Et all. 2017). One of the most effective ways of promoting entrepreneurial thinking and skills is through learning by doing (students make and run mini companies). This can trigger students to create their own company after their study. Community programs, economic development initiatives, universities, community colleges and private industry are offering a variety of entrepreneurship educational training courses to address employment issues and build local economies. Entrepreneurship training and education is delivered in many shapes and sizes as well as delivered by many entities both private and public (Kerrick, et all. 2016).

Exposing college students to entrepreneurship, if only through an awareness of entrepreneurship around them, are an important building block to their careers and society as a whole. As such, college is arguably a viable place to plant the seed of entrepreneurial intentions and to see if any have taken root (Claire, 2016). In other words, since students learn about entrepreneurship and themselves, entrepreneurship education leads to more variance in entrepreneurial intentions (higher and lower scores) (Ewijk & Al Aomar, 2016). While designing the education program for entrepreneurs, the following points should be kept in mind- Student specific requirements should be understood; the teaching should be more specific to student requirements; didactic methods such as lectures, readings, text books and seminar should be used for providing new information; active case studies, group discussions, brainstorming etc. should be used for skills building; problem solving in real-world situation, consultancy with small firms should be taken to provide hands-on experience (Mani, 2015).

The predominant indicators of the entrepreneurial university over the last three decades have been based on more easily avalilable quantitative indicators which capture the way in which universities push or sell what they already do; the incentives they create, the ways in which they organize themselves, and the outputs they produce in the form of patents, licenses, and spin-outs (Walshok & Shapiro, 2014). Key elements of the university ecosystem facilitating entrepreneurship include: (1) the rise of property-based institutions, such as incubators/accelerators and science/technology/research parks, to support technology transfer and entrepreneurship (2) substantial growth in the number of entrepreneurship courses and programs on campus (in multiple colleges/schools), (3) the establishment and growth of entrepreneurship centres, (4) a rise in the number of “surrogate” entrepreneurs on campus to stimulate commercialization and start-up creation, and (5) a rapid increase in alumni support of various aspects of this entrepreneurial ecosystem, including alumni commercialization funds and student business plan competitions (Siegel & Wright, 2015).

In line with this global discourse, university teachers are encouraged to be ‘entrepreneurial’, told that research can and should be commercialized, that patenting is important, that it is a good thing to start businesses, but also to develop entrepreneurial approaches to teaching and to cooperation with society and organizations outside of academia (Faltholm, et all. 2010). Regarding acedemy, entrepreneurship as an important educational innovation and discipline toward growing demand from seasoned business people interested in attaining skills to help them further expand their business. Considering public policy, education is one the most important factors influencing the entrepreneurial sector (Szopa, et.all. 2015). However, in addition to entrepreneurship, students also need to be equipped with marketing skills. The first step to do in equipping students about entrepreneurship include:

1. Students are taught to know their own weaknesses and strengths. Previously they were invited to get to know each other and tell each business interest.

2. Students are invited to further explore the ins and outs of business planning. Students should be divided into groups and asked to explain their business ideas. Then the business idea is analyzed by using SWOT analysis.
3. Students are trained to calculate the budget of the business idea submitted in the previous day. At the end of the future is expected to emerge creative entrepreneurs and independent
4. Students are trained to plan and conduct a simple market assessment to find out customer needs and wants. Also to know the advantages and weaknesses of competitors. It is important to know if later plunge in marketing efforts to perform marketing strategies in improving the quality of service to customers. One goal is to let students know the 4P marketing plan, ie product, price, place and promotion.

**B. Contextual Teaching Learning Method**

According to Sanjaya Contextual Teaching and Learning (CTL) is a learning strategy that emphasizes the full process of student involvement in order to find the material learned and relate it to real life situations that encourage students to apply it in their lives. CTL is a grassroots initiative that has emerged from teachers' efforts to build upon situated-cognition research and integrate into one approach a number of validated strategies that are too often employed independently of one another (Glynn, 2004). Contextual learning is a learning concept whereby teachers present real-world situations into the classroom and encourage students to make connections between their knowledge and application in their lives as family and community members. The meaning and knowledge carried by an individual are therefore, outcome of one's own experiences. Without experiences the individual is empty (Sylker & Kiyoshi, 2014).

Learning outcomes are expected to be more meaningful for children to solve problems, critical thinking and conducting observations and drawing conclusions in their long-term lives. In that context, students need to understand what learning means, what are the benefits, in what status they are and how to achieve them. CTL motivates learners to take charge of their own learning and to make connection between knowledge and its applications to the various contexts of their lives : as family members, as citizen, and as workers (Sears, 2003). Contextual is just a learning strategy. As with other learning strategies, the contextual is developed with the aim that learning goes more productive and meaningful. The contextual approach can be run without having to change the curriculum and the existing order by involving the seven main components of effective learning: Constructivism, Questioning, Inquiri, Learning Community, Modeling, and Authentic Assessment.

CTL learning strategy is an educational process that aims to help students see meaning in the academic material they learn by connecting academic subjects with the contents of daily life, that is with the context of personal, social and cultural life. Contextual learning as a model of learning that provides facilities for student learning activities to find, process and find learning experiences that are more concrete (related to real life) through the involvement of student activities in trying, doing and experiencing themselves. Incorporating the principals of contextual teaching helps to promote authentic learning and increases students' success by allowing them to make connections as they construct knowledge (Hudson & Whisler, 2001). Contextual teaching and learning represents a concept that involves connecting the content, the student's learning, with the context in which the content will be used (Putnam & Leach, 2005).

Learning is not only seen from the product side, but the most important is the process. This concept of learning can help teachers in relating between the material taught to the students' real-world situations and encouraging students to make connections between the knowledge they possess and their daily lives in which they live. To reinforce an applicative learning experience for students, learning needs to provide opportunities for students to do, try and experience themselves and not just as passive listeners who only receive all the information conveyed by the teacher. Students who acquire CTL learning will find it easier to understand events or activities after receiving information from teachers. In addition, students will be able to solve the problems that exist in his life. Five elements that must be considered in contextual learning is learning must pay attention to knowledge, learning starts from the whole, learning must be emphasized on understanding, learning is emphasized on effort practice, reflection on learning strategy and development.

CTL is a learning concept that helps teachers connect between the material taught to the real-world situations of learners and encourages learners to make connections between their knowledge and application in their daily lives, involving the seven main components of learning the main effective learning, that is Construktivism, Questioning, Inquiry, Learning Community, Modeling and Authentic Assessment. CTL strategy is an educational process that aims to help students see meaning in the academic material they learn by connecting academic subjects in the context of their daily lives, with the context of their personal, social and cultural circumstances. To achieve this goal, the system includes the following eight components: making meaningful connections, doing meaningful work, doing self-regulated learning, collaborating, critical and creative thinking,

helping individuals to grow and develop, attaining high standards, and using authentic scoring. There are seven strategies in carrying out in implementing CTL learning, that is:

a. Problem-based Teaching. The educator raises the problem of the learner challenged to think critically in solving the problem. This problem will bring personal and social meaning to the students.
b. Using diverse contexts. Educators make various contexts (school, family, community and so on) so that meaning (knowledge) is more qualified.
c. Consider student diversity. Educators nurture individuals and believe that individual and social differences should be used as a driving force for mutual respect and tolerance for the realization of interperonal skills.
d. Empowering students to learn on their own. Every human being is a lifelong active learner. Formal education is a crater candradimuka for learners to master the way of learning in order to learn independently in the future. For that they must be trained to think critically and creatively in searching and analyzing information with a little help or in an independent way.
e. Learning through collaboration. Learners get accustomed to learn from each other and from groups to share knowledge and determine the focus of learning.
f. Use authentic scoring. Authentic assessment shows that learning has taken place in an integrated and contextual manner, and provides an opportunity for learners to move forward in accordance with their potential.
g. Pursuing high standards. Schools determine graduation competencies from time to time are continuously improved.

The purpose of contextual learning is to equip students in the form of knowledge and skills are more relistis because the core of this learning is to bring things theoretical to practical. So that in the implementation of this method is cultivated theory that is learned applied in real situation. For lecturers this method helps lecturers to connect the material taught to the real world and encourage students to make connections between prior knowledge and its application in their life in society. In this context learners understand what learning means, what the benefits are in what status they are in, and how to achieve them. They realize that what they learn is useful for their later life. Thus they position themselves as needing a provision for their future life. They learn what is beneficial to him and strive to achieve it. In that effort, they need teachers as directors and mentors. CTL is much influenced by the constructivism philosophy developed by Jean Piaget. Piaget argues that since childhood the child already has a cognitive structure called a scheme formed by experience. In a contextual classroom, the teacher's job is to guide learners to achieve their goals. Teachers deal more with methods than to inform. Contextual only as a method of learning. As with other learning methods, contextual is developed with the aim that learning goes more productive and meaningful. Contextual approach can be implemented without having to change the curriculum and the existing order. CTL as a learning strategy has 7 principles. These principles underlie the implementation of the learning process by using CTL which should be developed by lecturers, that is :

1. Constructivism. Constructivism is the cornerstone of thought (philosophy) in CTL, namely that knowledge is built by humans little by little that the results are expanded through a limited context. Knowledge is not a set of facts, concepts or rules that are ready to be taken and remembered. Man must build that knowledge through meaningful experience. The above constructivism limits emphasize that the concept is not unimportant as an integral part of the learning experience that students should have, but how each of the concepts or knowledge that students have can provide real guidance for students to be actualized in real conditions. Therefore, in CTL, a strategy to connect students between each concept and reality is the preferred element compared with the emphasis on how much knowledge should be remembered by the students. The results of the study found that the fulfillment of theoretical satisfaction ability had a positive impact on the short term, but do not make a good enough contribution in the long run. The hapless theoretical knowledge is easily separated from one's memories if not supplemented by real experience. The implications for lecturers in developing this constructivism stage are mainly demanded the ability to membingbing students get the meaning of each concept he learned. Learning will be felt to have meaning if directly or indirectly related to the daily experience experienced by the students themselves. Therefore, each lecturer must have a sufficiently broad knowledge, so that with his insights he always easily provide illustrations, using learning resources, and learning media that can stimulate students to actively seek and do as well as find themselves the link between the concepts learned with experience. In this way, the student learning experience will facilitate the student's ability to transform other problem-solving problems, even in different spaces and times.
2. Inquiry. Discovering, is a core activity of CTL, through discovering efforts will provide assertion that the necessary knowledge and skills and other abilities are not the result of remembering a set of facts, but are the result of finding out for themselves. Learning styles that lead to discovery, have long been introduced in the

study of inquiry and discovery. Of course the finding element of both learning (CTL and inquiry and discovery) in principle is not much difference, essentially the same, that is the model or learning system that helps students both individually and in groups learn to find themselves according to their respective experience. emotional satisfaction, something results finds itself a higher value of satisfaction than the results of giving. Moving from that simple logic seems to have a close relationship when associated with a learning approach. Where learning outcomes are the outcomes and student credentials themselves, will be more durable remembered by the students when compared with the fullest of the lecturers. To grow the students' habits creatively in order to find their own learning experience, it implies the strategy developed by lecturers.

3. Questioning. Another element that is the main characteristic of CTL is the ability and habit to ask. Therefore, asking is a key strategy in CTL. The application of unsure elements in CTL should be facilitated by lecturers, students' habits to inquire or the ability of lecturers to use good questions will lead to improved quality and productivity of learning. As in the previous stages, the development of the ability and the desire to ask, is strongly influenced by the learning atmosphere developed by lecturers. In the implementation of CTL, questions raised by lecturers or students should be used as a tool or approach to explore information or learning resources that are related to real life. In other words, the task for the lecturer is to guide the student through the questions asked to look for and find the link between concepts learned in terms of real life. Through the application of questions, learning will be more lively, will encourage the process and results of learning more extensive and deep, and will be found many related elements that previously not thought either by lecturers or by students. Therefore, it is reasonable to ask the development of learning productivity will be higher because by asking, then; 1) Can explore information, both administration and academic; 2) Check students' understanding; 3) Generating student responses; 4) Knowing the extent of student curiosity; 5) Knowing what the students know; 6) Focusing students' attention; 7) Generating more questions from students; and 8) Refreshing the knowledge that students already have.
4. Learning Community. The purpose of the learning community is to familiarize students to work together and utilize learning resources from their friends. As suggested in the learning community, the learning outcomes are derived from cooperation with others through various experiences. Through this sharing children are accustomed to give each other and receive, the nature of positive dependence in learning community developed. Humans are created as individual beings as well as social beings. This implies that there are times when a person works alone to achieve the expected goals, but on the other hand can not escape dependence with other parties. Implementation of learning community in classroom learning will depend much on the model of learning communication developed by lecturers. Where required skills and professionalism of lecturers to develop the communication of many directions (interaction), ie communication model that is not only the relationship between lecturers with students or vice versa, but widely opened the path of communication communication between students and other students. learning in CTL is highly possible and widely open utilizing other learning communities outside the classroom. Each student should be guided and directed to develop his curiosity through the widespread use of learning resources that are not only partitioned by the learning community in the classroom, but other human resources outside the classroom (family and community). When we and students are accustomed to provide a broad experience to others, then at that time we or the students will gain more experience from other communities
5. Modeling. The development of science and technology, the complexity of life problems encountered and the growing demands of students and diverse, has impacted the ability of lecturers who have complete ability, and this is difficult to meet. Therefore, now lecturers are no longer the only source of learning for students, because with all the advantages and limitations possessed by lecturers will experience barriers to provide services in accordance with the wishes and needs of students who are quite heterogeneous. Therefore, the modeling stage can be used as an alternative to develop the learning so that students can meet the students' expectations thoroughly, and help overcome the limitations possessed by the lecturers.
6. Reflection. Reflection is a way of thinking about what has just happened or just been learned. In other words, reflection is the backward thinking about what has been done in the past, the student precipitates what he or she just learned as a new knowledge structure that is an enrichment or revision of previous knowledge. At the time of reflection, students are given the opportunity to digest, weigh, compare, live, and conduct discussion with itself (learning to be). A meaningful knowledge is obtained from a meaningful process also, that is acceptance, processing and precipitation, made a sandar in response to later symptoms. through learning the CTL model, the learning experience is not just happening and belongs when a student is in the classroom, but far more important than that is how to bring the learning experience out of the class, that is when he is required to respond and solve real problems faced day-to- day. The ability to apply knowledge, attitudes, and skills to the real world it faces will be easily actualized when the learning experience has been internalized in each student's soul and this is where the importance of applying elements of reflection to every learning opportunity.
7. Authentic assessment. The last stage of contextual learning is to conduct an assessment. Assessment as an integral part of learning has a very decisive function to obtain information on process quality and learning

outcomes through the application of CTL. Assessment is the process of collecting various data and information that can provide an overview or clue to the learning experience of students. With the accumulation of various complete information data as the embodiment of the appraisal, it will be more accurate also the lecturer's understanding of the process and the results of each student's learning experience. The lecturer will carefully know the progress, setbacks and difficulties of students in learning, and with it also the lecturer will has the ease to make efforts to improve and refine the process of tutoring in the next step. Given the picture of the student's learning progress required elaborate learning process, then the assessment is not only done at the end of the learning program, but integrally done during the process of the learning program occurs. In this way, the lecturer will obviously know the actual level of student ability.

**C. Learning Outcomes**

Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning (Kennedy, et all. 2005). Learning is one of the factors that influence and play an important role in the formation of personal and individual behavior. Most of the individual development takes place through learning activities. The importance and value of general education courses, including the requirements in the development of students learning according to essential learning outcomes, have been the reasons for implementation in several researches and development in general education courses for many years until the present time (Kleebbua & Siriparp, 2016). Rusman says that learning is an activity that can be done psychologically and physiologically. Activities that are psychological activities that are mental processes, such as activity thinking, expressing, understanding, concluding, listening, reviewing, comparing, differentiating, analyzing and so forth. While activities that are physiological activities that are the process of application or practice, such as conducting experiments or experiments, exercises, practice activities, create works, appreciation and more.

Learning according to Hamalik is a modification or reinforcing behavior through experience. According to this understanding, learning is a process, an activity and not a result or a goal. Learning is not just remembering, but more broadly than that, that is experiencing. Learning outcomes are not a mastery of training outcomes but behavior change. Learning according to Munir is a process of behavior change, due to individual interaction with the environment. So behavior change is the result of learning. That is, someone is said to have learned if he can do something that can not be done before. The behavior is doing aspects of knowledge cognitive), attitude (affective) and skills (psychomotor). Therefore, a good of learning outcomes requires onsiderable understanding of how to best relate the course content to our types of students and how to make the course meaningful to our student needs and life experiences (Aziz, et all. 2012).

A learning outcome is a description of what a student should know after fulfilling a given course. That is what the student should know, understand and be able to demonstrate on completing the course (Klefstad, 2010). Learning outcomes are important for recognition. Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning (Kennedy, 2012). Learning outcomes are some of the results achieved by students after experiencing the learning process. Learning process activities in schools aimed to obtain good learning outcomes. The result of learning according to Rusmono is the change of individual behavior which includes three domains that differ from each other, but has a close relationship that is: 1). Learning outcomes are included in the cognitive domain, ie learning outcomes related to intellectual development and intellectual thinking skills; 2). Learning outcomes included in the affective domain, ie learning outcomes that reflect changes in interests, attitudes and values found in students; 3) learning outcomes that are included in the psychomotor domain, namely learning outcomes related to the skills of students in carrying out activities. The academic performances have been measured using the number of credits, got every year, using the tests given at a course, and the results of a progress test. The analyses of multiple regression showed that the analysed learning activities, performance obtained during the first and second year, the courses attended during high school time , conscientiousness and verbal inteligence have been strongly and steadily connected with the academic performance (Lile & Bran, 2014).

Learning outcomes can be used as a benchmark or reference to know the high level of a person's learning ability, which is intended in the form of behavior change in a person as a result of his experience. From some opinions above can be concluded that the results of learning is the ability of skills, attitudes and skills obtained by students after receiving treatment provided by the teacher so that it can construct knowledge in everyday life. While specific applications are selected from across the range of facilities that learning platforms provide by some students, there are also students who move across and between different affordances and applications to support and enhance their learning experiences and learning outcomes (Passey & Higgins, 2014). A positive consequence of focus on learning outcomes may also be that it naturally calls for an increased focus on the underlying pedagogical approach and the philosophy of learning (Nygaard, et all. 2009). Achieving learning

outcomes need specific experiences to be provided to the students and evaluation of their attainment. Student assessment provides an indication of the areas where learning has happened and where it has to be improved upon (Aithal & Kumar, 2016).

These behavioral changes are obtained after students complete their learning program through interaction with various learning sources and learning environment. The learning outcomes measured in this study are emphasized in the cognitive domain especially about intellectual ability or cognitive ability. Learning outcomes require certain competencies that a teacher must possess. One of these competencies is the ability to evaluate every learning process. Competence is run straight with the tasks and responsibilities in learning, including learning process and learning outcomes. Effective program and course design relies on the establishment of learning outcomes that guide curriculum development and assessment and facilitate student success (Norris, 2016). Learning outcomes reinforce the belief that there is a real point to what is being taught and assessed, that there is a reason for what they experience in their courses. Students are less likely to become cynical and dismissive of courses that seem to have a point, and more motivated to take them seriously (Potter & Kustra, 2012). Learning activities are a process, while learning outcomes are some of the results achieved by students after experiencing the learning process. Learning outcomes are obtained by firstly evaluating the learning process that has been done. The results of entrepreneurial learning is strongly influenced by the teaching and learning process undertaken.

Learning outcomes are some of the results achieved by students after experiencing the learning process. Student learning process activities aimed at obtaining good learning outcomes. Student learning outcomes can be observed through changes in behavior, attitudes and knowledge. A person can be said to have succeeded in learning if he is able to show a change in him. Such changes include in terms of ability to think, skill, or attitude toward an object. Although there may be a direct relationship between meaningfulness and learning, the uniqueness of reality and peoples' idiosyncratic tendencies makes this relationship complex and challenging to predict. This difficulty is especially evident when trying to capture or predict what students learn (Marsh, 2007). Learning outcomes require certain competencies that a teacher must possess. One such competence is the ability to evaluate every learning process. The competence goes straight with the duties and responsibilities of teachers in learning including learning process and learning outcomes. Learning activities are a process, while learning outcomes are some of the results achieved by students after experiencing the learning process. Learning outcomes are obtained by firstly evaluating the learning process that has been done.

The result of learning according to Rusman is a number of experiences obtained by students that includes the realm of cognitive, affective and psychomotor domains. Learning is not only the mastery of the subject theory concepts, but also the mastery of habits, pleasures, interests-talents, social adjustments, skills, ideals, desires and expectations. This is in line with Hamalik's opinion that the results of learning can be seen from the change of perception and behavior, including the improvement of the behavior of the learners, for example from not knowing to know, from not understanding to understand. If someone has done the act of learning it will be seen a change in one or several aspects of the behavior. What is meant is the result of entrepreneurship learning is a manifestation of the ability achieved, controlled or owned by the individual in this case the student after receiving an entrepreneurial learning experience and the results can be knowledge, understanding and application of concepts, calculation of problem solving based on the subject.

**D. Enhancement of Learning Quality Entrepreneurship Course using Contextual Teaching Learning Method**

The CTL learning strategy invites students to think critically, so that students really feel that the entrepreneurial learning experience has a positive and useful impact on their lives, therefore learning outcomes will differ between the application of CTL and conventional learning strategies. The CTL learning strategy enables the creation of a conducive learning environment for students to learn to work actively in groups, giving more opportunities for students to be actively involved in the construction process of knowledge, skills, attitudes in groups, achievement awards for individuals and groups, and level of student ability more controlled. Learning by CTL method is based on cognitive theory because according to this theory interaction can support learning. Learning using conventional strategy emphasizes more on the development of learning ability to receive (reception learning).

The CTL learning strategy provides students with the motivation to understand the meaning of the subject matter with the context of their daily life in the context of their personal, social and cultural life. This social learning strategy allows students to have the knowledge / skills flexibly applicable from one problem to another. In contrast to conventional learning strategies that only receive direct lessons taught lecturers. CTL learning strategies have the characteristics of learning to cooperate with fellow students during the learning

process. In contrast to conventional learning strategy, students only accept, record and memorize lessons given by lecturers so that no cooperation can foster a sense of togetherness among students. Based on the conceptual and entrepreneurial learning objectives as described above, students using CTL learning strategies can be expected to achieve higher entrepreneurship learning outcomes than students taught using conventional learning strategies.

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# From Teacher Oriented to Student Centered Learning, Developing an ICT Supported Learning Approach at the Eduardo Mondlane University, Mozambique

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**ABSTRACT**
Eduardo Mondlane University (UEM) is in the process of modernizing its teaching and learning approaches. As one of the pedagogical reform projects, student-centred learning (SCL) in combination with web 2.0 tools was introduced as a pilot in the course 'ICT in Environmental Education' in the Faculty of Education. This study explored - using action research strategy - to what extent the new pedagogical approach contributed to students' competency development. Twenty-nine students were involved in the course, eight semi-structured interviews with students were combined with sixteen classroom observations and 8 weeks how students used the Learning Management System (LMS) and web 2.0 tools. Results showed that collaborative E-learning supported the development of students' information management and problem solving skills as well as their metacognitive strategies for self-regulated learning. ICT supported problem based learning contributed to an increased intrinsic motivation. However, not all students were ready to adopt an active role. At the start they looked upon teaching as a one-way knowledge transfer. This study recommends that E-learning initiatives in Mozambique should always go together with an ICT literacy course and training in 21st-century learning skills.

**KEYWORDS:** Student-centred learning, generic competencies, web 2.0 tools, E-learning.

## INTRODUCTION

ICT is changing the way people process, access and distribute information. Technological skills are among the key qualities employers seek (Moeller & Reitzes, 2011; Young & Chapman, 2010). Higher education institutions are adapting themselves to employers' demands to deliver 'technology savvy' students. They incorporate ICT in their programs in order to prepare students for their working life (Moeller & Reitzes, 2011). Hayes *et al.* (2001) described how ICT can also transform pedagogy. In terms of educational philosophy, ICT can facilitate a shift in students' learning approach: from reproducing knowledge conveyed by others to constructing knowledge themselves. In terms of didactical approach, ICT implies a move from teacher-centered to student-centered learning. In terms of material, ICT shifts the focus on global resources. In terms of activities, ICT helps to perform complex tasks, using multi-modal information. Those changes do not take place as separate phenomena, but are interwoven. Learning with technology assumes a participatory and self-regulatory approach, while SCL benefits from E-learning and web 2.0 tools.

UEM started a curricular reform around 2000 (Muianga *et al*., 2013). ICT and SCL were introduced to improve the quality of teaching and learning. The start was not easy. Evaluation of courses across faculties showed that direct instruction was still the dominant approach, despite the various attempts to introduce a constructivist-learning model (UEM, 2008). Teachers lacked knowledge about new pedagogical approaches and used technology ineffectively (*ibid*.).

These findings urged UEM to speed up the reform process in almost all faculties. A second phase of curricular reform was launched (UEM, 2008-2012). Competency-based program design was emphasized to assure the highest quality of learning and a push was given to ICT as a tool for active and critical learning. Several faculties started

web supported SCL pilots.

Besides the various positive experiences, there was also uncertainty about how students perceived the introduction of ICT and SCL. This doubt is not specific for UEM. Schweisfurth (2011, p. 430) pointed at a lack of research studies that focus on the voice of young learners in developing countries. In order to find out which obstacles hindered the adoption of a new way of teaching and learning, this study specifically aimed at exploring the perceptions of students.

The research questions of the study were:

How does the adoption of SCL in the course ICT in Environmental Education contribute to the development of generic competences, as perceived by the students?

How does the use of web 2.0 tools in the course ICT in Environmental Education support the adoption of SCL, as perceived by students?

"MOODLE" was used as LMS and web 2.0 tools were introduced to facilitate SCL and thus the acquisition of generic competencies.

**STUDENT-CENTERED LEARNING**

A variety of learning theories speak about SCL in terms of self-regulated learning, the nurture of higher level learning abilities, collaborative learning, intrinsic motivation and metacognitive skills, surface learning strategies and intrinsic goals, as well as deeper learning strategies (e.g., Biggs, 1993; Marton & Säljö, 1976; Laurillard, 2005). Felder and Brent (1996, p. 43) defined SCL as a broad approach that includes active learning experiences, self-paced and cooperative style, responsiveness to individual needs and arousing of learning potential. The authors underlined the importance of giving students responsibility for their own learning and for engaging them in activities, such as peer discussions, writing essays and exploring each other's attitudes and values. Commonly used terms for SCL are "active" and "collaborative" learning, emphasizing students' involvement in the learning process (Froyd & Simpson, 2008, p. 2).

The two dominant research traditions on SCL have focused on students' approaches to learning (SAL) and self-regulated learning (SRL) (Biggs, 1987; Lonka, Olkinuora & Mäkinen, 2004; Young, 2005; Apiola & Tedre, 2013). The SRL side has highlighted, for instance, deep learning, as it emphasizes learners' autonomy. Students are encouraged to control and direct their actions to achieve learning goals like information acquisition and self-guidance of professional growth (Marton and Säljö, 1976; Zimmerman, 2000). Many scholars point out that in self-regulated learning the involvement of students in learning activities, the responsibility to motivate oneself and the attainment of personal goals are the main pillars (Zimmerman, 2000; Greene & Azevedo, 2007).

In SCL the lecturer takes the role of facilitator and is not just a presenter of information (Motschnig-Pitrik & Holzinger, 2002). This role is crucial to guide students to become producers of knowledge instead of consumers. SCL is not exclusively focused on personal and cognitive growth, but also on the development of competences needed to perform as a professional in a future job or in self-employment.

Studies carried out in developing countries have shown SCL to have various advantages over traditional teaching methods. First, SCL supports students with diverse learning needs and it increases their retention of knowledge and skills (Baeten et al., 2013; Thanh, 2010). Second, SCL increases students' motivation and self-confidence by including them in the decision-making process (*ibid.*). Third, SCL stimulates creativity through emotional and intellectual discovery learning, which encourages students to become lifelong learners (Motschnig-Pitrik & Holzinger, 2002). Fourth, the focus on group work requires debate, brainstorming, and negotiation and this in turn gives students the opportunity to develop their communication and teamwork skills (O'Neill & McMahon, 2005). Fifth, increased responsibility for one's own learning encourages students to become independent learners (*ibid.*).

The introduction of SCL in developing countries also faces challenges. Limited resources and large classes impede its implementation (O'Neill & McMahon, 2005; Schweisfurth, 2011). In the beginning it is hard for teachers and learners to assume their new roles, as they must unlearn previous approaches (O'Neill & McMahon, 2005; Thanh, 2010). The shortage of staff trained in SCL is another problem (Tedre, Apiola & Cronjé, 2011; Schweisfurth, 2011). Initial training in new pedagogy is therefore indispensable (O'Neill & McMahon, 2005).

UEM (2008) recognizes that SCL is not a panacea for all problems. Not all students are involved, as independent, self-regulated learning might not suit everybody (*ibid.*). Nevertheless, SCL offers opportunities to experience authentic learning, as a basis to develop competencies that modern society requires of university graduates.

## COURSE ORGANISATION

Like other courses that are used as pilot on using SCL approach, the course 'ICT in Environmental Education' was run for first year undergraduate students in the Faculty of Education. The aim was to provide students with knowledge and skills about the use of web 2.0 tools and a LMS in environmental education. They were expected to explore with these tools the content in a more creative and critical way, thus developing relevant generic competencies.

Up till the pilot, teaching was done the traditional way relying on transmission of knowledge, memorizing theory that had no link to real life problems, and accumulation of information through lectures. The content and materials were selected by the teacher and evaluation was a reproduction of what was transmitted.

In the pilot the lecturer changed roles from deliverer of knowledge to facilitator of learning in small groups, at students' own pace. The lecturer helped students to develop skills allowing them to construct their own knowledge and their own learning strategies. Also the lecturer got involved more in the organization of the course activities and monitoring students interactions in LMS.

Twenty-nine students, divided into eight groups of three/four students, participated in the course of eight weeks. The class met face to face twice a week, three hours each, for theoretical and practical guidance. Independent work, in groups or individually and using the LMS, took 18 hours a week. Besides ICT skills, the students were expected to develop generic competencies: communication and collaboration; information research and information production; cooperation and self-learning; media literacy and information literacy; critical thinking and problem solving.

At the start students were trained to use the LMS. Each group worked for two weeks with one of the web 2.0 tools: wikis, podcasts, video sharing, social bookmarking or social networking sites (Blogs, Facebook and Twitter). Each group wrote a blog entry with the chosen tool and presented it during a classroom meeting. For this task, students created multimedia content using mobile phones, a digital camera or Moviemaker. One computer lab assistant and two IT technicians were available to help. Students discovered how to use different IT tools and they taught others about it. Most discussions took place in the LMS.

In the first face-to-face session, students were introduced to web 2.0 tools; they created Facebook accounts and connected their profiles. Then they were divided into groups. Each group chose a realistic environmental issue to study, produced videos and pictures, uploaded them to their blog and discussed their findings. Next, they decided how they could raise awareness among citizens about that particular issue. Some examples of the problems chosen were littering, erosion, the increase of waste in poor neighborhoods, and inappropriate use of drains.

During the following 3-hour sessions, students analyzed and evaluated the work of two other groups. For evaluation a predefined rubric was used to generate questions and debates in the LMS discussion forum. The various assignments that were carried out were used to assess the course. Group work carried 50% weight in the final evaluation. The other 50 % was divided over active participation in the classroom and the discussion forum, sharing resources, Internet search results, and evaluation of each other's work.

## METHODOLOGY

Action research was adopted because it deals with real problems, preferably within communities, with the aim to find solutions and produce guidelines for best practices (Koshy, 2005). The outcomes of the pilot could be helpful to improve all programs offered at UEM. The interventions in this study targeted two elements of the curricular reform: the professional development of students and the modernization of the teaching and learning approaches across the university.

Action research consists of self-reflective stages, which are fluid, open, and responsive (Koshy, 2005). The first stage has to do with the identification of the change pursued. This was done through context analysis: how can SCL contribute to the improvement of the university's courses? Researchers explored the current teaching and learning practices and the existing pedagogical vision. They pinpointed what could be improved through adoption of SCL. Next, the researchers developed the research questions and planned the research. It was decided to integrate SCL and ICT in a regular course. A formative evaluation scheme was designed with the intention to use the results to improve the SCL approach (third stage). SCL strategies based on web 2.0 tools and learning activities were (re-)designed with the intention to promote generic competencies. Implementation of SCL and learning activities was stage four. The final stage was a summative evaluation of all steps. In each stage researchers (experts) and students (learners) were involved.

In this study the cycle of self-reflective action research stages was carried out once. However, the results of this

research feed directly the future actions needed to improve the educational practice of the university.

Data were collected through semi-structured interviews, observations by researchers having a strong experience in ICT for education. The observations were used to collect data for checking if the content is suitable with class learning needs, and verifying whether the proposed activities improve the student learning process. This technique was also used to monitor the appropriateness of resources with the content. Observations were performed in the classroom, in the LMS and across web 2.0 websites produced by students.

During the interview process with students, the focus was to understand whether and how web 2.0 tools improved their competencies. During the 8 weeks course, an interview was conducted every two weeks with two students randomly chosen. Students' activities in their assignments were analyzed using Creswell's (1998) data analysis spiral. Additionally, the interviews were also transcribed, coded, analyzed, reflected upon and categorized in a circular process. Interviews were held in Portuguese and translated into English by the researchers.

**FINDINGS**

There was a shared feeling among students about the valuable contribution of group collaboration to their competence development. Their perception concerning the use of modern pedagogical practices had changed. One of the male students, "I" (pseudonym), described the changes in his mind-set:

I___[male] "At the beginning of this course, I could not take hold on the problems of my colleagues …nor formulate a constructive judgment … but now I understand how to help my colleagues ... and improve my own work after seeing the work of my colleagues"

The above excerpt exemplifies that collaboration enabled students to take an active role in knowledge sharing. The decision-making processes in groups stimulated students to explore the views expressed by others. Analysis of blogs showed improvement of information management skills. Students collaborated to find information on the Internet about environmental problems and they discussed their findings in order to come up with solutions. Working in groups requires interpersonal and communication skills, which are important professional characteristics in today's workplace (Young & Chapman, 2010). The following quote shows a combination of collaborative learning with ICT tools:

M___[female]"We managed to select an environmental problem and uploaded pictures to illustrate it… we also produced text to explain the pictures. This helped to discuss our topic with other groups ... we also managed to produce a video that showed our thinking. "

Since all the assignments were accessible online, students could comment and evaluate each other's work without the lecturer's interference. These activities contributed to critical and constructive thinking. M reported that: "This course and web 2.0 tools helped us to reflect on our work and gave us a different vision on how to evaluate our own work and the work of our colleagues." Constructive evaluation is essential for the development of critical thinking (Froyd & Simpson, 2008). Observation showed metacognitive development when students learned from assessing their work with a rubric and from compared their solutions with those of others.

The use of technology together with realistic and self-selected tasks increased students' intrinsic motivation, as confirmed by previous studies (Motschnig-Pitrik & Holzinger, 2002). R [female] commented, "Real-world problems made me study the tasks more intensively, so I understood the topic better." Students searched the Internet for relevant information, which enabled them to deepen their knowledge and to propose suitable solutions to environmental problems. Reflection took place in each step of the learning process: orientation, problem analysis, and presenting conclusions. The way of learning in the course was a turning point for many students. They perceived the positive effects of collaborative and self-regulated learning as well as the advantages of modern ICT tools; all elements long campaigned for by the university.

Another positive effect was the increase in computer literacy. Students did not have smartphones or Internet connections at home, and did not have e-mail accounts or social networking accounts at the beginning of the course. During the course, all students learned how to create multimedia content with web 2.0 tools and how to upload the content to various websites. The results confirmed Motschnig-Pitrik and Holzinger's (2002) argument that Internet technology is well suited for SCL, as it enhances independent learning and problem-solving skills. Yet, students had different perceptions of why and how technology was of value. Some appreciated tool-specific skills: "I learned to edit videos and animate images with Moviemaker … and also to use a blog" (P [male]). Others emphasized the value of new tools for sharing knowledge: "Now I can use a blog and share information about environmental conservation" (R [female]). Others mentioned growth of meta-knowledge: "Now I understand why ICT is important

... I learned to select relevant information…. I also know how to learn without a teacher…I can find solutions …. This is good when I have a job" (V [male]). Another student said, "Multimedia is a strong tool for environmental education because you can illustrate what is wrong and what is good, … and people learn faster". Students' media literacy was developed, and they learned skills to use web 2.0 tools to produce digital content in different formats (videos, pictures, and text).

The quality of group work improved throughout the course. All students learned to create and use blogs and some students started to use Facebook and other social media instruments. They were able to discuss their cooperation and the final results.

## CHALLENGES

Observation showed differences between students' activity in the discussion forum. In the interviews, some of the less active students said that they lacked necessary basic ICT skills, while others disliked the new learning approach. Therefore, some additional explanation in the classroom meetings was needed on the use of the tools and on the participation that was expected.

Some students had difficulties adapting themselves to the new role of being an active learner that came along with SCL. According to Felder and Brent (1996), some resistance is to be anticipated when introducing SCL, since its benefits are neither immediate nor automatic. In this study, SCL was introduced in a formal setting, which was new to most students. Therefore, the shift to ICT-based interaction and SRL raised problems: some students waited until the classroom meetings to ask questions and others expected their lecturers to give direct help, instead of using the course material, rubrics, or other self-guidance material. Those difficulties indicate a lack of confidence of learners in their own capacities, as P [male] explained: "most things were new … I wasn't sure whether my group was doing the right thing ... sometimes it wasn't easy to understand what the lecturers wanted from us". Another challenge was how to comment each other's work. Some students did not quite master the art of giving constructive feedback, which led to clashes.

Blog contents and interviews showed that not all groups were successful in producing appropriate content for their selected problem. N [female] pointed out that: "in the presentation of your problem, your group spoke about the poor garbage collection by the city council, but the video that you uploaded reported health problems that arouse from bad drainage maintenance. Although there is some relation between the two problems, they are not the same".

## DISCUSSION AND CONCLUSIONS

The interviews and assignments confirmed that students developed the generic competencies that this course was supposed to enhance: problem-solving, collaboration, e-learning skills, information production on web 2.0 and information search on the Internet. Mastering of those skills are an absolute requirement for career readiness in the 21st century (Moeller & Reitzes, 2011).

Web 2.0 tools and the LMS supported the adoption of SCL. Similarly, SCL facilitated the technology-enhanced learning practices. The combination of e-learning and SCL worked well even in this tradition-bound educational context. The web 2.0 tools enhanced students' learning activities by stimulating them to write, collaborate, research, analyze, compare, debate, classify and publish what they have learned. Students searched for relevant information using the Internet and presented the information in appropriate formats. Even though the quality of the blog content varied between the groups, the results displayed students' growing ability to plan, organize and produce multimedia content. This was in line with the course objectives to develop information management skills. The results of the pilot study confirmed other studies that say that a combination of SCL and web 2.0 tools enables students to explore information that is relevant to perform tasks at hand (Motschnig-Pitrik & Holzinger, 2002).

Most students did not feel a too great distance from the new practices, as they found that technology was of positive value for their knowledge construction, even though some of them struggled to learn independently how to use these tools. The majority of students perceived the organization of the course as exciting, which increased their intrinsic motivation. Several research studies confirm that SCL combined with modern technology is an enjoyable way to learn (Froyd & Simpson, 2008; Moeller & Reitzes, 2011; Motschnig-Pitrik & Holzinger, 2002; O'Neill & McMahon, 2005).

In terms of collaborative learning, group assignments encouraged communication, interpersonal skills, and knowledge sharing. However, students' level of engagement in group work varied. Previous studies showed that students without proper skill training work less effectively in groups (Brush & Soye, 2000). Hence, it would be incorrect to assume that every individual student benefitted equally from the group assignments. Also individual performance was assessed by looking at active participation in the classroom and in the discussion forum, and by

sharing materials and important resources.

In terms of competency development, the possibility to choose a real-life environmental problem as an assignment was motivating. Students showed that they could use available technology to find information, to discuss problems, and present a solution. Efficient use of technology promoted critical thinking and problem-solving skills. Group work evaluation, constructive feedback, commenting on group presentations, and reflecting on how the learning process went, all contributed to the gradual development of higher order learning skills.

The implementation of SCL also faced several challenges. Not all students embraced SCL. This hampers a wide-scale implementation of curriculum reform, as has been pointed out by several researchers (e.g., Schweisfurth, 2011). Furthermore, not all students adopted the available technology. They were not used to structure their own work and assume the role of an active learner. Students needed a lot of guidance and extra face-to-face meetings, as they had little experience in how to handle open-ended and (semi-)realistic assignments. This was an expected challenge, as it would be not very realistic to assume that students would perform perfectly on their first encounter with SCL. However, the adoption of SCL in a traditional learning environment could be improved by giving first a few smaller assignments as a way to carry out learning activities without direct instruction by the teacher. By practicing, students can slowly adapt to SCL (Froyd & Simpson, 2008; Brush, & Soye, 2000).

Main reason for students' inactivity to use new technology was the traditional teaching and learning culture they were familiar with. This challenge has been pointed out in many previous studies and was expected to show up in this study as well (O'Neill & McMahon, 2005; Schweisfurth, 2011; Thanh, 2010). The buy-in time for SCL implementation varies and depends on the culturally appropriate distance between teachers and learners (Schweisfurth, 2011). In the case of Mozambique, students are used to receive a lot of direct assistance from the lecturers and they assumed to receive this during the pilot as well. When they had to work independently, they felt insecure and confused. Even though it is hard to change what is culturally appropriate, the pilot shows that with the necessary preparation and guidance SCL can support the competency development of students.

The findings indicate that SCL and web 2.0 applications have the potential to increase the quality of education in terms of equipping future graduates with necessary skills to perform as successful professionals in the 21st century labor market. The design of the pilot course and the lessons learned from this study are suitable to be adapted to other courses at UEM.

Because the results are promising, the university should continue to invest more in training lecturers in SCL. This new pedagogy is required to fulfill the requirements of the labor market to deliver competent students. By shifting to SCL, combined with the use of web 2.0 tools, we believe that the quality of education at UEM will increase, especially in terms of a greater motivation, a better retention of knowledge, an increase in learning skills and a deeper understanding of the subjects taught (Froyd & Simpson, 2008). Lessons can be learned from the pilot study on how to realize a transformation of the direct teaching approach towards self-regulating learning. Guidance must enable students and teachers to leave behind the roles they are culturally used to. The curriculum must be restructured and the assignments must be updated.

The findings presented in this paper about the improved learning results should be taken with some caution, as students had limited opportunities to practice their newly acquired skills. The solutions they presented for the environmental problems were theoretical; hence there is no assurance that the solutions will work in reality. Furthermore, the results of this study cannot be generalized to other populations outside this specific study. There is, however, no reason to believe why the results would not be applicable, to some extent, to other similar contexts. The most important finding of this study was the positively experimented change in pedagogical approach and the development of ICT competencies that gave a push to student centered learning. In further studies its important to compare the learning outcomes before and after the introductions of pedagogical changes.

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# Implications for Curriculum, Materials, Teaching and Testing Strategies in a Saudi Arabian University

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**ABSTRACT**
Teaching is a multi-dimensional activity with a lot of societal obligations. This study identifies some of the important aspects namely Curriculum, Teaching Aids, Teaching strategies, and Testing Strategies. Further, it explores the difference in these four aspects with reference to satisfaction of teachers, teachers' experience and across disciplines**.** The researchers consider that this area is unexplored in Kingdom of Saudi Arabia to the best of their knowledge. The chief finding of this study is testing strategies differ with that the level of satisfaction of teachers and also across disciplines, and usage of materials and teaching aids differ across colleges. In contrast to the expectations, curriculum, teaching strategies and testing strategies do not differ among colleges and years of experience. Finally, the study recommends policies to improve the overall teaching process.

**KEYWORDS**: academic commitment, curriculum, teaching aids, testing strategies

## INTRODUCTION

Teaching is considered as one of the best and noblest professions around the world. Teachers should be dedicated, committed, and motivated towards their profession as it is a thankless job. A teacher needs to display his skills to motivate and influence his students. To motivate students, teachers not only have to be committed but also sound enough in their respective branches of knowledge. If a teacher is committed towards his profession and poor in his subject, he won't receive regards from his students and vice-versa. He should be good at subject and committed towards his profession too.

The researchers aim to find out whether the teachers' efforts are sufficient enough towards the profession to bring the desired results. The efforts of the teachers are studied on four aspects. These fours aspects are part of their work every day in the college. They are Curriculum, Teaching Aids, Teaching strategies, and Testing Strategies. At the same time, this study also wishes to explore the difference in these four aspects with reference to teachers' experience and across disciplines**.** The researchers select Prince Sattam Bin Abdulaziz University (PSAU) for their research. The researchers consider that this area is unexplored in Kingdom of Saudi Arabia to the best of their knowledge.

Being an emerging university in this vicinity, PSAU has many promises. We believe that it is the responsibility of the faculty existing in PSAU to fulfill them. The teachers working in it are from within the nation and various parts of the world. We want to identify how the faculty is working homogeneously for a common cause, i.e., shaping careers of the students. The commitment of the faculty not only will make PSAU reach its mission but also benefits the students. Hence the objectives of the current study are:

- To investigate the teachers' view about the Curriculum of PSAU
- To investigate the teachers' view about the use of Teaching aids in PSAU
- To investigate the teachers' view about the Teaching strategies in PSAU
- To investigate the teachers' view about the Testing Strategies used in PSAU

## REVIEW OF THE LITERATURE

### CURRICULUM

A curriculum is a plan or a program for teaching and learning prepared in the light of certain goals and which contains at least a reference to select and sequence learning content. Henderson &Hawthorne say that curriculum is, "...a plan for a pedagogical journey towards the good life, or students' actual classroom management with ideas and ways of knowing...", and "...depending on national, state, and local policy, it may also be understood as a course of study, a syllabus, or a group of text books or tests (2000: 3)". Bell & Baker opine that there are

various types of meaning for curriculum that may differ from the formal or teacher-intended curriculum (1997:3).

The curriculum of PSAU is organized. It is tailor made. The policy makers of the university have given liberty to teachers to make changes to the curriculum as per the needs and demands of the students and the society. The changes have to be made every semester, and it should be discussed in department council, college council, and university council for approval. The teachers can propose a maximum of twenty-five percent of change to the existing curriculum. This policy gives a great strength to the teachers as they observe and live with students round the semester. Besides, the courses prescribed to the students need to be updated constantly as per the needs of the society in their respective branches of knowledge.

The researchers aim to know from the faculty if the syllabus prescribed in their respective colleges is too much for the students. In addition, they want to explore how far the learning outcomes of the course are met with the syllabus prescribed. They further want to study if the faculty is aware of the learning outcomes of the course as they need to make changes to the course, if necessary. In addition to these, they also study if the faculty in their respective colleges is taking liberty with the syllabus for the benefit of the students and their own comfort.

**TEACHING AIDS**

Learning is a difficult practice. It can be strengthened with unusual instruction/educational resources as they inspire, encourage as well as make students' concentrate during the learning process. According to Ranasinghe and Leisher (2009), technology can be integrated into teaching if a teacher is determined to use it in his classrooms wherever it is necessary. They further opine that technology should support teachers in creating a learner-centric atmosphere in the classrooms. Koc (2005) suggests that if curriculum collaborates with technology, it yields outstanding results in academics as it certainly assists students to gain higher-order thinking skills. Romiszowski claims that, "a teaching aid must, as the name suggests, assist the teaching of the topic. It does not do the whole job. Other methods perform parts of the jobs and the aid is administered and controlled by the teacher (1968:11)". Chacko (1981) opines that good teaching learning materials certainly reduces the language barrier. He further opines that they will provide exact visual image and that in turn makes learning process easier. Morris (1968) believes that teachers use these materials consciously as they know the positive effect of these on the students.

PSAU has state of the art classrooms. Every college possesses white, active, and smart boards. They not only help teachers in teaching-learning process but also motivate students to learn interestingly. English language is complex to the students in KSA. At the same time, classroom teaching-learning process should be in English as per the university policy. Owing to this, the teachers with the support of technological aids reach students. As the students have little English language skills, technological aids assist teachers a lot. These boards are used for PPTs, writing on them with Activpens, drawing graphs instantaneously, uploading documents & images from the laptop, and etc. Videos and audios can also be played. Owing to all of these benefits, students find classes highly enthusiastic. In this regard, the researchers intend to identify the technological usage of the teachers in PSAU. They ask the teachers if the interactive methods help to reinforce the teaching learning process.

The mere usage of teaching materials doesn't bring any outstanding result among students. If teachers can sensibly select the materials and combine them during their teaching learning process, the students will get benefitted. To identify the effectiveness of teaching resources the researchers put three statements to the teachers in their questionnaire to respond. The first one is if the textbook is sufficient to cover the course. The second one is if additional reference books, handouts and teaching aids are used during teaching. Finally, if they also rely on online practice content along with boards available, while teaching.

**TEACHING STRATEGIES**

Traditional approach to teaching is – teachers teach, and learners learn. It's a one way and passive approach. In contrast, the modern teaching methods give an ample of scope to teachers to teach and learners to learn. De Caprariis, Barman, & Magee (2001) suggest that lecture leads to the ability to recall facts, but discussion produces higher level comprehension.

As per Henson,

> Today's education majors are asking different questions because they recognize that there are many teaching methods -expository, inquiry, questioning, discovery, simulation gaming... The old question "Which one should I use?"has given way to a new one: "Which *ones* should I use? and for what purposes?" Education students, who are now exposed to a number of teaching methods, know that certain methods work best with certain objectives. (1988:89)

Yelon (1996) states the following powerful principles for effective teaching:

- Help students make meaningful connections systematically
- Analyze prerequisites of required tasks
- Create a climate for open communication
- Organize essential content
- Provide effective learning aids
- Capture and maintain attention through the use of novelty model
- Provide active individual practice
- Create pleasant conditions and surrounding
- Be consistent

According to Westbrook, Durrani, Brown, Orr, Pryor, Boddy& Salvi (2013), there are six teaching observations that are essential for an effective and prompt learning. They are:

- Balancing class through group work and pair work
- Providing handouts beyond the prescribed textbook
- Diversified testing like open-ended and close-ended questions, elaborated answers & motivating students to put questions
- Effective academic involvement while explaining the concepts and projecting strong knowledge on it
- Using vernacular language and code switching
- Following variety of teaching styles

A few of these teaching observations are part of our questionnaire. The researchers focus to identify if the teachers in PSAU design the classroom activities as per the needs of the students, if they provide additional handouts to reinforce the concepts taught in the class, and if they involve students for their better understanding.

**TESTING STRATEGIES**

Many educationalists write about the power of examinations over what takes place in the classrooms. Pearson states that it is generally accepted that public examinations influence the attitudes, behavior, and motivation of teachers, learners, and parents (1988:98).

Frederiksen and Collins (1989) states that:

> "A systematically valid test is one that induces in the education system curricular and instructional changes that foster the development of the cognitive skills that the test is designed to measure. Evidence for systematic validity would be an improvement in those skills after the test has been in place within the educational system for a period of time (1989:27)".

The previous studies on teachers' testing skills reveal that teachers are not adequately ready to meet the needs of classroom assessment due to inadequate training (Goslin, 1967; Roeder, 1972; O'Sullivan&Chalnick, 1992). Teachers report that they are engaged in teaching syllabus, flexible with exam timing, supporting students during exam, and altering answers in the scripts (Hall &Kleine, 1992; Nolen, Haladyna, & Haas, 1992). A good number of teachers believe that they have sufficient knowledge of testing students' learning skills (Gullikson, 1984; Kennedy, 1993) and point that knowledge to their experience and university coursework (Gullikson, 1984; Wise, Lukin, &Roos, 1991). Carey (1994) and Gregory (1996) emphasize that teachers have ability to make necessary changes to the methods of testing now and then based on test results and item analysis.

Keeping in view the opinions of the theorists, the researchers designed a few statements to study teachers' approach towards testing. They are like if they want to test only objective questions in their exams; if they want to avoid subjective questions; if they don't teach that is not tested; and if they accept that exams are the best way to test students' knowledge.

The researchers take the above studies into confidence and designed a diversified questionnaire which is a combination of some of the aspects they mentioned. The earlier studies have focused on any one of them but not all are integrated to the best of the knowledge of the researchers.

**METHODOLOGY**

The researchers target to measure the commitment of teachers towards the four identified items namely, curriculum and syllabus; materials and aids; teaching strategies and finally testing strategies.

On the basis of the studies quoted above four statements are framed for each of the items. Hence, there are sixteen statements in total on which the respondents are supposed to mark their responses on Likert scale of five. All the Likert items are ranked viz., strongly agree is denoted by 1 and agree by 2, neutral by 3, disagree by 4 and strongly disagree by 5. The reliability of the questionnaire is tested using Cronbach Alpha. Besides this, three categorical questions are also part of the questionnaire. The first question is, "Are your efforts in teaching sufficient to bring the desired results?". The respondents are supposed to answer 'Yes or No'. Second, each respondent is asked to state his college of affiliation. The third one is related to years of teaching experience of the faculty. The experience of the faculty is further divided into three categories: 0-5 years, 5-10 years and 10 and above years. The questionnaire is administered to faculty at 13 different colleges of Prince Sattam bin Abdul-Aziz University. The different colleges represent different disciplines. A total of 174 faculty fill the questionnaire but only 159 questionnaires are used in the analysis as the unused 15 questionnaires contains incomplete responses. Finally, a set of 12 hypotheses are derived by the researchers to test based on the questionnaire. The first four hypotheses are regarding to find out the significant difference in terms of curriculum; materials & teaching aids; teaching strategies; and testing strategies among those who are satisfied with their efforts to bring desired results in teaching. The next four hypotheses test the significant difference in terms of all same four items with respect to colleges of affiliation. And the last four hypotheses test the significant difference considering again the four items and the years of teaching experience.

| Demographic Characteristics | |
|---|---|
| Gender of respondents | |
| Male respondents | 136 |
| Female respondents | 23 |
| Total respondents | 159 |
| College of affiliation | |
| College of Business Administration, Al Kharj | 24 |
| College of Engineering | 10 |
| College of Medical Sciences | 8 |
| Preparatory Year College | 22 |
| College of Pharmacy | 11 |
| Community college | 18 |
| College of Business, Howtah | 15 |
| College of Business Administration, Al Kharj (Girls' campus) | 8 |
| College of Engineering & Computer Science (Girls' campus) | 10 |
| College of Computer Science | 13 |
| College of Pharmacy (Girls' campus) | 5 |
| College of Science | 12 |
| College of Business, Sulayl | 3 |
| Years of experience | |
| Less than 5 years | 72 |
| 5 to 10 years | 77 |
| 10 years and above | 10 |

The value of Cronbach Alpha is 0.71. The questionnaire can be considered reliable or internally consistent. To test the significant difference between two groups, Students t-test is used and to test the difference among more than two groups Analysis of variance (ANOVA) is used. The level of confidence used is 95 percent. The alternate hypothesis is accepted when the p value in less than 0.05 for 95 percent level of confidence.

| S.No. | Statement | Item Mean | Factor Mean | Item Std Dev | Factor Std Dev |
|---|---|---|---|---|---|
| *Curriculum* | | | | | |
| 1 | I am aware of the course learning outcomes. | 1.31 | 2.05 | 0.49 | 0.77 |
| 2 | The curriculum covers the course learning outcomes. | 1.69 | | 0.70 | |
| 3 | Based on the needs, I modify the syllabus | 2.09 | | 1.03 | |
| 4 | I feel the syllabus prescribed is too much for the students. | 3.09 | | 1.12 | |
| *Materials & Teaching Aids* | | | | | |
| 5 | The textbook is sufficient to cover the course. | 2.20 | 2.44 | 0.87 | 0.92 |
| 6 | Additional reference books and handouts are used during teaching. | 2.13 | | 0.94 | |
| 7 | PPTs, videos and other interactive methods reinforce the teaching learning process. | 1.67 | | 0.81 | |
| 8 | I do not use online resources for teaching. | 3.77 | | 1.15 | |
| *Teaching Strategies* | | | | | |
| 9 | Classroom activities are designed as per the needs and abilities of the students. | 1.91 | 1.97 | 0.81 | 0.46 |
| 10 | Assignments and projects help in reinforcing the concepts taught in the class. | 1.69 | | 0.75 | |
| 11 | Essay type analytical questions in the exam won't affect my current teaching method. | 2.64 | | 1.03 | |
| 12 | Before I introduce another topic to students, I ask them, many a time, if they understand the present topic. | 1.64 | | 0.77 | |
| *Testing Strategies* | | | | | |
| 13 | MCQs, True/False and Fill in the blank questions are easy for the students. | 2.39 | 2.67 | 1.05 | 0.67 |
| 14 | Essay type questions are not easy for the students due to language issues. | 2.08 | | 0.98 | |
| 15 | I won't teach the content that is not tested in the exam. | 3.62 | | 1.14 | |
| 16 | Exams are the best way to evaluate the effectiveness of the students' learning. | 2.60 | | 1.13 | |

Out of all the twelve-hypothesis derived, the following two are found to be significant.

1. Ho: There is no significant difference between those who feel that their efforts in teaching are sufficient to bring the desired results, and those who feel otherwise, in terms of testing strategies.

Ha: There is a significant difference between those who feel that their efforts in teaching sufficiently bring the desired results, and those who feel otherwise, in terms of testing strategies (Accepted).

As the p value is 0.00 (Appendix 1) which is less than 0.05, the null hypothesis is not accepted. Contrary the alternate hypothesis is accepted. It implies that there is difference in the level of satisfaction among teachers in the use of testing strategies. This hints that there is difference in the usage of objective type of questions in exams like MCQs or using subjective type of questions. On an average the teachers also agree that MCQs are easy for students and subjective questions are difficult. The other aspect is teachers disagree that they teach the content that will come in the exam. Lastly, teachers generally agree that exams are the best way to evaluate the effectiveness of the students' learning.

2. Ho: There is no significant difference among different colleges in the university, in terms of the materials and aids they are using.
   Ha: There is a significant difference among different colleges in the university, in terms of the materials and aids they are using (Accepted).

The p value for this hypothesis is 0.021(Appendix 2). As the p value is less than 0.05, the null hypothesis is rejected. The alternate hypothesis is accepted which implies that there is difference among colleges in terms of usage of materials and aids. This result is quite surprising as all the classrooms are equipped with same

technological support and all course instructors are advised to use them during their lectures. They are also instructed to use online resources, wherever necessary, in their respective course specifications.

## ANALYSIS

The researchers' study identifies the level of satisfaction of teachers differs with testing strategies and there is a difference among colleges in the use of teaching aids. Curriculum, teaching strategies and testing strategies are used in the same way without any differences among colleges as per the study and it is also noticed that these aspects are used in the same way, though the years of experience of faculty vary.

The result related to curriculum is logically comprehensible as the university follows a defined curriculum which is common across all sections of the same course in the colleges it is taught. It is the same with materials and teaching aids viz., library facilities, smart boards, etc. are common across all the colleges. Interestingly, when materials &teaching aids and level of satisfaction of faculty in using them are related, the researchers find that there is no significant difference in using them by faculty, within the college. In contrast, there is a significant difference among colleges in using them. This difference gives a chance to the researchers to state that teaching aids are used differently from one college to another in PSAU. Though PSAU provides guidelines to teachers on using these resources in the classrooms, the difference exists from one college to another. The last one, testing strategies are not significantly different among colleges. It is because, the testing pattern is also structured with 50% of the marks for internal assessments including quizzes, assignments, projects etc. while the remaining 50% of the marks are allotted to the final exams held at the end of the semester. There is no room for the faculty to innovate different testing patterns while testing during examinations. One of the reasons for this is due to fixed way of testing like objective pattern. Further, the respondents are categorized in terms of years of experience. It is found that there is no difference between teachers' experience and their attitude towards curriculum, teaching and testing strategies. But when it comes to satisfaction of teachers in using the testing strategies, there is a significant difference. It is understood, based on the study, that satisfaction of teachers in using the testing strategies and using materials and aids vary from college to college in the university.

## CONCLUSION

The current study will certainly assist the top administration of PSAU to make remarkable decisions in future. It has been noticed by the researchers that the way the teachers test their students, as per study, is limited. As there is fixed regulation in the way the examinations need to be conducted, it gives no room for faculty to innovate in PSAU. As it is a limitation of this study to identify what exactly are the testing strategies used by teachers for the betterment of the students, this study recommends the university to look into this matter. The teachers who continuously make changes to the assessment need to be identified and encouraged to discuss the assessment methods with the rest of the faculty. Hence, it leads to the overall development of the stakeholders.

The other noticeable thing is teaching aids used in the university. The policy makers are recommended to focus on this as faculty in each college are not satisfied on using them. The researchers are also under the impression that the use of interactive methods is also common across colleges. In this regard, a policy implication in terms of identifying colleges and their needs and usage of materials and aids is recommended.

It's logical to assume that teaching methods improve with experience. It is recommended that the university should reap benefits of these experienced teachers and utilize them for training the new faculty. The study can further be focused to find the difference in the commitment regarding the four factors among the universities in one region and also among different regions. The study finally concludes that the recommendations can be considered for the progress among teaching fraternity specially to cope them with the teaching methodologies and testing patterns.

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## APPENDICES

### A. NULL HYPOTHESES

1. Ho: There is no significant difference between those who feel that their efforts in teaching are sufficient to bring the desired results, and those who feel otherwise, in terms of Curriculum.
2. Ho: There is no significant difference between those who feel that their efforts in teaching are sufficient to bring the desired results, and those who feel otherwise, in terms of Materials & Teaching Aids.
3. Ho: There is no significant difference between those who feel that their efforts in teaching are sufficient to bring the desired results, and those who feel otherwise, in terms of teaching strategies.
4. Ho: There is no significant difference between those who feel that their efforts in teaching are sufficient to bring the desired results, and those who feel otherwise, in terms of testing strategies.
5. Ho: Curriculumused by the faculty are same across all the colleges
6. Ho: Materials & Teaching Aids used by the faculty are same across all the colleges
7. Ho: Teaching strategies used by the faculty are same across all the colleges
8. Ho: Testing strategies used by the faculty are same across all the colleges
9. Ho: The Curriculum used by the faculty in all the colleges are the same irrespective of experience
10. Ho: The Materials & Teaching Aids used by the faculty in all the colleges are the same irrespective of experience
11. Ho: The teaching strategies used by the faculty in all the colleges are the same irrespective of experience
12. Ho: The testing strategies used by the faculty in all the colleges are the same irrespective of experience

### B. STATISTICAL TABLES

#### 1. SATISFACTION

| Independent Samples Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
| | | | Sig. | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| curriculum | Equal variances assumed | 1.27 | 0.26 | -0.99 | 157.00 | 0.32 | -0.09 | 0.09 | -0.27 | 0.09 |
| | Equal variances not assumed | | | -0.94 | 54.76 | 0.35 | -0.09 | 0.10 | -0.28 | 0.10 |
| materials | Equal variances assumed | 1.74 | 0.19 | -1.35 | 157.00 | 0.18 | -0.11 | 0.08 | -0.26 | 0.05 |
| | Equal variances not assumed | | | -1.25 | 53.36 | 0.22 | -0.11 | 0.09 | -0.28 | 0.06 |
| teaching | Equal variances assumed | 0.93 | 0.34 | 0.58 | 157.00 | 0.56 | 0.06 | 0.10 | -0.14 | 0.25 |
| | Equal variances not assumed | | | 0.55 | 55.74 | 0.58 | 0.06 | 0.10 | -0.15 | 0.26 |
| testing | Equal variances assumed | 2.61 | 0.11 | -2.92 | 157.00 | 0.00 | -0.33 | 0.11 | -0.55 | -0.11 |
| | Equal variances not assumed | | | -2.44 | 47.54 | 0.02 | -0.33 | 0.13 | -0.60 | -0.06 |

| Group Statistics | | | | | |
|---|---|---|---|---|---|
| | sat | N | Mean | Std. Deviation | Std. Error Mean |
| curriculum | 1 | 122 | 2.0246 | 0.47173 | 0.04271 |
| | 2 | 37 | 2.1149 | 0.52571 | 0.08643 |
| materials | 1 | 122 | 2.4201 | 0.4069 | 0.03684 |
| | 2 | 37 | 2.527 | 0.47061 | 0.07737 |
| teaching | 1 | 122 | 1.9822 | 0.51081 | 0.04625 |
| | 2 | 37 | 1.9257 | 0.55548 | 0.09132 |
| testing | 1 | 122 | 2.5984 | 0.53932 | 0.04883 |

| | | | | | |
|---|---|---|---|---|---|
| | 2 | 37 | 2.9257 | 0.75889 | 0.12476 |

**2. COLLEGES**

| Descriptives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
| | | | | | | Lower Bound | Upper Bound | | |
| curriculum | 1 | 24 | 2.0625 | 0.46771 | 0.09547 | 1.865 | 2.26 | 1.25 | 2.75 |
| | 2 | 10 | 2.275 | 0.41583 | 0.1315 | 1.9775 | 2.5725 | 1.75 | 3 |
| | 3 | 8 | 2.125 | 0.48181 | 0.17035 | 1.7222 | 2.5278 | 1.25 | 2.75 |
| | 4 | 22 | 1.8864 | 0.57594 | 0.12279 | 1.631 | 2.1417 | 1.25 | 3.5 |
| | 5 | 11 | 2.2727 | 0.52979 | 0.15974 | 1.9168 | 2.6286 | 1.5 | 3 |
| | 6 | 18 | 1.875 | 0.3237 | 0.0763 | 1.714 | 2.036 | 1.25 | 2.25 |
| | 7 | 15 | 2.0167 | 0.44788 | 0.11564 | 1.7686 | 2.2647 | 1.25 | 3 |
| | 8 | 8 | 2.25 | 0.46291 | 0.16366 | 1.863 | 2.637 | 1.5 | 3 |
| | 9 | 10 | 2.15 | 0.41164 | 0.13017 | 1.8555 | 2.4445 | 1.75 | 3 |
| | 10 | 13 | 2.0769 | 0.4608 | 0.1278 | 1.7985 | 2.3554 | 1.5 | 2.75 |
| | 11 | 5 | 1.8 | 0.37081 | 0.16583 | 1.3396 | 2.2604 | 1.25 | 2.25 |
| | 12 | 12 | 2.125 | 0.62614 | 0.18075 | 1.7272 | 2.5228 | 1.25 | 3.25 |
| | 13 | 3 | 1.5 | 0.25 | 0.14434 | 0.879 | 2.121 | 1.25 | 1.75 |
| | Total | 159 | 2.0456 | 0.48462 | 0.03843 | 1.9697 | 2.1215 | 1.25 | 3.5 |
| materials | 1 | 24 | 2.3333 | 0.45245 | 0.09236 | 2.1423 | 2.5244 | 1.25 | 3 |
| | 2 | 10 | 2.475 | 0.2993 | 0.09465 | 2.2609 | 2.6891 | 2 | 2.75 |
| | 3 | 8 | 2.4688 | 0.41052 | 0.14514 | 2.1255 | 2.812 | 2 | 3.25 |
| | 4 | 22 | 2.4091 | 0.34109 | 0.07272 | 2.2579 | 2.5603 | 1.75 | 3 |
| | 5 | 11 | 2.5227 | 0.17516 | 0.05281 | 2.4051 | 2.6404 | 2.25 | 2.75 |
| | 6 | 18 | 2.4444 | 0.43348 | 0.10217 | 2.2289 | 2.66 | 2 | 3.75 |
| | 7 | 15 | 2.45 | 0.5278 | 0.13628 | 2.1577 | 2.7423 | 1.75 | 3.5 |
| | 8 | 8 | 2.2812 | 0.2815 | 0.09952 | 2.0459 | 2.5166 | 2 | 2.75 |
| | 9 | 10 | 2.475 | 0.46323 | 0.14649 | 2.1436 | 2.8064 | 1.75 | 3 |
| | 10 | 13 | 2.7885 | 0.39325 | 0.10907 | 2.5508 | 3.0261 | 2 | 3.25 |
| | 11 | 5 | 1.85 | 0.54772 | 0.24495 | 1.1699 | 2.5301 | 1 | 2.5 |
| | 12 | 12 | 2.5208 | 0.37626 | 0.10862 | 2.2818 | 2.7599 | 1.75 | 3 |
| | 13 | 3 | 2.6667 | 0.52042 | 0.30046 | 1.3739 | 3.9595 | 2.25 | 3.25 |
| | Total | 159 | 2.445 | 0.42345 | 0.03358 | 2.3786 | 2.5113 | 1 | 3.75 |
| teaching | 1 | 24 | 1.8438 | 0.36722 | 0.07496 | 1.6887 | 1.9988 | 1 | 2.5 |
| | 2 | 10 | 2 | 0.57735 | 0.18257 | 1.587 | 2.413 | 1 | 2.5 |
| | 3 | 8 | 2 | 0.65465 | 0.23146 | 1.4527 | 2.5473 | 1 | 3 |
| | 4 | 22 | 2.197 | 0.44361 | 0.09458 | 2.0003 | 2.3937 | 1.75 | 3 |
| | 5 | 11 | 2.25 | 0.59161 | 0.17838 | 1.8526 | 2.6474 | 1.5 | 3.25 |
| | 6 | 18 | 1.8333 | 0.46177 | 0.10884 | 1.6037 | 2.063 | 1 | 2.5 |
| | 7 | 15 | 2.0167 | 0.64411 | 0.16631 | 1.66 | 2.3734 | 1.25 | 3.5 |
| | 8 | 8 | 1.6562 | 0.42125 | 0.14894 | 1.3041 | 2.0084 | 1 | 2.25 |
| | 9 | 10 | 1.775 | 0.44799 | 0.14167 | 1.4545 | 2.0955 | 1 | 2.25 |
| | 10 | 13 | 2.0192 | 0.52502 | 0.14561 | 1.702 | 2.3365 | 1 | 2.75 |
| | 11 | 5 | 2.15 | 1.00933 | 0.45139 | 0.8967 | 3.4033 | 1 | 3.25 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12 | 12 | 1.875 | 0.41969 | 0.12115 | 1.6083 | 2.1417 | 1 | 2.5 |
| | 13 | 3 | 2 | 0 | 0 | 2 | 2 | 2 | 2 |
| | Total | 159 | 1.9691 | 0.52029 | 0.04126 | 1.8876 | 2.0506 | 1 | 3.5 |
| testing | 1 | 24 | 2.7708 | 0.54632 | 0.11152 | 2.5401 | 3.0015 | 2 | 4.25 |
| | 2 | 10 | 2.725 | 0.32167 | 0.10172 | 2.4949 | 2.9551 | 2 | 3 |
| | 3 | 8 | 2.7188 | 0.8908 | 0.31495 | 1.974 | 3.4635 | 1 | 3.75 |
| | 4 | 22 | 2.6023 | 0.46713 | 0.09959 | 2.3952 | 2.8094 | 1.5 | 3.5 |
| | 5 | 11 | 2.4318 | 0.70791 | 0.21344 | 1.9562 | 2.9074 | 1.25 | 4 |
| | 6 | 18 | 2.7639 | 0.68316 | 0.16102 | 2.4242 | 3.1036 | 1.5 | 3.5 |
| | 7 | 15 | 2.6333 | 0.5164 | 0.13333 | 2.3474 | 2.9193 | 1.5 | 3.5 |
| | 8 | 8 | 2.5938 | 0.69356 | 0.24521 | 2.0139 | 3.1736 | 1.75 | 4 |
| | 9 | 10 | 2.725 | 0.34258 | 0.10833 | 2.4799 | 2.9701 | 2.25 | 3.5 |
| | 10 | 13 | 2.3654 | 0.47451 | 0.13161 | 2.0786 | 2.6521 | 1.75 | 3 |
| | 11 | 5 | 2.15 | 0.37914 | 0.16956 | 1.6792 | 2.6208 | 1.75 | 2.75 |
| | 12 | 12 | 3.1667 | 0.91287 | 0.26352 | 2.5867 | 3.7467 | 2 | 5 |
| | 13 | 3 | 3 | 0.43301 | 0.25 | 1.9243 | 4.0757 | 2.75 | 3.5 |
| | Total | 159 | 2.6745 | 0.61092 | 0.04845 | 2.5788 | 2.7702 | 1 | 5 |

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| curriculum | Between Groups | 3.972 | 12 | 0.331 | 1.458 | 0.146 |
| | Within Groups | 33.135 | 146 | 0.227 | | |
| | Total | 37.107 | 158 | | | |
| materials | Between Groups | 4.152 | 12 | 0.346 | 2.089 | 0.021 |
| | Within Groups | 24.179 | 146 | 0.166 | | |
| | Total | 28.331 | 158 | | | |
| teaching | Between Groups | 4.235 | 12 | 0.353 | 1.337 | 0.204 |
| | Within Groups | 38.536 | 146 | 0.264 | | |
| | Total | 42.772 | 158 | | | |
| testing | Between Groups | 7.116 | 12 | 0.593 | 1.67 | 0.079 |
| | Within Groups | 51.854 | 146 | 0.355 | | |
| | Total | 58.969 | 158 | | | |

**3. EXPERIENCE**

| Descriptives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
| | | | | | | Lower Bound | Upper Bound | | |
| curriculum | 1 | 72 | 2.0556 | 0.45815 | 0.05399 | 1.9479 | 2.1632 | 1.25 | 3 |
| | 2 | 77 | 2.0649 | 0.51042 | 0.05817 | 1.9491 | 2.1808 | 1.25 | 3.5 |
| | 3 | 10 | 1.825 | 0.4572 | 0.14458 | 1.4979 | 2.1521 | 1.25 | 2.5 |
| | Total | 159 | 2.0456 | 0.48462 | 0.03843 | 1.9697 | 2.1215 | 1.25 | 3.5 |
| materials | 1 | 72 | 2.3819 | 0.42784 | 0.05042 | 2.2814 | 2.4825 | 1.25 | 3.75 |
| | 2 | 77 | 2.5 | 0.4292 | 0.04891 | 2.4026 | 2.5974 | 1 | 3.5 |
| | 3 | 10 | 2.475 | 0.2993 | 0.09465 | 2.2609 | 2.6891 | 2 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | 159 | 2.445 | 0.42345 | 0.03358 | 2.3786 | 2.5113 | 1 | 3.75 |
| teaching | 1 | 72 | 1.897 | 0.47523 | 0.05601 | 1.7853 | 2.0087 | 1 | 3.5 |
| | 2 | 77 | 2.0649 | 0.54169 | 0.06173 | 1.942 | 2.1879 | 1 | 3.5 |
| | 3 | 10 | 1.75 | 0.56519 | 0.17873 | 1.3457 | 2.1543 | 1 | 2.5 |
| | Total | 159 | 1.9691 | 0.52029 | 0.04126 | 1.8876 | 2.0506 | 1 | 3.5 |
| testing | 1 | 72 | 2.6319 | 0.58588 | 0.06905 | 2.4943 | 2.7696 | 1.5 | 4.25 |
| | 2 | 77 | 2.6818 | 0.58298 | 0.06644 | 2.5495 | 2.8141 | 1.25 | 5 |
| | 3 | 10 | 2.925 | 0.94318 | 0.29826 | 2.2503 | 3.5997 | 1 | 4.75 |
| | Total | 159 | 2.6745 | 0.61092 | 0.04845 | 2.5788 | 2.7702 | 1 | 5 |

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| curriculum | Between Groups | 0.523 | 2 | 0.261 | 1.114 | 0.331 |
| | Within Groups | 36.584 | 156 | 0.235 | | |
| | Total | 37.107 | 158 | | | |
| materials | Between Groups | 0.528 | 2 | 0.264 | 1.482 | 0.23 |
| | Within Groups | 27.803 | 156 | 0.178 | | |
| | Total | 28.331 | 158 | | | |
| teaching | Between Groups | 1.562 | 2 | 0.781 | 2.956 | 0.055 |
| | Within Groups | 41.21 | 156 | 0.264 | | |
| | Total | 42.772 | 158 | | | |
| testing | Between Groups | 0.762 | 2 | 0.381 | 1.021 | 0.363 |
| | Within Groups | 58.207 | 156 | 0.373 | | |
| | Total | 58.969 | 158 | | | |

**4. RELIABILITY STATISTICS**

| Reliability Statistics | | |
|---|---|---|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| 0.718 | 0.715 | 30 |

# Investigation of the Satisfaction Levels of Teacher Candidates towards E-Courses

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**ABSTRACT**
In today's technology age, e-learning environments and e-courses are increasingly used in every level of education. In e-learning environments, teachers and students come together without time and place limitation and they are trained such in a traditional classroom environment. Courses in e-learning environments are often used in universities and teacher training departments. E-learning has become one of the preferred learning environments, especially since students are not limited by a particular classroom environment and are flexible. From this perspective, it is also important to determine the level of teacher candidates' satisfaction with the lessons in the e-learning environments for organizing and expanding the e-courses. In this study, it is aimed to determine the satisfaction level of the teacher candidates towards e-courses. Survey method was used to collect the research data. Participants of the study are the teacher candidates of the Faculty of Education at Sakarya University in the academic year of 2016-2017. "Satisfaction Scale for E-Courses" developed by Kolburan Geçer and Deveci Topal (2015) was used in the study. The scale consists of 35 items and 5 factors. These factors are Course Content and Teaching Process, Used Materials and Communication Tools, Attitude Towards E-Course, Media Design and Teacher-Student Interaction. It was examined whether there was any difference between the satisfaction levels of teacher candidates towards e-courses according to their gender, department, high school graduation types and internet usage period. According to the results of the study, it was concluded that the satisfaction level of the teacher candidates towards e-courses was medium level. Satisfaction levels towards e-courses vary according to the gender of the teacher candidates, the used materials and communication tools and attitudes toward e-courses. Satisfaction levels towards e-courses differ only in the dimension of media design according to the departments of teacher candidates. Another result is that the satisfaction levels of the teacher candidates towards e-courses do not differ according to their high school graduation types and daily internet usage periods.

**KEYWORDS:** e-learning, e-course, student satisfaction

## INTRODUCTION

People’s perspectives have been changed with the rapid improvement of technology in recent years. Today's technology age is called especially as the internet age. Everyone from young to old ages uses the internet in almost all environments. Internet is used in all areas such as education, health, entertainment and communication. Online learning or e-learning concepts emerge when individuals, especially university students, are thought to use the internet for educational purposes. E-learning is a learning process in which teachers and students come together without time and place limitation, and the electronic communication systems are used for interaction between the teacher, student and the course content. E-learning can be conducted in different ways according to the level of education and the content of the course (Moore & Kearsley, 2012; Simonson, Smaldino, Albright & Zvacek, 2012; Adnan & Boz Yaman, 2017). E-learning is the process of learning-teaching activities through internet technologies in order to increase knowledge and performance (Rosenberg, 2001). In other words, e-learning is the use of synchronous and asynchronous communication processes electronically to create and strengthen knowledge (Garrison, 2011; Şahin, Keskin, Özgür & Yurdagül, 2017).

A large part of the activities we can perform in today's classroom environment can be applied in e-learning environments without any problems. The e-learning application includes links to simulation, demonstration, audio and video frequency, internet materials and resources (Learnframe, 2000). E-learning has become one of the preferred learning environments, especially since it does not keep students in a particular classroom environment and provides flexibility in time. Aydın (2003) stated that the use of e-learning systems offers many advantages such as reducing the cost of publishing materials, efficient distribution and updating of materials, support on the need, increased interaction and taking into account the individual differences (Şahin et al., 2017). It is important that the learning designs implemented in this environment are qualified in order for the advantages of e-learning systems to be effective. Many components must be considered together when designing e-learning environments (Tuncer & Taşpınar, 2008). Course materials presented in the e-learning environment should be of a kind that prevents learners from being passive participants (Çelen, Çelik & Seferoğlu, 2011). If

the students who attend the courses in this environment feel comfortable, their satisfaction level will increase and they will want to spend more time in this environment. The expectations of the students should be determined and the necessary ones should be provided to meet these expectations in order to ensure the satisfaction of the students in the environment. Sun, Tsai, Finger, Chen & Yeh (2008) found that the critical factors affecting student satisfaction in e-learning are computer anxiety of the student, attitude of the instructor towards e-learning, flexibility of e-learning, quality of e-learning, perceived utility, perceived ease of use and variety of evaluations (Kolburan Geçer & Deveci Topal, 2015). Students should be satisfied with the courses in order to be permanent in e-learning environment and to adopt these environments in e-learning environment as well as in all environments. The more satisfied the students are with the environment, the more effective they will participate in the courses in the e-learning environment.

In this context, studies on e-courses in the literature are few. In their study, Adnan & Boz Yaman (2017) concluded that the satisfaction levels of engineering students with e-learning experiences who use e-learning environments are below average. Pena and Yeung (2010) found that as the level of Information and Communication Technology competency decreases, the level of satisfaction decreases. Şen Ersoy (2015), who conducted a study with distance learning English lessons, determined that most of the students found the course content interesting and they did not expressed any problem in communication and interaction with the instructor. However, it has been pointed out that some of the students experienced technical difficulties and learning difficulties in the lessons, they preferred face-to-face lecture and they wanted to see a concrete teacher figure in their lectures. As a result of another study by Gürbüz (2014), it has been seen that students have mostly positive perspectives about the distance education system and that their levels of satisfaction are high in terms of quality, time and place flexibility of the offered education. Öztürk, Kara, Özkeskin and Uça Güneş (2017) determined that most of their learners were highly satisfied with the distance education system. In addition, it was seen that various studies (Beqiri, Chase & Bishka, 2009; Bray, Aoki & Dlugosh, 2008; Palmer & Holt, 2009) were carried out in the literature.

However, no study was found on the investigation of the satisfaction levels towards e-courses of the teacher candidates in the faculty of education towards e-courses. For this reason, it is important to investigate the satisfaction levels towards e-courses of teacher candidates who are currently studying in the faculty of education and who will perform the teaching profession in the future.

The aim of the study is to determine the satisfaction levels of teacher candidates towards e-courses. Following questions were investigated according to this aim.

1. What are the satisfaction levels of teacher candidates towards e-courses?
2. Does the satisfaction levels of teacher candidates differ according to their;
    a. Genders,
    b. Departments,
    c. High school graduation types,
    d. Daily internet usage periods?

## METHOD

This study aims to show the satisfaction levels of the teacher candidates towards e-courses. Survey method was used to collect the research data. Survey method is a research approach that aims to describe the past or present as it exists. It is attempted to define the individual or object subject to the research as if it is within its own condition (Karasar, 2005). Moreover, relational survey methods were used in line with sub-objectives.

### Participants

The participants of the study are the teacher candidates who are studying in the Faculty of Education at Sakarya University in the academic year of 2016-2017. Quantitative distributions are given in Table 1 for teacher candidates whose scales were considered valid.

**Table 1.** *Participants' Characteristics*

| Variables | | f | % |
|---|---|---|---|
| **Gender** | Male | 91 | 38,6 |
| | Female | 145 | 61,4 |
| **Department** | Computer Education and Instructional Technologies | 56 | 23,7 |
| | Special Education | 42 | 17,8 |
| | Turkish Education | 113 | 47,9 |
| | Primary School Education | 25 | 10,6 |

| | | | |
|---|---|---|---|
| **High School Graduation Type** | General High School | 41 | 17,4 |
| | Vocational High School | 76 | 32,2 |
| | Anatolia High School | 95 | 40,3 |
| | Others | 24 | 10,2 |
| **Daily Internet Usage** | 0-1 hour | 26 | 11,0 |
| | 1-3 hours | 74 | 31,4 |
| | 3-5 hours | 80 | 33,9 |
| | More than 5 hours | 56 | 23,7 |
| **Total** | | **236** | **100** |

There was no specific sample for this study, 236 teacher candidates were participated in total. 91 (38.6%) of the participants are male and 145 (61.4%) of them female. 56 students (23.7%) are in the department of Computer Education and Instructional Technologies, 42 of them (17.8%) are in the department of Special Education, 113 of them (47.9%) are in the department of Turkish Education and 25 of them (10.6%) are in the department of Primary School Education.

**Data Collection Tools**

Personal information form created by the researcher and "Satisfaction Scale for E-Courses" developed by Kolburan Geçer ve Deveci Topal (2015) were used to collect the data for this study. The scale consists of 35 items and 5 factors. “Course Content and Teaching Process” consists of 9 items, “Used Materials and Communication Tools” consists of 8 items, “Attitude Towards E-Course” consists of 6 items, “Media Design” consists of 8 items and “Teacher-Student Interaction” consists of 4 items. Scale was scored in 5 levels; 1 for “Strongly Disagree”, 2 for “Disagree”, 3 for “Rarely Disagree”, 4 for “Agree” and 5 for “Strongly Agree”. Cronbach Alpha reliability value of the scale is .966. Cronbach Alpha reliability values for the sub-dimensions of the scale are; .932 for “Course Content and Teaching Process”, .921 for “Used Materials and Communication Tools”, .881 for “Attitude Towards E-Course”, .914 for “Media Design” and .900 for “Teacher-Student Interaction”. Internal consistency value of the scale after it was applied to teacher candidates is.905.

**Data Analysis**

A sufficient number of copied data collection tool were applied to the teacher candidates by the researcher. The highest score that can be taken for each item on the applied scale is five (5) and the lowest score is one (1). Three evaluation intervals and criteria were determined on average value in order to interpret and evaluate teacher candidates' satisfaction levels for e-courses (Table 2).

**Table 2.** *Evaluation Criteria for the Satisfaction Levels Towards E-Courses*

| Evaluation Criteria | Evaluation Range |
|---|---|
| Low Level | 1,00 – 2,33 |
| Medium Level | 2,34 – 3,66 |
| High Level | 3,67 – 5,00 |

Arithmetic average, percentage and frequency were used in the analysis of the collected data as descriptive statistics. On the other hand, independent sample t-test and variance analysis were used to determine whether the levels of satisfaction of e-courses differ according to the gender of the teacher candidates, their departments, their high school graduation and their daily internet usage periods. The significance level was taken as .05 in the analyzes of the data. SPSS 16.0 (Statistical Package for the Social Sciences) package program was used in statistical analysis.

## FINDINGS AND INTERPRETATIONS

The satisfaction levels of teacher candidates towards e-courses and the evaluation of satisfaction levels of these e-courses in terms of different variables are given as separate titles within the scope of this study.

**Satisfaction Levels of Teacher Candidates towards E-Courses**

Teacher candidates' satisfaction levels towards e-courses were evaluated in five dimensions; Course Content and Teaching Process, Used Materials and Communication Tools, Attitude for E-courses, Media Design and Teacher-Student Interaction (Table 3).

**Table 3.** *Satisfaction Levels towards E-Courses in Terms of Sub-Dimensions*

| | Subscale | $\overline{X}$ | sd |
|---|---|---|---|
| 1 | Course Content and Teaching Process | 3.28 | .61 |
| 2 | Used Materials and Communication Tools | 3.19 | .72 |
| 3 | Attitude Towards E-Courses | 3.15 | .60 |
| 4 | Media Design | 3.39 | .70 |
| 5 | Teacher-Student Interaction | 3.15 | .89 |
| | **General** | **3.25** | **.52** |

As seen in the table, means of the teacher candidates' satisfaction levels towards e-courses are; ($\overline{X}$=3.28) for the dimension of course content and teaching process, ($\overline{X}$=3.19) for used materials and communication tools, ($\overline{X}$=3.15) for attitude towards e-courses, ($\overline{X}$=3.39) for media design and ($\overline{X}$=3.15) for teacher-student interaction. This shows that teacher candidates have medium level of satisfaction towards e-courses.

**Satisfaction Levels of Teacher Candidates According to Their Genders**

It was examined whether the satisfaction levels of the teacher candidates towards e-courses differ according to their genders. The findings were given in Table 4.

**Table 4.** *Satisfaction Levels of Teacher Candidates According to Their Genders*

| Subscale | Groups | n | $\overline{X}$ | Sd | df | t | p |
|---|---|---|---|---|---|---|---|
| Course Content and Teaching Process | Male | 91 | 3.35 | .57 | 234 | 1.464 | .145 |
| | Female | 145 | 3.23 | .64 | | | |
| Used Materials and Communication Tools | Male | 91 | 3.35 | .58 | 234 | 2.828 | .005 |
| | Female | 145 | 3.09 | .78 | | | |
| Attitude Towards E-Courses | Male | 91 | 3.25 | .56 | 234 | 1.971 | .049 |
| | Female | 145 | 3.09 | .62 | | | |
| Media Design | Male | 91 | 3.45 | .60 | 234 | 1.186 | .237 |
| | Female | 145 | 3.34 | .75 | | | |
| Teacher-Student Interaction | Male | 91 | 3.16 | .87 | 234 | .226 | .822 |
| | Female | 145 | 3.14 | .90 | | | |

Findings show that satisfaction levels towards e-courses do not differ significantly in the sub-dimensions of "course content and teaching process" [t(234)=1.464, p>.05], "media design" [t(234)=1.186, p>.05], and "teacher-student interaction" [t(234)=.226, p>.05] according to the genders of teacher candidates. There is a significant difference in the sub-dimensions of "used materials and communication tools" [t(234)=2.828, p<.05] and "attitude towards e-courses" [t(234)=1.971, p<.05]. It was seen that the male teacher candidates have higher satisfaction levels than the female teacher candidates in the sub-dimensions of the used materials and communication tools and attitudes towards e-courses. According to this result, male teacher candidates are more satisfied than female teacher candidates, by using the course materials used in the environment where e-courses are applied and communication tools developed for these environments. Moreover, it can be interpreted that male teacher candidates have a more positive attitude towards e-courses than female teacher candidates.

**Satisfaction Levels of Teacher Candidates According to Their Departments**

It was examined whether the satisfaction levels of the teacher candidates towards e-courses differ according to their departments. The findings were given in Table 5.

**Table 5.** *Satisfaction Levels of Teacher Candidates According to Their Departments*

| Subscale | Source of Variance | S.S | sd | M.S | F | p | Significant Difference |
|---|---|---|---|---|---|---|---|
| Course Content and Teaching Process | Between Groups | 1.125 | 3 | .375 | .995 | .396 | - |
| | Within Groups | 87.455 | 232 | .377 | | | |
| | Total | 88.580 | 235 | | | | |
| Used Materials and Communication Tools | Between Groups | 3.993 | 3 | 1.331 | 2.624 | .051 | - |
| | Within Groups | 117.678 | 232 | .507 | | | |
| | Total | 121.671 | 235 | | | | |
| Attitude Towards E-Courses | Between Groups | 1.150 | 3 | .383 | 1.058 | .368 | - |
| | Within Groups | 84.089 | 232 | .362 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Total | 85.240 | 235 | | | | |
| Media Design | Between Groups | 7.851 | 3 | 2.617 | 5.737 | .001 | 1-2<br>2-4 |
| | Within Groups | 105.841 | 232 | .456 | | | |
| | Total | 113.692 | 235 | | | | |
| Teacher-Student Interaction | Between Groups | 3.359 | 3 | 1.120 | 1.421 | .237 | - |
| | Within Groups | 182.825 | 232 | .788 | | | |
| | Total | 186.184 | 235 | | | | |

Findings show that satisfaction levels towards e-courses do not differ significantly in the sub-dimensions of "course content and teaching process" [F(3-232) = .995, p>.05], "used materials and communication tools" [F(3-232) = 2.624, p>.05], "attitude towards e-courses" [F(3-232) = 1.058, p>.05] and "teacher-student interaction" [F(3-232) = 1.421, p>.05] according to the departments of teacher candidates. There is a significant difference in the sub-dimension of "media design" [F(3-232) = 5.737, p<.05]. Scheffe analysis as a Post Hoc analysis was performed to determine in which groups have significant difference. Teacher candidates from the department of Computer Education and Instructional Technologies ($\overline{X}$=3.61), Primary School Education ($\overline{X}$=3.56) and Special Education ($\overline{X}$=3.07) are more satisfied with the sub-dimension of media design towards e-courses.

**Satisfaction Levels of Teacher Candidates According to Their High School Graduation Types**

It was examined whether the satisfaction levels of the teacher candidates towards e-courses differ according to their high school graduation types. The findings were given in Table 6.

**Table 6.** *Satisfaction Levels of Teacher Candidates According to Their High School Graduation Types*

| Subscale | Source of Variance | S.S | sd | M.S | F | p | Significant Difference |
|---|---|---|---|---|---|---|---|
| Course Content and Teaching Process | Between Groups | 1.037 | 3 | .346 | .916 | .434 | - |
| | Within Groups | 87.542 | 232 | .377 | | | |
| | Total | 88.580 | 235 | | | | |
| Used Materials and Communication Tools | Between Groups | .829 | 3 | .276 | .531 | .662 | - |
| | Within Groups | 120.842 | 232 | .521 | | | |
| | Total | 121.671 | 235 | | | | |
| Attitude Towards E-Courses | Between Groups | 1.335 | 3 | .445 | 1.230 | .299 | - |
| | Within Groups | 83.905 | 232 | .362 | | | |
| | Total | 85.240 | 235 | | | | |
| Media Design | Between Groups | 3.181 | 3 | 1.060 | 2.226 | .086 | - |
| | Within Groups | 110.511 | 232 | .476 | | | |
| | Total | 113.692 | 235 | | | | |
| Teacher-Student Interaction | Between Groups | 1.138 | 3 | .379 | .476 | .699 | - |
| | Within Groups | 185.046 | 232 | .798 | | | |
| | Total | 186.184 | 235 | | | | |

Findings show that satisfaction levels towards e-courses do not differ significantly in the sub-dimensions of "course content and teaching process" [F(3-232) = .916, p>.05], "used materials and communication tools" [F(3-232) =.531, p>.05], "attitude towards e-courses" [F(3-232) = 1.230, p>.05], "media design" [F(3-232) =2.226, p>.05], and "teacher-student interaction" [F(3-232) =.476, p>.05] according to the high school graduation types of teacher candidates.

**Satisfaction Levels of Teacher Candidates According to Their Daily Internet Usage Periods**

It was examined whether the satisfaction levels of the teacher candidates towards e-courses differ according to their daily internet usage periods. The findings were given in Table 7.

**Table 7.** *Satisfaction Levels of Teacher Candidates According to Their Daily Internet Usage Periods*

| Subscale | Source of Variance | S.S | sd | M.S | F | p | Significant Difference |
|---|---|---|---|---|---|---|---|
| Course Content and Teaching Process | Between Groups | ,614 | 3 | ,205 | .540 | .655 | - |
| | Within Groups | 87,965 | 232 | ,379 | | | |
| | Total | 88,580 | 235 | | | | |
| Used Materials and | Between Groups | 2,077 | 3 | ,692 | 1.343 | .261 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Communication Tools | Within Groups | 119,594 | 232 | ,515 | | | |
| | Total | 121,671 | 235 | | | | |
| Attitude Towards E-Courses | Between Groups | 1,215 | 3 | ,405 | 1.118 | .342 | - |
| | Within Groups | 84,024 | 232 | ,362 | | | |
| | Total | 85,240 | 235 | | | | |
| Media Design | Between Groups | ,458 | 3 | ,153 | .313 | .816 | - |
| | Within Groups | 113,234 | 232 | ,488 | | | |
| | Total | 113,692 | 235 | | | | |
| Teacher-Student Interaction | Between Groups | 2,464 | 3 | ,821 | 1.037 | .377 | - |
| | Within Groups | 183,721 | 232 | ,792 | | | |
| | Total | 186,184 | 235 | | | | |

Findings show that satisfaction levels towards e-courses do not differ significantly in the sub-dimensions of "course content and teaching process" [F(3-232) = .540, p>.05], "used materials and communication tools" [F(3-232) =1.343, p>.05], "attitude towards e-courses" [F(3-232) = 1.118, p>.05], "media design" [F(3-232) =.313, p>.05], and "teacher-student interaction" [F(3-232) =1.037, p>.05] according to the daily internet usage periods of teacher candidates.

## RESULTS AND RECOMMENDATIONS

Satisfaction levels of the teacher candidates who are educated in the faculty of education towards e-courses were determined as medium level in this study. Moreover, it was observed that the satisfaction levels towards the sub-dimensions: course content and teaching process, used materials and communication tools, attitude towards e-courses, media design and teacher-student interaction were also medium level. Adnan and Boz Yaman (2017) found that engineering faculty students had level of satisfaction below average towards e-courses. Bray, Aoki and Dlugosh (2008) found that students who can cope with the difficulties of the online learning process, who can use the computer easily, who can communicate easily with the teachers and who prefer the individual learning process, have higher satisfaction levels. Chua and Montalbo (2014) reached a conclusion that students are satisfied with their work in virtual learning environments. Öztürk, Kara, Özkeskin and Uça Güneş (2017) found that most of the students who took courses through the Anadolum eCampus System were highly satisfied with the eCampus system and at the same time, they found that students were benefiting also the learning and preparation perspective from the system. Findings of the other similar studies related to e-courses and e-learning environments in this field (Leonard & Guha, 2001; Islam & Ferdowsi, 2014; Şirin & Tekdal, 2015) are supporting the findings obtained from this study.

Satisfaction levels towards e-courses differ in the dimensions of "used materials and communication tools" and "attitudes towards e-courses" while they do not differ in the "course content and teaching process", "media design" and "teacher-student interaction" dimensions according to the gender of the teacher candidates. In other words, male students are more satisfied than female students, in the dimensions of "used materials and communication tools" and "attitude towards e-courses". This difference may be because of the male students who study in university are closer to technology, they participate more effectively in learning activities through online environments, and also male students are more positive towards courses in e-learning environments than female students are. Adnan and Boz Yaman (2017) found that the satisfaction levels of e-learning experiences did not differ according to the gender of the students but the satisfaction of the male students was more positive than the female students. There was no difference between the gender of the students and their satisfaction levels towards e-learning and e-courses in the studies of Öztürk et.al. (2017), Shayan and İscioglu (2017) and Chua and Montalbo (2014).

Another result is that satisfaction levels towards e-courses differ only in the dimension of media design while they do not differ in the dimensions of course content and teaching process, used materials and communication tools, attitude towards e-courses and teacher-student interaction according to teacher candidates' departments. In other words, in terms of the dimension of media design, teacher candidates from the department of Computer Education and Instructional are more satisfied than the teacher candidates from the department of Special Education are. Naveh, Tubin and Pliskin (2010) found that there was a low level of correlation between the satisfaction levels of learners and their departments. There is no difference between the satisfaction levels of students towards e-learning and e-courses and their departments or faculties in the studies of Adnan and Boz Yaman (2017), Shayan and İscioglu (2017) and Öztürk and others (2017).

Last result is that satisfaction levels of teacher candidates towards e-courses do not differ according to their high school graduation types and their daily internet usage periods. It can be interpreted that there is no difference since teacher candidates did not have any courses in e-learning environments during high school education.

Moreover, it may be that the satisfaction levels of teacher candidates towards e-courses do not differ according to their daily internet usage periods because of teacher candidates who take courses in e-learning environment do not use the internet only for educational purposes. With this result, it can be interpreted that teacher candidates do not have enough information about e-learning environments and e-courses during high school education.

Considering the results of this study, it is thought that it would be beneficial for the teacher candidates, who will educate the generation of the future, to have more opportunities to study especially in e-learning environments and e-courses. It will be possible to increase the satisfaction levels of teacher candidates when the e-courses are arranged and the necessities for e-courses are given in detail because of this age is the technology age and courses are being taught in e-learning environments at every level of education. This study can be further investigated in detail by a qualitative research methodology and conducting a more in-depth study to improve the satisfaction level towards e-courses.

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# Motivating Factors for Faculty to Use Web Applications in Education

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## ABSTRACT
The social nature of Web applications have the potential to empower education. These applications provide a learning environment in which students can construct their learning, collaborate with others, generate ideas, edit and distribute their material, and more. The better way to seed Web applications into the learning environment and to make them effective educational tools is to implement them in the pre-service teachers programs.

This research aimed to investigate the influence of knowledge and experience of Web applications, perceived ease-of use, perceived usefulness, perceived pedagogical support, perceived risk, and colleagues' influence on the faculty's decision to adopt Web applications in their teaching within the pre-service teacher programs. Two hundred forty-nine faculty participated in this study by filling an online questionnaire that was self-designed and was distributed to a random proportional stratified sample of the faculty who teach at the colleges of education in American universities.

The findings reflect that the faculty currently teaching in these programs are knowledgeable of and have experience in using Web applications and even intend to implement them more in their teaching in the future. The findings showed that faculty knowledge and experience of Web applications and faculty perception of the usefulness of such applications were significant predictors of faculty intention to use Web applications in teaching. This, in turn, is a strong predictor of their actual use. Implementation of the study was provided, along with recommendations for further research.

## INTRODUCTION
Preparing K-12 teachers to implement technology effectively in their teaching is an important issue in the 21st Century (Adcock & Bolick, 2011; Kumar &Vigil, 2011). PK-12 teachers are expected to keep up-to-date with the developments in technology and take advantage of their ability to facilitate learning in order to teach the next generation (Coutinho & Bottentuit Jr., 2008). With the emerging Web applications that facilitate social communications and interactions, more people at different age levels have joined online communities as active participants. Web applications can be effective tools to engage learners, especially those who prefer to communicate this way (Rudd & Walker, 2010). Additionally, today's digital students are highly involved in Web applications (Muñoz & Towner, 2009). Integrating tools that students have already engaged within their learning has become vital (Samarawickrema, Benson & Brack, 2010).

Greenhow (2007) has called the widespread use of Web applications a significant phenomenon that impacts PK-12 teacher preparation for the 21st Century. These tools offer the opportunity to generate, edit, and share knowledge and information within groups of interest and communities of practice (Franklin & Van Harmelen, 2007).

## STATEMENT OF PROBLEM
Integrating Web applications into pre-service education teacher programs allows educators to find learning activities that go beyond cognitive knowledge to include 21st Century skills, including communication, creativity, productivity, critical thinking, collaborative working and social interaction within a community. Nevertheless, pre-service education teacher programs don't provide enough experience with integrating technology into teaching (Adcock & Bolick, 2011) and there is a large gap between the use of Web applications in daily life and in the coursework of pre-service teachers (Kumar & Vigil, 2011). Lack of such integration affects the ability of pre-service teachers to incorporate these tools into their teaching. There is a need to identify factors that can be used to facilitate adoption of Web applications in such programs "in order to provide practitioners with sound guidelines for deployment and training" (Gribbins, Hadidi, Urbaczewski, & Vician, 2007, p. 752)

## THE PURPOSE OF THE STUDY
Applying the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), this study aims to investigate the impact of gender, age, knowledge and experience of Web applications, the perceived ease-of use, usefulness,

pedagogical support, and risk of using Web applications in teaching, as well as colleagues' influence on the faculty's decision to adopt these tools into the pre-service teachers programs. The TRA suggests that a person's action is driven by what he or she concludes from the information that he or she has about a specific topic.

## THE SIGNIFICANT OF THE STUDY

Despite the emergence of Web applications in the everyday life of students (Ajjan & Hartshorne, 2008), technology used in education has been limited to delivering learning materials (Maloney, 2007). Digital students, as Rudd and Walker (2010) found, access Web applications extensively to express their opinions, participate in discussions with peers and for personal use. Their high involvement and engagement in Web applications (Muñoz & Towner, 2009) that encourage their active participation (Coutinho, 2009) should lead teachers to consider integrating such applications in learning.

The first step to using Web applications in learning is to bridge the gap between the online world and the classroom (Light, 2011) and effectively include in pre-service teacher programs experience with and training in the use of Web applications in teaching (Albion, 2008). This study aims to outline the factors that influence faculty in pre-service teacher programs to implement Web applications in their teaching, which in turn will help the decision-makers within pre-service teacher programs to develop better strategies to help faculty to adopt these applications.

## RESEARCH QUESTIONS

This study attempts to address the following questions:

a. Do gender and age predict faculty's intention to adopt Web applications in their teaching in the pre-service teacher bachelor-level programs in the United State?
b. Do knowledge and experience of Web application, perceived ease-of use, perceived usefulness, perceived pedagogical support, perceived risk, and colleagues' influence predict faculty's intention to adopt Web applications in their teaching in the pre-service teacher bachelor-level programs in the United States over and above gender and age?

## LITERATURE REVIEW

Web applications refer to the Web-based applications in which users can access, customize, read and write, add to the content, and collaborate with other users. Web applications include wikis, blogs, Facebook, Twitter, YouTube, Podcast, Google Documents, Wikipedia, WordPress, Flicker, Skype, Prezi, and RRS to name a few.

### The advantages of Web applications.

Literature reveals many advantages of using Web applications in education. Web applications open the door to direct communications among learners and educators (Greenhow, 2007; Light, 2011; Schroeder, Minocha, & Schneider, 2010; Tarik & Karim, 2011); support collaboration among learners (Duffy, 2007; Maloney, 2007; Rudd & Walker, 2010); change the way of sharing, accessing and interacting with information (Tarik & Karim, 2011; Teclehaimanot & Hickman, 2011); allow students to generate, socialize, and access their learning in unexpected ways (Duffy, 2007); promote the interactive use of the Web (Duffy, 2007; Rudd & Walker, 2010); and enhance user-generated content (Light, 2011). These tools provide learning in different forms that are appropriate for diversity learners (Coutinho, 2009); can be carried on mobile phones, thus freeing the Internet from physical place restrictions (Imperatore, 2009); improve students' technical skills (Coutinho et al., 2008; Schroeder et al., 2010); support multiple intelligences such as textual, visual, and social (Brown, 2002); allow the co-creation of content (Greenhow, 2007) and can be used to create authentic learning activities (Duffy, 2007). Web applications allow students to produce and publish (Solomon & Schrum, 2007); provide a user-friendly workplace (Silva, Oliveira, Carvalho, & Martins, 2008) and relaxed environment for students to work in (Tarik & Karim, 2011). These applications help in improving learning through the feedback and comments that students provide each other (Schroeder et al., 2010). Web applications are a means by which individuals can share their feelings, opinions and experiences as well as make use of what others share (Augustsson, 2010), and these tools are free and easy to use (Imperatore, 2009, Solomon & Schrum, 2007).

### The risks of Web applications.

Despite the advantage of using Web applications in education, there are some concerns. One is the difficulty of assessing students' activities (Schroeder et al., 2010; Waycott et al., 2010). Student Web authoring activities, for example, require different assessment strategies (Gray et al., 2010). Waycott et al. (2010) explained that collaborative authoring is difficult to assess because students can edit or delete their peers' contributions. The writing style used for Web assignments differs from the academic writing style required for other assignments because many Web applications can be used as online journals and allow students to incorporate audios, videos, photos and links (Waycott et al.). Additionally, uncertainty about the ownership of the collaborative work in

these social environments made it difficult to determine each individual's contributions for assessment purposes (Schroeder et al., 2010). Gray et al. (2010) expected that the barrier of assessment could prevent further adoption of these tools in higher education.

Another challenge to using Web applications in educating is that many students in higher education are not net savvy (Gray et al., 2010); not all students are independent learners; some need organized support and selected content (Bates, 2011). They may need to be taught how to use these tools to interact and communicate within the online environment (Schroeder et al., 2010). Faculty may need professional development in use of Web applications in a pedagogical manner (McLoughlin & Lee, 2007). While these tools are perceived to be easy to use (Anderson, 2007; Imperatore, 2009; Solomon & Schrum, 2007), the difficulty of implementing them in teaching and learning is still a concern (McLoughlin & Lee, 2007).

The copyright issue is always a concern when publishing work on the Internet. Kawashima (2010) argued that Web applications, by their ability to use, produce and create content, introduced mini creators, which added a new challenge to the copyright issue. These mini creators, as defined by Kawashima, are not professional artists but ordinary users who copy existing videos on the web, then add to, edit, change, and post the resultant videos to the Web, making them accessible to millions of people. Kawashima suggested that the copyright law should consider their creative contribution. Additionally, some students were concerned that their work could be copied so they did not feel comfortable publishing in open environments such as wikis or blogs (Waycott et al., 2010).

Schroeder et al. (2010) reported that another drawback of using Web applications in learning and teaching is increasing the workload for both students and educators as well as the time and effort needed to set up these tools, monitor the contributions and administrate the users. This created an extra workload for the educators besides operation the course itself. Students sometimes perceived the ongoing interaction as an extra task that impacted the flexibility of online learning since they had to wait for their peers' contributions to reach a common understanding.

Other weaknesses of the use of Web applications in education may cause concern. A supporting culture of student participation in content-creation is needed (McLoughlin & Lee, 2007). There is a need to maintain appropriate forms of interaction in these social environments (Schroeder et al., 2010). The use of Web applications involves sharing artifacts for others in the public domain to read and comment (Hughes & Oliver, 2010), which raises the risk of appropriation and privacy (Waycott et al., 2010). There is a possibility of misunderstanding when interacting through such social tools (Augustsson, 2010). Some Web applications are established by small businesses seeking to provide free service in the hope of producing advertising that should be monitored by educators, and "students must also be taught how to evaluate Internet information sources" (Imperatore, 2009, p. 2). More concerns will arise as additional Web applications emerge. However, "these tools are worth the trouble of learning how to use them, because when done right, they can add a whole new dimension to learning" (Light, 2011, p. 15).

**Theoretical Framework**

Decades ago, scholars attempted to understand how people accept and use technologies. Several models and theories have been developed to find which factors influence adopting the technology. User adoption of a technology means "the user's intent to accept and use these systems" (Alqahtani et al., 2010, p. 22). Table 1 presents some theories and models and highlights the factors that each model or theory suggests as predictors to the use of technology.

The Theory of Reasoned Action (TRA) suggested by Ajzen and Fishbein (1980) was established on the idea that people make logical use of the information they have and act accordingly. No "social behavior is controlled by unconscious motives or thoughtless in nature" (Grunwald, 2002, p. 47). TRA tries to understand human behavior and then to predict it through identifying the factors that influence the intention to such behavior. The *intentions* "are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance" (Ajzen, 1991, p. 181).

The theory of reasoned action claims that behavioral intention is the strongest cause of a behavior. Behavioral intention has two elements: the attitude and the subjective norm (Ajzen & Fishbein, 1980), "either of which might be the most important determinant of any particular behavior" (Trafimow, 2009, p. 506).

*Attitude* toward the behavior "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). The attitude is driven by behavioral beliefs (Grunwald, 2002).

The second element in determining the behavioral intention is the subjective norm which can be "determined by beliefs about what specific important others think one should do and how much one is motivated to comply with those important others" (Trafimow, 2009, p. 506). In other words, the subjective norm is driven by normative beliefs (Grunwald, 2002). These two factors are seen, according TRA, as the predictors of an intention but their relative weights may differ from one person to another (Grunwald, 2002).

Table 1: Theories and Models of Technology Acceptance

| Developer | Theory | Factors included in the theory |
|---|---|---|
| Rogers (1962) | Diffusion of Innovation | Relative advantage, compatibility, complexity, trialability, & observability |
| Ajzen & Fishbein (1975) | The Theory of Reasoned Action | Attitude, subjective norm, & intention |
| Ajzen (1985) | Theory of Planned Behavior | Attitude, subjective norm, & perceived behavioral control |
| Davis (1986) | The Technology Acceptance Model | Perceived usefulness & perceived ease of use |

**Factors influencing the adoption of Web applications (The Study Model).**
Many studies investigated the adoption of Web applications based on the pre-mentioned theories and models of predicting human behavior and revealed several factors leading to such adoption. Examples of these studies are listed in Table 2 (Ajjan & Hartshorne, 2008; Aladwani, 2011; Dwivedi et al., 2011; Guo & Stevens, 2011; Corrocher, 2011; Ceccucci, Peslak & Sendall, 2010; Orehovacki et al., 2009; Ulrich & Karvonen, 2011). Literature revealed factors significant in predicting adoption of technology such as knowledge and experience of Web applications, perceived ease-of use, and perceived usefulness (Ajjan and Hartshorne, 2008; Brown, 2012; Corrocher, 2011; Dwivedi et al., 2011; Guo and Stevens, 2011; Ulrich and Karvonen, 2011).

Table 2: Studies which Investigated Adoption of Web Applications

| Study | Examined Factors | Outcome | Model used |
|---|---|---|---|
| Ajjan & Hartshorne (2008) | Attitude<br>Perceived behavioral control<br>Subjective norm | Intention to use Web applications and actual use | The decomposed theory of planned behavior |
| Aladwani (2011) | Age<br>Training<br>Web applications attitudes<br>Gender | Acceptance of Web applications | Technology Acceptance Model |
| Corrocher (2011) | The users' characteristics<br>The technological features. | Intensive usage of Web applications | Diffusion of Innovation Model with Technology Acceptance Model |
| Dwivedi et al., (2011) | Perceived Ease-of use and Usefulness | Behavioral intentions to use Web applications | Technology Acceptance Model |
| Guo & Stevens (2011) | Prior experience<br>Perceived usefulness<br>Perceived ease of access to technology | Using wiki | Technology Acceptance Model |
| Orehovacki et al., (2009) | Personal characteristics<br>Types of online activities<br>Motivation | Use of Web applications | Technology Acceptance Model |
| Shin (2010) | Trust | Use Web applications | Social Network Services Model (proposed model) |
| Ulrich & | Attitude related to learner self- | Interest, | Technology Acceptance |

| | | | | |
|---|---|---|---|---|
| Karvonen (2011) | direction, instructional innovativeness; knowledge, conditions | Attitude toward technology and Interest, and contextual | Intention, Use of Web applications | Model |

The implementation of Web applications in teaching "requires faculty understanding and endorsement of the pedagogical use of Web 2.0 applications" (Ulrich & Karvonen, 2011, p. 207). Perceived pedagogical support is suggested as a factor that influences the faculty decision to use Web application in their teaching. The adoption of Web applications in teaching and learning, as with the adoption of any new technology, involves risk (Corrocher, 2011). The perceived risk factor is suggested as another influence to decisions about using such tools.

Colleagues' influence in using technology cannot be ignored. "Individuals who perceive that others expect that they should use the system will have a high score on intentions to use the system, even when they may personally not feel positive about the system" (Teo, 2009, p. 93). Based on what has been presented, the framework in Figure 1 is suggested.

What the model suggests is that faculty can use Web applications in their classrooms if they know about them, have experienced using them personally and their colleagues' influence. Since most these proposed factors fit in the three categories that Corrocher (2011) suggested "when studying individual choices of technology adoption, the literature generally focuses on three sets of determinants:
adopters' characteristics, features of the social environment, and attributes of the technology" p. 548).

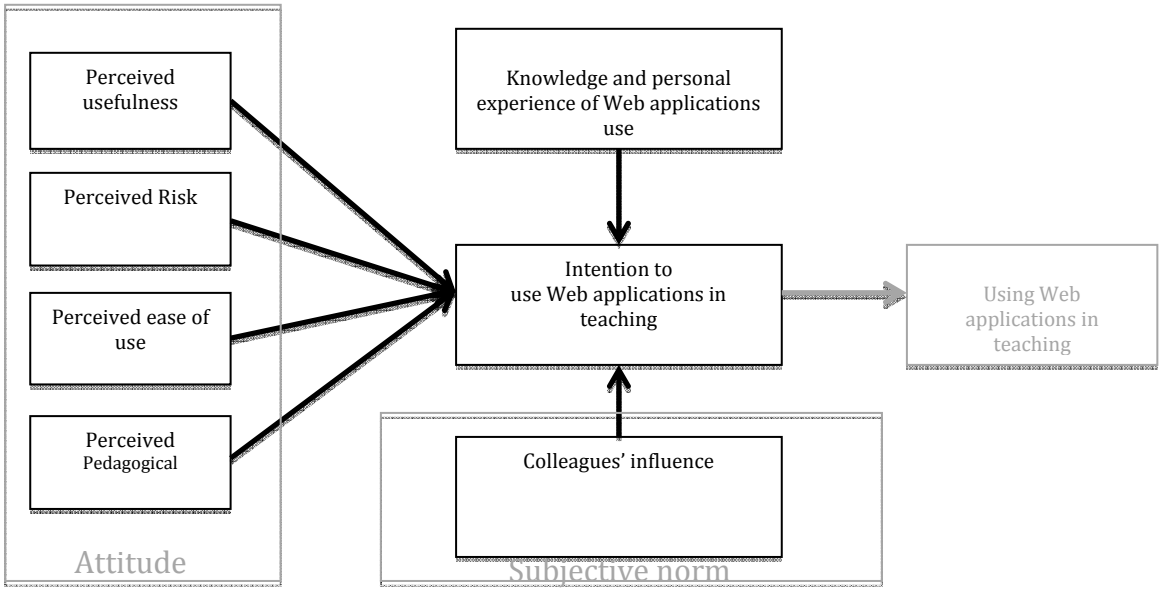


*Figure 1.* The study model to be used in this research.

**Adopters' characteristics.** While they are essential to understanding individuals' decisions of acceptance technology (Venkatesh, Morris, Davis & Davis, 2003), "scanty attention has been paid to study personal determinants of Web 2.0 usage" (Aladwani, 2011, p. 483). Age and gender, for example, have been found to be essential influences in adopting a new technology (Gribbins et al., 2007).

***Age***. Users of different ages have different aims in using technology. Corrocher (2011) found that age affected the use of Web applications. For example, older users (lower than 30) used social bookmarking more than did younger users (more than 30) who use the social network services significantly more for sharing materials with friends as well as for fun. Corrocher explained, "social bookmarking services are likely to be more popular among relatively older people, as these services entail a certain degree of job-related usefulness" (p. 554).

***Gender.*** Gender is always expected to affect the social communication behavior (Chai et al., 2011). Even though gender differences have diminished in the use of technology (Heemskerk et al., 2009) it is recommended that gender difference be included when studying the use of technology in education (Selwyn, 2007). Huang,

Hood, and Yoo (2013) found results supporting Selwyn's claim as they found significant difference between males and females in their perceptions toward Web applications when used for learning.

Other studies found no gender difference when using Web applications. Top, Yukselturk and Cakir (2011) examined gender differences in educators' use of Web applications with respect to specific elements such as actual use, perceived ease of use and usefulness, attitude, self-efficacy, compatibility, and perceived behavioral control. They found no significant difference between female and male K-12 teachers in their use of Web applications. Aladwani (2011), in his study of the personal determinates of the use of Web applications, found that gender has no effect on either the attitude or the use of Web applications. Huang et al. (2013) suggested that the gender differences diminishment might be contributed to certain Web applications features.

***Knowledge and experience***. Ulrich and Karvonen (2011) found that the knowledge of Web applications was significant in predicting the instructors' intention to use these applications in education, which in turn significantly influenced the instructors' interest in using Web applications as a learning tool. Brown (2012) found that participants who made frequent use of Web applications and for different purposes are seeing Web applications as tools to distribute learning materials and to enhance the active role of the learner. Greater use of these tools for different purposes, Brown explained, prompts better understanding of the tools' characteristics and, accordingly, their potential in learning. Corrocher (2011) also found that the users' experience of some of Web applications played an important role in the intensity of using them.

**Attributes of the technology.**

***Perceived usefulness*** refers to "the belief that using technology will enhance performance" (Taylor & Todd, 1995, p. 148). Perceived usefulness was one of two factors that Davis (1989) proposed as predictors to the attitude toward computer usage. Several studies reviewed by Grunwald (2002), intended to examine the impact of perceived usefulness as well as other different factors on the intention to use technology, have found that perceived usefulness is a strong predictor of intention. Corrocher (2011) argued that usefulness is one of the factors associated with the intensity of using technology.

The perceived usefulness of technology can refer to its usefulness for educators themselves as well as for their students. Ajjan and Hartshorne (2008) conducted a study to examine faculty's awareness of the advantages of using a Web application in learning and to understand the influences of such use. They found that perceived usefulness was a significant factor in predicting the attitude toward using the Web application. Another study by Dwivedi et al. (2011) was intended to examine the factors that influence users in general to adopt Web applications found that the perceived usefulness was a significant predictor of the user's intention to use Web applications, which in turn is a significant predictor of the behavioral intentions to use Web applications.

***Perceived ease of use*** refers to "the belief that the use of the new technology will be free of effort" (Taylor & Todd, 1995, p. 148). Corrocher (2011) defined ease of use as "the extent to which an innovation is perceived as relatively difficult to understand and use -its complexity or perceived difficulty of use-" (p. 548). By reviewing several studies intended to examine the impact of ease of use as well as other factors in the intent to use technology, Grunwald (2002) found that the perceived ease of use factor was significant.

While the ease of use positively affects the use of any technology, the "complexity does not only influence the adoption decision, but it also negatively affects the use of the technology after its adoption, by hampering the complete use or assimilation of the new technology" (Corrocher, 2011, p. 548). Corrocher explained that implementing complex technology involves a great effort to learn the necessary knowledge at the individual level as well as the organizational level.In regard to the use of Web applications in learning, Ajjan and Hartshorne (2008) found that ease of use was a significant predictor of the faculty attitudes toward using Web applications in learning. Dwivedi et al. (2011) found it a significant factor to predict the user's intention to use Web applications and accordingly a significant predictor of the actual use of Web applications

***Perceived Risk.*** Several studies have focused on the perceived risk when using Web applications, "with the idea that the adoption of a new product (new technology) is a risky decision because there might be undesirable consequences of the adoption related to the disruption of consumers' existing routines and to possible conflict with existing beliefs" (Corrocher, 2011, p. 549). Examples of undesirable consequences in the context of using Web applications in teaching and learning are exposing students' private information to the public, low quality of the learning materials that created by students, privacy or unreliable assessment instruments.

***Perceived pedagogical support.*** Veen (1993) found that the stronger factor that drove educators to use technology was their beliefs in regard to how technology supports their pedagogical strategy. Perceiving Web

applications as tools that support the new trends of learning can influence the faculty decision to adopt those applications in their teaching. Considering the impacts of Web applications on learning and, consequently on the practice of pedagogy, is critical (Duffy, 2007). The old way of teaching was presentation-driven where the information was presented and then tested (Solomon & Schrum, 2007). Web applications require an approach that considers learning as building knowledge through understanding, sharing, discussing, and giving feedback. The use of Web applications in education needs a supporting culture of student participation in content-creation (McLoughlin & Lee, 2007).

***Social environment (Colleagues' influence)***

The subjective norm was identified, by Ajzen and Fishbein (1975), as one of two elements that influence the behavioral intention in the theory of reasoned action. Subjective norm "refers to the perceived social pressure to perform or not perform the behavior" (Ajzen, 1991, p. 188). Rogers (1995) implied that social pressure is an influence to use the technology when describing the early adopters as they were driven by social prestige.

Educators' decision to use technology, as Teo (2009) found, is significantly influenced by the "expectations they feel the important 'others' have on them regarding the use of technology" (p. 103). "Applied to faculty use of Web 2.0, subjective norms will reflect the faculty's perception of whether their behavior is encouraged and accepted within their circle of influence" (Ajjan & Hartshorne, 2008, p. 74). Brown (2012) found evidence of the influence of colleagues on the academics' perceptions of Web as a learning tool. Peers' encouragement is important in shaping the attitude toward a technology, especially when the adopters have little experience at the early stage of the adopting (Guo and Stevens, 2011). Marcinkiewicz and Regstad (1996) explained the impact of such pressure is that the educators "would feel out of line by not using computers for teaching" (p. 31).

## METHODOLOGY

The study can be described as a relational one as it examines the variation in predictors and outcomes to find out whether they are associated.

### The Research Hypotheses

It is expected that the knowledge and personal experience of Web applications (KPE), perceived usefulness (PU), perceived ease-of use (PE), perceived pedagogical support (PPS), perceived risk (PR), and colleagues' influence (CI) are significant predictors of the faculty's intention to use Web applications in teaching (Ajjan & Hartshorne, 2008; Brown, 2012; Corrocher, 2011;Dwivedi et al., 2011; Duffy, 2007; Guo & Stevens, 2011; McLoughlin & Lee, 2007; Teo 2009; Ulrich & Karvonen 2011). As a result, entering them as a second step when using a hierarchical regression is expected to change $R^2$ significantly. In order to answer the research questions and test the model, the following hypotheses have been proposed.

$H_{01}$: The gender and age are not significant in predicting the faculty's intention to use Web applications in teaching (IU).

$H_{a1}$: The gender and age are significant in predicting the faculty's intention to use Web applications in teaching (IU).

$H_{02}$: The change in $R^2$ from model 1 to model 2 = 0, when using a hierarchical regression entering gender and age first as a group and next entering the six predictors as a group.

$H_{a2}$: The change in $R^2$ from model 1 to model 2 $\neq$ 0.

### Instrumentation

The questionnaire includes four parts (Appendix A). Part 1 collects demographic information such as gender, age, and rank. Part 2: has close-ended questions to collect data about the usage of Web applications personally, for teaching, and in the future. Part 3 contains 31 close-ended items using a four-point Likert-Scale to examine the influence of five factors (perceived usefulness, ease of use, risk, pedagogical support, and the colleagues' influence, on the decision to use Web applications in teaching. Part 4 allows for participant comments.

### The Population

The target population of the study were faculty, males and females, full-time tenure track, non-tenured assistant, associate, and full professors as well as adjunct and/or instructor ranks, currently teaching undergraduate courses in the teacher education department in the colleges of education at universities in the United States

### The Sample

**Sample size**. Because developing a prediction model is a concern in this study, the Precision Efficacy Analysis for Regression (PEAR) was selected to determine "the smallest sample that will provide the reliability of results required across multiple samples" (Brooks & Barcikowski, 2012, p. 1). PEAR requires an expected effect size as well as precision efficacy to be determined a priori. In the multiple regression studies, the effect size can be the

squared multiple correlation $R^2$ (Brooks & Barcikowski). Precision efficacy (PEf) refers to "how well a regression model is expected to perform when applied to future subjects relative to its effectiveness in the derivation sample" (Brooks & Barcikowski, 2012, p. 5). Literature was lax in providing a decent estimate of the $R^2$ of the combination of the proposed variables in this study, so the multiple regression using a hierarchical method was run to the pilot study. The adjusted $R^2$ was .725. Applying the PEAR using $R^2$ = .30, and PEf = .80 with nine variables (eight predictors and one dependent variable) the smallest sample size required for this study equaled 22.2 * 9 ≈200.

**Sampling**. After obtaining all the official required consent forms to contact the faculty and conduct the study, a list of all universities in United States that have colleges of education was obtained from univsource.com. (http://www.univsource.com/ed.htm). A proportional stratified sampling was used. Table 3 presents the number of potential participants from each region (West, Midwest, South and Northeast). For each region, the following steps were followed:

1. The universities were ordered alphabetically and assigned an integer number
2. Using the Randomizer.org website, http://www.randomizer.org ten random integer numbers were generated.
3. The universities that correspond to these random numbers were included in the sample.
4. A cluster sample then was used in which all faculty in the teacher education department in these universities were included as potential participants and their email addresses were obtained.
5. Steps 2-4 were repeated until the target number of potential participants in Table 3 is reached.

Table 3: Proportional Stratified Sampling

| Region | Number of universities | | Number of potential participants | |
|---|---|---|---|---|
| | N | % | N | % |
| West | 68 | 19 | 380 | 19 |
| Midwest | 88 | 25 | 500 | 25 |
| South | 153 | 43 | 860 | 43 |
| Northeast | 48 | 13 | 260 | 13 |
| Total | 357 | 100 | 2000 | 100 |

The first and last names of the faculty were obtained from the university websites for the purpose of sending personal invitations to participate in the online survey. Heerwegh (2005) found that the response rate increased by 7.8% if personalized email invitations to an online survey were used.

**Data Collection Procedure**

"Online survey enables researchers to reach out to a large number of respondents within a short period of time and with minimal cost" (Dwivedi et al., 2011, p. 3). After obtaining IRB approval, a personal email invitation using the first and last names of each faculty member, including a link to the online survey and inviting recipients to participate, was sent to the potential participants. The email explained the purpose and benefit of conducting the study. Faculty were asked to voluntarily participate in completing the online survey and were informed that clicking on the survey link signaled their agreement to participate. They were assured that they could quit any time with no negative effect to themselves. A week after sending the email invitation, the number of participants was 133, a response rate of 6.65%. A week later, a reminder email was sent to the potential participants after removing those who had already replied which increased the number of participations to 249, with a response rate of 12%. This satisfies the minimum number (200) required to run a multiple regression that was calculated using the PEAR method. The survey was closed and the data were downloaded as a SPSS file form on the Qualtrics website.

**Data Analysis Procedures**

Statistical Package for the Social Sciences (SPSS), version 20, was used to analyze the data. For each positive item, a participant gained one point if he or she strongly disagreed with the item, two points for disagreeing, three points for agreeing and four points for strongly agreeing. For each negative item the order was reversed (four points for strongly disagree to one point for strongly agree). Item analysis included computing two sets of statistics for each item, as recommended by Mueller (1986) " (1) percentage of respondents making each response, [and] (2) item mean and standard deviation" (p. 13), as well as Cronbach's Alpha Coefficient for the internal consistency for each factor.

To answer the research questions, a hierarchical method of multiple regression was used. The hierarchical regression is used when "the focus is on the change in predictability associated with predictor variables entered later in the analysis over and above that contributed by predictor variables entered earlier in the analysis"

(Petrocelli, 2003, p. 9). The variables that were entered earlier or covariate were age and gender while the variables that were entered later were knowledge about Web applications, perceived usefulness, perceived ease of use, perceived risk, perceived pedagogical support, and colleagues' influence.

## RESULTS

### Demographic Findings

Of the 249 participants who completed the survey, 175 (70%) were females and 74 (30%) were males. There were 46 (19%) professors, 78 (31%) associate professors, 78 (31%) assistant professors, 27 (11%) instructors, and 20 (8%) from other categories such as lecturers, adjunct or visiting faculty. Broken down by race, most of the participants were White/ Caucasian 198 (80%); 31 (13%) were Black/ African American; seven (3%) were Hispanic; nine (4%) were Asian/Pacific Islander; two (1%) were Arabic/Middle Eastern and only one (.4%) participant was Native American Indian.

The participants' ages ranged from 23 to 75, with a mean average of 50 (SD = 11). Two hundred twenty-four (90%) of the participants were full-time faculty while 25 (10%) were part-time; 180 (72%) were tenure-track faculty while 69 (28%) were not.

### Reliability of Instrument.

The instrument used to collect the data included eight constructs in addition to the demographic data and the open-ended questions. Cronbach's Alpha was calculated for each construct to ensure the reliability of the instrument. Cronbach's Alpha values ranged from .7 to .9, raising no concerns about the reliability of the variables. Table 4 presents the Cronbach's Alpha for each construct of the questionnaire, the number of items in each construct and the mean of the construct.

Table 4: *Cronbach's Alpha for Each Construct of the Questionnaire*

| Construct | Cronbach's Alpha | Number of Items | The mean of the construct |
|---|---|---|---|
| Knowledge and personal experience (KPE) | .780 | 8 | 2.81/5 |
| Using Web applications in teaching (USE) | .841 | 8 | 2.16/5 |
| Intention to use Web applications (IU) | .856 | 8 | 2.95/5 |
| Perceived Usefulness (PU) | .923 | 6 | 3.15/4 |
| Perceived Ease of Use (PE) | .712 | 6 | 2.78/4 |
| Perceived Risk (PR) | .667 | 5 | 2.29/4 |
| Perceived Pedagogical Support (PPS) | .931 | 7 | 2.93/4 |
| Colleagues' Influence (CI) | .793 | 7 | 2.82/4 |

### Results for Hierarchical Regression.

The faculty's intention to use Web applications in their teaching was predicted from the following variables: Age, gender, knowledge and experience of Web application, perceived ease-of use, perceived usefulness, perceived pedagogical support, perceived risk, and colleagues' influence. The total N for this analysis = 249 Hierarchical multiple regression was performed in which the age and gender variables were entered in the first step. In the second step the remaining variables were entered together. Results are shown in Table 5 and Table 6.

In step 1, the regression, including age and gender, was not significant $R^2 = .003$, $F(2,246)= .235$, $P> .05$. This result means gender and age are not significant predictors of the faculty's intention to use Web applications in their teaching. The first null hypothesis was accepted.

$H_{01}$: Gender and age are not significant in predicting the faculty's intention to use Web applications in teaching (IU).

In step 2, the overall regression, including all eight variables, was significant. $R= .779$, $R^2 = .639$, adjusted $R^2 = .627$. $F (6,240) = 53.0$, $P< .05$. The $R^2$ change = .637 which was significantly different from zero. The second null hypothesis was rejected.

$H_{02}$: The change in $R^2$ from model 1 to model 2 = 0, when using a hierarchical regression entering gender and age first as a group and next entering the six predictors as a group.

Table 5: Multiple Regression : Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .056[a] | .003 | -.005 | .88908 | .003 | .381 | 2 | 242 | .684 |
| 2 | .814[b] | .663 | .651 | .52378 | .659 | 76.879 | 6 | 236 | .000 |

a. Predictors: (Constant), Age in years, Gender
b. Predictors: (Constant), Age in years, Gender, KPE, PR, CI, PPS, PE, PU
c. Dependent Variable: IU

Table 6: Multiple Regression : Coefficients

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | |
|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part |
| 1 | (Constant) | 2.720 | .350 | | 7.771 | .000 | | | |
| | Gender | .073 | .126 | .037 | .582 | .561 | .035 | .037 | .037 |
| | Age in years | .002 | .005 | .026 | .401 | .689 | .023 | .026 | .026 |
| 2 | (Constant) | -.393 | .441 | | -.891 | .374 | | | |
| | Gender | .025 | .078 | .013 | .318 | .751 | .035 | .021 | .012 |
| | Age in years | 000 | .003 | .001 | .028 | .978 | .023 | .002 | .001 |
| | KPE | .571 | .056 | .533 | 10.210 | .000 | .749 | .550 | .396 |
| | PU | .615 | .146 | .376 | 4.201 | .000 | .673 | .262 | .163 |
| | CI | -.063 | .095 | -.028 | -.661 | .509 | .247 | -.043 | -.026 |
| | PPS | -.062 | .137 | -.039 | -.454 | .650 | .616 | -.029 | -.018 |
| | PR | -.018 | .086 | -.009 | -.209 | .835 | -.169 | -.013 | -.008 |
| | PE | .055 | .104 | .029 | .527 | .599 | .530 | .034 | .020 |

a. Dependent Variable: IU

**DISUCSSIONS**

The result of the hierarchical multiple regression showed that the faculty's intention to use Web applications in their teaching can be predicted quite well from the set of these eight variables. Approximately 70% of the variance in the scores of the faculty's intentions to use Web applications was accounted for by the regression. R= .779 $R^2$ = .639, adjusted $R^2$ = .627. F (6,240) = 53.0, P< .05. The $R^2$ change = .637 was significantly different form zero. Only two predictors out of the eight tested in the model were significant in predicting faculty intent to use Web applications in teaching. The first significant predictor was knowledge and personal experience in using Web applications (KPE). This finding agrees with previous studies that knowledge about Web applications influences using them (Brown, 2012; Corrocher, 2011; Guo & Stevens, 2011; Teo, 2009; Ulrich & Karvonen, 2011).

The second significant predictor was perceived usefulness of Web applications in teaching (PU). This result was consistent with prior studies that found PU to be significant in predicting the intention to use technology in general (Corrocher, 2011; Grunwald, 2002) and use Web applications in particular (Ajjan & Hartshorne, 2008; Dwivedi et al., 2011; Guo & Stevens, 2011).

Even though previous research showed that the younger users were in general more involved in using Web applications (Corrocher, 2011; Kearns & Frey, 2010), this study did not reveal any age effect on the knowledge and personal experience of Web applications, the use of Web applications in teaching, and the intention to use such applications in teaching in the future (bivariate regression was performed three times to test the predictability of age on all theses three variables). This finding did not agree with the previous research, which revealed age differences in using technology (Aladwani, 2001; Corrocher, 2011; Kearns & Frey, 2010). What might explain such disagreement could be related to the voluntary aspect of participating in the study. Out of 2000 recipients of the online questionnaire, only 249 agreed to participate. It might be that only those who were interested in Web applications and their usage in education, despite the variance of their ages, chose to participate. The high mean of the perceived usefulness (M= 3.15/4) might supports such explanation.

Selwyn (2007) recommended including gender differences when studying the use of technology in education. Huang, Hood, and Yoo (2013) found significant differences between males and females in their perceptions of

Web applications when used for learning. The result of this study revealed no gender difference between males and females in their knowledge and experience of Web applications, using such applications in their teaching, their intention to use them in the future, their perceived usefulness, ease of use, pedagogical support, risk, or colleagues' influence on them. This finding is consistent with other research which claimed gender differences have diminished in the use of technology in general (Lucas, 2002; Heemskerk at el., 2009) or in using Web applications in particular (Aladwani, 2011, Huang et al., 2013; Top et al., 2011).

**Final model.** The researcher elected to remove the non-significant predictors from the final model because the aim was to find a model that reliably predicts the IU and not to explore how the suggested predictors perform. The significant predictors best describe the prediction need. To ensure that such decision will not cause any shrinking in the overall fit of the model values as well as the model parameters, a multiple regression including only the significant predictors was preformed and the results seemed identical. The final model is

IU'= -.4 + .571 KPE+ .62 PU

Where IU: faculty intention to use Web applications in their teaching.
KPE: faculty knowledge and personal experience of Web applications.
PU: faculty perception of the usefulness of Web applications in teaching.

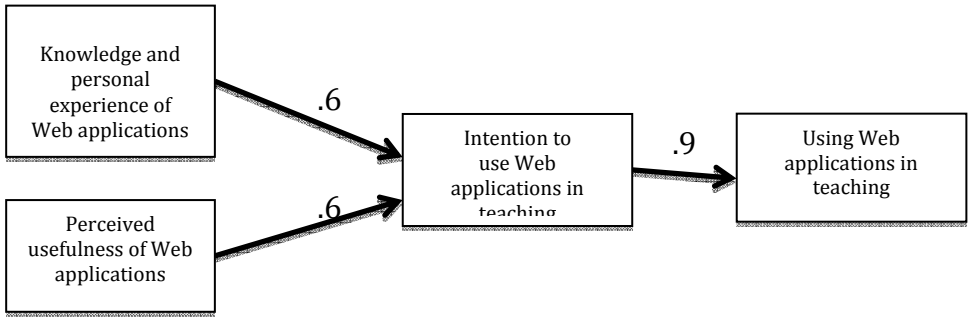


*Figure 2.* The final model.

The participants' comments revealed some barriers such as lack of motivation or time to learn about these applications, and ethical and technical issues prevent faculty from using Web applications in teaching. Some comments emphasize the need for training in the use of Web applications, while other comments revealed the faculty's positive attitude toward using Web applications in teaching; few comments revealed the opposite.

## CONSLUSION

The result of the study showed an acceptable level of using Web applications in the pre-service teachers programs at the colleges of education in American universities. It revealed that the faculty currently teaching in theses program are knowledgeable of and have experience in using Web applications and even intend to implement them more in their teaching in the future. The faculty are aware of the applications, pedagogical value and usefulness and perceive the peers' encouragement to use Web applications. They are aware of the risks involved in using such applications but they do not prevent faculty from continuing to incorporate them in their teaching.

Faculty knowledge and experience of Web applications and their perception of the usefulness of such applications are significant predictors of faculty intention to use Web applications in teaching which, in turn, is a strong predictor to their actual use. The more faculty know about and experience Web applications and the more they perceive these applications to be useful the greater their intention to use these applications. This result implies the importance of raising faculty awareness of the usefulness and power of these applications in education and of training faculty through professional development sessions to implement such applications in their teaching.

Overall, the suggested model predicted the faculty intention to use Web applications using eight predictors: Age, gender, perceived usefulness, perceived ease of use, perceived risk, perceived pedagogical support, and colleague influence. Seventy percent of the variance in the scores of the faculty's intentions to use Web applications was accounted for by the regression.

## RECOMMENDATIONS

1. The results revealed that the faculty at colleges of education in American universities implement Web applications in their teaching. This findings led to question whether that is the case at all colleges or only at colleges of education. This study recommends conducting a study to assess the use of Web applications among different disciplines in American universities.
2. This study found that knowledge and experience and perceived usefulness of Web applications are significant predictors of the intention to use Web applications while the colleagues' influence was a significant predictor to both knowledge and experience and perceived usefulness. It is recommended that a study be conducted to test the following model:

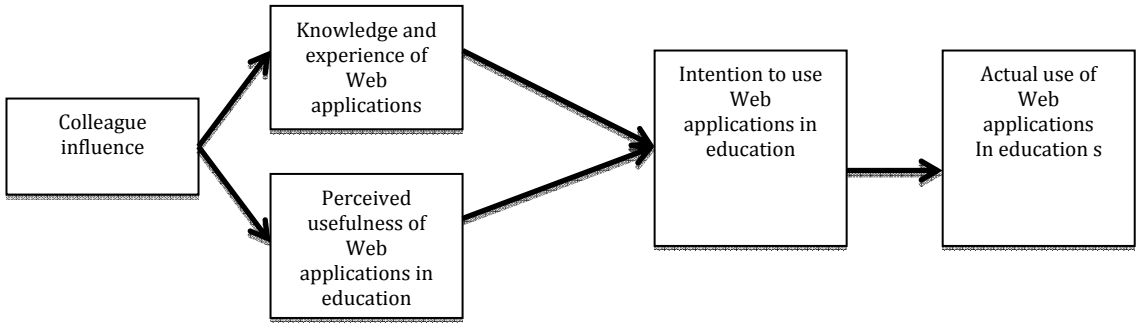


*Figure 3* Suggested model to be investigated

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**Appendix A: The Questionnaire**

Part A: Demographic Questions
Please provide the following demographic information:
**Gender** □ Male □ Female
**Age in years?**
**Race/ Ethnicity**
□ White / Caucasian
□ Black / African American
□ Hispanic
□ Asian / Pacific Islander
□ Arabic / Middle Eastern
□ Native American Indian
**Are you full-time?** □Yes □ No
**Are you tenure-track?** □Yes □ No
**Rank** □ Professor □ Associate professor
□ Assistant professor □ Instructor
□ Other ( )

**Department**
□ Education, General
□ Education, Other
□ Elementary and/or Early Education
□ Foreign Language Education
□ Middle School and/ or Junior High Education
□ Science Education
□ Math Education
□ Special Education
□ Secondary Education and/ or adolescent and young adult
□ Other ( )

**Part B.1: Knowledge and experience**

Please select the answer that best reflects your **personal use** of each Web application. If you use other Web applications please add them and include how often you use them.

| Web applications | Always | Usually | Sometimes | Seldom | Never |
|---|---|---|---|---|---|
| Collaborating Applications (e.g. Wiki, ThinkQuest, and Mindmap) | | | | | |
| Personal Publishing platform (e.g. Blog and WordPress) | | | | | |
| Video, audio and photo sharing (e.g. YouTube, Podcast and Flickers) | | | | | |
| Social media sites (e.g. Facebook and Twitter) | | | | | |
| Web-based office (e.g. Google Calendar and Google Documents) | | | | | |
| Digital cloud storage (icloud, Google drive, or Dropbox) | | | | | |
| Video conference (e.g. Skype and Adobe Connect Pro) | | | | | |
| Open source course management system (e.g. Moodle and Drupal) | | | | | |
| | | | | | |
| | | | | | |

B.2: Current use of Web application in teaching

Please select the answer that best reflects the use of each Web application in **your teaching.** If you use other applications of the Web, please add them and include how often you use them.

| Web Applications | Always | Usually | Sometimes | Seldom | Never |
|---|---|---|---|---|---|
| Collaborating Applications (e.g. Wiki, ThinkQuest, and Mindmap) | | | | | |
| Personal Publishing platform (e.g. Blog and WordPress) | | | | | |
| Video, audio and photo sharing (e.g. YouTube, Podcast and Flickers) | | | | | |
| Social media sites (e.g. Facebook and Twitter) | | | | | |
| Web-based office (e.g. Google Calendar and Google Documents) | | | | | |
| Digital cloud storage (icloud, Google drive, or Dropbox) | | | | | |
| Video conference (e.g. Skype and Adobe Connect Pro) | | | | | |
| Open source course management system (e.g. Moodle and Drupal) | | | | | |
| | | | | | |
| | | | | | |

B.3: Intention to use Web application in teaching
In the future, I (intend / will continue) to use the following Web applications. If you intend to use other applications of the Web, please add them and include how often you would like to use them.

| | Always | Usually | Sometimes | Seldom | Never |
|---|---|---|---|---|---|
| Collaborating Applications (e.g. Wiki, ThinkQuest, and Mindmap) | | | | | |
| Personal Publishing platform (e.g. Blog and WordPress) | | | | | |
| Video, audio and photo sharing (e.g. YouTube, Podcast and Flickers) | | | | | |
| Social media sites (e.g. Facebook and Twitter) | | | | | |
| Web-based office (e.g. Google Calendar and Google Documents) | | | | | |
| Digital cloud storage (icloud, Google drive, or Dropbox) | | | | | |
| Video conference (e.g. Skype and Adobe Connect Pro) | | | | | |
| Open source course management system (e.g. Moodle and Drupal) | | | | | |

Part C: Factors that influence the use of Web application in teaching
Please select the response that best reflects your position toward the following items about using Web application in education. (SA means Strongly Agree; A means Agree; D means Disagree; and SD means Strongly Disagree).

| | | Items | SA | A | D | SD |
|---|---|---|---|---|---|---|
| Perceived usefulness | 1 | I believe using Web applications in my teaching will enhance my students' learning. | | | | |
| | 2 | I believe incorporating Web applications in my teaching will help me improve my technical skills. | | | | |
| | 3 | I believe using Web applications in my classroom will facilitate learning. | | | | |
| | 4 | I believe using Web applications in my classroom will motivate my students to learn. | | | | |
| | 5 | I believe using Web in my classroom is useful for my students. | | | | |
| | 6 | I believe using Web in my classroom is useful for me. | | | | |
| Perceived ease-of-use | 7 | I believe that I can easily use Web applications in my classroom. | | | | |
| | 8 | I believe that my students can use Web applications easily. | | | | |
| | 9 | I believe that there are many ways to incorporate Web tools in the learning activities in my classroom. | | | | |
| | 10 | I believe that Web applications require advanced technical skills to be used easily.(N) | | | | |
| | 11 | I believe I need training on using Web applications in my classroom.(N) | | | | |
| | 12 | I believe that I can easily implement Web applications in my classroom in a pedagogical manner. | | | | |
| Perceived risk | 13 | I believe using Web applications in my classroom will raise the concern of exposing the students' information to the public. | | | | |
| | 14 | I believe when using Web applications for assignments, students might misuse their peers' contributions. | | | | |
| | 15 | I believe that when using Web applications in my classroom, some students might gain access to their peers' private information by watching them typing their passwords. | | | | |
| | 16 | I believe using Web applications in my classroom will increase my workload. | | | | |
| | 17 | I believe it is difficult to assess students' learning when using Web applications for learning activities. | | | | |
| Colleagues' influence | 18 | I believe that some of my colleagues are using Web applications in their teaching. | | | | |
| | 19 | I believe my colleagues are skilled in using Web applications. | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 20 | I believe that some of my colleagues are using Web applications for personal uses. | | | | |
| | 21 | I believe that my colleagues will in the future use Web applications in their classrooms. | | | | |
| | 22 | I believe that my colleagues expect me to use Web applications in my classroom. | | | | |
| | 23 | I believe that my colleagues would think that using Web applications in my classroom is useful. | | | | |
| | 24 | I believe that my colleagues would think that it is easy to use Web applications in my classroom. | | | | |
| Perceived pedagogical support | 25 | I believe that the use of Web applications in my classroom will help my students to construct their learning. | | | | |
| | 26 | I believe that the use of Web applications in my classroom will support learner-centered learning. | | | | |
| | 27 | I believe that the use of Web applications in my classroom will help me to apply collaborative learning. | | | | |
| | 28 | I believe that the use of Web applications in my classroom will help my students develop high-order thinking skills. | | | | |
| | 29 | I believe that the use of Web applications in my classroom will allow students to create the content of their learning. | | | | |
| | 30 | I believe that the use of Web applications in my classroom will place my students in the center of the learning process. | | | | |
| | 31 | I believe that the use of Web applications in my classroom will give my students an active role in constructing their learning. | | | | |

Part D: Comments

**How would you describe your teaching philosophy?**

.....

**Please provide any comments in regard to the use of Web applications in your teaching.**

.....

# Online Video for Self-Directed Learning in Digital Animation

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## ABSTRACT
Video is a preferred medium of instruction over other media for learning about digital animation. However, there is lack of understanding of how and why students use video instructions for learning digital animation. The purpose of this study is to explore how learners use online videos for learning from the perspectives of Uses and Gratification Theory and Cognitive Theory of Multimedia Learning. Twenty final year students enrolled in Digital Animation programmes in Klang Valley, Malaysia participated in focus group discussions to share their thoughts and experience of online videos for self-directed learning. Through thematic analysis, the students voiced dependency on online videos especially for skill mastery, ideas, and inspiration. The process of how online videos were used for self-directed learning was derived from data analysis. The findings also revealed that students gained content and process gratification by using videos but did not gain much gratification socially through online video uses. It was also found that digital and critical literacy skills are required in order to become more effective and efficient in using online videos for learning. The findings of the study would enable educators and media specialists to identify the capabilities and challenges of online video use to maximise its potential to engage learners.

**KEYWORDS:** Online Video; Uses Gratification Theory; Cognitive Theory of Multimedia Learning, Self-directed Learning; Digital Animation.

## INTRODUCTION
In recent years, there is a growth in online video-based learning (Giannakos, 2013) with Massive Open Online Courses (MOOCs) and video sharing platforms opened opportunities for self-directed learning. The breadth and the easy access to video content have made videos an essential and preferred choice for learning. The number of courses and students enrolled in MOOCs have steadily increased over the years (Shah, 2017). YouTube, an online video sharing platform has been voted as the number one tool for learning among Top 200 Tools for Learning in 2016 and 2017 while consistently ranked as the top video-based learning tool from the years 2009 to 2017 (Hart, 2017). Not only online videos are open access and user-friendly, the versatility and up-to-date video content have seen its use as a support for formal and informal learning in various areas of science, medical and health sciences, social sciences, arts and humanities (Kousha, Thelwall, & Abdoli, 2012). The use of online videos in learning is commonly practised to cater to the students' learning styles, to engage learners, to enhance communication, to provide learners with the opportunity for social collaboration and to reflect upon their learning (Cuevas & Kohle, 2012; Jordan, 2012). Learners moreover can access videos through online and mobile technologies enabling ubiquitous access to content and information. The freedom and control offered by online video-based learning platforms create a conducive environment fit for self-directed learning activities.

Video-based learning platforms had become more dominant teaching and learning environments on the Internet (Laaser & Toloza, 2017). The advantage of video learning is also seen in its effectiveness in presenting complex information and processes that are difficult to be presented through a single medium (Mayer & Moreno, 1998). Despite the popularity of video-based learning, there is a lack of understanding in relation to online video technologies especially in the use of online video and its impact of video-sharing technologies among users, groups and communities, as well as the impact of video technology on teaching and learning (Snelson, Rice, & Wyzard, 2012). It would be beneficial if learners are able to maximise the potential of video platforms to engage in self-directed learning activities to achieve learning goals. Therefore, the purpose of the study was to answer the research question of "how and why" students use online video resources to gratify their learning needs.

**Video-Based Learning Opportunities for Digital Animation**

Video is a time-based media containing visual elements frequently combined with other media elements to present content. Video has the characteristics of moving pictures, visualisation with audio support which is very suitable for the studies of digital animation. Studies of digital animation can be viewed from the perspective of technical, creative and principles-led studies that tell stories or messages. Despite so, art and design subjects are generally scarce in MOOCs (Shah, 2017). Nevertheless, digital animation related content is usually accessible on the MOOCs platform shared by partner contributors, e.g. Pixar in a Box by Pixar Animation Studios accessible through the Khan Academy portal. Digital animation content was more often retrieved from video sharing platforms. There are digital animation related learning portals which cater for designers, animators and storytellers such as TheCGBros and Motionographer, which covers content, insights and digital inspiration related to computer graphic imagery and all areas of motion visual design. Software providers and professional tutors whereas created YouTube learning channels (e.g. Adobe® Creative Cloud™, Autodesk 3ds Max Learning Channel) where information and tutorials were reposited to help learners use their tools. Digital animation content frequently contains theoretical knowledge, practical skills and techniques that need to be mastered. For example, principles of animation, behind-the-scenes, and "how to" videos which allowed students to practice while watching the videos (Guo, Kim, & Rubin, 2014; Van Der Meij & Van Der Meij, 2014).

Videos are a preferred medium for learning among digital animation students (Yuen, 2010). Videos appeal to the digital animation students due to their familiarity with the technological and technical aspects of video consumption and production as digital animation is a video genre itself. While videos have been an integral part of teaching and learning in the digital animation context, it could not be presumed that digital animation students are technologically advanced or skilled in using online videos for self-directed learning. Digital animation students like many Digital Learners may struggle to search for information online, struggle to make sense of the information obtained or struggle to vet and integrate online content into their learning (Gallardo-Echenique, Marqués-Molías, Bullen, & Strijbos, 2015). Thus, these skills such as digital literacy and critical literacy which could be taught to the students so they could use online videos more effectively to achieve learning goals.

**Theoretical Perspective of Media Usage for Learning**

Two theoretical perspectives are used to explain the use of video media for learning, the uses and gratification theory and the cognitive theory of multimedia learning as the supporting theory.

***Uses and Gratification Theory for Video-Based Learning***

From the theoretical perspective of uses and gratification theory (U&G theory), users are knowledgeable enough to choose media that will satisfy their needs, allowing for knowledge enhancement, entertainment, social interaction, diversion and escapism (Katz, Blumler, & Gurevitch, 1974; Levy & Windahl, 1985). U&G theory suggests that users are active consumers who have control over their media consumption, and have adequate self-awareness of their media use, interests, and motives to be able to interpret and integrate media into their daily lives (Katz et al., 1974; Levy & Windahl, 1985; Wang, 2014). As this study is focused on learning, the study focused on the uses and gratification of online videos for knowledge enhancement. U&G theory was applied in an educational media perspective where learners consciously choose the medium that could satisfy their learning needs, and they are able to recognise their reasons for making media choices while gaining satisfaction in the media use process. Stafford, Stafford and Schkade (2004) had identified that users could gain three types of gratification through Internet use, which are a) Content gratification (gratification gained from the use of the video e.g. the need for researching or finding specific information), b) Process gratification (gratification gained from the experience of purposeful or random navigating in its functional process), and c) Social gratification (gratification gained when video uses enable the forming and deepening of social ties). Similarly, users would be able to gain these gratifications through online video uses. This study mainly probed into how these three gratification aspects contribute to the students' online video use for learning.

***Cognitive Theory of Multimedia Learning***

Video designs that comply to the Cognitive Theory of Multimedia Learning are generally more engaging, more memorable, and are more effective in presenting complex information and processes compared to text-based or visual-based medium (Mayer, 2005; Mayer & Moreno, 1998). The Cognitive Theory of Multimedia Learning proposes multimedia such as audio and visual elements (words and graphics) facilitate active learning. This theory is strongly related to information processing model, which emphasises how multimedia representation, sensory memory, working memory and long-term memory are interrelated (Mayer, 2005; Mayer & Moreno, 1998). This theory explains the cognitive activities such as selecting words, selecting images, organising words and organising images, and more importantly how these activities (or information) are integrated coherently with the learner's prior knowledge in working memory. This will then lead to the meaning-making process, which is called as learning. The cognitive activities demand a high level of attention and reflection from the learner's

perspective. For example, videos in the multimedia format presented in small chunks with a conversational voice could engage and sustain learners' attention (Mayer, 2005; Mayer & Moreno, 1998). The benefits of learning through video include enhanced motivation and satisfaction (Moreno & Mayer, 2007; O' Shea, Stone, & Delahunty, 2015), and improved retention (Whatley & Ahmad, 2007).

**Interactivity in Multimodal Learning Environments**

The online video learning platform is an interactive and social activity which requires cognitive attention from the learners. Though most activities are focused on consuming videos, users may also participate through user-to-content (indirect) interaction and user-to-user (direct) interaction (Shao, 2009). With a social network account, users can engage in interactivities online to create playlists, tag, annotate, link, comment, search, read comments and review other users' write-ups. These activities are examples of user-to-content interaction. Learning with online videos also allows for user-to-user interactions where users chat and message each other through a social platform. Moreno and Mayer (2007) had derived five main types of interactivity in a multimodal learning environment. Table 1 lists the example of interactions possible within the YouTube platform.

**Table 1:** Example of YouTube interactions and interactivities

| Online video interaction[1] | Type of interactivity activities[2] | Description | YouTube Example |
|---|---|---|---|
| User-to-user | Dialoguing | Learner receives questions and answers or feedback to his/her input | Comments, ratings (like/dislike) |
| User-to-content | Controlling | Learner determines pace and/or order of presentation | Video control (play/pause), scrubbing video, download, subscribe channels (follow), add to, playlist |
| | Manipulating | Learner sets parameters for viewing | Video quality (HD), video viewing options (cinema mode/full screen), caption on/off, speed up/slow down |
| | Searching | Learner finds new content material by entering a query, receiving options, and selecting an option | Search list, sorting options (relevance, view count, ratings, upload date), YouTube recommendation |
| | Navigating | Learner moves to different content areas by selecting from various available information sources | Thumbnails reference, annotations, links, share |

[1] Shao's (2009) categories of online video interaction
[2] Moreno and Mayer's (2007) Interactivity in Multimodal Learning Environments

This variety of interactions offered learners cognitive attention (and also distractions) on video-based learning, which this study probes with a group of digital animation students.

**User-Generated Content and Video**

Learning with online videos has both pros and cons. On the positive side, online videos generally consist of user-generated content that has added knowledge of experienced users and experts as compared to traditional learning videos which are usually professionally created. User-generated content is defined as various kinds of media content publicly made available on the Web that is produced by end-users as Wunsch-Vincent & Vickery (2007) explained reflects a "certain amount of creative effort, created outside of professional routines and practices" (p.4). These videos shared on a social media site are at an advantage compared to other types of online videos (e.g. pay-per-view, video-on-demand) due to the social aspect offered by Web 2.0 technology. On the downside, while heavily dependent on users' participation and contribution, user-generated content sharing sites do not determine the content ownership and depend on users to flag the content as inappropriate before further dispute processes take place (YouTube, n.d.). Online video content especially information or instructional content might be outdated or lack sound instructional design that could confuse the learners. The effective use of these videos is dependent on the digital literacy skills of the users whereas critical literacy is needed to identify trustworthy sources of information, avoid biased content, and integrate divergent thinking into actionable knowledge (Greene, Yu, & Copeland, 2014). Ng (2012) explained that critical literacy involves "critically analyse digital materials in

more depth to understand the underlying meanings in the information" (p.1068). For students who lack critical literacy, the instructors' guidance is needed in facilitating further discussion and critical thinking.

## METHOD

This study employed a qualitative approach to explore how and why students use online videos for self-directed learning. Final year students from three higher learning institutions in Kuala Lumpur, Malaysia offering Digital Animation programmes were invited to participate in the focus group discussions. The advantage of using focus groups for this study is that it offers a more accurate representation of the reasons and occurrence of a topic, as well as conveying participants' beliefs, attitudes and feelings towards a topic that could not be explained by quantitative approaches (Liamputtong, 2011). According to Christensen and Johnson (2013), focus groups are able to provide "in-depth and rich information about participants; worldviews and their personal perspectives and subjective meanings" (p. 429). The focus groups are therefore able to elicit comments from students' "own words" (Serrant-Green, 2007, p. 3) and provided a deeper understanding of the participants' beliefs, behaviours and strategies of online videos use for self-directed learning. Focus groups were used for this study instead of a one-to-one interview was also based on the presumption that students would be more comfortable to divulge information within a group setting rather than feeling intimidated within a setting where the interviewer's attention would be focused on the individual (Billups, 2012).

The participants for this study was aimed at final year students as they were more experienced video users as compared to students in the other years of study. They were also more experienced in creating videos or animations, and have worked or are working on their final year digital animation projects. The final year students were also taken to have common experiences in self-directed learning, especially using online videos for problem-solving. From the invitation to participate, a total of twenty students composing twelve males and eight females voluntarily participated in the study offering their thoughts and experience in using online videos for self-directed learning. The participants were on average 21 years-old. A total of three sessions of focus group discussions were conducted. Each focus group was made up of 6 to 8 participants per institution. The participants were presumed to be from the same group of learners in terms of social and cultural background, knowledge, and the level of education. The researcher personally moderated the focus group discussions assisted by an assistant moderator who was more familiar with the culture and background of the participants.

The FGD was carried out in a semi-structured manner until all of the topics were covered, including additional questions in response to the participants' comments and reactions. During the focus group sessions, the participants were asked questions with the focus on how and why they use video for learning. The students were firstly probed to share their experiences on self-directed learning and moved on to the online videos for self-directed learning. The students answered questions such as "how do you sustain or improve your animation interest?", "What kind of videos do you (look) for?", "what makes a good video?", "Could you share a little on your ways in getting the most out of learning with videos?", "What do you suppose are the problems you would face while learning with videos?" Thematic analysis was used to analyse the discussion data. The steps were guided by Braun and Clarke (2006) such as familiarising with the data; transcribing the verbal data; generating initial codes; searching for themes; reviewing the themes; defining and naming the themes, and lastly reporting the analysis. For thematic analysis, the software called Nvivo was used for the process.

## FINDINGS AND DISCUSSION

Thematic analysis has identified how digital animation students used online video for self-directed learning. While the motivations and barriers of using online video derived from the thematic analysis are explained through the three aspects of gratifications (i.e. process, content, social) obtained through online videos usage. The findings also explained why digital animation students use online video for learning as compared to other medium of instruction as well as the challenges they faced in their pursuit of learning using online videos. The analysis of data has shown an emergence of distinct themes guided by the components of U&G theory and the cognitive theory of multimedia learning. The cognitive activities through the evidence of students' discussions, were also highlighted for each of gratification dimension.

### Video Uses and Process Gratification

The students expressed two main purposes for video use, namely 1) for gaining idea or inspiration and 2) skills mastery. There was an emergent process pattern on how students use online videos for learning as shown in Figure 1. Their process of using online videos for learning is explained from the perspectives of Process Gratification gained from online videos uses, with supporting data were provided under this theme and the subthemes related to the processes.

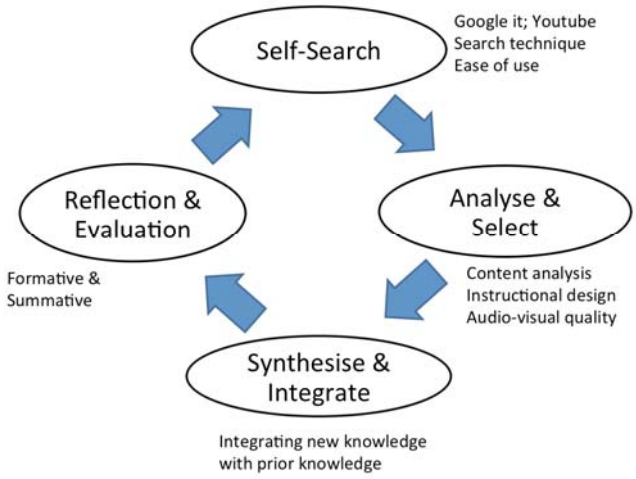


**Figure 1:** Process of using online video by digital animation students

Once the students' learning goal or task was identified, the video learning process starts with searching for suitable video tutorials, analysing and comparing the content of the searched videos, then synthesizing and applying what they learn from the video towards their learning goal or task, and lastly evaluating the learning outcome and obtaining feedback from relevant sources. Overall, digital literacy was warranted throughout the process of using videos for self-directed learning. Digital literacy is "the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others" (Martin, 2006, p. 155). These processes require cognitive abilities as Moreno and Mayer (2007) highlighted in the theory of multimedia learning.

***Self-search***

Digital learners are blessed with a range of digital tools and technologies that they could use for learning (Gallardo-Echenique et al., 2015), but their first self-learning activity was always to search online. They were constantly self-exploring during the search stage, continuously reverting to "search for tutorials online" after consulting with their peers or instructors, quoting Student R, "I take down (notes) on what I have to actually do and look for tutorials". The digital animation students said that they usually employ a random search tactic for video content, asserting that "We don't just stick to one. Sometimes, we just search and pick whatever that comes up" [Student N]. They stated not limiting themselves to what the internet has to offer, mainly using Google and YouTube as their main search engines. Being mostly visual and kinesthetic learners, Student L explained why it must be YouTube, "Because YouTube (…) explains and show examples… You can see how they do and solve the problem" There were a few preferred digital animation channels or portals that the students frequently accessed to get their learning materials which shared the latest content and the "best ones" [Student Z]. They obtained these sites from random searching, and from peers and instructors' recommendations.

In situations where there was no expert, the best way for the students to learn digital animation was to "search online". According to the students, with the internet, they could learn from those beyond their social network. "I don't have any friends that like it, teachers (too)… I just Google… and then I started to get more and more" [Student K]. The internet relieved the students from their dependence on the instructors or peers for learning. Self-critical students too believed that using the internet free them from troubling others. This following quote from Student J which explained the advantage of repeated and revised viewing of online videos:

> Sometimes like, for the individual (also), when we independently learning from the online, take an example for me la, for me, when I learn online I easily understand it. But sometimes when I ask people straight away… eh, how do you do this? After a few days, I forgot already.

The instructors' approach has a strong influence on the way students learn. The students commented that their reliance on the internet was partly due to the instructors' strong encouragement to use the internet. Students said, "the lecturers are part of the Google thing" [Student Z]. According to Student N, even when the students approached instructors for help, "the first thing (the lecturers)'d say like … Did you search for it, did you Google it?"

The *ease of use* of Google and YouTube prompted the following statement from the students: "Because we just need to type the technique we are looking for, it'll list out. So basically it's easy to search on YouTube compared to other internet browsers" [Student S]. According to the students, YouTube content is generally accessible unless internet bandwidth becomes an issue. Students voiced frustration caused by unstable internet connection complaining that the internet is slow, loadings could be "Sitting here forever...at 80%..." [Student R] and worse when the server is down sometimes. Especially for video tutorials, "If we were to watch it in HD, it'll always lag…can't watch it" [Student M]. The main concern of using video for learning is that a fast and stable Internet connection is required for downloading and uploading videos as video formats tend to have a larger file size compared to other online media.

***Analyse and select***

With the long list of content available, while searching, there were basically three tactics students employed to identify video content that is relevant to what they were searching for:- content analysis, reviewing the instructional design and audio-visual quality.

*Content analysis.* While searching for videos on open access site such as YouTube where search lists tend to be long, when asked about how they filter and select the videos, Student B stated, "Those thumbnails (of the video} which are more attractive...I'll click those." Jordan (2012) has stated that the thumbnail image plays a role to grab viewer's attention. Especially searching for idea and inspiration, the thumbnails give some information about the visual design of the video content. Search results are usually sorted according to relevance and could be further sorted into ratings and view counts to speed up filtering process. As for video tutorials, a student added that by reading the users' comments is an effective way to save time and achieve learning objectives. Another student added, "Sometimes it's stated in the comments below how to achieve what in the videos above. Sometimes the tutor might have forgotten to state a few steps...so we can ask them through the comments" [Student M]. Besides referring to users' comments, the students also scrubbed the video. Some of the methods used as they stated were:

- First, we skip through to see the overall solutions. When we find that it's suitable then only we view it again slowly from beginning to end… if we pause and view, we won't understand why the tutor does it the way he does it… we'd watch once and then watch again. [Student A]
- Sometimes we just speed up what he does. [Student K]
- I do while I watch, it's much easier. [Student J]

Students also sometimes download the videos "in case we need to search for it again" [Student X]. But for some of the more advanced and experienced students, they watch the video tutorials as revision while preferred referring to text tutorial as they already know the steps and were only searching for specific information:

> Sometimes I use just both (video and text) I guess. Because sometimes you already know the gist of what you need to do. So, It's like err … What's the settings again? Fast forward, fast forward … Oh, that's the settings, then you do something to the settings. [Student R]

*Instructional design.* After confirming that the content is what they were searching for, the students further compared the instruction design of the videos, to identify which was "easy" to follow in the sense that the instruction was precise and not confusing. The Principles of Instructional Design according to the first four of Gagné (1985) Nine Level (or Event) of Instruction begins with gaining attention, followed by providing a learning objective, stimulate recall of prior knowledge and then present the material with sequencing and chunking the information to avoid cognitive overload (Gagné, Wager, Golas, & Keller, 2005). Students were easily confused when following video tutorials which did not adhere to the Principles of Instructional Design. Student J stated, "It's bad because many steps were skipped…sometimes when they (tutors) made mistakes they don't edit it out". Students were required to 'fill in the blanks' or either will opt for other videos with a clearer instructional design. Therefore, some students preferred live demonstrations from their instructors, Student J further explained:

> Our lecturers would say, I tried it so I won't let you do the same mistakes again. That's the advantage of having lecturers. (Video) tutorials are not, you'll have to follow all the mistakes. You have to think wise. You have to watch carefully and skip what is necessary.

Online video tutorials usually range from a few minutes to an hour or two. The students although preferred shorter and chunked videos, but have stated they would tolerate lengthy videos if it was necessary to go through the details if the content and instructional design was in order. Student M stated, "Even if it's an hour or two-hour video, we'd just watch it … but sometimes, longer are better, but fewer mistakes please".

*Audio-visual quality.* Though not as pertinent as flawed instructional design, students preferred if the audio-visual resolution is of high quality for effective learning. As the students explained, that the visual quality is so low resolutions at times it was difficult to see the content clearly especially for screen-capture tutorials. The students would need to put their critical literacy for guesswork to understand what the tutor was trying to do. Students were generally more forgiving on low-quality visuals as compared to "boring" and heavily accented voiceovers. According to them, they would avoid these videos if possible. They lamented that irrelevant and excessive narration in the instruction design bores them, with students also relaying that "interesting" voices are important to help them stay interested and focused. They too found difficulties in understanding tutors who spoke with a heavy accent. Some of the remarks from the students were as follow:

- Too much gibberish… Sometimes he talked about his experience which is not related (to the tutorial) also. [Student K]
- He talked too much… he only starts showing after 2 to 3 minutes… voice is very important, sometimes I (want to) sleep already. [Student M]
- If they are not (English native speakers), like French … it's really hard to understand what they (are) saying… [Student J]

Finding the right video to watch was akin to finding the right person to ask. According to the students, they agreed that they have to find the right tutor that can show them what they were looking for. Even if the instructional design and video quality were not up to their expectation, it was considered a good video as long as the video content was able to teach the students something and help them achieve their desired learning goal.

***Synthesise and Integrate***

Next, the students would need their critical literacy skills to *integrate the knowledge* gained from the videos to their work. Bearing in mind that the nature of digital animation problems is ill-structured and authentic, Student M mentioned that adaption and innovation skills were needed in video learning, "When I was still in diploma, someone wanted to model an old Malay castle… he needed a tutorial for it but couldn't find any. He searched for other tutorials and adapted from there".

Students continuously tested and explored till they achieved their desired learning goal. There was no guarantee that watching video tutorials achieve the students' desired learning goal. Student A stated that the possibility of achievement was "70% …Roughly, just trying our luck, if we get it, we get it!" However, over time, students gained experience and knowledge in video usage, especially user-generated content more effectively. Whether the ability to analyse content and be able to integrate the knowledge gained from watching the videos and applying it in their work, getting ideas or mastering a skill, depends heavily on the students' digital and critical literacy. The students must be aware of their prior knowledge and skills, before selecting the right video that matches their knowledge and skill level, Student M stated, "I think if the person is intermediate level, he has to look for the intermediate level video. It depends on the technique and the results that we are looking for." Without the prior knowledge and skill level, students would not be able to apply the knowledge from the video to their work, e.g. "Rigging is odd… when you do yourself there're lots of problems, when you watch the tutorial… all are fine" [Student J]. The students also stated that learning from videos takes up a lot of time to search, preview, view, and re-view the appropriate videos for meeting their tasks. One student complained that "a lot of time wasted… especially when the due date is near, we get stressed…" [Student M].

***Reflection & Evaluation***

The learning process would not be completed without some self-reflection or evaluation of their learning. The students were constantly reflecting on their own learning at every stage of the learning process. At this stage, the students carry out a summative evaluation of their creative work and the overall achievement of their learning goal. However, from the focus group data analysis, it was found that the digital animation students rarely seek and give feedback from their peers. Student J said, "We really won't dare to comment, usually it's the lecturer who comments". When probed further, most students expressed indifference, fear of criticism or stated that they did not have the luxury of time to do so as they were piled with assignments. Although students are able to evaluate their own learning, the data findings supported Nicol and Macfarlane-Dick's (2006) argument that "formative assessment and feedback are still largely controlled by and seen as the responsibility of teachers" (p. 200) regardless of whether it is a student's choice or an instructor's approach.

**Content Gratification**

A summary of themes emerged under Content Gratification is listed in Figure 2, and will be explained with the support of data in this section.

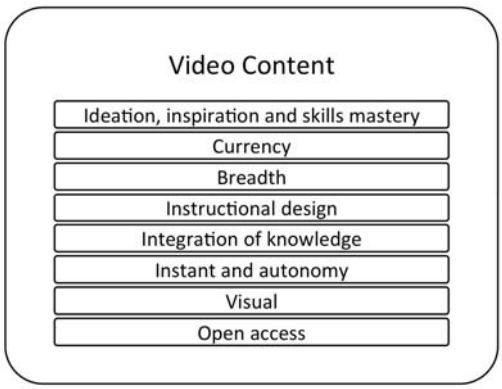


**Figure 2:** Content gratification of digital animation students

The students have reported mainly using online videos as references for idea and inspiration as well as a source of tutorials for skill mastery. Videos remain as the students' most popular choice for ideation and technical studies for animation design. The videos in narrative genres e.g. "story", behind-the-scenes, making-ofs and work-in-progress gave insights into the animation concept and development process, as Student M described, "Like how to achieve the camera angles; how to do those expressions… we copy them". Student J also said that through these behind-the-scenes they could better appreciate the content of the animation, which is "what is this artist trying to say with this project... How the idea came about". Even before the students enrolled in digital animation programmes, most of the students were watching videos and self-creating animation as hobbies, e.g. Student R shared her story:

> I did animation last time while I was younger, but that is all when I was younger because we were school students (…) and we had ample time to do whatever we like… games, animation and all these. So, we spent it on the things we like to do and that is to make the...animation, the TV series that we liked.

The gratification of video use for self-directed learning was the *currency* of content. According to the students, YouTube, and particular web portals frequently have updates of most recent animated shorts, latest videos related to developments of digital animation, behind-the-scenes, work-in-progresses, making-of's, and reels that they could refer to for idea and inspiration. The students moreover were also able to keep up-to-date on the industry progress, quoting Student Z, "They have the best ones which have lots of inspiration, the technicalities, ahh… momentous milestones in 3D". Digital animation software developers or professional users also frequently update their channels with the latest videos on digital animation techniques and solutions which students could watch to improve their digital animation skills.

Besides currency of the video content, students were gratified with the *breadth* of digital animation content spreading across a wide mix of user-generated and professionally generated content sharing sites. "There are a lot of videos", Student Z stated. The students were constantly referring to YouTube during the focus group discussions. During one of the session, the moderator asked the students "must it be YouTube?" Without thinking, Student G, S and M simultaneously answered "Yes!" All of the students agreed and Student K explained: "If you can't find what you want on YouTube, ask Mr Google". YouTube is the preferred source for skill-based mastery video content according to the digital animation students. The *breadth* of content allowed a variety of options for the students to choose from based on the analyses strategies, citing Student N, "Sometimes, they have different techniques of the same thing. We can do a comparison."

Students overall expressed indifference towards user-generated and professionally-generated content despite both formats of content have significant discrepancies in term of instructional design and audio-visual quality. Rather, the students were more concerned about the practicality of the content and were willing to compromise on its quality; justified by the following student's statement:

> To me, I don't care if they are professionals or not. As long as their techniques could achieve what I want to do. Like I can't solve some bone techniques etc. so I went to their video... *Oh, so that's how you solve it*…so I follow their way. As long as the results are the same, I don't care if they are professionals or not. [Student M].

Additionally, a student said that "Sometimes, the (worst) quality of a recording, like a 10-year-old doing this is …very helpful to us" [Student K]. Another student explained that sometimes user-generated content is more appealing to him because the content reflects his own experience: "Some of the students although they are not in

the industry yet, they will upload their tutorials. They'd share. They also had faced the same problem we faced" [Student S].

Besides that, students were gratified with video content that comes in *different levels of instructional design* that caters to different levels of learners, i.e. most skill-based learning tutorials are sorted according to beginner, intermediate, and advanced skill levels. By choosing the videos tutorials according to their skill level enable the students to grasp the content of the video more effectively. Student R described that "(if) you know the interface you don't need to see the beginner's stuff". If the student's skill level and selected video level were mismatched, students would be confused and will not be able to comprehend the content thus labelling the tutorial as "really hard to understand" [Student V]. The following quote describes Student J's experience learning from a video without the needed prior knowledge and skills:

> Like us, we are much focused when we watch tutorials. When he says the next step…he starts opening those menus or does something, he might have used some shortcut keys that we didn't know… then we'd go... *Oh, what's that?!*

Other challenges the students faced were the need to *integrate* the knowledge gained from the videos onto a different platform using a different tool, as some of the video content were outdated and also of a different animation platform:

> Sometimes we have people who use 3D products from a few years back. So… It's about how you use them is important… the way you use them can be applied to some other platform. It's about understanding what you are doing. [Student F].

Generally, the internet provided *instant* gratification for learning. It was part of their autonomy, as Student N explained "ya, no teachers or mentors or something, like you learn by yourself… through internet or media… that whatever you could find… information." Students can access the videos anywhere as long as they are connected to the Internet.

Besides being gratified with videos as *visual and multimedia content*, the speed of information retrieval was another reason the students stated why they favoured videos over textbooks. One student remarked that "The technology is so advanced today, we don't read books... You will find what you are looking for if you just Google Search" [Student J]. Another student added that access to video is ubiquitous and mobile adding to *instant* gratification, "Especially now you can search it on your phone" [Student N]. Some of the students nevertheless mentioned that print media is used as an alternative reference should the internet, peers or instructors fail to help them.

The students further explained why videos were popular with digital animation students. Student S stated, "I think because the kids nowadays don't like to read. They like to watch." Videos being "*visual*" was the main gratification behind the use of videos for learning because undeniably digital animation students were mostly visual learners. The students preferred learning with videos tutorials, as Student K explained, "I prefer videos, and it gives you the cursor and where to point the menu….so you don't get lost with the user interface." Student V added that learning using "Video tutorial is easier" because it is "Straight to the point. One by one…" These statements exemplified the multimodal impact of videos where a single medium cannot achieve. Video tutorials are a great source for students to master their digital animation skills. Screen-captured video tutorials allow learners to learn digital animation skills and techniques through step-by-step demonstration or to familiarise themselves with the digital animation tool environments (Luke & Hogarth, 2011).

***Open access***

Suber's (2015) definition of open access is "digital, online, free of charge, and free of most copyright and licensing restrictions". Generally, social media content is *open access*, therefore learning videos were easily accessible to the students. There are non-open access sites that allowed access to selected "free videos" or content with limited use such as "30 days trial only" which students can choose and learn from. It provided an opportunity for students to try out or kick-start their learning plan. Student K shared his learning experience, "When I first got my first PC… what I did was, I want to learn about 3D. So, I downloaded a lot of stuff (…) I checked with tutorials and all and see which I manage to do first. First, I tried Maya…and I (got) lost... then ok, stop. Do Blender…" However, most of the content from non-open access sites were accessible only through paid subscription. For example, the students stated that content related to realistic 2D render, 3D projection mapping, simulation and, "those teaching full set rigging without mistakes" [Student J] were difficult to come by on open access sites but were available through paid subscription sites. The majority of the students nonetheless pointed out that they were not willing to pay for the videos due to the high exchange rates. Student M elaborated:

> For that, you'll have to search for the paid tutorials. It happened to me before, I searched YouTube and all the free sites... I can't find any... I wanted to cry…just don't know why I can't find any. And then half-heartedly, I searched Lynda.com and I found it … but need to pay for it, we can't afford it.

Regardless, students voiced that they preferred *open access* videos compared to paid subscription-based web portals believing that there are alternative video contents similar to those in paid subscription, confidently stating "There will be others!" [Student M].

**Social Gratification**

The students seldom expressed their social gratification gained from online video use during their self-directed learning endeavour. The students were not making full use of the participatory opportunities of online video platforms, especially in giving comments to the video and gaining extra knowledge from the video response shared by others. Their video learning process focused more on user-to-content interactions and little on user-to-user interactions.

The following are found as the reasons for explaining low participation and contribution as video users: First, the students lacked the free time to participate and contribute; secondly, they did not have motivation in participating or contributing and thirdly, they lack the supportive environment that provides constructive feedback that encourages participation or contribution. The influence from their early education which is highly exam-oriented and teacher-centred (Kahl, 2013; Saleh & Aziz, 2012; Tengku Kasim, 2014) was still very much inculcated in the Malaysian students when they enter their studies in tertiary education institutions. They still regard the instructor as the authoritative figure in the learning process, resulting in the lack the knowledge and practice on how to be constructively critical towards their own learning.

During the focus group sessions, the students also have repeatedly stated that they seldom share their academic knowledge, only occasionally reposting "helpful" digital animation related content, e.g. "good film, animation, tutorial, inspiration, competition, storyboard…" [Student S] in their social network. They seldom comment or discuss the videos that they have watched, and the most feedback they gave was a "like" to the videos which they found interesting. According to the students, sharing academic work advocates too much peer competition and criticism from which they feel pressured. Most of the students discussed that for being self-critical about their work which could explain why the students rarely upload their own videos and contribute online. "Self-criticism relates to a form of negative self-judgment and self-evaluation, which can be directed to various aspects of the self" (Longe et al., 2010, p. 1849). While both self-evaluation and constructive self-criticism promote learning, excessive or enforced self-criticism are unhealthy because it focuses on the unfavourable examination or severe judgement of oneself, one's own faults and shortcomings (Sedikides & Luke, 2008). The students, however, were more willing to share non-academic related content or "personal stuff" within their social network.

## IMPLICATION OF THE STUDY

This study has contributed to the understanding of online video use for learning and the impact of video-technologies among learners. It has contributed in two areas of understanding, "how" online video was used, and "why" online video was used among learners in the digital animation context. The findings showed that videos are an essential medium for studies in digital animation where students are dependent on online videos for skill mastery as well as to gain ideas and inspiration. This implied that online videos will continue to be used for digital animation studies. Overall, how students use online videos for learning may differ slightly but commonly goes through the self-search, analyse & select, synthesize & integrate and evaluation cycle. This process is aligned with Knowles (1975) definition of self-directed learning "in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (p.18). These processes were also fairly aligned with the cognitive processes mentioned by Martin (2006) and Mayer & Moreno (1998) especially in the context of multimedia learning. This suggests that improving self-directed learning skills may also enhance online video uses.

Corroborating with other researchers' (e.g. Gallardo-Echenique et al., 2015; Prensky, 2001) studies about the behaviour of digital learners, the students in this study fit the characteristics of digital learners who are highly dependent on the internet for learning. Their descriptions of their experiences with video learning did not vary considerably. The students gained process gratification and content gratification through online video usage as it matches their learning style, needs and preferences. However, social gratification was not much observed from the students. Similar to what other studies have shown (e.g. Chau, 2010; Shao, 2009), the majority of digital animation students are consumers of video content, with little participation and even lesser contribution to the

video sharing sites. Generally, students in this study are not socially active in video sharing sites or social media for academic learning purpose. They lack the motivation to participate and contribute, believing that their instructors should play a more important role to comment and assess their learning. The findings from the study also implied that time, high level of digital and critical literacy are required to search, filter, select, watch and re-watch videos to critically grasp what the video content is about before they could make sense of it, test it out and apply it to their tasks and only a few of them will share it out to their network. The process of identifying suitable video for learning requires a high level of cognitive activities which need attention, critical selection and decision. Video sharing sites may offer opportunities to make learning more meaningful with the support of a socially engage and promotional environment for the learners. However, the social engagement aspect of using online video for learning requires more research and exploration. These findings, therefore, suggest more emphasis in promoting participatory culture among the learners to maximise the potential of videos for learning in video-based learning platforms.

Although video content in art and design is currently lacking in the MOOCs platform (Shah, 2017) or flawed in instructional design and audio-visual quality in video sharing platforms, it did not hinder digital animation students in using online videos for learning. Video content developers would need to look into areas of content and topics which are lacking, and fill the gap rather than reinventing the wheel – recreating a different video that teaches the same thing. Institutions of learning are also required to weight whether to train instructors or in-house developers to create original (significantly rare) video-based content or implement existing video content in the curricula. Studies of video design and technology to help learner learn would be a continuous feat. Instructional design and audiovisual quality of online learning videos for learning would need to focus on the engagement and sustainment of learners' attention. The online video platform needs to be improved (e.g. stable and strong internet connection) and maintained in order to empower and motivate the students to learn as it provides a natural context for self-directed learning. For example, appropriate video selection should be assisted by the instructors or experienced users to streamline the needs of students before leaving them for their self-learning. More guidance on the pools of online video which map to certain skill set is required to help students learn more efficiently.

## LIMITATION OF THE STUDY

The present study was limited to Malaysian digital animation students enrolled in three institutions in Klang Valley, Malaysia and a low number of samples participated in the discussions due to a small number of digital animation programme offered by higher learning institutions. The students' actual statements and comments during the focus group discussions were quoted in "cleaned-up" version of the text presented in the paper. "Minglish" which is English spoken with a mix of other vernacular languages (Halai, 2007) is commonly spoken in Malaysia. Minglish was used occasionally in the focus group sessions in order to encourage sharing among the students and to create an informal mood of discussion. An effort was made to ensure the reliability and validity of data coded into the specified themes and sub-themes, e.g. the vernacular language translations and interpretation were checked and validated a few times to ensure the meanings or codes were aligned with the themes. However, there is no claim to the level of accuracy as there was no formal method applied with regards to the anecdotal evidence. It could nonetheless be potentially bound to human errors limited to the cultural knowledge and language fluency of the researchers or the interpreters.

## CONCLUSION AND FUTURE STUDY

The findings in this study can also be used to explain the use of online video for other related area of studies such as creative and digital design subjects (i.e. web design, interactive design, digital arts, photography, etc.), which share the common traits such as to ideate and design, to acquire digital skills, and to create artefacts. As video-based learning is continuing to be a part of the education scene, institutions and instructors will need to continue to empower students' with digital and critical literacy, especially social skills by providing extrinsic motivations and positive learning environment so to prepare the learners for self-directed learning in the digital era. The findings of the study proposed for future studies to develop a more objective measure of learners' video use based on the model of gratification as the dimension of research, with variables developed based on the findings of this study. The findings would be important to the educators, researchers and media specialist for identifying online video learning capabilities and drawbacks when more self-learning paradigm such as heutogogy resurfaced as a new learning approach. The ideas of heutagogical learning are based on learners who are more autonomous and know how to learn. This is enabled due to the ubiquitousness of emerging technologies, user-generated content, and self-directedness in information discovery and in defining the learning path (Blaschke, 2012).

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# Problem Based Learning and the Development of Professional Competences: An Experience in the Field of Biomedical Engineering

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## ABSTRACT
In recent decades, one important objective in higher education has been developing professionals who can display competences in their specific work fields. Hence, the development of such competences and skills has been a widely discussed, highlighting that the use of active pedagogical initiatives might be the best approach to fulfill this requirement. In this study we analyze the students' perspective of the implementation of a hybrid curriculum between Problem-based Learning and Project Oriented Problem-based Learning in a course called introduction to biomedical engineering. In addition, we discuss different aspects of how competences are developed through this hybrid curriculum that was designed using course objectives and competences. Furthermore, data from 78 students from 7 different cohorts is analyzed and discussed from a qualitative approach developed from a critical and hermeneutic perspective. The results show that students are able to identify and understand differences between a passive pedagogical strategy that is centered in the teacher, and an active pedagogical strategy, centered in the student. Moreover, they acknowledge the changes from one strategy to the other as drivers for participation and development of competences in the field of engineering -namely ethics and professional responsibility, effective communication, and understanding the impact of solutions proposed in the field on local and a global contexts.

## INTRODUCTION
Recently, various aspects have changed the demands on the development of competences in the field of engineering. Different authors have attributed this change to complex phenomena such as globalization, technological advances, development of new specializations in the field, need for interdisciplinary work, among others (Becker, 2006, Galloway, 2007). Unfortunately, those changes have also revealed inconsistencies between the competences developed in engineering as part of the educational programs and the competences required by an engineer in the actual world.

Competences in engineering education can be classified into two main groups: general competences and engineering competences. The former, are those competences needed in all disciplines such as oral and written communication, teamwork, leadership, emotional intelligence, problem solving and ethical aspects. The latter are competences required by any engineer to succeed in their field, namely innovation, design and understanding of complex systems, theory-practice application and business management (Wakas, 2001; Male, Bush & Chapman, 2009). The need to develop competences is so important that specialized institutions like the Accreditation Board for Engineering and Technology (ABET) have gradually included evaluation processes related to the development of competences in engineering, science and technology programs. In the specific case of biomedical engineering -where life sciences and medicine are combined with engineering to improve the health of individuals and communities- the development of competences as interdisciplinary and collaborative work must be part a critical part of the curriculum (Cruz, 2016).

Nowadays, traditional education based on lectures and on a teacher-centered educational perspective has proven to be unsuccessful in the development of general and specific competences (Ribas et al, 2009). Additionally,

freshmen engineering students are not familiar with the characteristics of the engineering career, which could lead to a poor performance or dropout in emerging engineering programs, such as biomedical engineering (Cruz, 2016). In response, re-design of introductory courses to engineering in companion with several active pedagogical strategies –student-centered approaches- must emerge, aiming at modifying and enhancing traditional curricula, emphasizing on student's engagement and the development of competences.

Problem Based Learning (PBL) is an active pedagogical strategy commonly used in some disciplines to develop general and specific competences. PBL is a curricular model in which a problematic situation is presented initially, encouraging the students to find and understand the problem to be solved. Later, students and teachers identify the learning objectives together with relevant literature and information research. Finally, the students go back to the problem and build a possible solution to the situation (Capon, 2004). This model is a deviation from the traditional education, given that students are participant and responsible for their learning; on the other hand, the teacher acts as a guide in the process (Ribas, 2004). The problem situation is addressed by teams that build knowledge using previous experiences, reflecting about the problem and understanding its context. At the same time, they develop teamwork, oral and written communication, leadership, decision making, creativity and interdisciplinary work competences (for further information about PBL we recommend Capon, 2004; Ribas et al, 2009; Wood, 2003; Ribas, 2004 y Savery y Duffy 1995).

Another active pedagogical strategy for competence development related to PBL is the Problem Oriented Problem Based Learning (PO-PBL). This curricular approach involves the students in the process of developing a research project. In this process, the students outline a relatively wide problem to be solved within the framework of the class objectives, and they try to solve it in small teams, usually in a full term semester (Hernandez, 2014; Vithal et al, 1995). Throughout the semester, the students are able to build knowledge and develop competences such as learning to learn, work in teams, outline complex problems, use theory and resources to propose a solution to a given problem, critical thinking and interdisciplinary work (Hernandez, 2015; Vithal et al, 1995).

According to De Graaf and Kolmos (2007), PBL and PO-PBL strategies share at least 3 pedagogical and curricular principles in their foundation. First, the learning approach is based and organized by means of problems, which –rather than simply looking for a solution- encourages motivation, curiosity, in-context learning processes and the use of learning experiences by those involved. Second, there is a social approach in the learning teams, which implies that learning processes are mediated by dialogue and communication. As such, students not only learn from themselves but from their mates, determining the direction of their learning process and taking crucial decisions to fulfill their goals. Lastly, there is a clear interdisciplinary approach to the content that enables stakeholders to modify their traditional vision of teaching and learning based on contents and methods in specific subjects.

On the other hand, the biomedical engineering program is one of the newest programs of the engineering faculty. One of the main goals in its curricular design is taking advantage of the accumulated knowledge in recent curricula reforms in the faculty, in order to generate environments that favor the development of general and specific competences in students. In particular, the first semester course of introduction to biomedical engineering seeks to promote in the students the identification, explanation and application of basic principles and tools of biomedical engineering to solve biological and medical problems. Besides, the course is intended to develop communication, team work, critical thinking and problem solving competences. The curricular reform is one of the main concerns of several teachers considering the difficulty of students to understand various topics, and the lack of general and specific competences in upcoming professionals. Additionally, the students that participate in the course described above are encouraged to participate in an open symposium by the end of the semester. In this experience, first semester students in together with professors, researchers and businessmen, show innovative products and processes developed throughout the semester.

Given the characteristics, objectives and goals of the curriculum course, the active pedagogical strategies of PBL and PO-PBL were incorporated in the introduction of the biomedical engineering course. This research presents an analysis from the perspective of the students, in terms of the contribution of the PBL/PO-PBL hybrid curriculum to the development of competences.

## METHODS

*Research approach*

This research is based under a qualitative perspective grounded in a critical and hermeneutical approach, which makes possible a general and particular comprehension of the reality (Alvesson & Skoldberg, 2009; Goetz &

Lecompte, 1988). In this type of research perspective, the researcher does not look for objectivity in the process; on the contrary, its role, participation and characteristics as an active member of the research are taken into account. This perspective moves away from the positivistic perspective usually used in the natural sciences, in which the researcher is always trying to be as more objective as possible (Fassinger & Morrow, 2013). Furthermore, the study of perceptions in this research refers to our interpretations of reality as humans. From a phenomenological point of view, perceptions are strongly associated to a direct apprehension of reality, in which interpretation is different from sensations and intuition (Husserl, 1995). In other words, interpretation goes beyond the reception processes and is not limited by external impressions. On the contrary, perceptions have to do with the awareness of the physical world and are manifest as an intentional experience (Poza, 2005).

*Data gathering*

Systematizing the student's perceptions was the main source for data collection. Two different qualitative instruments were used for this purpose: an on-line survey (Appendix 1) and semi-structured interviews (Appendix 2). The former was sent via E-mail to students from different cohorts; the latter, was applied to 20 students at the end of each academic semester during four consecutive semesters. These instruments were designed aiming to inquire for competence development through the PBL and PO-PBL strategies implemented during the course. Informed consents and disclaimers were used as required in the data collection. Furthermore, questions were design to retrieve information about the personal reflection processes, providing qualitative data about the personal vision from the students about the matter of research Alvarez-Gayou (2009).

The information was analyzed via descriptive statistics and a process of triangulation of the information collected through the instruments. Two pre-established categories for the analysis of professional training of students were established: (a) training experience and (b) development of competences and skills.

*Implementation of the PBL and PO-PBL curricular model*

PBL was implemented so as to address different fields of biomedical engineering (Epidemiology, mathematics, cardiovascular dynamics, biomaterials, tissue engineering, signals and biomedical instrumentation) through common problems in these fields. The students were encouraged to analyze each of the problems given in 3 sessions of the course, by making an adaptation of the 7-steps PBL approach proposed by Savery and Duffy (2005)

Typically, in the first session of the course a problem situation was presented. Later in this session, students teamed up and discussed different approaches to solve the problem and different information search strategies. At the end of this session, instructions regarding the final report were given with a period of time to answer questions. In the second session, an expert in the specific PBL-subject of work offered a conference to share theoretical principles and application examples of the given theory. In the third session, the main goal for students was to deliver the report. During all the PBL sessions, professors from the biomedical engineering department, teacher assistants and research assistants were available to guide the process. These facilitators assisted the students in the route to find the solution for the problem. At the end of every experience, reports were evaluated and feedback was given to each team.

It is important to clarify that not all the sessions in the course were devoted to PBL experiences. For instance, some lecture classes were given on subjects such as imaging analysis and processing, protein design and clinical logistic. Moreover, there were workshops about anatomy, physiology, written skills development, ethics, business management, intellectual property and specialized software handling. Figure

The PO-PBL strategy was developed simultaneously throughout the semester. By facilitating interaction among small groups during the first weeks of the semester, the students had the chance to know each other. Then, they established a permanent work group and defined a specific research topic. The main objective of the PO-POBL experience was to offer a solution to a problem identified in the field of biomedical engineering in our country. The teams devoted 9 hours every week in to develop their projects, distributed in two face-to-face sessions of 1.5 hours each, a laboratory session of 1.5 hours, and 4.5 hours for research and development.

A fundamental element in the PO-PBL strategy is to define the problem that will guide the research. In order to promote motivation and context-related exploration of topics, the students were encouraged to define their own problems through negotiation processes in their teams, and they were given specific guidelines to facilitate this process. The viability of the proposals presented by the students was assessed by the teachers considering their novelty and their feasibility in terms of time and resources.

Once the research problem was defined, each work group developed their project by consulting technicians and professionals from different fields. This aimed at promoting communication skills, given that the students had to establish effective communication with experts. Habitual lecturers of the class had the opportunity to become facilitators, by guiding and giving feedback in different projects. The final results of the projects were presented in form of prototypes and designs in the symposium at the end of each semester.

**RESULTS**

The online survey was sent to the students from seven different semesters, gathering information from a total of 78 students who answered the survey. All the participants in the data collection were students who experienced the educational initiative subject of this research. The sample comprised students from all the semesters; however, most of the students claimed to have taken the course during the 2015-10, 2015-20 and 2016.10 semesters, as illustrated in Figure 2. The results related to the perspectives of the students about the outcomes of the educational experience are presented in two pre-established categories for analysis: training experience and development of competences and skills.

*Perceptions of training experience*

The perceptions related to this category were analyzed from three different points of view: i) personal and academic growth, ii) course structure and design; and iii) general learning experience throughout the course.

For the category of personal and academic growth, the questions in the survey categorized the perception using a 1 to 5 scale, being 5 the highest and 1 the lowest value. Most of the students pointed out that the implemented proposal was of great value in terms of academic and personal growth, as illustrated in Figure 3.

Some of the arguments given by the students are:

Stud1: *"This is a multidisciplinary course; I learned a lot, which makes me enthusiastic about the upcoming semesters of biomedical engineering"*

Stud26: *"This course enables me a vision about each of the research areas in this career, offering a clear perspective of biomedical engineering"*

Stud 56: *"Activities in this course strengthen not only academic skills, but communication and teamwork"*

Stud34: *"This course fosters the skills needed to develop projects and drive innovation"*

Stud4: *"This course helps me to understand the biomedical engineering career"*

On the other hand, some of the arguments of a low-ranked experience are the following:

Stud15: *"There were very complicated ideas for a first semester course"*

Stud24: *"I realized that the creation of a product or design is not easy and needs too much research, on the other hand, I think professors expect very complicated and difficult products"*

Stud59: *"At the beginning you don't have much knowledge, then, what we can achieve in the project is not what is expected"*

In terms of the structure of the course, most students stated that the structure proposed was highly adequate. Besides, they manifested that the PBL and PO-PBL approaches have become an interesting learning opportunity, since they constantly apply concepts and knowledge. Some of the arguments are the following:

Stud33: *"I think it is a very good strategy; learning is more evident than in lecture classes, we can learn more through problems because we can easily apply the knowledge"*

Stud17: *"The course is excellent. Projects and workshops are of great help to understand the insights of the career"*

Stud20: *"I consider that PBL is a good tool that allows us to deepen in class topics"*

Stud68: *"I found it very good because we can work from different career perspectives"*

Stud71: *"It is a good methodology that allows us to develop teamwork and to know about sub fields of the career"*

The data shows that the perceptions of the students are consistent with the PBL objectives described by different authors (Capon, 2004, Wood, 2003 y Ribas, 2004). As a recommendation, some students suggested that they need more supervision moments. Sometimes they feel that supervisions are extremely short:

Stud14: *"…however, better supervision processes must be applied to offer extra help in the development of the projects"*

Stud60: *"I feel that PBL experiences could be somehow shallow, feedback moments should be present after the grade process"*

Finally, the students were asked about the general learning experience throughout the course. The answers were organized in 4 qualitative categories: (a) Poor, meaning that no contribution was perceived; (b) Regular, meaning

that no significant contribution was perceived; (c) Good, meaning that a significant contribution was perceived; and (D) Excellent, meaning that a very significant contribution was perceived. As shown in the Figure No 4, a considerable percentage of students perceived that "Good" (23.4%) and "Excellent" (62.3%) contributions were experienced throughout the development of PBL and PO-PBL exercises.

*Perceptions of professional development competences*
Specific questions regarding the development of 7 competences internationally accredited by the ABET were included in the survey. In this sense, the answers were tabulated in a 1 to 5 scale, being 5 the highest and 1 the lowest value. Figures 5 and 6 show the distribution of the results obtained.

In general, the responses state that this course offers major contributions to the development of competences. The answers according to the students' semester show how the PBL and PO-PBL approaches have gained the position of key developers of such competences. Some examples of these statements are the following:

Stud7: *"I consider that –PBL and PO-PBL- are good strategies as compared to lecture classes. We can learn and apply our knowledge more through study cases. However, I feel that PBL could have a better feedback process"*

Stud 16: *"We are still getting used to it, but in the end it is a good methodology"*

Stud30: *"I think it is good to get involved in project development, because you can gain experience in innovation"*

Stud38: *"These approaches keep the students thinking throughout the semester"*

Stud 65: *"I think it is a good methodology because it makes the students not only conduct a research, but also give a real result"*

It's important to mention that additional competences were developed by means of the PO-PBL strategy. Technical and economic feasibility as well as ethical and intellectual property aspects were addressed by the students. Additionally, teamwork and oral and written communication were developed/reinforced during this process.

**DISCUSSION**
The arguments posed in section 4.1 are evidence of how the curricular changes based on PBL and PO-PBL enable the development of knowledge by means of motivation and inquiry. An interesting aspect identified in the process was noticing there were different ways in which the students addressed the problems: based on personal or family experiences, consulting medical doctors or professionals in the field, or consulting non-profit organizations. Undoubtedly, those different approaches are drivers for motivation as suggested by Wood (2003). Moreover, the use of active pedagogical approaches not only developed theoretical concepts, but also promoted general competences in the students as proposed by Ribas (2004). Additionally, the students could experience a wide vision of the professional areas and sub-fields in biomedical engineering, meeting the main of objectives of the introduction to biomedical engineering course.

On the other hand, some of the students seem to have very high expectations -or think the teachers have it- in relation to the PO-PBL strategy. This leads to the perception in first semester students that "it is extremely difficult". We consider that this sort of perceptions results from the comparison with a traditional education and a content-centered curriculum, in which the students are used to being exposed to contents first and apply these contents afterwards. Hence, we consider that some of the students were biased to a massive inclusion of contents as the main objective of the course, rather than an active pedagogical experience.

On these grounds, we consider that reinforcing the role of the professors in upcoming courses is extremely important. In particular, teachers should understand that they have the role of facilitators that stimulate debate by formulating indirect questions and by defying and questioning the student's arguments in the feedback process (Ribas, 2004). Moreover, The information collected suggests that this kind of curriculum design encompasses different learning dimensions that range from concepts to reflective learning processes. Additionally, the students fulfilled one of the main objectives of the PBL and PO-PBL approaches suggested by Capon (2004) and Vithal et al (1995) by putting in practice specific contents and theories of the subject area, connecting theory with practice.

As shown by the results in section 4.2, most of the students perceived a comprehensive development of all the competences evaluated. However, the perception of the development changed among some students. For example, ethics and responsibility, effective communication and understanding of the social impact in engineering solutions were perceived as the most developed during the course. As described by Male (2007),

these competences are of major importance for the development of general and specific engineering competences.

On the other hand, the system, component or process design was the competence perceived to be the least developed. This is an important two-fold finding. First, the development of this set of competences could be a complicated task to develop in a single course; hence, we suggest a continuous use of active pedagogical approaches throughout the undergraduate program. Second, the students' awareness of the complexity of these approaches suggest high levels of reflection processes in the course, which is not common in courses based on traditional approaches.

In addition, it has been rewarding to know that some of the work groups have been constantly working in their projects beyond the course. Some of the teams have shown their results in biomedical engineering seminars and congresses. Furthermore, meetings have been scheduled with the "Innovation department of the institution" to persist and legally protect the inventions made by the students. One specific example of these experiences is the design and elaboration of a repletion clamp prototype. This clamp reduces the procedure time of researchers and technicians and increases the quality of tissue preservation. This project was born in the first semester of 2015 and presented in the First Peruvian Congress of Morphologic Science/Fourth Pan-American Congress of Anatomic Technics at the end of the same year.

This proposal still has opportunities and challenges subject of research. For instance, the opinions, perspectives and reflections of professors and assistants need to be considered. The analysis of this information could increase the impact of the program in terms of competence development, and shed light on failures in teaching and learning procedures.

Finally, one major challenge is the identification and improvement of the relationships between PBL exercises and projects developed to be presented in the symposium. This could offer a better understanding of how to strengthen competence development in the course. Likewise, this study also revealed flaws in the feedback in PBL. Hence, better feedback procedures will be designed and implemented in the future.

## CONCLUSIONS

Given that professional careers related to the engineering field are getting complex with time, engineers require different sets of skills and competencies in order to fulfill expectations and success in the area. The development of skills and competences generally is not easily accomplished by traditional teacher-centered strategies, in which the transfer of knowledge is the main purpose. On the contrary, several examples has shown that student-centered strategies, in which the students are actively involved in their learning process, are the best way to develop high-level skills as well as specific-career competences. As such, the redesign and improvement of our introductory course to biomedical engineering using the PBL and PO-PBL approaches, has promoted a student-centered approach for competence development. We consider that these strategies enable a general vision of the biomedical engineering career in the students, and give them a viewpoint on their future role as professionals in society.

It is important to clarify that further iteration and more robust reforms in other engineering courses must be executed to fully validate the findings exposed in this study, as well as include a higher number of participants in this process. Nonetheless, perspective evaluation framed in a hermeneutic vision of evaluation stimulates the transformation of traditional practices, making a shift from content memorization processes. This sort of proposals generates invaluable knowledge regarding competence development, enhancing professional education in students; hence, this research extends an open invitation to researches to set in motions initiatives as this one, in order to generate pertinent and contextualized engineering programs to face today's world necessities.

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**Appendix No 1**

Survey: perception about the curriculum model implemented in introduction to biomedical engineering

Dear student,

This survey aims to know your perception regarding the course "introduction to biomedical engineering" and EXPOANDES. This information will be valuable in order to improve teaching and learning processes in the future. We guarantee that all information provided will be used for improvement. Please answer all the questions in the most honest and sincere possible way.

If you decide to participate, please fill the present survey, otherwise close this window. Thanks for your collaboration.

1. Point out the academic period in which the introduction to biomedical engineering was taken: (i.e. 2015-10)
2. In a 1 to 5 scale, being 5 the maximum value, indicate to what extent this course was valuable for your academic growth.
    a. Please explain your answer
3. In a 1 to 5 scale, being 5 the maximum value, indicate to what extent this course was valuable for your personal growth.
    a. Please explain your answer
4. In a 1 to 5 scale, being 5 the maximum value, indicate to what extent this course develops the following professional competences.
    a. Systems, component or process design
    b. Multidisciplinary work performance
    c. Ethics and responsibility
    d. Effective communication
    e. Understanding of the social impact in engineering solutions
    f. Awareness of the importance of learning to learn
    g. Knowledge of contemporary issues
5. How do you categorize your experience throughout the course
    a. Excellent
    b. Good
    c. Regular
    d. Bad
6. In comparison with other methodologies applied in other courses, how do you categorize the implemented methodology in this course?
    a. Worst
    b. Equal
    c. Better
    d. Can't categorize it
        i. Please explain tour answer
7. Indicate to what extent the activities developed in this course develops teamwork
    a. Totally agree
    b. Agree
    c. Disagree
    d. Totally disagree
        i. Please explain your answer
8. In a 1 to 5 scale, being 5 the maximum value, indicate to what extent EXPOANDES was valuable for your academic growth
    a. Please explain your answer
9. What is your opinion about the structure of the course (PBL and PO-PBL exercises)
10. Additional comments or suggestions can be described in this question.

**Appendix No 2**
Interview: perception about the curriculum model implemented in introduction to biomedical engineering

This interview aims to know your perception regarding the course “introduction to biomedical engineering” and EXPOANDES. This information will be valuable in order to improve teaching and learning processes in the future. We guarantee that all information provided will be used for improvement. Please answer all the questions in the most honest and sincere possible way.

Would you like to continue with the interview?
1. How valuable does the Introduction to Biomedical Engineering course was to your growth and career? Why?
2. Do you consider that the introductory course to biomedical engineering contributes to the development of engineering skills? Why?
3. Compared to the work methodology used in other courses, what do you think about the methodology implemented in this course?
4. What do you think about your learning experience during the course?
5. What aspects do you think would improve the course?

# The Perceptions of Users Regarding Multimedia Principles in Mobile-Based Japanese Language Learning

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## ABSTRACT
This study aimed to explore the perceptions of users regarding the use of seven multimedia principles in mobile-based Japanese language learning. Students and lecturers expounded their views on these seven multimedia principles: Generative Learning, Spatial Contiguity, Temporal Contiguity, Coherence, Modality, Redundancy and Personalization. A single group with intervening mobile-based Japanese language learning design was used to test each of the multimedia principles. The participants consisted of 62 undergraduates and three Multimedia lecturers. A mixed method approach was employed where questionnaires and interviews were used as data collection tools. The findings revealed that a majority of the respondents agreed that the multimedia principles were appropriate for application in mobile-based Japanese language learning, except for the Personalization and Redundancy principles. The respondents expressed the need for incorporating on-screen text and formal style text in a mobile learning environment. The findings of this study can facilitate instructors and developers to develop an optimal mobile-based learning experience for Japanese language learners.

**KEYWORDS**: Japanese language, Mobile-based learning, Principles of Multimedia.

## INTRODUCTION
Mobile-based learning has increased in popularity among kids, teenagers and adults. Mobile-based learning is an education via the network using personal mobile devices, such as tablets and smartphones to obtain learning materials through mobile apps, social interactions and online educational hubs. It is flexible, allowing learners access to education anywhere and anytime. The development of mobile-based learning apps has increased drastically with the aid of advances in multimedia to fulfil the needs of targeted audiences or learners. Multimedia is the presentation of material using at least two of the elements of sound (audio), text, still graphics, and motion graphics (visual) (Mayer, 2002). The purpose of combining various types of media is to convey a message or information and to facilitate effective learning among learners. Consequently, more and more mobile apps developers are integrating multimedia into the learning apps to enrich the learning material. This has resulted in a progressive mobile apps development in order to fulfil the requirements of modern learning needs and to reach the high quality of multimedia material in mobile-based learning. However, to successfully deploy multimedia in mobile-based learning environments, an effective approach is required to address the multimedia issues jointly.

Previous research has unveiled the increasing complexity in the multimedia content (Rasiwasia, Costa Pereira, Coviello, Doyle, Lanckriet, Levy, & Vasconcelos, 2010) as well as some pertinent issues in designing effective multimedia-based instruction for education (Issa, Schuller, Santacaterina, Shapiro, Wang, Mayer, & DaRosa, 2011). Most of these researches have reported issues of mismatch between words and audio when the multimedia principles are applied in learning apps. In regards to these matters, great effort is required to gather users' perceptions in tandem with designing effective mobile-based learning material. This study attempts to investigate the perception of users regarding the use of multimedia principles in mobile-based learning.

*The Concept and Importance of Multimedia Principles in Education*

The seven principles of multimedia proposed by Mayer (2002) has been widely referred to in designing multimedia learning materials. The seven principles are Generative Learning Principle, Spatial Contiguity Principle, Temporal Contiguity Principle, Coherence Principle, Modality Principle, Redundancy Principle, and Personalization Principle. The first principle, Generative Principle, suggests that learners learn better with words and pictures than from words alone. This principle allows learners to visualize ideas and connect concepts with the help of pictures (Malik & Agarwal, 2012). It also cautions that learners are less likely to connect the words with other knowledge when words are used alone which usually lead to shallow learning. The second principle, the Spatial Contiguity Principle, suggests that learners learn better when the corresponding words and pictures are presented near to each other rather than far apart on the page or screen. This principle helps to attract learners' attention by visualizing the messages when an image is placed next to the words. However, learners will need to visualize the content using cognitive processing in order to understand the intended messages.

Next, the Temporal Contiguity Principle suggests that learners learn better when the corresponding portions of the narration and animation are presented at the same time. This principle allows learners to cope with the learning content by making mental connections simultaneously in their working memory. However, narration could be used during the presentation followed by an animation in successive presentation that allows the learner to have two separate exposures to the explanation rather than one. The forth principle, the Coherence Principle, suggests that people learn better when extraneous words, pictures and sound are excluded from multimedia messages. A simple and concise slide presentation makes it easier for a learner to focus and read the content. Albeit, this principle is not applied to learners who learn subjects that require complex action in multimedia such as biology or medicine which demands extraneous information of a complex structure (Issa *et al*., 2011)

Modality Principle, the fifth principle, suggests that people learn better from words and pictures when the words are spoken rather than printed. This principle allows the learner to easily convert information from oral information for further information processing (Mayer & Moreno, 2003). However, the learners' visual channel might become overloaded when both words and pictures are presented visually. The sixth principle, Redundancy Principle, suggests that people learn better from graphics and narrations than from graphics, narrations and on-screen text. This principle renders ease to the learners' visual sensory while watching for the main content while listening to the audio. However, people have separate channels for processing verbal and visual material that causes learners to select only a little amount of information to be processed at one time (Clark & Mayer, 2016). Lastly, the Personalization Principle suggests that people learn better from a multimedia lesson when words are transmitted through a conversational style compared to a formal style (Mayer, 2005, 2009). According to Moreno and Mayer (2000), using audio that represents a friendly mood and environment will increase the learners' interest. In this study, the conversational style was engaged to the learners by using "I" and "you" (e.g.: "Next, I would like you to click on your name") instead of a third person in the formal style (e.g.: "Next, click on the name at the top").

According to Clark and Mayer (2016), well-designed multimedia messages help to enhance the learner's ability to absorb and assimilate learning material. Thus, in order to design an effective multimedia instruction that promotes understanding among learners, it is crucial to be guided by relevant multimedia principles based on how learners learn.

Past research has reported the increasing sophistication in multimedia content that is not matched with the multimedia principles (Rasiwasia *et al*., 2010), as well as issues in designing an effective multimedia instruction and applying multimedia design principles to enhance learning in medical education (Issa *et al*., 2011). Meanwhile, in the mobile context of multimedia learning, many issues and challenges brought by the emerging technologies remain unanswered in learning foreign languages. For example, users' experiences have been identified as one key factor in designing mobile-based multimedia learning, but its provision in learning foreign languages has not been explored thoroughly. The area concerned with multimedia design which is to enable mobile-based learning in a foreign language and exploration of users' perception on mobile-based learning are explored thoroughly for the purpose of this research.

*Purpose of Research*

It is particularly important to address challenges in applying information and multimedia processing techniques for mobile-based learning in a foreign language. As yet, little is known on how multimedia principles are applied to mobile-based learning in foreign languages, and consensus among instructional

design researchers on how to design effective instructional messages across various media. In order to comprehend these issues, effective ways of applying appropriate multimedia principles in mobile-based learning are essential based on learners' views and requirements. Thus, the impact of multimedia principles to foreign language learners' cognitive processing demands exploration in constructing a meaningful mobile-based learning.

The Japanese language has long been regarded as one of the most difficult languages to learn (Miller, 1982). It is a challenge to learn Japanese due to the way the words are pronounced. and it involves three writing styles: *hiragana, katakana, and kanji. Kanji* words are the most difficult yet useful to learn because in *kanji* one letter has several meanings, pronunciations and different writing style. Non-native Japanese learners are only exposed to *hiragana, katakana, and kanji* through learning materials. It is particularly important to address the challenges encountered by non-native Japanese learners in applying the principles of multimedia in mobile-based learning. Therefore, this study attempts to investigate users' perceptions regarding the principles of multimedia in a mobile-based Japanese language learning context.

The objective of this study was therefore to explore the perceptions of Malaysian learners regarding Mayer's seven principles of multimedia when studying the Japanese language in a mobile-based learning environment. The learners in this study refers to university students and lecturers. The result of this study could serve as a guide for educators to look into how multimedia principles work on mobile-based learning which can assist students to generally learn a new foreign language. The findings of this study will provide general ideas for instructors and designers to select and implement any of Mayer's Multimedia Principles which are considered as effective in mobile-based learning.

*Research Questions*

The research questions guiding this study is as below:

What are the perceptions of university students and lecturers regarding Mayer's seven principles of multimedia in mobile-based Japanese language learning?

## Methodology of Research

*Research Participants*

The participants consisted of university lecturers (n=3) and undergraduates (n=62), both from the Faculty of Creative Multimedia in a private Malaysian multimedia university. Purposive sampling was used in combination with non-random sampling in order to identify participants who have background or basic knowledge in the principles of multimedia. Selection of participants who possessed knowledge, ideas or experiences relevant to the research would best help the researcher achieve the research objectives (Creswell, 2003). The mean age of the students was 23 years. Of them, 36 were males and 26 were females. The students were generally Malaysians from a multi-racial group of Chinese, Malay and Indian. The lecturers were experts in multimedia, who have a vast of experiences in the teaching and developing multimedia. Participation in the research was voluntary and individual responses were strictly confidential. After the written permissions of the relevant authorities were obtained, the students and lecturers' written consent was obtained.

*Research Instrument*

A mixed method approach used qualitative and quantitative methods to address research objectives in this study. Research instruments comprised of questionnaires (quantitative data) and interviews (qualitative data). A seven-item questionnaire was developed and used to gain opinions from the students and lecturers. Each item represented each respective principle in the Seven Principles of Multimedia and was accompanied by a screenshot of apps. A sample of questionnaire items is shown in Figure 1.

I think that spoken words are needed when words are presented.

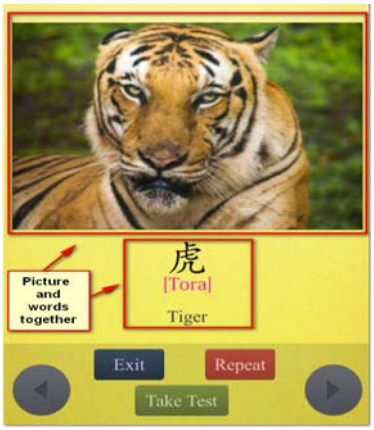
1) Strongly disagree
2) Disagree
3) Neither agree nor disagree
4) Agree
5) Strongly agree


**Figure 1: A sample of questionnaire items**

All responses were entered on a five-point Likert scale ranging from (1) Strongly Disagree, (2) Disagree, (3) Neither Agree or Disagree, (4) Agree to (5) Strongly Agree. Mean scores ≤3 refer to negative perceptions toward the use of multimedia principles in mobile-based Japanese language learning. The items in the questionnaire were reviewed by 25 students in a pilot study. The participants were asked to detect errors, give feedback and critique the items in the questionnaire. Based on their feedback, the questionnaire was improved.

Semi-structured interviews were conducted with Multimedia lecturers and students in order to gain a deeper insight about their view point regarding the use of the Seven Principles of Multimedia in mobile-based learning. Semi-structured interviews were conducted by referring to screenshots of apps for seven principles of multimedia. An example of interview questions is shown in Table 1. The interview questions were validated by two lecturers in the field of multimedia-learning during the pilot study. Interviews were audio taped and transcribed.

**Table 1: An example of interview questions**

| Multimedia Principle | Interview Questions |
|---|---|
| Multimedia Principle A suggested that people learn better from words and pictures rather than from words alone.<br>  | 1 (a): After you have gone through the lesson, by presenting the words and picture together, what do you think about it?<br><br>1 (b): In your opinion, how Multimedia Principle A can help student learn Japanese language better? |

*Research Design*

A single group with intervening mobile-based Japanese language learning design was used to test each of the multimedia principles. The study utilized a ready-made free application available from iTunes named 'Learn Japanese Easily'. This apps is available on https://itunes.apple.com/us/app/learn-japanese-easily/id532810714?mt=8. The purpose of using the selected apps was because it had sufficient multimedia elements to test the Seven Multimedia Principles in terms of words, pictures and audio. Besides, the app is attractive, rich in colour and designed in a simple and neat way that would not disorient the beginner learner. Learn Japanese Easily app also provides learners a relaxing and interactive way of learning Japanese language. Learners can interact with the software by connecting words with images to confirm their meaning.

The field study was administrated to two groups of undergraduates. The first group consisted of 22 students, while the second group consisted of 40 students. The participants, including the three lecturers were exposed to Learn Japanese Easily app using smart phones and tablets. In addition, participants went

through each tutorial within the application. A total of two hours were used to run the lessons for each participating group.

The administering of questionnaires was followed by showcasing three pictures of mobile apps' screen shots for each item. The questionnaires were completed within 10-15 minutes. Follow-up semi-structured interviews were conducted with three lecturers, as well as 10 students who were randomly selected from each group.

*Validity and Reliability of Questionnaire*

Both the pilot and field study were conducted by the researcher over a duration of two weeks, with the assistance of the multimedia lecturers in order to ensure the accuracy of the principles used and to increase the reliability of the study. Quantitative data was analyzed using SPSS Version 22.

Cronbach's alpha was used to assess the internal consistency of questionnaire. The Cronbach's Alpha coefficient of internal consistency was computed to determine the degree to which the items on the same instrument, measure the same construct in order to produce a consistent result (Cohen, Manion, & Morrison, 2007). Chua (2006) stated that an alpha value within 0.65 and 0.95 was considered satisfactory. The alpha value of the questionnaire based upon the 25 undergraduates' scores was 0.795. For an instrument with only seven items, the value showed a satisfactory indication of internal consistency. The Corrected Item-Total Correlation and Cronbach's Alpha Coefficients After Each Item Was Deleted were also calculated (Table 2). All the Corrected Item-Total Correlation was less than that Cronbach's Alpha Values if Item was Deleted. Consequently, this indicated that all the seven items contributed to the Seven Principles of Multimedia in the instrument.

**Table 2. Corrected Item-Total Correlation and Cronbach's Alpha if Item was Deleted**

| Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item was Deleted |
|---|---|---|
| 1 | .446 | .592 |
| 2 | .403 | .598 |
| 3 | .392 | .600 |
| 4 | .433 | .596 |
| 5 | .040 | .686 |
| 6 | .074 | .687 |
| 7 | .498 | .572 |

Secondly, the internal consistency analysis was conducted to examine item-total correlations and inter-item correlations. The item-total correlations varied from 0.25 to 0.69 (Table 3). According to Büyüköztürk (2014), item-total correlations with 0.3 and above is considered acceptable. Overall, there was a significant, weak to moderate and positive correlation between items and total scores. On the other hand, the inter-item correlations varied from a weak 0.017 (between Item Five and Item Seven) to a moderate 0.43 (between Item Three and Item Four). According to Clark and Watson (1995), average inter-item correlations should fall somewhere between .15 and .50. Overall, there was a significant, weak to moderate and positive correlation between test items, except items 5 and 6. Thus, items 5 and 6 were revised in terms of wording as shown in Table 4. The initial items 5 and 6 were phrased as 'I learn better if the spoken word is presented' and 'I think animation and the spoken words are sufficient in the app', respectively.

**Table 3. Correlation Coefficients between Items as well as Item and Total Scores**

| | | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 |
|---|---|---|---|---|---|---|---|---|
| **Correlation** | **Item 1** | 1.000 | .314* | .311* | .192 | .38 | .136 | .368** |
| | **Item 2** | .314 | 1.000 | .272* | .220 | -.041 | -.050 | .295* |
| | **Item 3** | .311* | .272* | 1.000 | .431** | -.026 | -.071 | .318** |
| | **Item 4** | .192 | .220 | .431* | 1.000 | .092 | .117 | .324** |
| | **Item 5** | .038 | -.041 | -.026 | .092 | 1.000 | .108 | .017 |
| | **Item 6** | .136 | -.050 | -.071 | .117 | .108 | 1.000 | .068 |
| | **Item 7** | .368** | .295* | .318** | .324** | .017 | .068 | 1.000 |
| | **Total** | .583** | .594** | .604** | .595** | .249* | .327** | .651** |
| **Sig. (2-tailed)** | **Item 1** | - | .011 | .012 | .126 | .762 | .282 | .003 |
| | **Item 2** | .011 | 1.000 | .029 | .079 | .743 | .694 | .017 |
| | **Item 3** | .012 | .029 | 1.000 | .000 | .834 | .572 | .010 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Item 4** | .126 | .079 | .000 | 1.000 | .467 | .351 | .008 |
| **Item 5** | .762 | .743 | .834 | .467 | 1.000 | .383 | .894 |
| **Item 6** | .282 | .694 | .572 | .351 | .393 | 1.000 | .581 |
| **Item 7** | .003 | .017 | .010 | .008 | .894 | .591 | 1.000 |
| **Total** | .000 | .000 | .000 | .000 | .045 | .008 | .000 |

*. Correlation is significant at the .05 level (2-tailed)
**. Correlation is significant at the .01 level (2-tailed)

**Results of Research**

*Findings from the Quantitative Data (Questionnaire)*

The results shown in Table 4 below are based on the perceptions of 62 students and 3 lecturers regarding the Seven Principles of Multimedia in mobile-based Japanese language learning: Generative Learning, Spatial Contiguity, Temporal Contiguity, Coherence, Modality, Redundancy and Personalization. For the purpose of discussion, Strongly Disagree (SD) and Disagree (D) are stated as "disagree", Agree (A) and Strongly Agree (SA) as "agree", while "Neither Agree or Disagree" is maintained.

**Table 4. Summary of Percentage, Means and Standard Deviations of Questionnaire Responses**

| No | Item | Strongly agree | Agree | Neither Agree or Disagree | Disagree | Strongly disagree | M | SD |
|---|---|---|---|---|---|---|---|---|
| | | | | % (N = 65) | | | | |
| 1 | The pictures and words help me to learn faster about the content. | 46 | 54 | - | - | - | 4.46 | .50 |
| 2 | The location of the pictures and words help me to learn the content better. | 19 | 70 | 11 | - | - | 4.08 | .61 |
| 3 | By presenting words, pictures, and pronunciation at the same time, I understand the language faster. | 37 | 52 | 11 | - | - | 4.26 | .66 |
| 4 | A simple presentation like 'next', 'previous', 'repeat' and 'exit' elements are necessary when learning the Japanese language in this apps. | 43 | 57 | - | - | - | 4.43 | .50 |
| 5 | I think that spoken words are needed when words are presented. | 50 | 49 | 1 | - | - | 4.60 | .56 |
| 6 | I think that on-screen text is needed with the narration in the apps. | 43 | 48 | 9 | - | - | 4.34 | .64 |
| 7 | I think the formal style instead of conversational style, helps me to listen and to speak Japanese sentences better. | 62 | 34 | 4 | - | - | 4.57 | .59 |

The results show that all respondents agreed that, i) the pictures and words help them to learn faster about the content (Generative Learning Principle), and that ii) 'next', 'previous', 'repeat' and 'exit' elements are necessary when learning the Japanese language in this app (Coherence Principle). Almost all respondents (99% and 96% respectively) agreed that the spoken texts are needed when words are presented (Modality Principle), and the formal style helps them to listen and to utter Japanese sentences better (violation of Personalization Principle). A total of 91% agreed that on-screen text is needed for the narration in the apps (violation of Redundancy Principle). On the other hand, a total of 89% agreed that i) the location of the pictures and words help them to learn the content better (Spatial Contiguity Principle), and ii) the simultaneous presentation of words, pictures and pronunciation helps them to understand the language faster (Temporal Contiguity Principle). None of the respondents disagreed with the use of the Seven Principles of Multimedia in mobile-based Japanese language learning.

***Findings from the Qualitative Data (Interviews)***

The interview data were analyzed to ascertain whether the responses from the respondents matched the ideas put forward in the questionnaire. The abbreviations used for the analysis are: "S" represents Student, "L represents Lecturer, "G1" represents Group 1, and 'G2' represents Group 2. The findings on each principle is described as below.

***The Redundancy Principle***. According to the Redundancy Principle proposed by Mayer and Moreno (2003), learning is diminished if animation, narration and on-screen text are used together. However, the majority of respondents in this study found that this principle was inapplicable in mobile-based Japanese language learning. Both lecturers and students believed that on-screen text would allow students to learn better in terms of understanding by reading the delivered information in text especially in a foreign language. The respondents further insisted that listening alone would make it difficult for a beginner to catch up. Sample responses include:

> *"For the learning purpose, on-screen text allows students to understand the lesson better"* (S10, G2; L01); *"..in the context of foreign language just by listening is hard to catch up"* (S2, G1); *"..student tend to read, especially when they can't catch up or understand spoken words of narration"* (L02); *"...even with all the design of motional form of pictures in and out, people still tend to read the subtitle without looking at the animation which perhaps will present the most information"* (L03).

Besides, both lecturers and students agreed that this principle will come into play when the spoken words or audio are not working properly.

> *"..it is a good thing to have on screen text especially when the audio is not that clear, or having lost for catching up the spoken words"* (L01); *I might mishear from audio, so I really need screen text on this apps"* (S22, G2).

This principle is mainly to allow young learners to reach the highest focus in learning. The findings of this study, however, did not support this principle as claimed by both lecturers and students. Thus, the Redundancy Principle was discovered to be inapplicable in mobile-based Japanese language learning.

***The Principal of Personalization***. The Personalization principle suggests that people learn better from a multimedia lesson when words are presented in a conversational style rather than formal style. The study found that two out of the three lecturers felt that this principle was inapplicable. The lecturers believed this principle should not be applied in mobile learning unless it could provide clear and ample instruction for learners to follow and learn. A majority of students felt that words presented in the formal style was sufficient for them to learn, as it would not complicate or distort the text. Below are some of their comments:

> *"This application is friendly enough, no need conversational words in learning"* (S41, G1)*; "It is straight forward, easy for me to understand".* (S13, G1); *"Formal is ok, simple and easy to catch up* (S21, G1; S34, G2); *"As long as navigation is allowed, formal is ok"* (S32, G2).

Nonetheless, both lecturers and students in this study believed that this principle was applicable in video learning in creating a warm and friendly environment.

> *"Will be more friendly if conversation is inside the video"* (S04, G1); *"Conversation creates a warm environment in video learning"* (S03, G2); *"It gives better experience to users to connect with the lessons using video" (S22, G2).*

This principle is mainly to assist students' learning by creating and stimulating the learning environment, with the main objective of building a connection between the lesson and the learner. However, this study does not support this principle as claimed by students since they could accept a formal style of presenting words. Students preferred a straight forward and fast type of learning, which allowed them to easily read and not overload their cognitive processing. Thus, this principle was recognized as not applicable in mobile-based Japanese language learning.

***Principle of Generative Learning Theory***. This principle suggests that students learn better when they are presented with a combination of words and pictures rather than with words or pictures alone. From the perspectives of both students and lecturers, it was found that they strongly agreed with this principle. According to lecturers, they were able to memorize the *kanji* word for "apple" when they saw the picture of an apple. The pictures helped in visualizing and remembering the learning process much easier, while the text displayed pronunciations in English to encourage proper pronunciation. Besides, students also agreed that they needed to have a picture paired together with a word to learn better compared to using words alone. The combination of words and pictures allowed the students to detect the correct name of an animal when the picture of an animal was presented to him or her. Their responses included:

> *"The pictures of the objects helped me to remember the words"* (S11, G1); *"…by presenting the words and picture together, it will help me to identify the Japanese words better"* (L02); *"…since I'm not familiar with the Japanese words or language, the words will help me to pronounce, while images will support in visualising the words"* (L03); *"By placing words and pictures together, it will allow students to identify the name of the animal"* (L01).

Participants also remarked that the pictures helped them visualise the words and their meanings. In their words:

> *"The Japanese words are hard to learn. Pictures help me to visualise the words"* (S40, G2)*; "Images does help visualize and memorize the words better"* (S11, G1); *"I can relate it with my memory after seeing the picture"* (S14, G1); *"I need pictures to display the definition"* (S27, G2); *"I need pictures because the hardest part in Japanese is words and its pronunciation"* (S34, G2); *"Picture helps to give a clearer view of the terms"* (S30, G2); *"Pictures show me the meaning of words"* (S11, G1).

This principle aided students in building links between pictures and words. However, if words alone were presented, the learner could only build a "verbal" mental representation, but hardly build a "visual" mental representation. This principle is mainly to assist students' learning by understanding what the verbs are and by mentally visualizing the content when the words are presented as per agreed by lecturers. Therefore, when developing multimedia materials for language learning, both words and pictures should be included. Thus, this principle was found applicable in mobile-based Japanese language learning.

***Principle of Spatial Contiguity*.** This principle suggests that students learn better when words and pictures are presented near to each other rather than being placed apart. Both the students and lecturers found this principle to be applicable. According to lecturers, this principle helped them to relate and link both elements together as a single item. They further added this will help them in remembering and memorizing the text much better. As for students, this principle helped them to locate the picture easily as they tended to have a habit of referring to the nearest picture. Students were eager to know the visual form of the texts they read. According to the students, looking at the nearest picture will help them to understand the written words much faster. Besides, students were easily attracted to an interesting or even just a simple picture that was presented near to the words. They will look at the picture first before the words. Sample responses include:

> *"When looking at the pictures and words that are near to each other, I'm able to relate the two items together as one"* (L01); *"Since I'm not familiar with Japanese language, by presenting the images near to the words will help me to remember the text better"* (L03); *"Pictures and words are noticeable when they are near" (*S32, G2)*; "When I read the text, I need to know the visual form of the words" (*S12, G2); *"When I read the words, I will immediately look at the nearest picture"* (S10, G1); *"I learn faster when pictures are placed near to the words" (*S11, G1).

From this study, it is also found that the pictures play an important role to attract student's attention to prevent boredom while the reading of texts. From there, students were capable to foresee and construct relationships between pictures and the text. This principle aims to relate the connection of verbs and visuals when placing pictures beside words as agreed by lecturers. Besides, learners can locate the picture easily as a visual aid in their learning. Therefore, when developing multimedia materials, words and pictures should be placed near to each other to allow learners to identify the connection between the pictures and words. Thus, this principle was found applicable in mobile-based Japanese language learning.

***Principle of Temporal Contiguity***. This principle suggests that students learn better when words and pictures are presented together rather than in succession. Both the students and lecturers found this principle to be applicable. Both lecturers and students agreed that this principle would help them to see the connection between the picture and words as a whole. From there, students were able to perceive the information faster while visualizing the images in their mind. From the mobile learning lesson, students were found to be able to identify the words easily by recalling the picture as a whole as they could view the single page from the mobile content. Feedback included:

> *"Engaging words and pictures at the same time make me understand better"* (S24, G2); *"From the single page, I get to know what I see"* (L3); *"It is easier to understand when I see the whole page"* (S28, G2); *"I can easily relate the pictures to words at the same time"* (S12, G1);*"I prefer to see the words and pictures appear as a whole"* (S08, G1); *"My brain is able to understand quickly when seeing the whole texts with pictures"* (S12, G1); *"It is better to show up together for our viewing and understanding"* (S14, G1); *"Help me to understand the content in instant"* (S14, G1); *"Single glance help me to link the words with the pictures"* (L2).

This principle aims to relate the connection of verbs and the visual together as one. When developing multimedia material, the words and pictures should be presented as a whole instead of in succession. Thus, this principle was found applicable in mobile-based Japanese language learning.

***Principle of Coherence.*** The principle of Coherence suggests that students learn better when extraneous words, pictures and sounds are excluded from the multimedia message rather than to include them. Both students and lecturers found this principle was applicable. Lecturers believed that eliminating extraneous multimedia element inside the multimedia presentation would make the learning process more focused with less distracting elements on the main content. In addition, they said that the added irrelevant images would only disrupt the concentration of students. They noted that:

> *"Eliminating extraneous multimedia element from the presentation will make the learning more focused"* (L01);*"..student has limited capability to absorb information and to focus on content information for a longer period. It will be best to avoid complicated content for learners"* (L02);*"..if adding an irrelevant images, concentration will be distracted"* (L03).

Students also shared parallel views with the lecturers regarding this principle as they would love to learn from more straight-forward and simple content. According to the students, they would rather avoid heavy-visually loaded information. Besides, students do not like unorganized and chaotic multimedia presentation. The students agreed that a simple design with minimal elements would help in directing them to the point of content. Below are some of their comments:

> *"It is good to keep as simple as possible. Minimal elements help learner to learn straight to the point"* (S02, G1); *"Make the apps easier to use and straight forward"* (S13, G2); *"These simple function and elements are necessary to have inside the content for modern apps"* (S05, G1); *"It is good as it is not complicated"* (S20, G1); *"The picture is in the centre and organized. It is at the right position for us to view"* (S13, G1).

Overall, the findings suggest that irrelevant words and pictures should be excluded when developing multimedia material. This principle aimed to reduce an overload of cognitive processing. Thus, this principle was found applicable in mobile-based Japanese language learning.

***The Modality Principle***. The principle of Modality suggests words to be presented as speech rather than on-screen text. This principle claims that student's learning is enhanced when the speech narration is used inside the presentation. Both students and lecturers in the study found this principle applicable. Based on the collective experience in this study, participants were inclined to remember the names of the animals easily when they listened to verbal pronunciations at the same time. The lecturers asserted it was a good way to learn while listening to the verbal utterances from the audio at the same time. The spoken words help to navigate the learners to become better readers which contributes to better focus on the content. It also works as an alternative option for the vision when the visual input is overloaded. Related responses are:

> *"Our mind need the sense of hearing to remember faster"* (S13, G1); *"When the words are spoken, I can remember the names of the animal better"* (L02); *".. it helps to direct me to the information of the slide by reading and listening at same time"* (S02, G1); "*Spoken words will help me in focusing the content of learning when I'm about to lose concentration of eye sight."* (S03, G1); "*.. people tend to hear and see … it is a good way to learn when hearing and watching on screen"* (S13, G1).

Besides, the lecturers agreed that this principle should be applied in language learning, as it mainly aims on the production of correct pronunciation especially in the foreign language. Students expressed that sound enhances their learning in the context of learning a foreign language. In addition, they learned to have better enunciation and make correct pronunciations through the lesson. Since the students were novice learners, the verbally uttered words definitely helped them to learn better. They commented:

> *"..help students to get a proper and better pronunciation of the words than just reading it"* (L01); *"I need sound for learning foreign language"* (S40, G2); *"The audio helps me to pronounce the words correctly"* (S01, G1); *"It is a lot easier to pronounce the words when someone has said it correctly"* (S14, G1); *"Our brain can easily learn with visual and sound"* (G32, G2); *"It will make me focus on the learning"* (S12, G1); *"I might misread, so I need sound"* (S38, G2); *"A must because it shows us how to pronounce correctly"* (S10, G1).

Spoken words also attract and create fun in a multimedia lesson to avoid a dull learning experience. Students learned better when verbal input was presented as speech rather than just as text alone.

> *"The Japanese pronunciation is weird but fun to hear"* (S14, G1); *"Audio make the lesson more enjoyable to learn"* (S12, G1); *"More fun when hearing the pronunciation of Japanese"* (S15, G2); *"Motivate me to catch up and speak together"* (S15, G1); *"Listening to sound is more fun"* (S21, G2); *"…so that user won't get bored"* (S10, G1); *"Make the apps more interesting"* (S16, G1); *"It will grab my attention for sure" (S05, G1).*

Based on the results, a meaningful learning experience can be achieved when learners are able to build connections between corresponding visual and verbal representations. In conclusion, it is necessary to incorporate spoken words to support learners' acts of listening while they read texts to help them focus and understand the lesson better. This principle aims to support learning using sound as a learning aid. Thus, this principle was categorized as applicable in mobile-based Japanese language learning.

## DISCUSSION AND CONCLUSION

The research stipulates that the Seven Principles of Multimedia are applicable in the context of mobile-based Japanese language learning based on the students' perspectives in the questionnaire, except for the Personalization and Redundancy principles. The findings from the interviews similarly revealed that a majority of the students and lecturers disclosed that the Redundancy and Personalization principles were unsuitable for the mobile-based Japanese language learning.

The Redundancy Principle suggests that learners focus on a single processing system in selecting information so that they can attain maximum focus in learning. However, both lecturers and students stressed the need for on-screen text, other than animation and narration to be displayed in a mobile-learning environment. Particularly, beginner learners emphasized the need of the texts to display the

pronunciation and definition of *kanji* words upon seeing the picture and listening to the pronunciation in order to help them learn better. They found that listening to mobile audios are not enough because they may not be entirely clear. The findings were inconsistent with previous researches (Mayer, Heiser, & Lonn, 2001; Moreno & Mayer, 2002) that on-screen text can overload the visual channel by presenting too much information for visual working memory to process simultaneously.

Meanwhile, the personalization principle aims to assist students' learning by creating and stimulating the learning environment, which involves building connections between the lesson and the learner. Previous research on the personalization principle in multimedia learning (Kurt, 2011) found that conversational style used in the software motivated learners to study and feel as if they were talking to a human. Yet, the learning performance of this condition did not really reflect the users' needs in the mobile-based Japanese language learning environment. The participants felt that the content would be too packed and complex if the conversational style text was applied in the mobile. Students also preferred the straight forward formal style text in their lesson instead of reading a lot of friendly conversational texts in the mobile context. They agreed that a simple designed mobile environment will decrease the mental load for cognitive processing.

In summary, the research findings conclude that only five multimedia principles of Mayer (2002) were found applicable in mobile-based Japanese language learning. These multimedia principles were Generative Learning Principle, Spatial Contiguity Principle, Temporal Contiguity Principle, Coherence Principle, and Modality Principle.

## RECOMMENDATION AND FUTURE RESEARCH

It is necessary to identify the multimedia principles which deserve to be included with proper instructional method before developing the mobile learning material. It is important to refer to experts such as Multimedia lecturers or instructors before proceeding with the implementation of the principles in the mobile learning material. Careful consideration of these principles enables instructors to form the basis of an implementation strategy for using mobile technology, which can offer the best manner for optimal learning. Adding screen texts during the narration does potentially improve students' learning, but its uses should be based on cognitive theory and intended language users.

This research shows that images and sounds possess great potential to improve human learning, especially when the goal is to promote deep understanding. However, in order to effectively use them, it is necessary in future research to investigate how people learn from pictorial and verbal media. The seven principles are based on a cognitive theory of multimedia learning and were tested by previous rigorous experimental studies. Yet, the seven principles should not be taken as rigid procedures to be followed in all situations. Instead, for future study, it is suggested that researchers employ a study which investigates how multimedia presentations should be designed to promote the cognitive processes, which involved meaningful learning. Finally, more scrutiny and research is required in the area of multimedia education so that its design and content reach the standards of educational procedure with add-on edutainment.

Despite the focus on multimedia principles used in a mobile-based learning environment for adult learners in this study, it can also be applied to all levels in education and carried-out within different age groups.

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# When an Instructional Designer Hold the Strings of Puppets: A Qualitative Study of Using Visual Metaphor in E-learning Environment

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**ABSTRACT**
Studies have shown the importance of visual metaphor in facilitating learning. Metaphor aids in communicating complex concepts in a clear manner, and enhances the learning experience. This study investigates graduate students' experiences and attitudes toward visual metaphors in an online learning environment. The visual metaphor used in this study was developed for an online instructional design course. Participants read the materials and were asked to respond to open-ended questions. The participants' responses were analyzed qualitatively. A within-case analysis was conducted, followed by a cross-case analysis, in order to study multiple cases. Evidence encountered suggests that visual metaphors assisted participants in fulfilling their educational goals. When interviewed, all participants appreciated the visual metaphors presented and stated that they preferred the presence of visual metaphors in the context of their studies. However, the participants had different perspectives on how the meaning of the metaphors could be perceived.

**KEYWORDS:** Visual Literacies, Visual Metaphor, Instructional Design, Online Learning, Higher Education

## INTRODUCTION

Graphical metaphors have become an essential part of interfaces and computer communication, even though computers and the Internet began as numeric and textual tools. Visual instruction is an easier way to help students understand the concepts and facilitate learning. Administrators of online learning projects should emphasize, and consider requiring, students' use of visuals to reduce misunderstandings (Shih & Cifuentes, 2003). Moreover, the benefits of metaphors have appeared in research for many years and a use of metaphor for designing user interface is almost always recommended (Blackwell, 1998).

Many practitioners prefer the use of visual metaphor in learning because of all the evidence that demonstrates the effectiveness of the use of metaphor. Using visual metaphor for learning can make a difference to students' learning experience. Rieber and Noah (2008) illustrated how the use of metaphor results in an increased level of tacit learning, evidenced by greater scores on a special gaming task when used in conjunction with metaphor. Kartal and Uner (2017) found evidence that conceptual metaphors have positive effects on the learning of phrasal verbs. And Hube, Tremblay and Leigh (2015) found that metaphor functioned both as an educational and communication tool for students. According to Lakkoff and Johnson (1980), understanding takes place within a broad domain of experience and not in isolated concepts. Learners use information to help solve problems and develop and organize new information. Visual metaphors enable the learners to understand such abstract concepts in terms of familiars and well understood knowledge (see Figure 1).

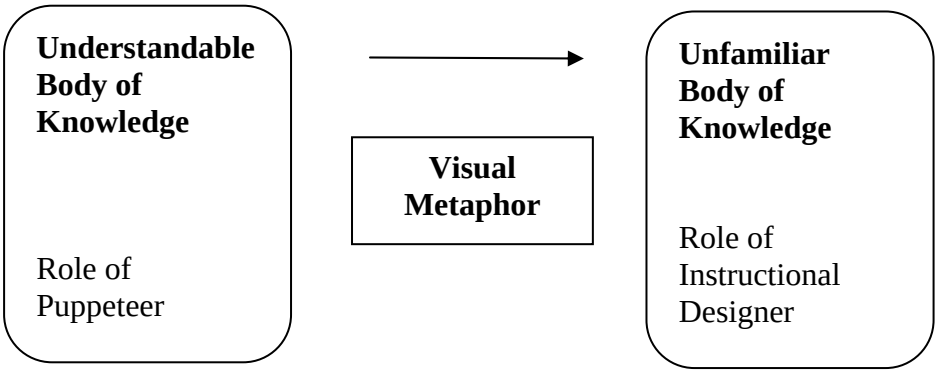


**Figure 1**. *The relationship between understandable and unfamiliar knowledge.*

Furthermore, using metaphors in education help individuals communicate complicated concepts, and influence

how people behave in the world (Lakoff & Johnson,1999).

Lakoff and Johnson (1980) defined the concept of metaphor as a novel or poetic linguistic expression where one or more words for a concept are used outside of its normal conventional meaning to express a similar concept. Many studies into metaphor have explored linguistic rather than visual metaphors. However, Sering (2006) stated that "the definition of visual metaphors stand in relation to linguistic ones" (p. 231). He also indicated that "in linguistics the form has taken a simple, defined rule A is B. This rule influences research into visual metaphor that attempts to find a visual equivalent of the linguistic form" (p. 243). Furthermore, he indicated that each of the simple form elements A and B is a result of interactions and interrelationships of a complex network of domains. These metaphors are grounded in systematic correlations within our experience (Lakoff & Johnson, 1980). As a result, Sering (2006) defined visual metaphor as a term used to describe how visuals are organized as a means of sharing.

Metaphors can be constructed in different ways. One of the most noticeable metaphors is where a physical object is further specified as being a person. Human beings use their experience of human motivations, characteristics, and activities to allow us to realize a wide variety of experiences with nonhuman entities (Lakoff & Johnson, 1980).

Metaphorical concepts can hide an aspect of our experience as a conduit metaphor (Lakoff & Johnson, 1980). This is illustrated by the following complex metaphor: ideas (or meaning) are objects, linguistic expressions are containers, and communication is sending. Also, metaphor allows us to understand one domain of experience in terms of another. This substantiates the suggestion that learning takes place in terms of entire domains of experience and not in terms of isolated concepts (Lakkoff & Johnson, 1980).

Gentner, Ratterman, and Forbus (1993) add that a metaphor is just a representation of the facts. For this reason, it is important for teachers to avoid using misguided metaphors and to be sure that their students are able to make appropriate and strong connections between the analogs and the target.

Some metaphors may be more attractive than others because of their accessibility, flexibility, imaginativeness, or aesthetic value (Safard, 1998). Analogies, like metaphor, draw comparisons from one thing to another. "Drawing an analogy between a problem situation and another situation sometimes provides insight into how a problem can be solved" (Ormrod, 1999, p. 375). It is important to use analogy correctly, because if used inaccurately it may result in approaching the problem incorrectly. People may draw inappropriate parallels, even if they identify a truly analogous situation. They might try to find an analogy that is similar to the problem in terms of superficial features without establishing deep connections (Ormord, 1999, p. 376). Also, analogical thinking limits the search for solutions to situations that have something in common with the one currently undertaken (Woolfolk, 1998).

Many prefer the use of visual metaphor in learning because of all the evidence that demonstrates its effectiveness. There are many different theories as to how people learn. Teaching and learning activities can be designed and implemented to take differing principles and processes of learning into account. Visual metaphors can be used in instruction as visual code or to reduce cognitive load or even to give cues to retrieve information from long-term memory as in information processing theory.

Informational processing theory describes the human brain as similar to a computer, with brain having three main storage areas: (1) sensory (2) short-term memory (3) long-term memory. In the sensory register, only a portion of the information is attended to and transferred to short-term memory. The information from short-term memory is encoded and stored into long-term memory. In long-term memory, the information will be retrieved when appropriate cues are provided (Tabbers, Martens, & Merrienbor, 2004).

Knowledge is stored in long-term memory as packets of information. Those packets are organized in categories that are connected in systematic and predictable ways. Learners use those organized packets of information to solve problems and develop and organize new information through learning and experience. Working memory capacity is limited; high levels of information processing and storage with such a limited capacity for memory might cause an increased cognitive load (Resier & Dempsy, 2007). Cognitive load theory defines as "extraneous load" the unnecessary memory load caused by the presentational format of instructions (Tabbers, Martens, & Merrienbor, 2004). However, working memory capacity can increase if the elements related to the information processed have previously been stored in long term memory. In other words,
"sophisticated and automatic schemata [packets of information] free a learner's working memory capacity, allowing processes such as comprehension and reasoning to occur" (Resier & Dempsy, 2007, p. 39).

One study investigated the generalizability of the modality and cuing effects on classroom setting focusing on the cognitive load theory. Students using visual material spend significantly less time on the instructions, which only strengthens the conclusion that they have really outperformed their colleagues in the audio conditions (Tabbers, Martens, & Merrienbor, 2004).

Mayer (1997) found that using the coordinated presentation of explanations in a visual format (illustrations) was effective. Also, Zhu and Grabowski (2006) found that combining instruction with more related explaining visuals leads to more effective instruction. He further indicated that placing text and visuals side by side encourages learners to read the instructional text as well as build referential connections between the instructional text and graphics.

Online learning has become one of the most helpful and powerful ways to connect knowledge across the globe. Technology plays a key role in the delivery of distance education. The key to effective distance education is to focus on the needs of the learners and the requirements of the content, and then selecting the delivery system (Biner, Bink, Huffman, & Dean, 1997). Without employing appropriate theories and instructional strategies in harmony with the unique features of the internet, the expectations of higher learning outcomes will not be reached (Neo & others, 2012). However, not much is known about the use of visual metaphor in an online learning environment. The literature demonstrates that the characteristics of an online learning environment can have a great impact on student satisfaction. Involving instructor support, personal relevance, and real life examples related to student experiences in an online learning environment contributes to student satisfaction, and will increase student motivation, participation, and ultimately, learning experience (Sahin, 2007).

Studies show that the use of visuals in online learning environments reduce misunderstandings and facilitate learning. Johnson (2007) found that when using visuals in online learning, students' achievements were significantly enhanced. He also recommended that college students be provided with less verbal and more visual instructions.

The purpose of this study is to investigate graduate students' experiences and attitude toward visual metaphors in an online learning environment. This was obtained through investigating the following two research questions: what are graduate students' experiences of using visual metaphors in an online learning environment? And, what are the students' attitudes toward visual metaphor in online learning environments?

## METHOD

### Participants

In this study, a convenience purposeful sampling approach has been used (Creswell, 1998) to select participants. Creswell (1998) stated, "The more cases an individual studies, the greater the lack of depth in any single case" (p.63). Based on that, the intended participants were four students (see Table 1). Each participant was given a pseudonym to ensure anonymity. All participants were graduate students in the university's college of education.

**Table 1.** *Overview of Participant Information*

| Participants | Gender | Age | Students Level | Number of previous online courses taken |
|---|---|---|---|---|
| John | Male | 35 - 45 | Ph.D. | 3 |
| Sara | Female | 35 - 45 | M.A. | 1 |
| Elizabeth | Female | 25 - 35 | M.A. | 1 |
| Maria | Female | 25 - 35 | M.A. | 2 |

### Instrument

The data source used in this study is an interview. According to Creswell (2005) "a qualitative interview occurs when researchers ask one or more participants general, open-ended questions and record their answers" (p. 214). Moreover, the visual metaphor used in this study was included in the interview guide to ensure that participants know exactly what is meant by the metaphor. The interview ensured that all relevant topics were discussed (Merriam, 1998). The interview included open-ended questions, such as "did the visual metaphor help you understand the instruction? How?" Table 2 illustrates how the relationship between the research questions and the interview questions will be used in this study.

**Table 2** *The Relationship Between Research Questions and Interview Questions*

| Research Questions | Interview Question |
|---|---|
| 1. What are graduate students' experiences in using visual metaphor in an online learning environment? | Did the visual metaphor help you understand the instruction? How?<br><br>Did you think that visual metaphors distract your understanding? Why?<br><br>Did you think that visual metaphor delivered the wrong message? How?<br><br>Do you think that you would have understood the instruction with the same quality if the visual metaphor had not been presented? How?<br><br>What are the strengths of visual metaphor?<br><br>What are the weaknesses of visual metaphor?<br><br>What suggestions do you have for using visual metaphor?<br><br>Talk about your overall experience in using visual metaphor. |
| 2. What are students' attitudes toward visual metaphor in an online learning environment? | Did you prefer to have visual metaphor in the instruction? Why?<br><br>What is your attitude toward visual metaphors? |

**Procedure**

The study took place at a mid-sized university in the western region of the United States. The visual metaphor used in this study was developed for an instructional design course. The metaphor used in this study was an instruction presented online via the online learning management system "Blackboard". The intended class is an instructional design course. The goal of this class is to teach graduate students the role of instructional design and how to create effective, efficient, and appealing self-directed learning units. The visual metaphor that had been used in this course is "puppeteer" (see Figure 2). The idea is that the puppeteer is the instructional designer and the puppets are the instructional design elements. This figure also represents the four steps within the visual metaphor: sizing up the learner, stating the outcome, making it happen, and knowing what the learner knows.

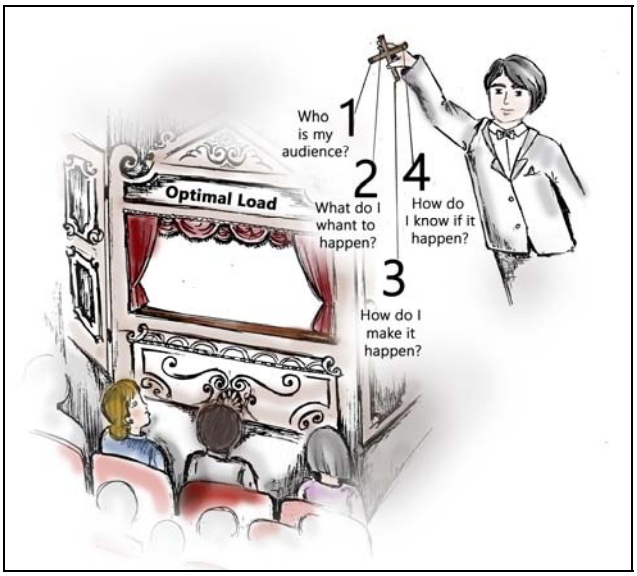


**Figure 2**. *The Role of Instructional Designers Represented by the Puppeteer and its Four Steps*

During the course of the study, which was 1 semester, students were required to go through three steps located in the Blackboard. These links were “start here,” “go to class,” and “post homework.” The instructor's weekly posts contained visual metaphors in addition to text explanations. These posts focused on the role of instructional designers in comparison with the role of the puppeteer. Furthermore, to assist students' learning, a weekly puppeteer map was provided to show student progress within the course.

During the final week of the course, students were asked to complete a face to face visual metaphor interview. The data collected was in the form of an interview, that contained approximately 10 questions. Participants were asked about their attitudes and experiences with the visual metaphors and to what extent the metaphors supported their learning.

**Data analysis**

The information gathered from the data collection method provides insight into graduate students’ experiences and attitudes toward the visual metaphor in an online learning environment. Participant’s responses to the open-ended questions are analyzed qualitatively. The transcript of the interview data for each participants was examined and themes were developed. According to Creswell (1998), the typical method for analyzing multiple cases is to conduct a within-case analysis followed by a cross-case analysis. The within–case analyses smooth the progress of describing each case and facilitate a way of finding themes. While the cross-case analysis looks for similar themes and patterns across all of the cases in the study. The steps used to analyze the data in this study are as follows:

Open coding: the within-case analysis started with open coding. This step involves searching through the entire data set and assigning coding. For each student response, the researcher reads and codes the data at least twice.
Case comparison: This steps focuses on the themes that emerge from each of the cases compared. Similarities and differences between the cases are identified.
Conclusion generation: uncertain conclusions become visible during the analysis of the data. Then, the conclusion is supported through consistent evidence.
To insure the accuracy and credibility of the findings, triangulation strategy is conducted during both within and across case analysis. Moreover, the written data is coded on two occasions by different researchers subsequently, the coding is compared to ensure its reliability.

**RESULT**

This section presents the results of four cases that provided data for this study.

Table A shows the relationship between the research questions and the interview questions. After collecting the data, the researcher found an overlapping between some of the students' answers. This was taken in consideration in analyzing the results.

**Students’ experiences in using visual metaphor:**

The participants in this study shared some common opinions in their learning experiences and learning techniques. The first case was John. He provided more data than each of the other cases. This case was perceived as a model for defining codes (Moore, 1998). He found that the metaphor was helpful. He stated that the visual metaphor (puppeteers) helped orient him on each unit and helped him to see what the instructor focused on in each particular unit. It also helped him to have an overview of instructional design. He thinks that the puppeteer made it easier to stay on track with what the instructor wanted them to do. John seems to use the visual metaphors very often and to benefit from them. John also said that the visual metaphor sometimes impeded the understanding for some students, but not his understanding. He thinks that some students will get an incorrect message or create a mental image inconsistent with the target concept.

> One of the risks incurred in using a visual metaphor is some students will get caught up on real or imagined inconsistencies such as “Does the teacher just pull the students’ strings?” “Are the students just puppets?” “Are students just passive observers?” etc.

John also believed that there is no perfect metaphor. He thinks that the best metaphor will be disliked by a small portion of the population: it might help 80% of students, might not help, or even hurt, 15% of the students, and might be distracting to 5% of the students.

Moreover, john thought the puppeteers provided an effective conceptual framework without using instructional design terminology, as he thought that the use of specialized terms could make it more difficult to step back and

see the bigger picture. He also thought the visual metaphor freed up cognitive processing capability to focus on the task by making it easy to keep aware of how the specific unit fitted into the whole task.

John has used visual metaphor in teaching. He felt that from his experience using metaphor might provoke a negative reaction from students if overused. He gave an example of how an effective metaphor works. He said.

> For example, in teaching organizational culture an iceberg metaphor works well to help people understand the concept. With an iceberg ¾ of the ice is underwater and so is not visible. Organizational culture is made up of some visible parts such as artifacts, but contains a great deal of less obvious pieces such as beliefs and underlying assumptions that are not obvious to the observer or even to members of the organization. As a result of the movie "Titanic", people understand the concept of part of the iceberg not being visible and so can readily envision how a significant part of organizational culture is not readily visible either. Again, as long as it is not over used it can be very effective.

John also mentioned that the metaphor should be well chosen. He said that the visual metaphor should be representative of the whole task and not contain easily misleading elements.

Sara was another student involved in this class. She had the idea of "learning can be fun". From her experience, she said that metaphors often help understanding, which she used for her own learning, teaching, and observation. She also found metaphor to be an intriguing way of understanding and interpreting new concepts. She felt a somewhat subliminal message of learning as entertaining was especially appropriate.

Moreover, she found that a visual metaphor is a process of making connections. Sara said that the strength of the visual metaphors is in the illustration of interrelationships. For example, what the puppeteer does to one part of the puppets affects the reset of the puppets, as well as affecting other aspects of the puppets show.

Sara then talked about the weaknesses of visual metaphor. She thinks that the metaphors need to be similar enough to the new materials being presented so as to aid an understanding rather than detracting from it. No metaphor is going to perfectly reproduce and represent the new material: there are limits to how far metaphor can be used and extended. Sara is satisfied with using visual metaphors but she is visual metaphor might not be as effective for the visually impaired. In her opinion learning styles need to be a consideration: audio learners, for example, might not find visual metaphors as effective.

While talking about her experience teaching, Sara said:

> "The old adage that "a picture is worth a thousand words" certainly illustrates how visual metaphor can make a concept clearer, much as a lens helps bring something into focus. It is important that the metaphor be understood by the audience, or you end up trying to explain two new concepts! However, used appropriately, I find it can be a very effective tool for understanding, illustrating, visualizing and remembering new information".

Elizabeth agreed with all students that the puppeteers help her to see the content in a different light and support her understanding of the content. She said that the puppeteer helped to orient her in the unit of study. Elizabeth understood the main idea that the puppeteers were meant to represent instructional designers, working behind the scenes. However she found the meaning of the four parts confusing:

> "My interpretation was that what the puppeteer was holding should align with the ABCD model we were learning, but instead I had to translate the numbers 1, 2, 3 and 4 into the appropriate ABCD meaning. 2) If you interpret this as the instructional designer being like a puppeteer and working behind the scenes that is OK, but elaborating it further with the additional pictures caused confusion for me. I found focusing on A B C D and what they meant much easier without the visual metaphor. additional pictures caused confusion for me. I found focusing on A B C D and what they meant much easier without the visual metaphor".

Elizabeth was confused between the ABCD steps (which together represent Step 2 of this ID model: Stating the Outcome) with the whole instructional design steps which are: 1) correspond with understanding the learning material, 2) what do I want to have happen? 3) how do I make it happen? 4) how do I know if it happens?

She agreed with the other participants that visuals metaphors should be used, developed and created very carefully or they can cause increased cognitive load and confusion. She said that if she doesn't understand the metaphor very quickly then she has to work at interpreting it, which adds extraneous cognitive load. She also thinks that visual metaphors can support intrinsic cognitive load by adding or clarifying one's interpretation of

content or the context in which content is presented. It is also a way to present a lot of information, but only if the user understands the metaphor.

Elizabeth also thinks that visual metaphors could have limitations. They can take time to think through and create. And she believes that, when teaching using metaphors, it is important that the learners (users) have a similar understanding of the metaphor to prevent divergent interpretations of the metaphor's meaning, which could create confusion around the point or idea being presented metaphorically. In addition to that she thinks that metaphors cannot elicit an idea if the idea it is not readily apparent. As a teaching aid, learners should have a similar understanding of the metaphor if it is being used to present concepts, content or ideas.

Elizabeth believes that metaphors should elicit an idea in the learners mind quickly, and that she needs to be purposeful and very deliberate and thoughtful when looking for metaphors to present ideas, concepts or content. Because, as she said, she does not have time to think through various metaphors for presenting concepts, content or ideas.

Maria agreed with the other participants that the visual metaphor was helpful to understand the written explanation. She preferred to use the instruction with the visual metaphor than without using the visual metaphor. She stated that it helped present the information in a way that she could understand it better and also see how the different parts of the instruction are connected. She also mentioned that, if the visual metaphors had been presented without the written explanations, they would have clouded her understanding of the idea being presented. Maria felt that by highlighting each of the steps in the puppeteer metaphor it helped to focus on the aspect of the instruction that was being taught. She believes that, because she is a visual learner, the metaphor did help her understand the instruction better. She stated that "visual metaphors help in creating an optimal balance between the instruction, the learner, and the environment".

Maria, as with the other participants, thinks that if visual metaphors are not carefully designed they could be distracting to the learner and may lead to cognitive overload. She also stated that metaphors should be simple, used sparingly, and we should only include them in instruction if they will help create optimal load.

Maria also talks about her experience using metaphor. She indicated that she does not use metaphor very often but when she does she has to be very careful. She said:

> "I am also very careful when I do use them by making sure that they are necessary and would enhance the instruction. One of those times was when I used them in designing Public Speaking instruction for my Freshman Communications class. The young age of the audience made it necessary to include visual metaphors in the instruction to help them understand, chunk, store, and recall the information easily."

From the cases above, themes emerged that answered the first research question in this study. Cross-case comparison strategy was used by looking for similarities and differences. This procedure led me to see patterns of experiences among the participants. The following are some patterns that emerged during the data analyses. The name of the themes has been taken from the exact words of the participants.

**"Help to understand"**

All the participants thought the metaphors that have been used in this study were helpful. John and Sara agreed that the metaphor helped to organize the whole task of instructional design. Maria stated that the metaphor helped her to understand the information. Elizabeth agreed that the metaphor was helpful to orient her in the unit of the study and help her to understand the idea of the instructional designer being like a puppeteer and working behind the scenes. However she misunderstood step 2 of this ID model: Stating the Outcome.

**"New knowledge"**

John and Sara believe that metaphor can be a suitable way to represent new knowledge by providing a framework within which to present it. Sara and Elizabeth agreed that metaphor should be understood by the audience simply, rather than having to explain two concepts.

**"Cognitive load"**

John, Elizabeth, and Maria agreed that the metaphors helped to create an optimal load. They were an easier way to stay on track and let them focus on how each unit fitted into the whole task. It also supported intrinsic cognitive load by adding the subject's interpretation of the content in another concept.

**"Making connections"**
Sara and Maria mentioned that the visual metaphors helped them to understand how different parts of the instructions were connected. For example Sara stated "what the puppeteers does to one part of the puppet affect the rest of the puppets, as well as affecting other aspects of the puppets show."
**"Easy"**

All participants agreed that metaphors are an easy way to help learners understand concepts. They also agreed that visual metaphor should designed well in order to be an easy and successful instructional tool for learners. For example, Elizabeth described how she felt satisfied when she can quickly establish a metaphor's meaning without spending too much time interpreting it.

**"Limitation"**
All participants think that metaphors have some limitation: a poor selection of metaphor can be distracting for everyone, no metaphor is going to perfectly represent new ideas, and it can sometimes take time to think through and create metaphors.

**"Not distracted"**
All participants stated that the visual metaphors did not distract their understanding. On the contrary they saw them as being helpful. Elizabeth added, "if I find it not supporting my understanding or if it add to my cognitive load, then I just ignore it".

**"Experience"**
John, Sara, and Maria personally used metaphors in teaching or presentations. They agreed that visual metaphor was an effective way to facilitate learning. For example, John indicated how the visual metaphor helped him to explain the idea of teaching organizational culture using the metaphor of an iceberg.

*Students' attitudes toward visual metaphor:*
John enjoyed the metaphor presented and he found it helpful. Many words in his response represented his satisfaction such as "I found the metaphor helpful", "I definitely preferred to have a visual metaphor", "The metaphor worked well for me", "I like visual metaphors, provided there are not a lot of inconsistencies", "but the visual metaphor made it easier to stay on track", "They help learners better understand", "as long as [the visual metaphor] is not over used it can be very effective".

Sara also saw the visual metaphors as an entertainment tool with which to learn. She also liked the way that the metaphor had been used. Sara pointed to her satisfaction many times in this study: " Yes, I found it helpful", "because I personally like metaphor, I like symbols and puzzles", "as I use metaphor personally a lot, I enjoy metaphor", "In fact, I felt a somewhat subliminal message of learning as entertaining was especially appropriate. Learning CAN be fun!", "Actually, I really like metaphor, and I like making connections, and I like the process of searching for appropriate and sometimes novel metaphors to relate to a particular idea, concept, etc", "I find metaphor helpful, useful, and enjoyable", "I also find metaphor helpful just in everyday life, in interactions with people and with my environment. It is a way of engaging in life rather than passively watching it pass by".

From her responses Maria seemed very satisfied. She said that well-designed visual metaphors could be beneficial in instructional design, especially in situations where they can be adapted to enhance a particular subject matter or topic of instruction.

Elizabeth also liked the metaphor, stating that "I like them and try to use them when possible". However, compared to the other participants she was enthusiastic but not as emphatic: "it can sometimes help me see the content in a different light or support my understanding of the content."

Themes emerged in the cases above that helped to answer the second research question in this study. By using a cross-case comparison strategy I looked for similarities and differences. Following are some patterns that emerged during the data analyses. Naming the themes has been taken from the exact words of the participants.

**"Like"**
All the participants thought that used of visuals metaphor in online learning environment was interesting and they liked it.

**"Preference"**
All the participants except one preferred the use of visual metaphors in their learning. John preferred the visual metaphor, as it provided a basic conceptual framework without using instructional design terminology, which could be more difficult. Elizabeth didn't prefer using visual metaphor because she thought that the content was simple enough without it.

## DISCUSSION

This study explored student's experiences and attitudes toward the use of visual metaphors in an online learning environment. Although participants in this study shared some similar opinions, they have different perspectives. This data was concluded based on the questions stated in Table 2: *The Relationship Between Research Questions and Interview Questions.* These results are also associated with the literature review that correlate with visual metaphors.

The overall data concludes visual metaphors in this study helped the participants in order to pursue their goals within the course. All the participants liked the metaphors and preferred to use them during instruction. Based on the interview results the researcher finds that all students understood the idea of metaphor very well. Furthermore, one case interpreted a different meaning than the one the metaphor was designed to facilitate. According to Elizabeth's responses it seems that she got the wrong message from the visual metaphors presented. This supports previous literature which shows the importance in teachers avoiding using misguided metaphors that can lead to inappropriate meaning (Gentner, Ratterman, and Forbus, 1993). Due to the depth of the metaphor, Elizabeth showed confusion and interpreted the visual metaphor and its steps in an incorrect manner. This can be supported from John's experience in his suggestion that "when using metaphor in class don't become too enamored with it. If you focus on the metaphor so much it will irritate students rather than facilitate the student's learning". Maria also stated that metaphors should be simple and used sparingly in order to be effective. Even though Elizabeth was confused, the majority of participants got the right message from the visual metaphor. This proves and concludes the visual metaphors presented in this study are well designed.

Regarding the students' attitude, the data showcases that all participants liked the visual metaphors and enjoyed them. Sara, for example, stated more than once that she enjoyed the visual metaphors used in this study because it motivated her engagement during the semester. This finding supported Sahin's study where he indicated that providing real life examples related to student experiences in an online learning environment contributed to student satisfaction, and will increase student's motivation, participation, and ultimately learning experience (2007).

The metaphors used in this study helped to create an optimal load for the participants. This is evident in John's assertion without them it would be "more difficult to step back and see the big picture". This particular finding is consistent with the literature. Analogical thinking limits the search for solution, which reduces cognitive load (Woolfolk, 1998).

Previous studies show that the use of visuals in online learning environments facilitate learning. Johnson (2007) found that using visuals in online learning significantly enhanced students' achievement. In this study, the visual metaphor helped learners to understand the instruction and to facilitate learning.

## IMPLICATIONS

Metaphor is widely used and has appeared in instructional design research literature for many years. This study adds to the body of knowledge surrounding the use of visual metaphor in learning. This study will help researchers and professionals in the field of educational technology to understand the conditions and experiences of using visual metaphor in an online learning environment. In addition, the results of this study will help educators realize the necessity of using metaphor for online learning and to assess the learning tools being used to ensure their effectiveness.

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