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Beyond Employability: Embedding Soft Skills in Higher Education

Keow Ngang TANG

International College, Khon Kaen University, Thailand tangng@kku.ac.th

ABSTRACT

Today, higher education institutions are being evaluated by the manners in which they react to the social and economic needs of society, that is, how they are expediting social mobility and wider access to higher education, hence this leads to their actions to enhance graduate employability. Therefore, this research was designed to examine the 34 lecturers who joined a workshop related to how they are transferring soft skills and sharing their experiences of their instructional activities. These 34 lecturers are eligible participants who have fulfilled the criteria given by Newton Fund Researcher Links Workshop comprising of 20 Thai, 13 United Kingdom, and one Vietnamese. A qualitative interview research method was employed. An interview protocol was used as an instrument to explore the key ideas from these participants on how to embed soft skills in detail to enhance graduate employability. Results of the study revealed that most of the higher education institutions have been facing the challenges head-on, rethinking the role of career services, academics, and even support services in boosting employability. In addition, results also indicated that in the United Kingdom higher education system has been emphasized on the vital importance of non-academic skills to employability. Besides, participants have highlighted a list of soft skills that graduates should possess and it seemed that the place where these skills will most often be instructed is in the lecture theatre, the tutorial room or the study group. Those soft skills are depending on how lecturers to ensure that they are embedded these soft skills in their course design and delivery.

KEYWORDS: Embedding; employability; higher education institutions; soft skills

INTRODUCTION

Okay-Somerville and Scholarios (2017) defined the term of graduate employability as job positions, occupation prestige and, to a slighter degree, the excellence of engagement. Therefore, past researchers referred employability upon qualification establishes a significant sign of graduate security. Rothwell, Herbert, and Rothwell (2008) distinguished internal and external insights of employability for graduate candidates to the workplace. The internal perception of employability denotes to aspects related to insights of graduates' capabilities, skills, and knowledge to search for their relevant jobs. The external perception of employability is related with insights outwit the graduate own switch, for instance, request for degree issue, reputation of the higher education institutions, and the general state of the graduate labor market.

Higher education scholars are assumed to gain assured skills and potentials, for example, team-working and problem-solving skills after experiencing their higher education learning process (CBI, 2009). Researchers as well as practitioners, have emphasized the significance of a set of soft skills that including the abilities to collaborate, communicate, and problem-solving in higher education institutions over the past decade (Chamorro-Premuzic, Arteche, Bremner, Greven, & Furnham, 2010). This is to define the obvious learning effects of tertiary education programs, as well as consequences in relations of assured kinds of transferable skill, for example communicative, team-working or problem-solving skills.

This progression has carried out in line with policymakers of higher education institutions and scholars' major focus on the graduates' employment effects and also the degree to which tertiary education program in preparing scholars sufficiently for their employability. Syed Ahmad (2013) further emphasized that higher education institutions are eventually expected to serve as human capital providers for the nation thus industry's feedback is extremely important to determine the characteristics that the graduates must possess so that they can function effectively in their workplace. Therefore, the idea of soft skills has to be the key elements of the regular learning consequences so that all scholars are anticipated to obtain the soft skills during their learning time in higher education institution is a logical step that should be taken.

The main aim of higher education's instructional activities obviously outspreads away from guaranteeing that graduates are employable. Employability skills refer to the skills that are required, sustaining, and doing well on a job. These skills and characteristics allow graduates to survive together with their colleagues, to create a perilous decision, resolve problems, develop deference, and eventually turn out to be robust representatives



designed for the business (Yorke, 2006). Yorke further highlighted that graduates' employability has to turn out to be a goal that governments have around the world, to changing degrees, executed on national higher education systems. It is the fact that higher education institutions are grounds where scholars track their socialization and obtain and grow a variety of knowledge, skills, attitudes, and characteristics that shake the manner they act in and take part with, broader society.

According to Kember, Leung, and Rosa (2007), there is increasing recognition for awareness that soft skills can support scholars to achieve academic and job-related aims upon their graduation. On this line of reasoning, soft skills have become increasingly critical parts of education to be embedded in the instructional process. This is because employers are desperately seeking employees with a combination of skills that seem fall under this career readiness and employability umbrella. Besides, Chamorro-Premuzic et al. (2010) stated that employer investigations have mirrored dissatisfaction with the degree to which soft skills are nurtured in tertiary education. Employers mentioned that there is always a breach between what they need of graduates in valuation undertakings and what happens in the workplace.

Employability concerns are at the very fundamental of current tertiary education both in Thailand and the United Kingdom. Previous arguments inclined to emphasize on generous worries that tertiary education must hunt for the scholars to well accomplish their part in society but current debates have concentrated additionally on an idea that the entire program courses must contain content of increasing employability, and also embedding soft skills in the United Kingdom (Cranmer, 2006). On the other hand, Thailand has incorporated ideas of scholars' effort enthusiasm as a resource of guaranteeing effectiveness in a comprehensive setting (UNESCO, 2012). In addition, numerous procedures have been established in Thailand, for example, the Thailand Quality Framework (TQF), in meeting with education and market experts.

According to the report of UNESCO (2012), the enrolment of tertiary education had been enlarged fivefold from 28.6 million to 152.2 million within 1970 to 2007. This has reflected the priority given to higher education institutions to develop a knowledge-based economy. Inappropriately, this tendency was not in parallel with employment rates. The worldwide unemployment rate increased from 5.6 to 6.2 percent from 2007 to 2010. It can be seen that there is a remarkably competitive situation for 15 to 24 years old people. For example, young unemployment rates have fluctuated between 11.8 to 12.8 percent namely 11.8 percent, 12.8 percent, 12.6 percent, and 12.7 from 2007 to 2010 (UNESCO, 2012). The above data are worrying because early life represents the dynamic workforce of the nations and the majority of them are higher education graduates. If not productively involved for prolonged time periods, a mass of problems and challenges facing an extinct generation will be compacted by several governments.

Although some unemployed tertiary education graduates might be partially initiated by disparities in the economy such as the current fiscal disaster and financial recessions are definitely causes for the drop in the amount of job available. Furthermore, the graduates' high unemployment rates might be also caused by the supply-side issues. As a result, higher education institutions need to be clearly understood the type of skills vital for scholars to move in the labor market so that they can nurture these skills in their course delivery. The significance of higher education programs performs a vital role in assisting their scholars' employability.

LITERATURE REVIEWS

UNESCO's call intends to make sure justifiable excellence education and lifelong learning for all by 2030 (Pavlova, Lee, Maclean, 2017). The significance of tertiary education systems is the major concern to meet the countries' economic and social requirements are rising globally (Organization for Economic Co-operation and Development OECD, 2005). Thailand government adapted educational policies to compact with these concerns consist of: a promise relating to curriculum flexibility and excellence across the diverse higher education programs presented; the commitment of diverse, numerous stakeholders; occupation assistance, corresponding programs to sufficiently encounter the needs of both graduates and the labor market, and efforts to assurance fairness (Thanomwan, Keow Ngang, Prakittiya, & Sermpong, 2017).

Karmel (2017) used OECD country-level data to grasp whether the structure of countries' education systems, illustrated by the level of participation by age at the numerous International Standard Classification of Education (ISCED), affecting systematically the level of unemployment for the cohorts aged 20-24 and 25-29 years old including whole labor market conditions and demographic structures, were accounted for. Karmel found that the structure of education systems does make a variance although the general state of the labor market is critical.

Chamorro-Premuzic et al. (2010) examined the three United Kingdom investigations using a determination-constructed tool to measure the significance and development of 15 soft skills. The first study



with a total of 444 samples acknowledged solid latent constituents encompassing these 15 soft skills, for example, the differences between-scholars were less than the differences between-skills. Consequence and filtering scores on these 15 soft skills projected educational performance thus interpreted the educational performance was affected by scholars' personality. The second study used a bigger sample as 1309 to simulate the construction of the 15 soft skills inventory and their associations with educational performance. Result of the mean differences analysis showed that there are higher soft skills ratings in 'softer' courses across the faculties namely humanities, life sciences, and hard sciences. The third study utilized 87 samples and merged an IQ measure found that there is a significant association with the scores of soft skills.

Results of their study highlighted the unified construction of principles regarding numerous soft skills and their substantial associations to instructional pertinent scholar differences.

Cranmer (2006) reported on the effect of employability skills in tertiary education instructional activities on the graduate labor market for the Higher Education Funding Council, England. Comprehensive evidence collected at higher education institution sector level was drained on to evaluate how lecturers perceived and engaged in the employability skills instructional activities. Cranmer claimed that regardless of the greatest purposes of lecturers to enhance graduates' employability, the restrictions innate within the program would constantly yield diverse consequences. In addition, means would be better operated to upturn employment-based training and practice, and/or employer participation in developments, which were initiated to positively shake direct scholar projections in the labor market and, therefore, backing graduates in the provisional period into employment.

CONCEPTUALIZING GRADUATE EMPLOYABILITY

Employability drives well away from the basic idea of significant skills and is demonstrated in the claim of a combination of personal potentials and principles, considerations, skilled performs, and the capability to replicate effectively on practice. Therefore, scholars will cultivate their employability in methods that replicate their specific conditions with the hope that they will become capable graduates who have self-reliance in their capability to (i) take active and proper action; (ii) describe what they are pursuing to attain; (iii) aware and work efficiently with others, and (iv) carry on to acquire from their practices, both as individuals and in relationship with others, in a various and varying society.

Employers would like to look for additional skills besides graduates' qualifications and experience. This means that the technical skills possessed by specialists are less important compared to those soft skills that can be transferred between different jobs and employment sectors when linked with different roles. On this line of reasoning, employers have to recognize their staff that has the right skills and qualities to accomplish their role and contribute to the organizational success. The Association of American Colleges and Universities conducted a survey showed that there is a gap between how higher education institutions prepared their scholars to believe for their chosen and how employers believe the graduates' readiness. Results of this survey indicated that current university graduates are found to be well prepared in written and oral communication, innovation, complex problem-solving, critical thinking and analytic reasoning, and applying their knowledge and skills to real-world settings perceived by about a quarter of the surveyed employers. However, results showed that more than 60 percent of graduates rates themselves as well prepared in terms of these soft skills. This result underlines tertiary education must identify innovative and active methods to measure and communicate their graduates' accomplishment. Employers told that they need comprehension into soft skills and higher education institutions must understand what employers want from their graduates (Kruger, 2015).

Ministry of Higher Education, Malaysia (2017) found that university graduates are lacking in communication and interpersonal, problem-solving, team-working, and critical and creative thinking skills. Since the late 1980s, government-funded initiatives and programs were existed in the United Kingdom and have planned to upkeep the soft skills development. The National Committee of Inquiry into Higher Education 1997 report (in Cranmer, 2006) recommended the soft skills development encompassing communication, numeracy, information technology, and learning how to learn should be introduced at higher education level within all courses. Further government-funded initiatives offered to upkeep higher education institutions in sustaining this concern.

The researcher had conceptualized soft skills that could be embedded into the course content as identified by Holmes (2014). They are communication and interpersonal skills, team-working, critical thinking and problem-solving, and personal development skills. Communication and interpersonal skill refer to job communication which includes being self-reliant about communication to individuals either over the phone or face-to-face as well as writing well enough in emails and memos in order to be understood. Examples of communication and interpersonal skill are writing assignments and reports; blogging or using social media; and making the oral presentation. Good communication skill is the capability to communicate with a wide variety of people both verbally and in writing, exhibit a wide-ranging vocabulary, maintain good eye contact, write clearly



and concisely, and adapt our language to our audience are all vital skills that employers look for. Good verbal and written communication means we can acquire our messages across with less unintentional of mistake. On the other hand, interpersonal skill is the skill we practice to interact with other people. Good interpersonal skill allows us to contribute effectively as a member of a team, fulfill customers or clients' expectations, negotiate, make decisions, manage our time competently, take obligation, and work efficiently with other colleagues. Good interpersonal skill allows us to emphasize and form a rapport with colleagues and clients, leading to a well and less stressful working environment.

Team-working skill means individuals are able to perform competently and properly in teams cooperate on projects and receive positive condemnation when working with others. Team-working skill is important in almost any work setting. Individuals focus on the importance of the team in the workplace. An individual is able to learn about teamwork and the different roles an individual can have within a team. Individuals will examine strengths and weaknesses they might have in inhabiting each of the roles. An individual is able to understand leadership, describing the traits that make a good leader. If individual works on a few team projects, that individual needs to be able to survive well with others, partaking the assignment with colleagues to achieve a goal.

Critical thinking and problem-solving skill mean the capability to solve the problem and make appropriate decisions. Critical thinking is defined as one's capability to comprehend, evaluate, and deduce information, and draw conclusions. Decision-making and problem-solving need collecting reliable information, assessing the information for a variety of resolutions and choosing the most suitable choice based on the standards and condition. An individual will have to evaluate conditions and solve the problems in most of the jobs. Therefore, they should be logical and make a coherent decision. Although the capability to solve problems and make suitable choices is critical, individuals with this skill are able to effectively plan and organize their team and are probable to get the job completed appropriately in the first time. This skill is useful for employers because they can save money and time. Planning and organizing also require the recording of data in a report which can be discussed to when planning upcoming projects. In addition, critical thinkers are inventive and innovative and are probable to develop innovative ways of doing stuff that adding value to the work environment, making more efficient systems and procedures. Critical thinkers can deal new viewpoints about the work and the organization.

Personal development is defined as all about having the correct attitude towards work and the organization. The individual who is exposed to learning and embrace transformation will be more positive than the individual who is scared of learning and resilient to changes in the organization. Personal development is alarmed with how individuals progress their working performs and attitudes to work. Personal development consists of self-motivation and confidence as it is the personal appearance and how others perceive us. On the other hand, self-management skill or so-called as self-control is the skill that we use to manage our personal feeling and how we react to problems and challenges. Personal development comprises learning to evade potentially negative emotions for example anger and stress while emerging assertiveness and active negotiation skills.

METHODOLOGY OF RESEARCH

The researcher employed a qualitative approach to gather information. A total of six focus group interviews were conducted with 34 participants consisting of 20, 13, and one from Thailand, United Kingdom and Vietnam respectively. They participated in the workshop which was conducted from 31st July to 3rd August 2017 in Asia Hotel Bangkok, Thailand. This workshop was designed to find ways to enhance graduate employability by higher education institutions. Each focus group comprised between five to six participants. The participants were selected based on the criteria that they are early career researchers and was awarded their doctoral degree not more than 10 years prior to the workshop. Those participants who do not have a doctoral degree but have equivalent research experience can still be considered as eligible to be selected. The criteria set by the Newton Fund Researcher Links Workshop sponsored by Thailand Research Fund in collaboration with the British Council. Participants must from non-profit organizations. All the participants were purposively selected according to the above criteria.

An interview protocol consists of several crucial questions to explore the methods utilized by participants' institutions that help the researcher to define the graduates' employability thus allow the participants to pursue their ideas or responses in detail. The flexibility of this methodology permits for the innovation or expansion of data that is important to the researcher but may not have formerly been understood of as applicable by the researcher (Gill, Stewart, Treasure, & Chadwick, 2008). The semi-structured questions were probed by the researcher herself who required supplementary data with follow up question. In order to ensure an accurate record of what was mentioned in the focus group discussions, all the interview sessions were audio-taped for transcription purposes. The interviews lasted one to two hours. The logic of consuming this research design was



to determine and articulate the opinions and experiences of participants as higher education practitioners concerning their innovative ways to develop scholar employability.

The main purpose of this study was to investigate how participants identify employability, and for this purpose, researcher probed every participant to define the term of employability. As mentioned earlier, the significance of these participants' self-reports is to assess their engagement level and how they valued employability in their academic delivery. An additional purpose was to recognize the prominence engaged in employment-related skills in higher education instructional activities. For this resolution, participants were requested to specify the degree of significance assumed in their instructional activities, stretched from educational objectives, for example teaching professional topic understanding and theoretic accepting, to the growth of more obvious employability-enhancing skills. The soft skills were selected to reveal those characteristically perceived as improving scholar employability in higher education, including personal development skills, communication and interpersonal, critical thinking, team-working, and problem-solving. The third aim was to discover the association between embedding soft skills in courses or soft skills subject as a stand-alone course.

RESULTS OF RESEARCH

The results of the six cycles of focus group interview are performed in keeping with the three main purposes that indicating before. This study aims to deliver the construction and concentration of the interviews. Several key points are developed and some repeated points have occurred. The preliminary result is the participants' knowledge and expectations of graduate employability. Next, the results of employment-related skills namely personal development, communication and interpersonal, team-working skills, and critical thinking and problem-solving skills were presented. The final result was on how these soft skills were embedded in higher education instructional process. The following is the summary of all the themes reflecting the key results of focus group interviews.

The significance of soft skills proficiency for graduate employment

Majority of the participants agreed that universities are dedicated to providing technical skills training effectively compared to develop soft skills of their students. This is because most of the university courses are planned to train students a specific capability. All of the participants emphasized the importance of soft skills proficiency in order to be employed. This is because employers have a limited worker asset if graduates lack these behaviors. All the 13 United Kingdom participants mentioned that there is a movement in higher education institutions of the United Kingdom to cultivate the entire individual development by the completion process of both hard and soft skills. Many participants mentioned that university graduates lack soft skills.

"Employers often find a broad gap between the soft and technical skills of university graduates at their place from the business side." (Focus group interview 2)

"Especially the new graduates, they are missing the soft skills required for specialized accomplishment" (Focus group interview 5)

"Many for-profit high education institutions in Thailand have initiated to assimilate the soft skills into their program, conveying bigger alertness to this emergent of soft skills need in training." (Focus group interview 6)

"Last time, we had not focused on teaching soft skills at all in higher education institution but now we have embedded those soft skills in order to make our higher education institutions being competitive." (Focus group 1)

"Many companies said that most of the university graduates are the absence of communication and decision-making capability, a thought of how to consider the matters freely and also having problems to work in their own groups, to resolve multifaceted problems and to construct their ideas during discussions. We are told by those companies that they are insufficient of emotional intelligence, leadership, and creativity" (Focus group interview 2)

"United Kingdom's employers are obviously concerned about soft skills particularly at the field of the liberal arts and social sciences. That makes me doubt about the seriousness of soft skills problem." (Focus group interview 3)

The methods of embedding the soft skills

The diversity of methods has been suggested by the participants related to effectively embedding soft skills into



their course design. In general, there are four basic questions that should be answered while lecturers are designing activities for their courses. The four questions are including the purpose of this activity and the importance, what kinds of soft skill are developed through the teaching activity, and the methods that the students can apply what they have learned in their workplace. The employment-related skills such as critical thinking and communication skills can be embedded in role-playing instructional activities. Team-working skill can be developed in group work instructional activities. Other than soft skills can be taught in weekly teaching courses, companies who involved as parts of the university internship program can integrate these soft skills in those activities within their internship training. Additionally, some of the participants highlighted the importance of coaching and mentoring in order to sustain these soft skills. Graduates are expected not only what they know the matters well but also ought to be lifelong learners.

"For example, team-work assignment supports our scholars to appreciate the significance of cooperation and manage the time together with their colleagues" (Focus group interview 1)

"University graduates are expected to become lifelong learners who have the questioning capability, support their argument with evidence, apply their knowledge in different and unfamiliar contexts rather than just recognize education as a matter of knowledge after four-year of their study in university. I would say this is also the university vision." (Focus group interview 2)

"For example, role-playing is an important instructional activity that can develop students' critical thinking and communication skills" (Focus group interview 3)

"A silent uprising at my institution is the classroom incorporation with other stakeholders around the world. For example, we recruit passionate employers to be faculty members and you will find our scholars are helping lots of internships in business companies, non-profits service organizations, and also some non-governmental organizations around Thailand." (Focus group interview 3)

"Even though sometimes if the soft skills were not effectively taught in the undergraduate education courses, I would like to suggest the companies who involved in internship training, can integrate these soft skills development activities within their training." (Focus group interview 4)

"Soft skills can be developed and enhanced through coaching and mentoring." (Focus group interview 5)

"Most of the junior experts can pick up merely by modeling the behaviors." (Focus group interview 6)

The advisory boards of each faculty in higher education institutions should include practitioners so that they can constantly appraise their program and their instructional methods according to the board members' feedback. In order to enhance graduate employability, faculty should include externships into their programs with the aim to develop scholars' professional experiences. A substantial follow-up such as the faculty can survey the employers regarding their scholars' performance after six months of the students' placement. The feedback about scholars' preparation can be incorporated into the related courses. Co-curricular transcripts, badging options, and portfolio are the various methods to encourage scholars to polish up their soft skills.

"Co-curricular record can be one of the evidence which allowing graduates to reflect their soft skills. This record will be useful for the graduates to bring to their workplace, hence establishing their co-curricular performance as expected by employers." (Focus group interview 2)

"Certain marking selections can be knotted to evaluation, which permits graduates to demonstrate their claims of soft skills capability." (Focus group interview 3).

"And portfolio allows graduates to share solid cases of when and how they rely on they have renowned themselves. This will encourage them to develop their soft skills." (Focus group interview 6)

Embedding of soft skills in higher education instructional activities

All the participants agreed that soft skills cannot teach as a stand-alone subject and have to embed in the courses. The importance of soft skills may vary from one sector to the other. Eventually, each company is motivating to the similar aims namely client satisfaction and profitability. However, all the four soft skills are found to be benefited by any individual in any job.



"Communication, critical thinking, creativity, and problem-solving skills are the basic soft skills required by most of the business organizations and they are differing and depending on the types of industry." (Focus group interview 3)

"Numerous higher education institutions are creating their programs to nurture the soft skills required by employers. Soft skills such as communication and interpersonal skills, critical thinking and problem-solving skills are very important, but yet these soft skills cannot be taught as a stand-alone subject." (Focus group interview 4)

DISCUSSION

The results of this research have shown that all the 34 Researcher Links Workshop participants emphasized the importance of soft skills development are constant across an extensive range of non-academic characteristics to cultivate graduate employability either in Thailand or the United Kingdom higher education institutions. Lecturers as practitioners should understand that the solid improvements on any of the soft skills are perhaps revealing of improvements to other soft skills to be applicable at the workplace. For instance, if lecturers know that students' team-working skill is vital to train for their outstanding academic achievement, at the same time, they also rely on critical thinking and problem-solving skills for the same purpose. In addition, current results imply that it is extremely important to equip graduates with the pertinent soft skills so that they are able to achieve their work-related career goals, as they are important implications for occupational psychology. Thus, graduates should alert of the requirement to cultivate soft skills in order to boost their effort projections. On this line of reasoning, the researcher hopes that the gap between academically fostered and occupationally desired skills such as soft skills is reduced.

Generally, higher education graduates stand for a resilient opportunity of searching for a job that they can enjoy significantly higher incomes than individuals with only secondary education qualification (Organization for Economic Cooperation and Development, 2004). However, soft skills development in higher education institutions has to be committed to substantial resources causing no confirmation that these efforts had a substantial independent impact on graduate employability (Mason, Williams, Cranmer, & Guile, 2003). Moreover, previous studies showed that a degree of mismatch occurred due to the soft skills acquired by the graduates at higher education institutions are insufficient to use in their employment (Cranmer, 2006). This could be the limitations of this study that soft skills can also be developed through other channels to enhance graduate employability outside the higher education institutions.

In addition, the results of this study found that employers' participation in program course planning showed to have positive impacts on graduates' employability. This implies that graduates have their capability to get graduate-level jobs at the beginning stage, within six months of graduation. According to Cramer (2006), these impacts would shrink swiftly over time because graduates are able to obtain other occupationally specific skills and knowledge jobs in line with their specialization through on-the-job training and working experiences. As Little (2003: 22) emphasized that the longer period of continuing mismatches between the supply and demand of the labour market would cause more than one of the transitions into other employment due to their insufficient employability. Therefore, the researcher would like to suggest to higher education institutions to redirect their resources from classroom-based initiatives to employment-based training and internships to enhance graduates' soft skills thus provide immediate projections and support graduates in the transitional stage into employment.

CONCLUSIONS AND IMPLICATIONS

Higher education is regarded as dominant to nationwide policies for acquiring shares in the international market and higher education institutions as the sources of valued human capital to backing nationwide growth is increasing. The fast-tracking change to an information technology economy and high-technology industries requires constant human resource training and development. Consequently, a proper tertiary education system is precarious for organizing capable personnel. Literature reviews and results of the study indicated that graduates believed their education and skills were sufficient and higher education institutions reflected their confidence in preparing their scholars for the transition to the workplace. Unfortunately, literature reviews indicated that new graduates are found to be lacked essential soft skills for employment, revealing impractical expectations and demands for higher wages by graduates as examples. Such distinct viewpoints must be taken into consideration for effective resolutions to enhance the graduate employability. It can be concluded that employers are seeking for graduates who are well-informed and experienced and simultaneously retain the required characteristics.

To highlight some key points emphasized by the participants in this Researcher Links Workshop, it can be concluded that all the lecturers should try out innovative methods of instruction and communication, comprising assessment of learning activities, and permitting scholars to arise with their own thoughts for learning and



co-planning lecture with potential employers. One of the outputs is the course modules development that they can utilize again later. Besides, results showed that there is an encouragement of embedding soft skills through classroom instruction has been really effective to assist in enhancing employability. This result was found to be in line with Hagmann and Almekinders (2003). In addition, some participants tried out coaching and mentoring techniques and with potential employers with excessive achievement, and this stimulated them to progress themselves more. This implies lecturers have to try utilizing components of personal development in the approach they work together with their scholars, so the scholars will be requested to inform their learning about development in their soft skills behavior in their instructional activities.

Training and education in participatory approaches to a certain degree, is considered an effective method to generate the required soft skills development. Therefore, there is a need for the incorporation of these four soft skills namely communication and interpersonal, personal development, team-working, and critical thinking and problem-solving skills into the curricula because higher education lecturers have to consider themselves, as corrective soft skills experts relatively than soft skills communicators. This is because the lecturers' expertise and skills to plan and implement curricula that intertwine soft and technical skills is usually insufficient. Therefore, it is recommended that scholars need to engage and develop those soft skills through learning processes or training over a time span in higher education institutions.

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Digital Citizenship: A Theoretical Review of the Concept and Trends

Dr. Cristina Hennig Manzuoli

Doctor en Educación y Sociedad, Profesor investigador, Centro de Tecnologías para la Academia, Universidad de La Sabana, Campus Universitario del Puente del Común Autopista Norte, km 7, Chía, Cundinamarca, Colombia cristinahm@unisabana.edu.co & cristina.hennig2@unisabana.edu.co

Mg. Ana Vargas Sánchez Mg. Erika Duque Bedoya

ABSTRACT

This article aims to analyze the concepts and tendencies identified in research conducted on digital citizenship in the last ten years. To satisfy this objective, search parameters were established for articles in specialized databases. Within the results, the prevailing categories were concepts, abilities, empowerment, instruments, programs and technologies that favor digital citizenship. The main findings include that different definitions exist of the concept of digital citizenship and that information and communication technologies contribute to access to information, though not equally at the global level. Additionally, digital citizenship is promoted by different initiatives such as programs focused on citizen participation. Thus, research focused on digital citizenship adopts a transcultural perspective in educational, social, public and private arenas.

Keywords: digital citizenship, education, technology, knowledge society, empowerment

1. INTRODUCTION

The Internet is a medium that boosts intercommunication and interconnection, which has led us to consider new forms of relating to one another in society. This phenomenon has been link to the cultural aspects of societies since the mid-20th century, prompting calls for the importance of reflecting on, considering and strengthening the implementation of digital citizenship in different educational, business and social settings (Sancho, Hernández and Rivera, 2016).

Consequently, several theorists (Arif, 2016; Ortega-Gabriel, 2015 Sanabria & Cepeda, 2016; Gorman, 2015; Simsek & Simsek, 2013; Waikato Diocesan School for Girls, 2015, cited in Gorman, 2015; Sullivan, 2016) have focused on defining digital citizenship, what digital citizenship implies, its effects or benefits on society and, more importantly, what role should be assumed by individuals participating in digital citizenship.

However, given the amount of information and numerous perspectives on the issue, it is difficult to identify a single focus or to unify concepts. Similarly, it is unclear which aspects definitively constitute digital citizenship as well as which aspects should be strengthened.

In addition, researchers have made evident the digital divide in society, that at present the policies established by the governments have not been able to cover. With deficit in aspects such as infrastructure, connectivity, among others (Searson, Hancock, Soheil, Shepherd, 2015). Consequently, seeks to deepen on these items. As, it seeks to focus on not so clear points and prospective for future research on digital citizenship.

The use of technologies in social life has created inconveniences and problems that remain difficult to understand from academic and policy perspectives, such as cyberbullying, sexting and grooming, which have reached the point of permeating scholarly and work environments, moving beyond the borders of the personal. From this fact stems the motivation to analyze the theoretical and practical research conducted on digital competency within the last ten years.

Some systematic reviews on digital citizenship have addressed aspects such as digital literacy (1980 -1998) (Hivon & Titah, 2017) and digital skills (2000-2016 English language) (Hintz & Brown, 2017). This comprehensive review updates the revisions to deepen the conception and current state of digital citizenship.

2. METHOD

To perform a systematic review (SR) of the scientific literature, phases and tools were established to gather information.

First, the tools for gathering information in the selected databases were established to delimit the selection criteria for relevant articles. Second, tools were determined for organizing the information gathered, which enabled tagging and classifying the articles in a systematic manner. In addition, the scope, characteristics and conclusions of each article were determined based on the research question, as described next.



Phase 1. Selection criteria

In this phase, the search and selection criteria were identified for articles to ensure the replicability of the study and reduce bias and possible errors in identification. The following databases were used: Science Direct, Redalyc, Eric, ISI, Proquest, Scopus, Emerald, Dialnet and Ebsco. These repositories of scientific and arbitrated publications, provided detailed information on current academic and scientific articles for it's possible to access them and stablish search terms: Digital citizenship and ICT (see Table 1).

Table 1 Tags identify in the search

Торіс	Author and year			
	h 10 2017			
_	Arif, 2016			
-	Sancho, Hermández and Pivera, 2016			
-	Sanabria and Ceneda 2016			
Concept of Digital –	Common 2015			
Citizenship _	Searson Hancock Soheil & Shenherd 2015			
-	Crandall and Fisher 2009			
-	Hintz Dencik & Wahl-Jorgensen 2017			
-	Hivon & Titah. 2017			
-	Couldry, Stephansen, Fotopoulou, MacDonald, Clark &			
	Dickens, 2014			
	Sullivan, 2016			
-	Simsek & Simsek, 2013			
	Sanabria and Cepeda, 2016			
Digital Citizenship Skills –	Waikato Diocesan School for Girls, 2015			
-	Burridge (2010) and Missingham (2009), cited in Gazi			
_	(2016)			
	García-Valcárcel, Basilotta and Mulas, 2016			
_	Area & Ribeiro, 2012			
	Arif, 2016			
Digital Citizenship Topics [–]	Ortega-Gabriel, 2015			
-	Simsek & Simsek, 2013			
-	Hintz, Dencik & Wahl-Jorgensen, 2017			
-	Karaduman, 2017			
	Sullivan, 2016			
-	Simsek & Simsek, 2013			
-	Gorman, 2015			
Empowerment –	Cáceres, Brändle & Ruiz, 2015			
-	Alcaide-Muñoz, Rodríguez-Bolívar, Cobo & Herrera-			
_	Viedma, 2017			
_	Hintz, Dencik & Wahl-Jorgensen, 2017			
_	Martinez, 2011			
_	Szopiński & Staniewski, 2017			
_	Sampedro, Sánchez & Poletti, 2013			
	Hivon & Titah, 2017			
	Choi, Glassman & Cristol, 2017			



_	Aytekin and Ozlem, 2013			
Instruments –	Cabrera, Marín, Rodríguez and Espín, 2005			
-	Hohlfeld, Ritzhaupt, Dawson & Wilson, 2017			
	Blevins, LeCompte & Wells, 2014			
Programs	Pellegrino, Zenkov and Calamito, 2013			
	Al-Zahrani, 2015			
	Simsek & Simsek, 2013			
	García-Valcárcel, Basilotta and Mulas, 2016			
	Jiménez, 2016			
– – Technologies that Promote	Gao & Lee, 2017			
	Techataweewan & Prasertsin, 2017			
Digital Citizenship	Toks Oyedemi, 2015			
-	Gozálvez, 2011			
	Espaliú, 2015			
-	Nam, 2017.			
	Hernández, Robles & Martínez, 2013.			

Source: by the author, based on Gisbert, 2011.

The following details were considered:

- 1. In the article selection process: the authors' names, title, type of publication, journal name, language and keywords.
- 2. To limit the search, a range of ten years was established, from 2007 to 2017 for establish a rank of years and can deep this papers and according to the theoretical framework of the study, this period was established to obtain the greatest number of sources that address digital citizenship.
- 3. Each advanced search in the databases provided the available information of articles on digital citizenship. In this first phase, 734 bibliographic references to scientific and academic studies were found.
- 4. Languages: Articles in Spanish and English was searched

Phase 2. Selection of potential articles

In this phase, the titles of the articles were reviewed individually to identify articles that satisfied the search criteria and the names of the corresponding topics. For example, under the topic of digital citizenship, information was found regarding the expansion of knowledge that was irrelevant to the study. Articles were discarded if they did not provide pertinent information based on the tags used in the search and the established disciplines in the social sciences. Articles for which full access to the document was not permitted were also discarded.

Applying this initial filter reduced the search to 100 bibliographic references. All information was stored in a database for subsequent consultation and analysis.

Next, to complement the data collection phase, the previous process was conducted, reviewing the abstract and conclusions of each article, thereby further narrowing the selection of potential articles. Following this process, 90 documents remained for analysis.

3. RESULTS

The categories correspond with the findings presented with greater occurrence in the investigated articles. Two big categories have been emerged: Digital citizenship as a bridge to empowerment and Overview of instruments and programs focused on digital citizenship, which they collect the main trends that arise from the results of the systematized articles. The two major categories presented subcategories in the case of the first category: Policies for digital citizenship, the concept of digital citizenship and its characteristics, and in the second category: instruments for measuring digital citizenship and training programs for citizens, these subcategories grouped together by affinity with the themes. In order to guarantee the reliability of the groupings carried out, intracoder and intercoder carried out to check that the categories corresponded with the findings investigated in the articles reviewed. Figure 1 show a synthesis of Categories and subcategories:





Figure 1: Tendencies in digital citizenship

3.1 Digital citizenship as a bridge to empowerment

Conceptualizations of digital citizenship are nascent, given that it is not yet understood in depth, prompting different researchers (Arif, 2016; Ortega-Gabriel, 2015; Sancho, Hernández and Rivera, 2016) to indicate the need to continue investigating, expanding and generating academic debates on the topic. Thus, a wide range of perspectives exists regarding what digital citizenship encompasses.

In general, studies (Sanabria & Cepeda, 2016; Gorman, 2015) illustrate that digital citizenship refers to "the values of respect, tolerance, liberty, security..." (Sanabria & Cepeda, 2016, p. 98) and emphasizes the democratic principles (ethics, legality, security and responsibility) that guide actions in digital spaces (Sanabria & Cepeda, 2016, p. 98).

Other authors (Searson, Hancock, Soheil & Shepherd, 2015) propose that digital citizenship is a comprehensive concept with the following three components: constant questioning of the policies of all nations, active interest in the affairs of other countries and an interest in creating a just global order. Couldry, Stephansen, Fotopoulou, MacDonald, Clark & Dickens, (2014) propose a similar perspective on digital citizenship, though offer a stronger heuristic vision focused on exploring the uses of technologies through (interpersonal) relationships and the social practices generated by different social groups.

Authors such as Hintz, Dencik & Wahl-Jorgensen, 2017 mention that "Digital citizenship is typically defined as the (self-) enactment of people's role in society through the use of digital technologies" [p731]. Other authors have adopted a citizen participation perspective on the use of open data, concluding that said participation is crucial and facilitates practical activities, greater responsibility, and improved communication and relationships between citizens and open data portals; however, data extrapolated to global contexts is nevertheless lacking (Hivon & Titah, 2017).

Some researchers have discussed the issue of the constant monitoring of the activities of digital citizens by state agencies and internet companies, causing an intermittent change in the balance of power [(Hintz, Dencik & Wahl-Jorgensen, 2017; Hintz, & Brown, 2017; Martínez Rodríguez, 2011).

Additionally, some studies (Simsek & Simsek, 2013) allude to the skills necessary to participate in digital citizenship. Some authors mention contemporary literacy skills (Simsek & Simsek, 2013; Area & Ribeiro, 2012) or technical and social skills (Waikato Diocesan School for Girls, 2015, cited in Gorman, 2015), while others (Sanabria & Cepeda, 2016) refer to dimensions of digital citizenship (creative, communicative and participative, axiological).

Clearly, digital citizenship is considered an essential aspect and one that should take priority in student training at educational institutions. This perspective is reflected in studies that have found deficiencies in student training with regard to civic knowledge (Robles, 2011) and studies that present teacher perceptions of the integration of digital citizenship into the thematic content of classes (Karaduman, 2017).

Research on digital citizenship highlights many topics, such as the use of Web 2.0, online participation, democracy, citizenship rights, technological capacities, the internet, social networks, values, norms, being informed, critical attitudes and the digital divide (Arif, 2016; Ortega-Gabriel, 2015; Simsek & Simsek, 2013; Area & Ribeiro, 2012).

Articles also highlight that countries such as Australia and New Zealand are working to promote the rights and responsibilities associated with digital citizenship and recognize these as fundamental to government processes, thus advocating for digital citizenship as a universal right (Sullivan, 2016; Simsek & Simsek, 2013; Gorman, 2015). This effort has been supported by experts in the field such as Area & Ribeiro, 2012, who state that "the



new literacies are a right of individuals and a necessary condition for social and democratic development in 21st-century society" [p13].

This perspective has led to a redefinition of the public (state, nation) and private toward the creation of new scenarios of social interaction and democracy in which all citizens participate (Sancho, Hernández and Rivera, 2016). However, it has also been suggested that digital citizenship has generated inequality in certain sectors of society, widening the digital divide, particularly in developing countries (Crandall and Fisher, 2009, cited in Sancho, Hernández and Rivera, 2016; Rahm & Fejes, 2017)..

In this context, the notion of empowerment represents the attempt to grant each person or group decision-making power, highlighting the role of citizenship in facilitating democracy and increasing the capacity to exercise power rather than to delegate it. This notion has gained strength with the emergence of Information and Communication Technologies (ICTs), sparking new proposals such as the concept of open government (Cáceres, Brändle, & Ruiz, 2015; Hivon & Titah, 2017), where citizens are allowed to access state data and thus launch a debate with solid arguments.

Other authors such as Burridge 2010 and Missingham 2009 cited in Gazi (2016), propose that the international promotion of digital citizenship increases generational empathy, thereby encouraging common norms for behavior in digital society.

Other studies reveal that ICTs have allowed citizens to gain access to information on voter intention and increase the transparency of information, increase trust in institutions and government, and monitor the behavior of politicians and government representatives. However, these technologies have not facilitated true citizen participation in which citizens can make proposals, and all sectors of the population are included (Alcaide-Muñoz, Rodríguez-Bolívar, Cobo, & Herrera-Viedma, 2017; Sampedro, Sánchez & Poletti, 2013).

3.2 Overview of instruments and programs focused on digital citizenship

Proposed instruments for measuring digital citizenship include self-report scales that consider behavior, cognition and social context, such as the instruments developed by Choi, Glassman and Cristol, (2017), in contrast to scales that inquire about the concept of digital citizenship, such as those developed by Cabrera, Marín, Rodríguez and Espín, (2005). The studies by Aytekin and Ozlem, 2013 found that the levels of digital citizenship are influenced by hours of internet use per day, the purpose of internet use, the use of devices to connect to the internet and the use of social networks by students. Researchers recommend that similar studies be conducted with other populations, along with the inclusion of new variables that can influence the development of digital citizenship.

The instruments also focus on measuring various skills, including citizenship and digital literacy, information management, collaboration, communication, the creation of content and knowledge, the evaluation and resolution of problems and technical operations. All the considered skills imply learning throughout one's life and the productive use of technology (Techataweewan & Prasertsin, 2017).

Other studies have found a relationship between the use of social networks and citizen participation, specifically for a group of women belonging to rural areas who engage in scant digital citizen participation through these means (Jiménez, 2016). Echoing these findings regarding the use of social networks and citizen participation, studies conducted in North America reveal the efficiency of sending government information through social networks to complement the government services provided to citizens (Gao & Lee, 2017).

Studies also report on programs to empower citizens, providing information about local, state and federal governments using simulators of citizen participation processes (Blevins, LeCompte & Wells, 2014). Other programs involve the use of instruments for strengthening student commitment to civic education by integrating multimodal instruction methods in the classroom, such as those developed by Pellegrino, Zenkov, and Calamito, 2013. With respect to classroom activities, some studies reveal that schools that implement dialogue with students promote the development of civic behavior and active citizen participation. These initiatives include topics such as civic participation and local, state and federal government, in which the emphasis rests on civic disposition and commitment (Blevins, LeCompte, & Wells, 2014).

Internet use appears to be associated with greater citizen participation in digital spaces, consistent with the findings of Toks Oyedemi, 2015. Similar studies include Gozálvez, 2011, who finds that technology enriches democratic processes and citizen participation as well as citizen initiatives (Espaliú, 2015). Thus, the idea of *the internet as a space for engaging public matters* has grown stronger, as highlighted above by the different functionalities acquired by social networks, namely, providing simultaneous and multiple communication, facilitating faster transmissions of communicative and activist information (Hernández, Robles & Martínez, 2013; Gonzalez-Lizarraga, Becerra & Yanez-Diaz, 2016).



Related to the above proposals is the development of digital skills to become informed and actively participate as citizens in digital society García-Valcárcel, Basilotta and Mulas, (2016). In this respect, new concepts have been proposed to describe new approaches to democracy, including teledemocracy (Beker and Aterton, 1981 and 1987, cited in Martínez, 2011), cyberdemocracy (Howard Rheingold, 2004, cited in Martínez, 2011) and digital or electronic democracy, digital government and e-administration.

Other studies highlight the importance of developing competencies through new literacies that strengthen digital citizenship, supported by public policies and individual responsibilities (Simsek & Simsek, 2013). Studies also reveal that students with high levels of attitudes toward the internet and self-efficacy in the use of computers exhibit high levels of respect for themselves and others and educate themselves and others about digital citizenship (Al-Zahrani, 2015).

In contrast to the research summarized thus far, some studies find both advantages and disadvantages in the use of the internet as a mechanism for citizen participation. On the one hand, for instance, a positive aspect is free participation. From another perspective, this aspect can be become a form of oppression in certain countries with undemocratic regimes. Thus, studies emphasize the importance of conducting more research to clarify the relationship between the use of ICTs, citizen participation and democracy (Nam, 2017; Szopiński, & Staniewski, 2017).

Studies also find that although students have increased their digital literacy, this increase does not guarantee that students will use technology to empower themselves, become more autonomous in their learning or develop critical thinking skills. The studies reveal gaps in the instruments used to investigate the use of technology and propose conducting interviews and classroom observation to learn how teachers and students choose certain technological tools for teaching, learning and participation (Hohlfeld, Ritzhaupt, Dawson, & Wilson, 2017).

4. **DISCUSSION**

This literature review aimed to identify the research fields that have explored digital citizenship and to highlight the different perspectives on digital citizenship. The review demonstrates that the concept of digital citizenship has permeated society and, therefore, the relationships that arise with it, thus providing new perspectives on what it means to be a digital citizen (Sullivan, 2016; Simsek & Simsek, 2013; Gorman, 2015). Digital competencies have provided spaces for society in general to express itself in response to different social, political and academic phenomena (Vesnic-alujevic, 2013; Soukup, 2014). Additional research is required, however, on the relationship of technologies to the phenomena present in society.

Various researchers have advocated the practical application of the concept of digital citizenship (Blevins, LeCompte & Wells, 2014; Pellegrino, Zenkov & Calamito, 2013; García-Valcárcel, Basilotta and Mulas, 2016), for instance, by prioritizing citizen participation in digital realms. Notably, such proposals have elevated the perceived importance of training as well as further studying this topic.

In developing countries, access to technological resources is not guaranteed, thus affecting individuals' access to information and online participation. Moreover, certain governments do not often make public the information managed by government agencies.

Hence, the conditions for training and acquisition of skills concerning digital citizenship are likely more favorable in developed countries that already possess the support and open databases from governments. This contrast is a clear example of how the state can transform itself, thus opening the door to societal participation in government processes (Sancho, Hernández and Rivera, 2016). Nevertheless, the relationship between government, citizen participation (democracy) and ICTs has not been addressed in adequate depth, which suggests the necessity of pursuing comparative research on developed and developing countries.

In this respect, one of the most widely recognized proposals worldwide is that of the International Society for Technology in Education (ISTE, 2004), which posits that digital citizenship comprises nine areas (netiquette, communication, education, access, commerce, responsibility, rights, ergonomics, and risk). This composition, in contrast to the programs and proposals reviewed, demonstrates that only certain areas of digital citizenship has been addressed in the literature, such as access, rights and communication. This selective investigation of digital citizenship reaffirms the need for further research on digital citizenship and raises the question of the adequacy of training provided in current programs and whether such training has been addressed all areas or dimensions of digital citizenship.

5. Conclusion

In synthesis, promoting digital citizenship implies great challenges, which can include participation by government bodies, universities, schools, families and society in general, transforming them into agents capable



of facing situation in digital environment. Though digital citizenship concept included practical values, tolerance, respect, democracy and questioning regarding policies by citizens (Sanabria & Cepeda, 2016; Gorman, 2015). Some authors agree digital citizenship is refered mainly to citizenship promulgation in society with ICT (Sancho-Gil, Hernández, Rivera, 2016). Also included other trends such as digital identity as right (Gorman, 2015, citizenship empowerment using technology for pronunciation about the approach of citizen participation mechanisms (Alcaide, Rodríguez, Cobo, Herrera, 2017) and citizen influence on changes in the use of Internet (Hintz, Dencik & Wahl-Jorgensen, 2017).

It is important to delve into other aspects such as analyzing basic citizen training around democratic principles (ethics, legality, security and liability) and how previous concepts could be influenced by citizen acts, because there are critical positions about digital gap could be generated into citizen inequality and manipulation by undemocratic regimes Nam (2017). The results of this review indicate that whereas initiatives are underway and different countries are conscious of the importance of providing training on digital citizenship, it is necessary to reflect on the recognition that this field should have in developing countries, toward establishing alliances between countries and offering equality for all. In this way, could have been consider for future works this question: How could the measurement instruments in Digital Citizenship reflection different relationships in different countries? Transcultural studies could elaborate on the differences between countries with high and low access to technological resources.

Regarding the skills required to exercise digital citizenship, it would be worth asking: what does society need to contribute to digital citizenship? The follow-up shows three trends in terms of the training needs of citizens: the first is democratic knowledge for citizen participation and knowledge of the rules of citizen behavior (Sanabria & Cepeda, 2016; Burridge, 2010; Missingham, 2009).

The second tend includes social skills such as creativity, critical attitude, axiology, communication (Arif, 2016; Ortega, 2015; Sanabria & Cepeda, 2016) and the third tendency is digital literacy (Simsek E, Simsek, 2013; Area & Ribeiro, 2012) which includes the Internet management, skills in the handling of information and the use of social networks. On the other hand, it is necessary to establish in theory and practice, the relationships and interactions that technologies generate in citizenship and technology promote this aspect with greater force, since it is a point that does require analysis. According to the above, the following questions can have been ask to inquire about these issues: How have programs in Digital Citizenship transformed the profile of the citizen?

The results include the relevant tools for the design of instruments oriented to the measurement of digital citizenship in school, government and family contexts. For this reason, it is worth considering the following question: How is the level of education in Digital Citizenship former and how is it contribute to the professional profile of the students in formation? This aspect is interesting to deepen in future research because students have deficiencies in civic knowledge (Robles, 2011) and digital literacy is not a guarantee that the use of the Internet will developed critical thinking and empowerment. In this regard, the instruments used in the studies analyzed present two trends: the first one is oriented to how the Internet is being used as a mechanism of public interaction, enriching citizen and activist participation (Jiménez, 2016; Gao X, Lee, 2017). The second tendency of the account of the instruments used to measure the educational use of civic education and citizen participation with multimedia (Robles, 2011; Blevins, LeCompte & Wells, 2014). However, it is necessary to analyze the criteria of choice of technological tools that propitiate these skills (Hohlfeld, Ritzhaupt, Dawson & Wilson, 2017).

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ICT Literacy and School Performance

Gina M. M. C. SANTOS

Universidade de Trás-os-Montes e Alto Douro, 5000-801 Vila Real, Portugal

Eleusina M. C. P. S. L. RAMOS

Universidade de Trás-os-Montes e Alto Douro, 5000-801 Vila Real, Portugal

Joaquim ESCOLA

Dept. Educação e Psicologia, Escola de Ciências Humanas e Sociais, Universidade de Trás-os-Montes e Alto Douro, 5000-801 Vila Real, Portugal.

Manuel J. C. S. REIS

Dept. Engenharias / IEETA, Escola de Ciências e Tecnologia, Universidade de Trás-os-Montes e Alto Douro, 5000-801 Vila Real, Portugal. mcabral@utad.pt

ABSTRACT

There is no doubt that Information and Communication Technologies (ICT) are now an integral part of the life of children and young people. Some of the recent literature studies on literacy in ICT show that this should incorporate Internet literacy, Computer literacy and Information literacy, and being these three forms of literacy indispensable in many aspects of human life in the 21st century. To determine the relationships between these three dimensions of literacy in ICT, the importance of parental and teachers support and use of the Internet as a pedagogical tool, as well as the influence of these factors on school performance and assess how they relate to explain, in general, why ICT literacy influences school performance, structural equation models have been used. The results show that ICT literacy is undoubtedly a factor in school performance of students of the 3rd cycle of basic education and secondary education (7th to 12th grades) in the district of Vila Real, Portugal. It was further found that the use of the Internet as a pedagogical tool is a major factor in school performance, and that parental and teacher support has a positive influence on ICT literacy.

INTRODUCTION

Learning with the support of Information and Communication Technologies (ICT) has been constantly evolving, having come to generalize the idea that the generation of today's young people is surrounded and immersed in technology, such as smartphones, computers, tablets, game consoles, among other (Prensky, 2010). As a consequence, this generation has proven to be more experienced in the use of technology (Palfrey and Gasser, 2013; Prensky, 2010). It is common sense that the students of the Portuguese 3rd cycle of basic education and secondary education fall in this classification, and as such they are comfortable in using ICT, even when compared with their parents and teachers.

Some studies on ICT literacy (see, for example, Lau and Yuen (2014); Aesaert et al. (2014)) show that this should include Internet literacy, Computer literacy and Information literacy, and being these three forms of literacy indispensable in many aspects of human life in the 21st century.

To determine the relationships between the various dimensions of literacy in ICT (Internet literacy, Computer literacy and Information literacy), the importance of parental and teachers support in using the Internet as a pedagogical tool, as well as the influence of these factors on school performance and assess how they relate to explain, in general, why ICT literacy influences school performance, structural equation models have been used. It is important to know not only new technologies, but also to master them and to realize that they are constantly changing. To understand the full meaning of this area, it means having the notion that ICT are not only able to perform skillfully the most diverse software, be proficient in the Web domain, etc., but also be able to infer all this knowledge and know how to use it critical- and competently.

In short, as sooner a child acquires ICT literacy skills the better. Better results are achieved when there is a parental and teacher support as a way to encourage the use of technologies to achieve better school performance. Note that students of the new millennium, not only have more aptitude and skills in the use of ICT, when compared to their parents and teachers, but also were shaped by them, in respect to their standard thoughts and communication, notions of learning, and even in their personal and social values, such as multitasking that is taken as a current social practice (Pedró, 2007).

Here, it is aimed to examine how ICT literacy influences the academic performance of students of the 3rd cycle



of basic education and secondary education (7th to 12th grades) of the Vila Real district, in Portugal. It is intended to make a contribution in this research area through the development of a model that allows us to assess the causal relations between the variables under study: ICT literacy (Internet literacy, Computer and Information literacy), Internet to support study and leisure, parental support, teacher support and school performance.

So, to achieve these aims, it was asked the following questions, given raise to the corresponding hypotheses:

- H1: Does the use of Internet to study influence scholar performance?
- H2: Does ICT literacy foster school performance?
- H3: Does ICT literacy influence the use of the Internet to study?
- H4: Does ICT literacy encourage school performance mediated by the use of the Internet to study?
- H5: Do teachers influence the ICT literacy of students from the 3rd cycle of basic education and secondary education in the municipality of Vila Real?
- H6: Do parents encourage their children to use ICT literacy to support their studies?

The answers to these question and the test of the corresponding hypotheses will be given in the remaining of the paper. Section 2 is dedicated to the literature review; section 3 is used to present the methodology used; sections 4 to 6 will be used to characterize and analyze the data obtained, validate the measuring instrument and the proposed model; and in section 7 the results will be discussed and the main conclusions will be presented.

RELATED WORK

ICT literacy

There are several terms used to define the range of human attributes associated with the use of ICT. The most common names in the latest reports and review articles include the terms competencies, skills and literacy. Despite their distinct and specific meanings, they are often used interchangeably in similar contexts (Markauskaite, 2006). The concept of literacy has been defined and studied in depth in the area of education (Hannon, 2000). Its definition varies from being seen as a set of skills, a process, a line of thought or practice (Herring, 2009). Different researchers tend to work separately addressing different aspects of the concept (Lau and Yuen, 2014).

According to Lau and Yuen (2014) digital literacy, as a concept, integrates Internet literacy and Computer literacy. ICT literacy, as a concept, integrates Internet literacy, Computer literacy and Information literacy. Here, this concept of ICT literacy will be adopted.

The European Commission included in 2007 digital skills as one of the eight types of key competencies for lifelong learning, also known as the 21st century skills. In this context, digital skills are associated with critical thinking, problem solving, as well as the creative and innovative use of a computer, besides simply mastering technical skills in ICT. According to Aesaert et al. (2014), digital competence is defined as the proficient and critical use of ICT for work, leisure and communication. According to the European Commission it underpins the basic skills in ICT, the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet (Figel, 2007). Similarly in the United States of America, the National Educational Technology Standards for Students of the International Society for Technology in Education (ISTE) were organized into 6 categories ("creativity and innovation", "communication and cooperation", "research and fluency in information", "critical thinking, problem solving and decision making", "digital citizenship" and "technological operations and concepts"), that demarcate from the technical skills in ICT stooping to the creative use of ICT, problem solving and information literacy (ISTE, 2007).

Concerning ICT literacy there has been a number of different defended settings, such as the OECD (Organisation for Economic Co-operation and Development) that has defined it as the interest, attitude and ability of individuals to properly use digital technology and communication tools to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others in order to effectively participate in society. OECD has also suggested five critical components of ICT literacy: access, manage, integrate, evaluate and create (Lennon et al., 2003). Baek et al. (2008) defined ICT literacy as the ability to recognize problems related to ICT and the ability to search, analyze, evaluate, organize, create, use, manage and communicate information in order to solve the problems related to ICT. In short, it can be inferred that this concept includes cognitive and technical aspects.

Regarding Internet literacy (Internet literacy, or Network literacy, or Hyperliteracy), van Deursen (2010) used the term "Internet skills" referring to these as skills related to the environment (e.g., knowing how to use browsers, search engines, filling out forms) as well as skills related to content (e.g., find, select and evaluate



information). In this work, Internet literacy is the ability to access, analyze, evaluate and create online content (Lee and Chae, 2012). Internet literacy covers all types of actions related to the use of the internet, such as information retrieval, downloads, online shopping and online interpersonal communication (Savolainen, 2002). These skills are seen as an important component of human capital, because highly skilled users are best positioned to benefit from the Internet (Hargittai and Hinnant, 2008), enhancing communication and informal learning (Lee and Chae, 2012). The concept of Internet literacy has been emphasized on the issue of online security, and the European Commission created the Safer Internet action plan, whose aim is at the Internet literacy as a means for children and young people to protect themselves from harmful content (pedophilia, pornography, bullying, etc.). Lee and Chae (2012) observed that this kind of literacy helps not only to protect against online negative influences, but also reduces the inequality of information and involves the children in creative and social activities. However, Livingstone and Helsper (2007) reported that, due to the strong correlation between online participation and online risks, the most qualified users are more likely to engage in online activities, so they are more likely to be exposed to risks of breach of privacy, unwanted exposure, among others. Buckingham (2007) emphasizes that education must go beyond the ability to access and locate information and that it is equally important to know how to evaluate and use information critically. Thus, it is important to know the interests of the authors, to question the sources of information, and how that information is represented in reality.

The Computer literacy (Computer literacy or Information Technology (IT) or Electronic literacy) is a widely discussed concept. Horton Jr (1983) defines computer literacy as the understanding of what the machine can do, through the knowledge of hardware and software. The concept of Computer literacy, according to Bawden (2001, 2008), can be understood as a set of necessary operational powers for handling a wide range of software applications, including word processors, spreadsheets, databases, etc., as well as the knowledge of some generic skills such as copying files or configuring a printer driver. Tsai (2002) defines Computer literacy as the knowledge, skills and attitudes necessary for all citizens to be able to deal with computer technology in their daily life. Poynton (2005) states that the computer assumes the role of disseminating information, such as the press did for many years, increasing the ease with which information can be reproduced and disclosed. Thus, it is essential to hold the skills in Computer literacy to benefit from the information provided by the press as well as to benefit from the information provided by the personal computer. Poynton also grouped the lifespan (children, youth and adults) effects of computer literacy. He found that the more time children spend using the computer and software applications the better performance, in their future, they will have, when faced with new skills in emerging literacies. For young people, Poynton has measured that Computer literacy is positively associated with the scores obtained in practical measuring skills tests. Concerning adults who did not obtained specific knowledge in the area of technology, they need specific training to develop their skills and maintain equitable access to information. Selber (2004) claims to be essential to incorporate more opportunities to allow students and teachers to recognize Computer literacy as a social practice and raising the topic beyond the why and how to use technology.

Regarding Information literacy, Koltay (2011) argued that information plays a vital role in the development of democracy, cultural participation and active civic participation, having this literacy an increasingly important role, particularly for knowledge workers who make intensive use of Internet and computer tools. Also, Information literacy emphasizes the need for recovery and careful selection of the information available in the workplace, at school, and in all aspects of personal decision-making, especially in the areas of citizenship and health. Education in Information literacy emphasizes critical thinking, metacognitive and procedural knowledge used to locate information in specific domains, areas and contexts. The main emphasis is placed on the recognition of the message of quality, authenticity and credibility (Hobbs, 2006). Lloyd and Williamson (2008) in a study on how Information literacy is understood in educational contexts, in the workplace and in the community, concluded that the context is an influential factor in determining the phenomenon. Catts and Lau (2008) reported that Information literacy is appropriate in all areas of human development, defining it as the ability to identify information needs, assess their quality, manage this information, use it effectively and in an ethical way, besides being able to create and communicate the knowledge gained through the application of information. Among the referred definitions there are common aspects, being perhaps the most important one the awareness that information skills cannot be seen in separately, as they are interrelated processes that involve the way people think about information and make use of it (Eisenberg et al., 2004).

Currently, all aspects that relate to critical thinking and communication skill are emphasized, as new generations are increasingly characterized by an immersion in the world of the Internet, which is an integral part in their daily life. This critical thinking is important, if not crucial, to be able to filter all the unregulated information and communication existing in the universe of the Internet (McPherson, 2008). It is then necessary to develop habits of reflection that make us clearly question what it is known about each subject, and then build a new knowledge.



This critical literacy will enable us to participate and communicate comfortably and safely in these contexts, it offers us the ability to find the searched information, observe this information in various formats, solve problems and infer about the ideas that arise. This capacity is referred to as "multi-literacy" (McPherson, 2008).

Parental and teachers support for ICT literacy

Students' ability to learning through the use of technology goes far beyond the classroom, since they use it, albeit the basic way, to support their study (Clark et al., 2009). According to Kuhlemeier and Hemker (2007) and van Braak and Kavadias (2005), students tend to use the computer and Internet at home, to a much greater degree than in the classroom. Also according to Kuhlemeier and Hemker (2007) and van Braak and Kavadias (2005) the ICT skills are mainly acquired through "learning by doing" at home, and less in the context of the classroom, through specific training. Mumtaz (2001) suggested that teachers, in order to improve the results of education in ICT at school, should take into account the use of computers at home by students.

It is also important to note not only how teachers use technology in the classroom, but, more than that, the way they help promoting the use of technology by students as a complementary support to their study outside the classroom (Greenhow et al., 2009). According to Lai (2015) and McLoughlin and Lee (2010), teachers may also influence the behavior of students concerning the use of technology outside the classroom, through other means, such as encouragement and emotional support, resource recommendations, homework involving the use of technological resources and guidance on how to use technological resources for learning. This is evidenced by Luckin et al. (2009) which state that the educational resources used by students in their study are suggested mostly by their teachers. This pedagogical or meta-cognitive practice is critical to facilitate the transition from "living tools" to "learning tools" (McLoughlin and Lee, 2010). However, according to Toffoli and Sockett (2015), it is being found that most teachers do not exercise this influence on students regarding the autonomous learning outside the classroom.

Teachers need the knowledge and skills to play this role of advice on their students, particularly in what concerns to the selection of technological resources that meet the individual needs of their students, the ability to create educational activities that make a bridge between learning inside the classroom and outside of the classroom, always through the use of technology, in order to promote the use at home (Kop and Fournier, 2011). Thus, Lai (2015) argues that it is important that professional development programs for teachers emphasize their responsibility, concerning autonomous education of students, as well as the various ways that may influence students in the use of technology outside the classroom.

According to Yu et al. (2012), the family environment, in particular the influence of parents, has an impact on the use of ICT by their children, which in turn has an impact on their studies.

It should be noted that parents tend to assume that their children learn how to use a computer at school, but in fact the quality and quantity of available education may not necessarily be satisfactory (Oksman, 2003). Thus, parents may not have the perception of how important is the key role they play in influencing the digital skills of their children (Zhong, 2011).

For Wilson (2009) families are an immeasurable resource that should be used by teachers to improve the academic performance of their students. However, according to Plevyak (2003), not always there is a parental involvement with the school, being very often due to negative reasons (Friedel, 1999) (e.g., poor school performance of their children).

For Yu et al. (2012), one of the barriers to parental involvement in computer use at home is related to the lack of knowledge on how to engage properly with their children. According to Yu et al. (2011) when parents no longer have control or do not have a guiding role on how to use the computer at home and children refuse to communicate with their parents about this issue, parents become what these authors call "concerned outsiders".

Using the Internet to support the study

The use of the Internet is one of the most widely studied themes in the area of educational technologies. The types of use of the Internet have been subject to a variety of rankings over the years.

Here, it is adopted a classification that takes into account the typology of use, starting from the resources used. In this chain, several authors identify the use of the Internet for several purposes, adopting different classifications. For example, Large (2005) adopted a classification of Internet use in four groups: 1) education, where the Internet is a source of information to support school work; 2) leisure, where the Internet is a place to find songs, images, videos, movies, and information essential to support hobbies, as well as pertinent information to facilitate the daily life of the young; 3) cultural enrichment, when using the Internet to know other cultures,



access virtual museums, among others; and 4) social interaction with friends, relatives and sometimes strangers, via email, or online chat in real time. However, Kalmus et al. (2011) classified the use of the Internet into two main groups: a first group consisting of entertainment and social networks, and a second group consisting of work and information. Other kind of classifications are the ones proposed by Hamburger and Ben-Artzi (2000) that differentiate the use of the Internet in social networks, leisure and information services, or Landers and Lounsbury (2006) who also adopted three types of classification: leisure, socialization, and academic use.

It is a common fact that both teachers and students use the Internet to obtain information to help in doing school work. There is a huge number of sites that exist solely and exclusively as educational resources.

Becker (2000), after analyzing the US Census data, concluded that the main reason for Internet access was a way of supporting the study, but grouping all types of leisure use, such as playing online, listening to music, consulting/ sending e-mails, etc., counted for more time than the study support.

Nowadays, with the emergence of social networks, the type of Internet use for leisure by young people has undergone significant changes. Thus, according to Karal and Kokoc (2013), Internet users have given preference to the use of social and communicational networks, which, as sharing environments, offer opportunities in any age group and at any level of schooling, being, currently, the most popular online communication method (Glusac et al., 2015).

The themes explored by adolescents in social networks are varied, and some lines of research are associated with this phenomenon, such as focusing on the impact of social networks on cognitive abilities. For example, Alloway et al. (2013) indicated that in their study, youths who routinely used Facebook (but not YouTube) for more than a year had better oral, reading, and writing skills, as well as better storage capacity compared to colleagues with shorter usage times.

Jenkins (2010) reported that young people participating in large participatory culture communities around online games, online knowledge libraries such as Wikipedia, fan groups, etc., work together to solve problems and complete tasks, developing a new knowledge in a collaborative way.

ICT literacy and school performance

It is common sense that the better the school performance, the better the chances of success for the students (Darolia, 2014; Erten and Burden, 2014). These authors note that students who have access to ICT and a good school and family environment are the ones that perform better.

Similarly, school performance has been an influential factor in ICT literacy, as stated by Baek et al. (2010), who, when doing a study on ICT literacy with three groups of students with different school performance (good, sufficient and insufficient), verified that the group with a good school performance showed a level of ICT literacy higher than the remaining groups.

Barber (1997) found that the vast majority of teachers believed that the use of the Internet did not improve student performance because its use was disorganized and unrelated to the school curriculum.

Kubey et al. (2001) have found that the intensive use of the Internet for leisure is highly correlated with poor academic performance, especially by those using the online communication applications. These researchers also noted that there is a significant number of individuals that when able to be with their friends at any time of the day, their time of rest will become disturbed, and thus reducing their school performance.

On the other hand, Jackson et al. (2011) found that a greater use of the Internet is associated with better reading abilities, especially in young people with difficulties in this area. Chen and Peng (2008) note that casual users have better interpersonal relationships, better academic performance, and greater personal satisfaction, in parallel with those who use the Internet on an ongoing basis, who are prone to becoming depressed, physically ill, lonely and introverts.

Huang and Leung (2009) believe that being proficient in ICT has a positive impact on academic performance, because, by definition, it means having competence to easily solve academic problems.

METHODOLOGY

Our sample considers the students of the 3rd cycle of elementary education and secondary education (7th to 12th grades) of the public and private schools of the district of Vila Real, in Portugal. It should be noted that the



district of Vila Real is made up of 20 parishes, whose population is around 52,000 people. According to the data provided by the "General Directorate of School Facilities" (*Direção-Geral dos Estabelecimentos Escolares*), in the district of Vila Real there are 5 schools with an educational offer for the 3rd cycle of basic education and 4 for the secondary education.

In a first moment of our research the Administrative Councils of the schools of the district of Vila Real were contacted. Next, primary data were collected by filling out a questionnaire with personal descriptive data, Internet use for leisure, Internet use to support students' study, Internet literacy, Computer literacy, Information literacy, the role of teachers concerning the students' work and the degree of encouragement of parents towards the use of the Internet to support their children's (students) study.

As stated above, this research covers Information literacy, Internet literacy (communication) and Computer literacy (technology), which form the conceptual framework of the ICT literacy scale to be implemented and validated. In terms of measurement, the scale was considered to be a unitary construction with three correlated sub-scales representing the three literacies mentioned above. The questionnaire was applied between May and June of 2015, and 1100 surveys were distributed, with 808 valid answers (74% of response rate). A copy of the complete questionnaire can be downloaded from http://http://www.mcabral.utad.pt/inq.pdf.

Characterization of the sample

This section intends to make a brief characterization of the research sample, which consists of 808 students from the 7th to the 12th grade. It will also be made the characterization of the parents of these same students, especially regarding their educational qualifications, professional situation and professional activity.

Students

Regarding gender, it can be seen from table 1 that 53.1% of the students in the sample are of the masculine gender, being 46.9% of the female gender. The most represented age is 13 years old (23.4%), followed by 14 years old (21.7%), 15 years old (18.3%) and 16 years old (16.8%). The less represented ages are 12 years old (12.3%) and students aged 17 or above (7.5%). The most represented years of schooling in the sample are the 7th grade (27.4%), the 8th grade (26.2%) and the 10th grade (26.1%), the least represented being the 9th grade (12.4%) and the 11th and 12th grades with 4.3% and 3.6%, respectively (table 1).

Sociodemographic variable	N	%	
Gender			
Male	429	53.1%	
Female	379	46.9%	
Total	808	100%	
Age (years old)			
12	99	12.3%	
13	189	23.4%	
14	175	21.7%	
15	148	18.3%	
16	136	16.8%	
17+	61	7.5%	
Total	808	100%	
Grade			
7th	221	27.4%	
8th	212	26.2%	
9th	100	12.4%	
10th	211	26.1%	
11 th	35	4.3%	
12 th	29	3.6%	
Total	808	100%	

Table 1. Descriptive statistics of the sociodemographic variables of the sample.

Students were asked to answer how often they accessed the Internet to support their study by assigning a score of '1'—never accessed, '2'—accessing less than 1 hour a week, '3'—accessing between 2 to 3 hours a week, '4'— accessing 4 to 5 hours a week and '5'—accessing more than 5 hours a week.

Internet access to support students' study is less frequent than for leisure, table 2, almost reaching the average of 2 to 3 hours a week at home (2.87 ± 1.093), but being lower in school (1.87 ± 0.879) and in other spaces (1.70 ± 0.876).



Regarding school performance, students were challenged to fit into a ranking of their class with five ranks, ranging from the best 20% of the class to the worst 20%. About 34.7% said they were in the best 20% of the class, with 29.6% falling in the middle of the class (between 40% and 60%). The second (20% to 40%) and the fourth (60% to 80%) groups were equitable, representing 15.8% and 15.7%, respectively. Lastly, the least representative group was the group of students in the worst 20% of the class, with only 4.2% of the students stating they belong to this group.

Table 2. Descriptive statistics associated with the frequency of access to the Internet for leisure and to support the study

the study.				
Internet access	Mean	Std. Dev.		
Leisure				
At home	4.25	1.022		
At school	2.17	1.134		
Other spaces (e.g., cafe, bar, restaurant,)	2.59	1.191		
Support the study				
At home	2.87	1.093		
At school	1.87	0.879		
Other spaces (e.g., cafe, bar, restaurant,)	1.70	0.876		

Parents

Regarding the school qualifications level, it can be observed that parents generally have a higher level, being slightly higher than that of mothers, which is verified for those who have MSc or PhD degrees (17.9% vs. 12.5%), (21.6% vs. 18.0%) and 12th grade or equivalent (30.2% vs. 30.0%), which is the most represented level of schooling, table 3. In the lower school qualifications level, parents score slightly lower than mothers, as is the case of parents who only have the 4th grade of schooling (10.5% vs. 8.1%), the 6th grade of schooling (10.6% vs. 4.7%) and the 9th grade of schooling (17.3% vs. 16.4%).

When asked about the situation of the parents in their job, the majority of students indicated that parents are employed and there is a slightly higher value of employed parents than mothers. The prevailing situation is that of employees (60.5% vs. 59.4%), followed by self-employed (20.1% vs. 12.3%) and workers on their own (8.6% vs. 3.8%). Regarding retirement, it was also found that parents scored the largest number (2.9% vs. 1.2%). The number of parents unemployed reported by the students is similar among parents and mothers, being slightly higher in mothers (6.9% vs. 6.7%). As expected, it was reported a number of domestic mothers that is much higher than that of the parents (16.0% vs. 0.5%).

	Father		Mother	
	N. of cases	%	N. of cases	%
ducation				
Less than the 4th grade (1st cycle)	9	1.1%	9	1.1%
4th grade (1st cycle)	84	10.5%	65	8.1%
6th grade (2nd cycle)	85	10.6%	38	4.7%
9th grade (3rd cycle)	139	17.3%	131	16.4%
12th grade or equivalente	241	30.0%	242	30.2%
Bachelor	144	18.0%	173	21.6%
MSc/ PhD	100	12.5%	143	17.9%
tuation				
Employed worker	460	60.5%	458	59.4%
Self-employed as employer	153	20.1%	95	12.3%
Self-employed as isolated	65	8.6%	29	3.8%
Unpaid family worker	5	0.7%	4	0.5%
Retired	22	2.9%	9	1.2%
Unemployed	51	6.7%	53	6.9%
Domestic	4	0.5%	123	16.0%
ctivity				
Professions of the armed forces	42	6.6%	8	1.3%
Representatives of the legislative and executive bodies,		0.0%	40	7.00/
directors, directors and managers,	55 8.6%	43	7.0%	
Specialists in intellectual and scientific activities	91	14.3%	135	21.9%
Technicians and professions at the intermediate level	95	14.9%	96	15.6%
Administrative staff	42	6.6%	79	12.8%
Workers in personal, security and safety services and vendors	81	12.7%	79	12.8%
Farmers and skilled workers in agriculture, fisheries and	35	5.5%	19	3.1%

Table 3. Parents' school education, professional situation and activity.



forestry				
Skilled workers in industry, construction and craftsmen	88	13.8%	24	3.9%
Operators of plant and machinery and assembly workers	59	9.2%	8	1.3%
Non-qualified workers	50	7.8%	126	20.4%

VALIDATION OF THE MEASURING INSTRUMENT

From now on the following abbreviations and notions will be used:

- CFI—Comparative Fit Index;
- CR—Composite Reliability;
- GFI—Goodness-of-Fit Index;
- I.C. 90%—confidence interval at 90%;
- PCFI—Parsimony Comparative Fit Index;
- PGFI—Parsimony Goodness-of-Fit Index;
- RMSEA—Root Mean Square Error of Approximation;

• P[rmsea ≤ 0.05]—In addition to reporting a confidence interval around the RMSEA value, AMOS software tests (please see below) for the closeness of fit (PCLOSE). That is, it tests the hypothesis that the RMSEA is "good" in the population (specifically, that it is < 0.05). Joreskog and Sorbom (1996) have suggested that the p-value for this test should be > 0.50;

- MECVI-Modified Expected Cross-Validation Index;
- $\chi^2_{\rm dif}$ difference between the two χ^2 ;

• In the figures, the 'd' char in the expressions "dInt", "dInf", "dInfo", etc., means "disturbance" (i.e., the residual errors captured in endogenous variables);

• df—degrees of freedom.

This section aims at the empirical validation of the four constructs (factors or latent variables) used in this research (ICT literacy); a second order construct composed of three constructs of first order (Internet literacy, Computer literacy and Information literacy), Internet use to study, support from teachers, and support from parents.

Once determined the Confirmatory Factorial Analysis related to the construct with the three types of Literacy (1st order factors), then it will be verified if the construct ICT literacy can be considered as a 2nd order construct that includes the three mentioned 1st order factors. The factorial validity of the model to describe the levels of ICT literacy was evaluated by means of a confirmatory factorial analysis with the AMOS software (please refer to SPSS Inc., Chicago, IL) as described in Marôco (2007). The composite reliability and mean extracted variance for each factor were evaluated as described in Fornell and Larcker (1981). The existence of outliers was evaluated by the square distance of Mahalanobis (DM²) and the normality of the variables was evaluated by uniand multivariate coefficients of asymmetry (Sk) and kurtosis (Ku).

The overall adjustment quality of the factorial model was made according to the indexes and respective values of χ^2 /df, CFI, GFI, PCFI, PGFI, RMSEA, P[rmsea ≤ 0.05] and MECVI. The quality of the local adjustment was evaluated by the factorial weights and the individual reliability of the items. The refinement of the model was performed from the values of the modification indexes by the Lagrange multipliers (LM) produced by AMOS, considering that trajectories and/or correlations with LM > 11 (p < 0.001) were indicators of significant variation in the quality of the model.

Reliability and validity of the measurement instrument 'ICT literacy'

ICT literacy was evaluated using 16 items, belonging these to the three types of literacy discussed above:

• Internet literacy, with 5 items (Lau and Yuen, 2014; van Deursen, 2010), consisting of items '7a' "I am able to define the initial page of a web browser (e.g., Internet Explorer)", '7b' "I am able to search information on the Internet using a search engine (e.g., Google)", '7c' "I am able to use e-mail to communicate", '7d' "I am able to use instant messaging software to chat with my friends (e.g., Skype, Facebook Messenger)", and '7e' "I am able to download files from the Internet";

• Computer literacy, with 5 items (Lau and Yuen, 2014; van Deursen, 2010), consisting of items '8a' "I am able to define a header/footer in a word processor (e.g., Microsoft Word)", '8b' "I am able to draw a chart using a spreadsheet (e.g., Microsoft Excel)", '8c' "I am able to insert an animation into a presentation software (e.g., Microsoft PowerPoint)", '8d" "I am able to edit a photo using an image editing software (e.g., Photoshop)", and '8e' "I am able to set up a printer (e.g., installing the printer drivers)";

• and Information literacy, with 6 items (Lau and Yuen, 2014; Bawden, 2001), consisting of items '9a' "I am able to properly identify the needed information from a question", '9b' "I am able to collect/retrieve



information in digital environments", '9c' "I am able to use ICT to properly process the obtained information", '9d' "I am able to interpret and represent information, such as the use of ICT to synthesize, summarize, compare and contrast information from different sources", '9e' "I am able to use ICT to design or create new information from information already obtained", and '9f' "I am able to use ICT to transmit the correct information to suitable targets".

Four observations showed DM^2 values that suggested to be outliers; however, the improvement in the overall fit quality of the model without these observations was not significant, so the confirmatory factorial analysis was done with the totality of the observations. No variable showed Sk and Ku values indicating severe violations to the Normal distribution (|Sk| < 3 and |Ku| < 10; see Kline (2005) and Marôco (2007)).

The initial model that aims at describing the levels of ICT literacy, adjusted to a sample of 808 students from the 3rd cycle of basic education and secondary education (7th to 12th grades), showed a low quality of adjustment ($\chi^2/df = 5.925$, CFI = 0.928, GFI = 0.911; PCFI = 0.781, PGFI = 0.676, RMSEA = 0.078, P[rmsea = 0.05] < 0.001, MECVI = 0.830). It was possible to improve the quality of the adjustment ($\chi^2/df = 2.788$, CFI = 0.979, GFI = 0.965, PCFI = 0.727, PGFI = 0.627, RMSEA = 0.047; P[rmsea ≤ 0.05] = 0.732; MECVI = 0.376) after a correlation of some of the errors present in the three factors, as can be seen in figure 1, and once removed the item '8e' "I am able to configure a printer (e.g., installing the printer drivers)" from the Computer literacy list of factors whose modification indexes suggested the saturation of this item in factors different from those proposed in the original version. This new model presented a quality of adjustment higher than the original model ($\chi^2_{dif} = 380.919$), as well as a lower MECVI (0.830 vs. 0.376).



Fig. 1. Standardized factorial weights and individual reliability of each of the items of the "ICT Literacy" $(\chi^2(78) = 217.460, \chi^2/df = 2.788, p = 0.000, CFI = 0.979, PCFI = 0.727, GFI = 0.965, PGFI = 0.627, MECVI = 0.376, RMSEA = 0.047, P(rmsea \le 0.05) = 0.732, and I.C. 90%]0.040, 0.055[).$

Table 4 shows the standardized factorial weights, the composite reliability (HR) and the mean extracted variance (MEV) of the "ICT literacy" measurement instrument. HR of the factors was high, being 0.835 for Internet literacy, 0.803 for Computer literacy, and 0.919 for Information literacy, so that the reliability of the construct is adequate (HR \ge 0.7). The MEV, an indicator of the convergent validity of the factors, was also adequate (MEV \ge 0.5), being 0.503 for Internet literacy, 0.508 for Computer literacy, and 0.654 for Information literacy. It was also calculated the Cronbach's α , being it 0.840 for Internet literacy, 0.784 for Computer literacy, and 0.913 for Information literacy.


	i uic inc	asuremen	n msu um		neracy.
Literacy factor	Item	λ	HR	MEV	α
	7a	0.763			
	7c	0.737			
Internet	7e	0.700	0.835	0.503	0.840
	7b	0.679			
	7d	0.662			
	8c	0.780	0.803		
Computer	8a	0.771		0.508	
	8b	0.696			0.784
	8d	0.588			
	9d	0.886			0
	9c	0.828			
	9e	0.801		0.654	
Information	9f	0.788	0.919		0.913
	9a	0.774			
	9b	0.771			

Table 4. Standardi	ized factorial weights	s of the i	tems α, λ	, composi	te reliabil	ity (HR), a	nd mean extracted
	variance (MEV) o	f the me	asuremen	nt instrume	ent "ICT l	iteracy".	
	Literacy factor	Item	λ	HR	MEV	α	

The discriminant validity of the factors was evaluated by comparing the MEV with the squares of the correlation between the factors. Table 5 shows the square of the correlations between the various factors and, at the main diagonal, in bold, the respective values of MEV.

 Table 5. Square of the correlations between the various factors and their respective values of MEV (diagonal) of the measurement instrument "ICT literacy".

	Internet	Computer	Information
Internet	0.503	0.434	0.342
Computer	0.434	0.508	0.465
Information	0.342	0.465	0.654

The square of the correlation between the factors is lower than the corresponding value of MEV, for which it is possible to confirm the existence of discriminant validity between these factors.





Fig. 2. Standardized factorial weights, individual reliability of each of the items in each factor in the 2nd order model of "ICT literacy" ($\chi^2(91) = 283.178$, $\chi^2/df = 3.112$, p = 0.000, CFI = 0.972, PCFI = 0.737, GFI = 0.957, PGFI = 0.640, MECVI = 0.465, RMSEA = 0.051, P(rmsea ≤ 0.05) = 0.378, and I.C. 90%]0.044, 0.058[).

In order to test whether the factors related to the "ICT literacy" measure (Internet literacy, Information literacy, and Computer literacy) are the only second-order factors ("ICT literacy"), the 2nd order model shown in figure 2 was tested.

The standardized regression coefficients are indicated in table 6, sorted in descending order.

Literacy factor	Coefficient	р
Computer literacy	0.894	<0.001
Information literacy	0.787	<0.001
Internet literacy	0.745	<0.001

Table 6. Standardized regression coefficients of the 2nd order model "ICT literacy".

Reliability and validity of the instrument of measure "Internet to study"

The use of the Internet as a support to study was evaluated using a set of eight items, partially adapted from Zhao et al. (2010). The items used are: '3a' "Find study contents through search engines (e.g., Google)", '3b' "Finalize homework by using the Internet", '3c' "Participate in online courses", '3d' "Learn online how to create web sites", '3e' "Practice what is taught by teachers in the classroom", '3f' "Participate in online teaching discussion groups", '3g' "Search onWikipedia", and '3h' "Browse digital libraries and/or databases".

Two observations showed DM^2 values that suggested to be outliers; however, the improvement of the overall fit quality of the model without these observations was not significant, so the confirmatory factorial analysis was done with the totality of the observations. No variable showed Sk and Ku values indicating severe violations to the Normal distribution (|Sk| < 3 and |Ku| < 10).

The initial model aims at representing the use of the Internet to support the study and it showed a quality of adjustment that was inadequate ($\chi^2/df = 15.421$, CFI = 0.772, GFI = 0.896, PCFI = 0.552, PGFI = 0.498, RMSEA = 0.134, P[rmsea = 0.05] < 0.001, MECVI = 0.422).





Fig. 3. Standardized factorial weights and individual reliability of each of the items of the "Internet to study" $(\chi^2(3) = 1.401, \chi^2/df = 0.467, p = 0.705, CFI = 1.000, PCFI = 0.300, GFI = 0.999, PGFI = 0.200, MECVI = 0.032, RMSEA = 0.000, P(rmsea \le 0.05) = 0.971, and I.C. 90%]0.000, 0.044[).$

It was possible to improve the quality of the adjustment ($\chi^2/df = 0.467$, CFI = 0.772, GFI = 0.96, PCFI = 0.552, PGFI = 0.498, RMSEA = 0.044, P[rmsea ≤ 0.05] = 0.971,MECVI = 0.032) after a correlation of some of the errors present in the three factors, presented in figure 3, and once removed the items '3c' "Participate in online courses", '3d' "Learn online how to create web sites", and '3f' "Participate in online teaching discussion groups", whose factorial weights were below 0.5. As can be seen in table 7, the model presented a quality of adjustment higher than the original model ($\chi^2_{dif}(17) = 307.015$), as well as a lower MECVI (0.422 vs. 0.032).

Table 7. Statistics and adjustment indices of the 'Internet to study'.

Statistics / Adjustment index	Value	Reference values
χ²	χ² (3) = 1.401	The smaller the better p>0.05
χ^2 / df	0.467	> 5 – bad]2;5] – acceptable <2 – good
CFI	1.000	< 0.8 – bad [0.8;0.9[– poor
GFI	GFI 0.999	
PCFI	0.300	< 0.6 – bad
PGFI	0.200	[0.6;0.8[– good ≥ 0.8 – very good
RMSEA (I.C. 90%)	0.044	 > 0.10 – unacceptable]0.05;0.10] – good ≤ 0.05 – very good

Table 8. Standardized factorial weights of items λ , α , composite reliability (HR) and mean extracted variance (MEV) of the "Internet to Study".

Factor	Item	λ	HR	MEV	Α
Internet to study	3h	0.801	0.759	0.396	0.714
	3a	0.731			
	3b	0.569			
	3g	0.495			
	3е	0.486			

Table 8 shows the standardized factorial weights, the composite reliability and the mean extracted variance of the "Internet to study" measurement instrument. HR was high (0.759), so the reliability of the construct was adequate (HR ≥ 0.7). MEV was $0.396 \approx 0.4$, a little lower than the reference 0.5. However, the Cronbach's α was acceptable, being 0.714.



Statistics / Adjustment index	Value	Reference values
~~2	$x^{2}(10) = 10.780$	The smaller the better
λ	χ (10) = 19.780	p>0.05
		> 5 – bad
χ^2 / df	1.978]2;5] – acceptable
		<2 – good
CEL	0.006	< 0.8 – bad
Cri	0.990	[0.8;0.9[– poor
GEI	0.003	[0.9;0.95[– good
011	0.555	≥ 0.95 – very good
PCFI	0.474	< 0.6 – bad
		[0.6;0.8[– good
PGFI	0.355	≥ 0.8 – very good
DNACEA		> 0,10 – acceptable
	0.057]0.05;0.10] – good
(1.C. 90%)		≤ 0.05 – very good

Table 9. Statistics and adjustment indices of the 'Support from teachers'.

Reliability and validity of the instrument of measure "support from teachers"

The "support from teachers" aims at representing the role of teachers in the work that students have to prepare. This construct consists of a set of 8 items, adapted in part from Zhao et al. (2010), these being items '10a' "Research guidelines", '10b' "Suggest the sources to be used", '10c' "Suggest the use of the Internet", '10d' "Suggest the structure of the work", '10e' "Appeal to the bibliographical citation", '10f' "Penalize the copy of information", '10g' "Help with the search" and '10h' "Give information treatment guidelines".

Two observations showed DM^2 values suggesting to be outliers; however, the improvement of the overall fit quality of the model without these observations was not significant, so the confirmatory factorial analysis was done with the totality of the observations. No variable showed Sk and Ku values indicating severe violations to the Normal distribution (|Sk| < 3 and |Ku| < 10).

The initial model showed a poor quality of adjustment ($\chi^2/df = 11.063$, CFI = 0.920, GFI = 0.931, PCFI = 0.657, PGFI = 0.517, RMSEA = 0.112, P[rmsea ≤ 0.05] < 0.001, MECVI = 0.314). After some of the errors were correlated, as shown in figure 4, and item '10f' removed (the factorial weight was less than 0.5), it was possible to improve the quality of adjustment ($\chi^2/df = 1.978$, CFI = 0.996, GFI = 0.993, PCFI = 0.474, PGFI = 0.355, RMSEA = 0.035, P[rmsea ≤ 0.05] = 0.855, MECVI = 0.070). As can be seen in table 9, the model presented a higher adjustment quality than the original model ($\chi^2_{dif}(10) = 201.47$), as well as a lower MECVI (0.314 vs. 0.070).



Fig. 4. Standardized factorial weights and individual reliability of each of the items of the "Support from teachers" ($\chi^2(10) = 19.780$, $\chi^2/df = 1.978$, p = 0.031, CFI = 0.996, PCFI = 0.474, GFI = 0.993, PGFI = 0.355, MECVI = 0.070, RMSEA = 0.035, P(rmsea ≤ 0.05) = 0.855, and I.C. 90%]0.010, 0.057[).



Table 10. Standardized factorial weights of the items (λ), composite reliability (HR) and mean extra	ted variance	ce
(MEV) of the "Support from teachers".		

Item	Question	λ	HR	MEV	α
10b	Indicate the sources to use	0.801			
10h	Give guidelines of information processing	0.780			
10a	Search guidelines	0.749			
10d	Suggest the structure of the work	0.716	0.868	0.488	0.865
10g	Help me search	0.643			
10c	Suggest the use of the Internet	0.626			
10e	Appeal to bibliographic referencing	0.533			

Table 10 shows the standardized factorial weights, the composite reliability and the mean extracted variance of the "Support from teachers" measurement instrument. HR was high (0.868), so the reliability of the construct was adequate (HR \ge 0.7). MEV was 0.488, which is very close to the reference value of 0.5, and the Cronbach's α was very good, being 0.865.

Reliability and validity of the instrument of measure "support from parents"

The encouragement by parents to use the Internet for school support was measured using four items (Zhao et al., 2010; Igbaria et al., 1996; Taylor and Todd, 1995): '11a' "My parents recommend me to use the Internet to do the school work", '11b' "My parents always encourage me to use the Internet to finish homework", '11c' "I am always supported and encouraged by my parents to use the Internet", '11d' "My parents oppose using the Internet" (inverted).

One observation presented a value of DM^2 suggesting to be an outlier; however, the improvement of the overall adjustment quality of the model without this observation was not significant, so that the confirmatory factorial analysis was done with the totality of the observations. No variables showed Sk and Ku values indicating severe violations to the Normal distribution (|Sk| < 3 and |Ku| < 10).

The initial model showed a poor adjustment quality ($\chi^2/df = 11.059$; CFI = 0.974, GFI = 0.986, PCFI = 0.325, PGFI = 0.197, RMSEA = 0.112, P[rmsea ≤ 0.05] = 0.006, MECVI = 0.047). After removing item '11d' (whose factorial weight was less than 0.5), and although the unifactorial construct is less than 4 items, thus preventing the calculation of a set of indexes associated to the model, it was possible to arrive at the final representative model of this measurement instrument, as can be seen in figure 5 that presents the standardized factorial weights and the individual reliability of each of the items in the simplified final model.



Fig. 5. Standardized factorial weights and individual reliability of each of the items of the "Support from parents" (CFI = 1.000, GFI = 1.000).

Table 11. Standardized factorial weights of the items (λ), composite reliability (HR) and mean extracted variance (MEV) of the "Support from parents".

Item	Question	۸	HR	MEV	α
11c	I am always supported and encouraged by my parents to use the Internet	0.823			
11b	My parents always encourage me to use the Internet to finish homework	0.814	0.793	0.566	0.786
11a	My parents recommend me to use the Internet to do the schoolwork	0.598			



Table 11 shows the standardized factorial weights, the composite reliability and the mean extracted variance of the "Support from parents" measurement instrument. HR was high (0.793), so the reliability of the construct was adequate (HR \ge 0.7). MEV was 0.566, which is above the reference value of 0.5, and Cronbach's α was good, being 0.786.

STRUCTURAL EQUATIONS ANALYSIS OF "INTERNET TO STUDY"

In this section the model associated to the use of the Internet to support the study, named "Model 1", will be tested. The structural equations model can be organized into two sub-models: 1) the measurement sub-model (corresponding to a confirmatory factorial analysis), which defines how hypothetical or latent variable constructs are operationalized by the observed or manifested variables; and, 2) by the structural sub-model that defines the causal or association relationships between latent variables.

As before, the proposed structural model was evaluated in two steps using the AMOS software (v. 20, SPSS Inc., Chicago, IL), using the maximum likelihood estimation method, as described in Marôco (2007).

In a first step the adjustment quality of the sub-model of measurement (corresponding to the confirmatory factorial analysis) was measured and in a second stage the adjustment quality and plausibility of the structural model. As in the previous section, these were performed according to the adjustment quality indexes and respective reference values, described in Marôco (2007), namely: χ^2 /df, CFI, GFI, PCFI, PGFI, RMSEA, P[rmsea ≤ 0.05] and MECVI. The quality of the local adjustment was evaluated by the factorial weights and the individual reliability of the items and the significance of the causal trajectories were evaluated with a Z test at the critical ratios. Trajectories with p < 0.05 were considered significant.

Step 1: measurement sub-model of "Model 1"

The measurement sub-model consists of 5 of the 6 previously validated constructs, these being the "ICT literacy", "Internet to study", "support from teachers" and "support from parents" constructs, plus the manifest variable associated to the student's school performance.

Eight observations showed DM² values suggesting to be outliers; however, the adjustment difference was not significant, so the confirmatory factorial analysis was done with all the observations. After analyzing the factorial weights, individual item reliability and modifying indexes, the model was kept, because the model presented a good adjustment ($\chi^2/df = 2.257$; CFI = 0.952; GFI = 0.925; PCFI = 0.836, PGFI = 0.764, RMSEA = 0.039, P[rmsea ≤ 0.05] = 1.000, MECVI = 1.457).

Figure 6 shows the values of the standardized factor weights and the individual reliability of each of the items in the measurement sub-model of "Model 1", associated to ICT literacy to support the study.

Step 2: structural sub-model of "Model 1"

The analysis of the trajectories between the factors revealed that the trajectory "Internet to study" \rightarrow "School performance" is statistically significant, with a significance level of 5% in the bilateral test (β IntStu.SchPer = 0.089; p = 0.024). The trajectory "ICT literacy" \rightarrow "School performance" showed a greater weight than the previous one and statistically significant (β ICTLit.SchPer = 0.273; p < 0.001), also noting that this trajectory has, in addition to the direct effect mentioned above, a significant effect through the "Internet to study" factor (β ICTLit.SchPer–IntStu = 0.030; p = 0.018). Regarding the trajectory "ICT literacy" \rightarrow "Internet to study" this presented a coefficient of regression also statistically significant (β ICTLit.IntStu = 0.338; p < 0.001). Finally, teacher support and parental support contribute to ICT literacy as can be seen from the statistically significant trajectories "Teacher support" \rightarrow "ICT literacy" (β SupTea.ICTLit = 0.138, p < 0.001), and "Parental support" \rightarrow "ICT literacy" (β SupPar.ICTLit = 0.214, p < 0.001), the latter presenting a slightly higher regression coefficient. Figure 8 shows the conceptual model for "Model 1", presenting the values of the standardized factor weights.





Fig. 6. Measure submodel of "Model 1" ($\chi 2(436) = 983.929$, $\chi 2/df = 2.257$, p = 0.000, CFI = 0.952, PCFI = 0.836, GFI = 0.925, PGFI = 0.764, MECVI = 1.457, RMSEA = 0.039, P(rmsea ≤ 0.05) = 1.000, and I.C. 90%]0.036, 0.043[).

CONCLUSIONS

Taking into account the statistical results obtained and presented in table 12, it can be stated that ICT literacy is a determining factor in school performance of students of the 3rd cycle of basic education and secondary education in the district of Vila Real, Portugal. It is also verified that the use of Internet to study is a preponderant factor for school performance. It should be stressed that parental support and teachers support have a positive influence on ICT literacy.

Our first research question "Does the use of Internet to study influence scholar performance?" (hypothesis H1) is supported by the structural model. It is inferred that the use of the Internet to study, namely through the use of search engines, the use of libraries and/or digital databases and the completion of homework, through the use of the Internet, significantly influences school performance (as expected; see, for example, Jackson et al. (2011)).

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Fig. 7. Structural submodel of "Model 1" and standardized factorial weights, individual reliability of each of the items in each factor in the 2nd order model of "ICT literacy" (χ 2(440) = 1053.462, χ 2/df = 2.394, p = 0.000, CFI = 0.946, PCFI = 0.839, GFI = 0.921, PGFI = 0.768, MECVI = 1.533, RMSEA = 0.042, P(rmsea ≤ 0.05) = 1.000, and I.C. 90%]0.038, 0.045[).

Regarding the research question "Does ICT literacy foster school performance?" (hypotheses H2 and H4), it was found that it is supported by the structural model. It was verified that ICT literacy significantly influences school performance in a direct way (H2) and mediated by the use of the Internet to support the study (H4) (Huang and Leung, 2009). Computer literacy shows a greater convergence, namely through the use of software for multimedia presentations, word processing and spreadsheeting (Poynton, 2005). This is followed by Information literacy, where students report that they are able to interpret and represent information, such as the use of ICT to synthesize, summarize, compare and contrast information from different sources, also reporting that they are able to use ICT to process the information obtained in this way, and also they are able to use ICT to design or create new information from information already obtained (Lloyd and Williamson, 2008; McPherson, 2008). Internet literacy showed a lower convergence, where students mentioned that they are able to set the default home page for a web browser (e.g., Internet Explorer), use e-mail to communicate and download files from the Internet (see, for example, Lee and Chae (2012).

In the same way, our third question "Does ICT literacy influence the use of the Internet to study?" (hypothesis H3) is supported by the structural model. It should be noted that there is a statistically significant relationship between "ICT literacy" and "Internet to study", through the points mentioned above.

Regarding the fifth research question "Do teachers influence the ICT literacy of students from the 3rd cycle of basic education and secondary education in the municipality of Vila Real?" (hypothesis H5), it was verified that this is supported by the structural model. It was found that the support from teachers is relevant to the acquisition and development of ICT literacy skills (Internet literacy, Computer literacy and Information literacy), corroborating, among other authors, Yu et al. (2012); Wilson (2009); Vekiri (2010); Zhong (2011) and Kim et al. (2014). It is noted that the teachers indicate the sources to be used for the works to be done, giving directions for information processing and supervising search.

Concerning the sixth research question "Do parents encourage their children to use ICT literacy to support their studies?" (hypothesis H6), it was found that this is supported by the structural model. It can be verified that parental support is important for the acquisition and development of the competencies inherent in ICT literacy



(Internet literacy, Computer literacy and Information literacy), corroborating, among others, the works of Lai (2015); and Kop and Fournier (2011). It must be pointed out that parents encourage their children to use the Internet to complete homework, as well as feel supported and encouraged by them for its use.

Table 12. Results for the supported research hypotheses for "Model 1' (**p < 0.001; * $0.010 \le p < 0.050$).

Hypothesis	Trajectory	Standardized regression coefficient	Result
H1: Does the use of Internet to study influence scholar performance?	Internet to study \rightarrow Scholar performance	0.089*	Verified
H2: Does ICT literacy foster school performance?	ICT literacy $ ightarrow$ Scholar performance	0.273***	Verified
H3: Does ICT literacy influence the use of the Internet to study?	ICT literacy $ ightarrow$ Internet to study	0.338***	Verified
H4: Does ICT literacy encourage school performance mediated by the use of the Internet to study?	ICT literacy → Scholar performance (mediated by Internet to Study)	0.030*	Verified
H5: Do teachers influence the ICT literacy of students from the 3 rd cycle of basic education and secondary education in the municipality of Vila Real?	Support from teachers \rightarrow ICT literacy	0.138***	Verified
H6: Do parents encourage their children to use ICT literacy to support their studies?	Support from parents $ ightarrow$ ICT literacy	0.214***	Verified



Fig. 8. Conceptual model for "Model 1".

As for the frequency of Internet use to support the study, it is predominant in ICT literacy and in school performance that the results are less significant than the previous ones, with a correlation between the frequency of Internet use and computer literacy and Informational, since in terms of school support it is necessary to develop the critical spirit inherent in information literacy in order to build new knowledge, as well as mastering the working tools of any software.

Finally, it is important to mention that the results obtained about the influence of parents' educational attainment on ICT literacy and their children's school performance show that a higher degree of parental schooling corresponds to higher ICT literacy and school performance of the students. The same applies to the professional activity of the parents, noting that the higher the professional qualification of the parents, the higher the ICT literacy and the better the school performance (Vekiri, 2010; Kim et al., 2014). It was also verified that there are differences in ICT literacy and student performance regarding the use of the Internet by parents, that is, children whose parents use the Internet have a higher degree of ICT literacy and school performance.



In short, the ICT literacy of students of the 3rd cycle of basic teaching and secondary teaching (7th to 12th grades) has a predominant influence on school performance, being also important the stimulus of parents and teachers to use the Internet as a tool to support the study.

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Investigation on Motivation of Online Reading: A Case Study Preparatory Year Students

Eyhab Talal Yaghi

School of Educational Studies, Universiti Sains of Malaysia etyaghi@gmail.com

Dr. Amelia Abdullah

Program Chairperson for B.Ed (TESOL), School of Educational Studies, Universiti Sains of Malaysia ameia@usm.my

Dr. Zarina Mustafa

Senior Lecturer, School of Educational Studies, Universiti Sains of Malaysia mzarina@usm.my

ABSTRACT

Our knowledge of online reading motivation behavior is primarily based on limited data. The aim of the research was consequently to scrutinize students' motivation behavior toward online reading act. Therefore, this research employed a mixed method approach to satisfy the objectives of the study. Thus, data collection tools from previous research were carefully selected and modified to suit the purpose of the study. Respondents included in this study were randomly selected from the population under examination, the students of PYP at Majmaah University. The students' responses were keyed WARPPLS software. In respect to qualitative data, five students were interviewed to obtain their responses to online reading motivation behavior. The main result was students and their colleagues have a different opinion about online reading. In line with results of the questionnaire, students' interviews revealed that they are motivated to read online for different purposes such as reading for exam, pleasure or discovering new things. These results offer an overwhelming understanding of the notion of online reading motivation and broaden our knowledge of the factors that might affect students' motivation while reading online.

KEYWORDS: Reading, online reading, motivation, EFL reading.

1. INTRODUCTION

No one can deny the importance of reading in peoples' lives. It is the key to success and building knowledge that enables individuals to be superior, well - educated and smarter. Books, newspaper, and magazines were the sources of information and tools we use to practice reading whether for pleasure or other purposes. Nowadays, with massive progress in the field of technology, reading as activity started to shift from paper-based form to digital one. This alteration gives reading new aspect where people can use their smartphones, tablets and other devices to read their exciting topics with one touch.

2. BACKGROUND

Despite the importance of motivational factors, the field remains plagued by issues. Two related problems have included framing underlying constructs and identifying or developing appropriate measures of those constructs. Many now agree that motivation is multidimensional in nature, comprising several factors (Guthrie, Wigfield, & VonSecker, 2000; W. Schaufeli, 2012; Wigfield & Guthrie, 1997). However, measuring these factors–and, in consequence, understanding the research that employs such measures—can be problematic because of differences in how the various components have been operationalized (Morgan & Fuchs, 2007; Petscher, 2010; Schaufeli, 2012; Watkins & Coffey, 2004).

The disarray that presently characterizes the terminology of reading motivation might well cause some investigators to avoid its study altogether (Petscher, 2010). Others, however, suggest that the situation occasions merely the need for a systematic review. Indeed, (W. B. Schaufeli, 2012) call for definitional clarity, noting that

It should be a task of high priority for future research to reach a consensus on the definition of reading motivation (including its dimensions) and the use of individual and



composite scales. The great variety of measures and combinations thereof makes it difficult to compare and evaluate the results from prior studies. (p. 459)

This process led to a final list of 12 motivation-related constructs: agency, attitudes, expectancy, extrinsic motivation, goals, interest, intrinsic motivation, reading motivation, self-belief, self-concept, self-efficacy, and value. Of note, although engagement has been widely discussed as an essential construct (Guthrie, Klauda, & Ho, 2013; Guthrie et al., 2000; Ivey & Johnston, 2013; Workman, 2008); we did not include it in the present analysis because it also includes behavioral aspects (Fredricks, Blumenfeld, & Paris, 2004). Whereas the 12 terms included in our analysis are factors that either facilitate or promote reading practices, engagement is often conceptualized as an optimal outcome, condition, or experience where readers are involved in reading.

R. Day (2002) highlights the variety that online context provides for readers and users. Moreover, recent technologies and internet give the superiority for digital material over the paper-based text due to the diversity of materials and topics exhibited digitally (Coiro, 2009).

3. DEFINITION OF MOTIVATION

Motivation plays a crucial role in second language learning. In his definition of motivation, Gardner (1985) states that motivation in second language learning is the desire to communicate with target language and use what you have acquired in the community of target language. For reading, motivation is different from learning second language (Grabe, 2009). Wigfield and Guthrie (1997) defined motivation as "beliefs, needs, and goals that individual have". Moreover, Guthrie et al. (2000) indicate that students who have high intrinsic motivation tend to use more comprehension strategies and had better reading comprehension of science context. They also found that students with learning goal had a high reading performance and were active readers. Reading motivation might be used as predicting tool of the amount of reading and reading comprehension.

From these studies, Wigfield and Guthrie (1997) built up a Motivation for Reading Questionnaire (MRQ), which many L2 reading motivation studies subsequently adopted. The early MRQ version explored self-efficacy and intrinsic, extrinsic, and social motivations. Recent studies have adapted (Wigfield & Guthrie, 1997) questionnaires and developed different constructs (Mori, 2002). Mori (2002), for example, created a 30item L2 reading-motivation questionnaire that explored self-efficacy and reading's intrinsic value, extrinsic utility, and importance. (Mori, 2004) later developed a new questionnaire on the basis of Expectancy-Value Theory (Eccles & Wigfield, 1995) to re-examine the relationship between motivation and the amount of reading. Results showed that reading proficiency did not anticipate how much students read, whereas students' study habits and task-specific motivations did.

4. THE COMPONENTS OF EFL READING MOTIVATION

In their theoretical model of L2 reading motivation, R. R. Day, Bamford, Renandya, Jacobs, and Yu (1998) suggest that motivation to read in L2 is strongly influenced by extensive reading materials and attitudes and less by reading ability and the sociocultural environment. The results of this study, however, show a slightly different picture of the influences on the participants' EFL reading. One of the most influential factors (and also predictors of motivation for the participants to read in English) is the participants' perceived reading ability in English, i.e. the more the students feel competent at reading in English, the more they hope to be fruitful further on and the more they read, and vice versa. Furthermore, students who consider themselves as competent readers in English are more inclined to leave their comfort zone when choosing their reading materials (e.g. reading materials which are above their reading competence in EFL, reading also materials chosen by others). Moreover, the participants show high value to interesting materials, regardless of the language they are written in, which does echo with R. R. Day et al. (1998) claim that L2 reading motivation is strongly influenced by reading materials.

Motivation theories are among the most important aspects of psychology and language education (Guilloteaux & Dörnyei, 2008). Motivation is the major source of stimulus to initiate second language learning and serves as the driving force to sustain students' enthusiasm in learning (Dörnyei & Skehan, 2003). Without sufficient motivation, good teaching and curriculum planning cannot ensure successful learning. Students need to be continuously motivated during the long and laborious language learning process (Grabe, 2009). It has been demonstrated in extensive research on first language (Taki) reading motivation that how much students read and how well they comprehend the text can be predicted by the intrinsic and extrinsic dimensions of motivation (Baker & Wigfield, 1999; Gottfried, 1990; WANG & Guthrie, 2004).

Motivation in second language (Takase) contexts has been shown to follow a different path, and few researchers have addressed its connection to reading comprehension (Grabe, 2009). Until the 1990s, motivation for L2 learning was dominated by Mori (2002) integrative and instrumental motivation model. It was not until the early 1990s that there was an emergence of a wider range of motivation research (Dörnyei & Skehan, 2003), and it



was found that students with different language profiles had different learning motivations. For example, English foreign language (Abanomey) and English as a second language (Plano Clark, Garrett, & Leslie-Pelecky) students may be more influenced by academic and classroom factors that include a focus on goals, self-efficacy, and interest (Grabe, 2009; Ushioda, 2008).

Researchers' focus in empirical studies of L2 reading motivation has been on developing instruments to explore learners' motivation. (Mori, 2002) developed an L2 reading motivation questionnaire based on (Wigfield & Guthrie, 1997) Motivations for Reading Questionnaire (MRQ). They tested 447 Japanese learners of English, and found four factors influencing motivation: the intrinsic value of reading, the extrinsic utility or value of reading, the importance of reading, and reading efficacy. (Takase, 2007) investigated the motivational effects of extensive reading among 219 high school EFL students in Japan. Results showed that the amount of L2 reading was predicted by L1 and L2 motivation. Apple (2005) surveyed 85 Japanese university learners' motivational changes after a 3-month extensive reading program. Results showed that students did not seem to improve due to the relatively short timeframe and the difficulty of ascertaining increased motivation among students whose motivation was initially high.

Individual differences have also been found to play a role in L2 motivation. Researchers have found that females were more motivated than males to learn languages (Carreira, 2011; Sung & Padilla, 1998). (Carreira, 2011) investigated 268 EFL Japanese sixth graders' motivations for learning English and found a significant effect on intrinsic motivation for learning EFL, on interest in foreign countries, and on instrumental motivation, with girls having higher scores than boys. Sung and Padilla investigated 591 American students in Asian language programs and found that female students had more motivation to study a foreign language than male students did. Mori and Gabel investigated 453 second-year non-English majors' motivations in four dimensions: integrativeness, intrinsic value, negative value, and attainment value. Results showed that females had significantly higher scores in integrativeness than male students did. As for language proficiencies, Lau and Chan (2003) investigated 159 Hong Kong students' Chinese reading comprehension and demonstrated that good and poor readers had different strategy uses and reading motivations, with poor readers' motivations to read being very low. The pedagogical implications of these studies are that poor readers will be helped by reading programs with strategy training and teaching materials to enhance motivation.

Overall, the positive relationship between motivation and reading behaviors has been supported by the extensive L1 reading motivation research. However, relatively few researchers have focused on L2 reading motivation (Apple, 2005; Huang, 2013; Mori, 2002; Takase, 2007), and even fewer researchers have explored the effects of learners' proficiency levels and gender differences on motivation. Because motivation is one of the key factors in L2 reading development, and because a new and important opportunity for teaching reading and increasing motivation is offered by online reading, empirical studies on L2 reading motivation, especially in a digital reading environment (Larson, 2009) are urgently needed.

As mentioned above, this study concerns checking the validity and reliability of the amended version of the (ORMQ). Therefore, the researchers went through the pilot study to find out whether the amended questionnaire is suitable to measure online reading motivation.

5. METHODOLOGY

5.1. Population

The target respondents have been selected randomly from the students of PYP, at Majmaah University. The respondents were studying in second semester for the academic year 2017/2018. The number of respondents was 170. The researcher interviewed 5 students representing the qualitative stage of the study.

5.2. Research design

The researcher followed mixed design method (Quantitative- qualitative). The study is mainly based on the quantitative approach since it suits with the nature of the study and reach to large number of respondents. And to give more deep understanding for the results generated from the quantitative phase, the researcher employed the qualitative approach by interviewing 5 students who were chosen randomly to state their opinions about motivation to read online.

5.3. Research instrument

To achieve the aims of the study, the researcher employed a questionnaire to obtain students responses quantitatively. On the other hand, he conducted interviews with randomly selected students to satisfy the mixed method approach where the researcher mixes between quantitative and qualitative method.



5.3.1 Quantitative phase

For the purpose of the study, the researchers adapted Wigfield and Guthrie's (Carrier) Motivations for Reading Questionnaire (MRQ), where the researcher changed and modified the statements of the questionnaire to be suitable for study's purpose. The modified questionnaire went through stages. First, it has been exposed to language instructor to check the language of amended statements. After language checkup process, the researcher sent the questionnaire to a panel that they are expert in the field of study to check whether the amended statements are fulfilling the intended objectives of the research or not.

5.3.2 Qualitative phase

In this phase, the researcher interviewed 5 students and recorded their responses to the questions where they exposed to while the interviews. After that, students' responses were analyzed and classified to themes and sub-themes in order to form a comprehensive understanding of motivation for online reading.

5.4. Data collection

To reach the modified questionnaire to the whole respondents smoothly taking in account the factors of time and distribution, the researcher designed a link and asks students to enter the link and rate their responses to questionnaire statements. The time that the students took to write down their answers was recorded by the researcher. After that, the researcher approached students' responses to (WARP PLS) program to analyze their responses.

On the basis of the results generated from students' responses to questionnaire, the researcher interviewed students to integrate the results of questionnaire with students' responses during interviews.

5.5. Discussion

The aim of conducting this pilot study is to ensure that the modified version of (MRQ) is valid to measure the online reading motivation. The first step is to perform Cronbach's Alpha test, which is used to measure the internal consistency of questionnaire's items. The table below shows that the estimation of Cronbach's Alpha is .931, suggesting that the items have relatively high internal consistency. (Note that a reliability coefficient of .70 or higher is considered "acceptable" in most social science research situations.).

5.6. Quantitative phase analysis

5.6.1. Validity of Motivation Tool

In this section, motivation tool has gone to ensure the validity. Therefore, SmartPLS was used to seek a statistical evidence for convergent validity. Results obtained from the pilot study in respect to motivation tool are presented in Table 1 The results showed that all internal consistency reliability values (ICR) are higher than 0.70 as recommended by Nunnally (Becker & Dwyer), ranging from 0.70 to 0.88. In addition, the AVE results are higher than 0.50 and composite reliability values are higher than the threshold 0.50 (Chin, 1998; Hsu, Shepherd, & Tesch, 2006).

In respect to ICR, all constructs exhibit more than 0.70 which is considered above any correlation value among all other constructs. Table 2 exhibits correlations results. The results reveal that all correlation values are between -1 and +1 which according to Hair et al., (Alsamadani), values within that range display convergent validity i.e. convergence. Therefore, it can be established that motivation tool is valid to be used for further investigation.

Table 1 Mot	Table 1 Motivation Tool Pilot Study Results					
Construct	ICR	AVE	CR			
Avoidance	0.78	0.61	0.88			
Devalue	0.77	0.60	0.91			
Efficacy	0.70	0.50	0.85			
Intrinsic Motivation	0.70	0.50	0.81			
Peer rejection	0.88	0.78	0.95			
Peers acceptance	0.83	0.69	0.92			
Perceived difficulty	0.85	0.72	0.93			
Value	0.70	0.50	0.87			





Table 2 Correlation Results of Motivation Tool

	Avoidance	Devalue	Efficacy	Intrinsic Motivation	Peer rejection	Peers acceptance	Perceived difficulty	Value
Avoidance	1							
Devalue	0.84	1						
Efficacy	0.44	0.52	1					
Intrinsic Motivation	0.07	0.11	0.48	1				
Peer rejection	0.70	0.71	0.51	0.40	1			
Peers acceptance	0.38	0.57	0.61	0.46	0.43	1		
Perceived difficulty	0.55	0.70	0.39	0.56	0.67	0.62	1	
Value	0.39	0.40	0.74	0.67	0.52	0.73	0.66	1

The operational definition of motivation concept used in the research refers to reasons to be motivated to read online by university students. In order to establish reliability in motivation tool, Cronbach Alpha test was used in which it is considered internal consistency most popular test (Field, 2009). The results obtained from the pilot study yielded a lowest score i.e. $\alpha = 0.80$ and highest score $\alpha = 0.94$. Table 3 provides information on scores obtained from the pilot study.



Construct	Cronbach's Alpha
Avoidance	0.84
Devalue	0.88
Efficacy	0.81
Intrinsic Motivation	0.80
Peer rejection	0.94
Peers acceptance	0.91
Perceived difficulty	0.92
Value	0.83

Table 3 Cronbach's Alpha results

Table 4 gives insights on the mean and standard deviation for each ORM. The value of the mean refers to the frequency of use which ranged from 1 (strongly disagree) to 5 (strongly agree).

Table 4

Intrinsic Motivation		Mean	SD
I enjoy online reading.	IM1	3.063	1.374
I read information from the internet as much as I can.	IM2	2.924	1.39
I read online because it's fun.	IM3	3.066	1.422
I read interesting information online	IM4	3.003	1.429
I read information online during my free time.	IM5	3.03	1.345
I spent long hours reading online information	IM6	2.877	1.357
If I hear about something interesting, I might use the internet to read about it.	IM7	3.01	1.429
		2.9961	1.3922
Avoidance			
I read online information as little as possible.	A1	2.745	1.301
Online reading is not fun.	A2	2.646	1.401
Online reading is not one of my favourite activities.	A3	2.658	1.321
Online reading is boring.	A4	2.682	1.39
I put in as little effort as possible to online reading.	A5	2.795	1.329
		2.7052	1.3484
Value			
It is easy to read information on the internet, so I won't have to work hard	V1	2.891	1.329
It's important to me to understand online information.	V2	3.046	1.409
Online reading is more useful than most of my other activities that I do.	V3	2.887	1.352
Online reading in my spare time is very important to me	V4	2.861	1.367
Reading information online outside of university is important to me.	V5	2.944	1.367
I can make use of what I learn by reading online.	V6	2.927	1.369
It is very important for me to be successful in online reading.	V7	2.848	1.377
		2.9148	1.3671
Devalue			



It doesn't make a difference to me whether I read online or not.	D1	2.917	1.38
Online reading takes too much time.	D2	2.97	1.288
I don't want to read information on the internet.	D3	2.95	1.295
Online Reading is not a good way to spend time	D4	2.97	1.394
Online Reading is not important to me	D5	2.917	1.356
I have more important things to do than online reading in my spare	D6	3.003	1.318
Online Reading is a waste of time	D7	2.914	1.337
		2.9487	1.3382
Peers Acceptance			
My peers and I share the same opinion about online reading.	PA1	3.03	1.353
Other students care about my opinion regarding online information.	PA2	2.983	1.321
Other students respect my habit of online reading.	PA3	2.752	1.367
Other students value my ideas about the information I on the internet.	PA4	2.947	1.321
My class fellows think that what I read online is interesting.	PA5	2.831	1.305
,			
Students trust the information that I read online.	PA6	3.093	1.26
		2.9393	1.321
Peer Rejection			
My peers and I have different opinion about online reading.	PR1	3.179	1.313
My peers do not care for my ideas about the information I get by	PR2	3.123	1.287
reading online.	DD 2	2.026	1 2 4 5
Other students don't respect me because I often get information online.		3.036	1.345
Other students don't value my opinion about online information.	PK4	2.92	1.241
Other students don't value my opinion about online information.	РКЭ	3.026	1.366
		3.0568	1.3104
Efficacy			
I can figure out how different section fit together when I read an online text.	E1	3.076	1.252
I am good at explaining online information.	E2	2.99	1.333
I can find the main idea of an online text.	E3	3.02	1.4
I can figure out what unfamiliar words mean in online texts.	E4	3.172	1.324
I understand most of the information that I read on the internet.	E5	3.076	1.339
I understand the main point of an online text.	E6	3.027	1.359
I can correctly answer questions based on online information that I have read on the internet	E7	2.901	1.358
have read on the internet.		3.0374	1.3378
Perceived Difficulty			
Online information is too hard to read in my spare time.	PD1	2.947	1.38
I need more help than other students to understand the main ideas of	PD2	2.904	1.386
some online information. It is hard to explain online information that I road on the internet		2 021	1 2 2 1
I think reading online is really confusing	נעי עק	2.921	1.301
It is hard for me to answer questions about the information I read	1 D4	5	1.370
online.	PD5	2.914	1.347



It is difficult for me to read online compared to other students.	PD6	2.851	1.342
		2.9228	1.3723

Based on the results above, we can figure out that the highest mean goes to (peer rejection) factor with mean (M=3.0568) while Dowson and McInerney (2001) comes in the last position with mean (M=2.7052). The highest frequent statement was reported by students is *My peers and I have different opinion about online reading* (M= 3.179) and the least frequent statement is *Online reading is not fun* (M=2.646).

Table 5

Category	statement	Category	Statement
	Highest frequent		Least frequent
PR1	My peers and I have different opinion about online reading.	A2	Online reading is not fun.
E4	I can figure out what unfamiliar words mean in online texts.	A3	Online reading is not one of my favorite activities.
PR2	My peers do not care for my ideas about the information I get by reading online.	A4	Online reading is boring.
PA6	Students trust the information that I read online.	A1	I read online information as little as possible.
E1	I can figure out how different section fit together when I read an online text.	PA3	Other students respect my habit of online reading.

The given table above depicts the highest frequent statements and the lowest statements. As for the most frequent, we can see that peer rejection and efficacy share the same percentage 40% for each while peer acceptance takes part with 20%. In contrast, it is obvious that the overwhelming majority belongs to avoidance with 80% and peer acceptance shares only with 20%.

5.6.2. Qualitative data analysis

5.6.2.1. Sample of interview

As underliend before, the sample size of students were interviewed was five. The students study in PYP and they are varied in their diciplines. The following table offers further details in this regard.

Table 6

S/N	Respondents	Discipline
1	А	Medicine
2	В	Medicine
3	С	Engineering
4	D	Engineering
5	Е	Applied Medical Sciences

In this section, five students study in PYP were selected and interviewed to investigate the motivation of online reading among Saudi EFL. The respondents' interviews' data were noted verbatim. Table reflects the main themes and subthemes resulted from students' interviews.



Table 7

S/N	Main theme	Sub- theme	
1	Matingtion to noged online	Motivation is important	
1	Motivation to read online	Motivation is not important	
		Preference to read books	
2	Reading material	Reading college's subjects	
	0	Reading from websites	
		Reading for study	
3	Purpose of reading online	Reading for pleasure	
	1 7 0	Reading about international issues	

5.6.2.2. Interviews' analysis

The following table shows the answers of the students toward the interview's question where they declared their opinions about online reading motivation.

Table 8 Motivation to read online

S/N	Participants	Responses
1	Khalid	"I am not motivated to read online. I favor reading books since I have an eye problem (sight problem): therefore. I always have a tendency to decrease the time of watching the
		screen. As a result, I am more interested in reading books although internet includes huge and enormous information."
2	Abdullah	"Motivation doesn't mean anything to me. I don't care about online reading motivation"
3	Faisal	"Motivation is important to read online. For example, reading for college's subject increases my motivation to read. In contrast, I will be less motivated if I read for pleasure."
4	Sultan	"If I have a question and I don't know the answer, I will be motivated to go online and search for it. So, motivation depends on my needs"
5	Ahmad	"I am motivated for online reading. World of the internet like the ocean where I can explore many things. Today many passages and articles motivate me to read specially those focus on certain topics such as mind blowing."

Two of the students described themselves that they are unmotivated for online reading for different reasons. Khalid attributed that he is not motivated to certain health problem, eye sight problem. Therefore, he favors reading books though the information in the internet is huge, *I am not motivated to read online. I favor reading books since I have an eye problem (sight problem), therefore, I always have a tendency to decrease the time of watching the screen. As a result, I am more interested in reading books although internet includes huge and enormous information.*" However, Abdullah is unmotivated due to his carelessness toward online reading "Motivation doesn't mean anything to me. I don't care about online reading motivation"

Conversely, Sultan connected his motivation toward online reading with the purpose of online reading. So, if he has a question, he will be motivated to read online to find the answer "If I have a question and I don't know the answer, I will be motivated to go online and search for it. So, motivation depends on my needs". Faisal valued the importance of motivation. Furthermore, he is highly motivated when online reading has a connection with his college's subjects. Conversely, he is less motivated when online reading goes for pleasure: "Motivation is important to read online. For example, reading for college's subject increases my motivation to read. In contrast, I will be less motivated if I read for pleasure." Ahmad has a different view from the others. He valued the internet information since it supports him to increase his awareness about global issues "I am motivated for online reading. World of internet is like the ocean where I can explore many things. Today many passages and articles motivate me to read specially those focus on certain topics such as mind blowing."



6. DISCUSSION and CONCLUSION

Researchers progressively are calling for more investigation of motivation in specific aspects which gives studies value and finds different understanding for motivation (Bong, 2004; Wigfield, Guthrie, Tonks, & Perencevich, 2004). This study was designed to explore students' motivation toward online reading. We studied multiple domains of motivation toward online reading. For that reason, we have devised a modified questionnaire to achieve the goals of the study and answer the proposed questions.

Taken together, the findings of this study implicate that the most crucial aspect that has an impact on students' motivation is peer rejection. This is an evidence that students are uncaring to their peers' points of view concerning what they read online. On the other hand, Avoidance, one of the investigated aspects, was the least factor that affects the students' motivation. This outcome suggests that the majority of students do not oppose or have a rejection to use the online methods as a tool for reading and obtaining information. The analysis of this study revealed that the most frequent statement was My peers and I have a different opinion about online reading and the least frequent statement is Online reading is not fun.

For interest, it was quite apparent from students' responses that they are highly confident of their way of online reading and the content they read. Consequently, this led students to be uncaring to their colleagues' views and reject opinions proposed by them. This implies that students consider online reading as a space of their freedom to search what they want, moving from one website to another, communicating with others and a place to express thoughts and opinions. In contrast, students' responses reflect that they are not avoiding internet in general which indicates to the power of internet existence in their daily life.

Qualitatively, students show carelessness toward the impact of motivation on online reading. However, they connected their motivation for online reading with the purpose of reading. So, the purpose of reading spurs students to read online and form their ways of reading. One of the interviewees mentioned the importance of the internet as a source to boost the students' awareness of global issues.

Long and Szabo (2016) have found that digital text can be a propelling variable in expanding their engagement which prompts higher accomplishment. Picton (2014) described that e-books and online platform had a direct impact on increasing students' motivation to read.

This study sought to investigate the students' motivation to read online and address the aspect that might affect this process. Therefore, this research would pave the way for other scholars to undertake in this area and where they can discuss other domains in motivation for online reading.

Definitions of term

The researchers used abbreviations in the research, and to clarify the definition of each term to be clear and avoid any misunderstanding of their meanings, the following list explains each term:

The term	Definition
MRQ	Motivations for Reading Questionnaire
IM	Intrinsic motivation
AV	Avoidance
V	Value
DV	Devalue
PA	Peer acceptance
PR	Peer rejection
EF	Efficacy
PD	Perceived difficulty

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Learning Leadership of School Administrators and Teaching Behavior Affecting The Effectiveness of Teacher Professional Development: Hierarchical Linear Model

Julasak COCKPIM

Jul_kumath_kku@hotmail.com

Kanokorn SOMPRACH

Corresponding Author, Faculty of Education, Khon Kaen University, Thailand kanoklin@kku.ac.th

ABSTRACT

The main aim of this research was to investigate the effects of learning leadership of school administrators and teachers' teaching behavior toward teacher professional development. A total of 412 samples consisting of 103 school administrators and 309 teachers participated as respondents. Researchers utilized a quantitative survey design with a questionnaire instrument. Descriptive statistics were used to examine the perceived level of all variables and inferential statistics, applying hierarchical linear model using teacher and school administrator level. Results showed that all the independent variables either school administrators' learning leadership or teachers' teaching behaviors are positively associated to teacher professional development at significant level 0.01. Teachers' teaching behavior was correlatively explained to the variance of teacher professional development of 20.60 percent. The learning leadership factors namely creativity and integration and advanced technologies were significantly affecting teacher professional development at 0.01 and 0.05 levels respectively. Finally, learning leadership factors namely creativity and team learning were significantly affecting teacher professional development at significantly affecting teachers' teaching behavior at significant level of 0.01 and 0.05 respectively.

KEYWORDS: Learning leadership; teacher professional development; teachers' teaching behavior

INTRODUCTION

According to Kouzes and Posner (2016), learning leadership is so influential of direction and outcomes whether at the micro level of schools and learning environments, or of extensive systems. Somprach and Tang (2016) defined learning leadership is a leadership style that engaging in the design, implementation, and sustainability of powerful innovative learning environments. A teacher professional development can be described as a collegial group of teachers and principals who work and learn together in their commitment to enhance learner achievement (Leclear, 2015).

Somprach, Tang, and Popoonsak (2017) explored the role of essential leadership styles of school principals in encouraging teachers' participation in professional learning community to 731 teachers in basic education in northeastern of Thailand. Their findings indicated that learning, transformational, collaborative, and invitational leadership styles are the four significant predictors for promoting teachers' participation in professional learning community. In addition, Thailand Manual for Strategic Plan, Ministry of Education (2010) emphasized that Thailand needs to have comprehensive guidelines to develop teachers' professional skills to prepare its future global citizens of the 21st century.

Somprach, Prasertcharoensuk, and Tang (2016) surveyed 375 teachers regarding the relationship and effect of administrative factors that affecting the effectiveness of Thai World Class Standards Schools. Their findings indicated that the four significant predictors are factors for using information and communication technology, teacher professional development, internal process management and the focus on learners and stakeholder that have successfully contributed 65.60 percent variance of effectiveness of Thai World Class Standard Schools at 0.01 significance level with multiple correlation coefficient as 0.81.

RESEARCH OBJECTIVES

Based on the previous literatures above, researchers would like to investigate learning leadership of the school administrators, teachers' teaching behavior toward teacher professional development in schools under the administration of the Office of Secondary Education Region 22, Thailand. The following are the specific objectives of this study:

i. To identify the perceived level of learning leadership of school administrators, teachers' teaching behavior and teacher professional development.



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- ii. To examine the fixed and random effects of null model.
- iii. To examine the fixed and random effects of simple model.
- iv. To examine the fixed and random effects of hypothesis model.

METHOD

Survey design was employed using questionnaire as a method to collect quantitative data. A total of population 2,843 consisted of 137 school at macro level and 2,706 teachers at micro level from 137 schools under the Office of Secondary Education Region 22, Thailand. A total of 103 schools were selected out of 137 schools in accordance with the Krejcie and Morgan's Table (1970). A multistage sampling technique followed by proportional simple random sampling technique was administered to select samples according to the two levels. Therefore, the target groups were divided into two levels, namely school administrator level and teacher level with a ratio one school administrator to three teachers. Consequently, the sample size of 103 school administrators was randomly selected in proportion to different sizes of schools namely small, medium, and large. This is followed by simple randomized teacher-level samples under the sample of 103 school administrators at macro level. As a result, the total samples of teacher were comprised of 309 teachers at micro level. Since researchers employed Hierarchical Linear Modeling (HLM), a large sample size is needed in order to find accurate group variation. Hair, Back, Babin and Anderson's (2013) proposed that the proper ratio of samples is 20:1 or 20 samples per one observable variable. Since there were 11 observable variables in this study, the required sample size was 220 samples of teachers. On this line of reasoning, simple random sampling technique was utilized to select 309 of teachers to fulfill Hair et al. (2013) suggestion that sample size should not less than 100.

Two types of survey questionnaire were used in this study catering for macro and micro levels respectively. The two types of questionnaire were administered in the Thai language to ensure that the respondents could understand about the statements. This survey questionnaire method benefits this study in terms of obtaining data more efficiently as time, energy, and costs would be minimized (Wyse, 2012), hence provides an excellent means of measuring attitudes and orientation in a large population which can, therefore, be generalized to a larger population (Gay, Mills, & Arirasian, 2012).

Teachers' teaching behavior was the micro level independent variable consisted of six factors namely learning management plan, learner centered teaching activities, use of media and technology, assessing the actual condition, classroom management, and classroom action research. On the other hand, learning leadership of school administrators was the macro level independent variable was comprised of creativity, powerful learning environment, flexibility, integration, advanced technologies, team learning, and school-directed learning. Dependent variable was teacher professional development included professional learning community, specific curricula, student-learning needs, quality teaching, and enterprising collaboration.

RESULTS OF THE STUDY

Results of this study are presented based on the research objectives that are indicated above. The initial result is the descriptive results related to the three variables namely teachers' teaching behaviors, learning leadership of school administrator, and teacher professional development. This is followed by results from HML analysis for null hypothesis testing.

Descriptive results of all the perceived level of learning leadership of school administrators, teachers' teaching behavior and teacher professional development.

Descriptive results indicated that all the variables of this study are perceived at high levels. Specifically, the perceived level of learning leadership of school administrators, teachers' teaching behavior, and teacher professional development were found at high level as their mean score was 4.43, 4.26, and 4.27 respectively. Table 1 shows the average score of the perceived level of each variable.

Variable	Mean score	SD	Interpretation
Learning leadership	4.43	0.32	high
Creativity	4.46	0.43	high
Powerful learning environment	4.43	0.37	high
Flexibility	4.44	0.51	high
Integration	4.41	0.44	high
Advanced technologies	4.43	0.36	high
Team learning	4.45	0.38	high
Self-directed learning	4.43	0.41	high

 Table 1: Results of the perceived level of practice on each variable



Teachers' teaching behavior	4.26	0.49	high
Learning management plan	4.32	0.50	high
Learner centered teaching activities	4.25	0.54	high
Use of media and technology	4.24	0.55	high
Assessing the actual condition	4.22	0.63	high
Classroom management	4.32	0.57	high
Classroom action research	4.18	0.64	high
Teacher professional development	4.27	0.46	high
Professional learning community	4.21	0.56	high
Specific curricula	4.27	0.59	high
Student-learning needs	4.27	0.61	high
Quality teaching	4.34	0.50	high
Enterprising collaboration	4.35	0.49	high

Null model analysis

The micro-level analysis of HML was conducted in two steps. The first step (null model) was conducted on the dependent variables without considering any independent variables. As indicated in Table 2, the results of fixed effect test showed that the total mean score of teacher professional development was 4.251 ($\gamma_{00} = 4.251$) with a statistical significance at 0.01. Therefore, researchers were able to use the simple model analysis for the second step (simple model).

Table 2: Results of null model from fixed effect and random effect

Fixed effect	β	Standard Error	•	t-test	df	p-values
INTRCPT, γ ₀₀	4.251**	0.040		107.351	102	< 0.001
Random effect		Variance	df	χ^2		p-values
Mean difference of school (U _{0j})		0.132	102	559.695		< 0.001

**p<0.001

Simple model analysis

Based on Table 3, the results of fixed effect test showed that the total mean of the teacher professional development was 4.245 ($\gamma_{00} = 4.245$) with a statistical significance at 0.01, t = 216.284. Independent variables at micro-level that provided positive effects on teacher professional development were learning management plan and learner centered teaching activities with every factor variable having a statistical significance of 0.01. The regression coefficient of each factor was 0.317 and 0.355 respectively. Both of the factors were used to explain the variance of teacher professional development of 20.60 percent. This implies that the promotion of learning management plan and learner centered teaching activities can improve teacher professional development. Analysis of random effect was illustrated through the following equation:

Teacher professional development = $4.245^{**} + 0.317^{**}$ (learning management plan) + 0.355^{**} (learner centered teaching activities)

Fixed effect	β	Standard Erro	r	t-test	df	p-values
INTRCPT, γ ₀₀	4.245**	0.020		216.284	102	< 0.001
LMP	0.317**	0.065		4.864	102	< 0.001
LCTA	0.355**	0.049		7.275	102	< 0.001
Random effect		Variance	df		χ^2	p-values
TPD		0.009	85		133.650	0.001
LMP		0.151	85		119.945	0.008
LCTA		0.021	85		122.510	0.005
Mean difference between teachers		0.071				

Table 3: Results of sin	ple model from fixed	effect and random effect
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**p<0.01

Hypothetical model analysis

Factors of learning leadership of school administrators that were positively affecting teacher professional development namely flexibility, integration, and advanced technologies. The regression coefficient of each factor was 0.169, 0.129, and 0.083 respectively, with statistical significance 0.01 and 0.05. The analysis result was illustrated through the following equation.



Teacher professional development = $4.238^{**} + 0.169^{**}$ (Flexibility) + 0.129^{*} (Integration) + 0.083^{*} (Advanced technologies)

These factors were used to explain the variance of teacher professional development of 31.21 percent. This implies that the learning leadership of school administrators were affecting learning management plan were creativity and team learning factors. Both factors have influence over regression coefficient at 0.370 at significant level of 0.05. The analysis result was illustrated through the following equation:

Learning management plan = $0.283^{**} + 0.370^{**}$ (Creativity) + 0.335^{**} (Team learning)

The factors at the level of school administrators can be explained by the variance of learning management plan of 11.18 percent. The factors at the level of learning leadership of school administrators affecting activities that learner centered teaching activities were creativity, integration, and advanced technologies which having influence over regression coefficient at 0.425 and 0.284 significantly at 0.01 and at 0.443 significantly at 0.05 as illustrated through the following equation:

Leaner centered teaching activities = $0.333^{**} + 0.425^{**}$ (Creativity) + 0.284^{**} (Integration) + 0.443^{*} (Advanced technologies)

The variables at the level of school administrators can be explained by the variance of learner centered teaching activities of 14.39 percent. The administrator-level model can be explained the variance of teacher professional development of 95.50 percent.

Table 4: Results of hypothesis model analysis from fixed effects and random ef	fects
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Fixed effects	β	Standard error	t	df	р
TMD	4.238**	0.019	223.998	95	0.000
Flexibility	0.169**	0.062	2.727	95	0.000
Integration	0.129*	0.058	2.233	95	0.028
Advanced technologies	0.083*	0.037	2.223	95	0.029
LMP	0.283**	0.062	4.541	95	0.000
Creativity	0.370**	0.132	2.805	95	0.000
Team learning	0.335*	0.144	2.324	95	0.017
LCTA	0.333**	0.048	6.959	95	0.000
Creativity	0.425**	0.158	2.686	95	0.009
Integration	0.284**	0.099	2.879	95	0.000
Advanced technologies	0.443*	0.208	2.135	95	0.035
		10			
Random effects	Variance	df	χ^2	р	
TMD	0.006	78	123.643**	0.001	
LMP	0.134	78	105.331*	0.021	
LCTA	0.018	78	104.39985*	0.024	
Difference between teachers	0.063				

DISCUSSION AND CONCLUSION

Results of this study revealed that predictors of teachers' teaching behavior that affecting teacher professional development were learning management plan and learner centered teaching activities. This implies that teachers' teaching behavior is important because it can directly affect teacher professional development. The results are found to be in line with Buntos's (2014) and Somprach et al.'s (2017) studies. Buntos's study revealed that there are three predictors for teacher professional development namely self-awareness, broad vision, and teaching skills with a multiple-correlation coefficient of 0.727, predictor coefficient or predictive power of 52.80 percent significantly at 0.05 level. Somprach et al. demonstrated that the greater the flexibility of the hiearchy through learning leadership, the higher the teachers' participation levels in professional learning communities.

The learning management plan and learner centered teaching activities were positively affected teacher professional development. This implies that the learning management plan allows teachers to be prepared to face problems and prepare classroom activities to suit the lessons and learners. On the other hand, learner centered teaching activities also contributed to teacher professional development because the changes in current education requires more dynamic educational management according to the principle that all learners are able to learn and develop themselves. In addition, results revealed that learning leadership factors namely flexibility, integration, and advanced technologies are important to promote teacher professional development. Therefore, all the educational agencies should encourage teachers to participate in teacher development planning, monitor the evaluation of supervision, follow up the work, prepare themselves to handle a variety of learning styles, and provide adequate budget and training needs.



Results showed that creativity and team learning are significantly affected the learning management plan. This implies the importance of learning leadership in fostering the learning skills of 21st century learners through the design and development of innovative learning environment to meet the needs of learners. Besides, results also found that creativity, integration, and advanced technologies are the most influential independent variables toward learner centered teaching activities. Teachers are encouraged to play a role in implementing the curriculum. They have to manage class to achieve the objectives of the curriculum in order to raise the quality of education to become realistic. They should also integrate between sciences and cross-sciences to promote and develop the learners to be able to associate knowledge appropriately, leading to potential and intelligence. The aim is to provide the learners with the opportunity to search for information and select useful information, learn how to work with others happily. In addition, the school administrators should encourage teachers and school personnel to utilize appropriate technologies to improve the quality of teaching and learning in accordance with the curriculum standards and facilitate and support a variety of technologies to lead to further learning innovations.

Results of this study contribute to the growing interest in incorporating teachers' teaching behavior coupled with school administrator's learning leadership to improve teacher professional development into accountability of educational policy will be informed according to these results of the study. Similar to previous studies, researchers include school fixed effects in all of the three models, which helps to reduce this and other potential sources of bias. However, as a result, our estimates are restricted to within-school comparisons of teachers and school administrators and cannot be applied to inform the type of across-school comparisons that district typically seek to make.

Researchers believe that HLM is an important statistical tool to investigate the relationship between learning leadership of school administrators, teachers' teaching behavior, and teacher professional development. By taking into account the hierarchical nature of educational data, HLM separates variation in teachers' teaching behavior into between teachers and between learning leadership of school administrators and then analysis each factor in relation to the other. Hence HLM offer better statistical adjutments and more accurate estimations and promote better educational policies and practices.

Finally, researchers would like to suggest to the Office of Educational Service Area should focus on the development of learning leadership of school administrators by organizing seminars and study tours to provide educational administrators with opportunities to develop themselves. Participatory action research is recommended by using the results of this research as a guideline for teacher professional development.

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New Approach at Evaluating the Private Schools' Curriculum: I-CODE Model

Dr. Fatih Aygören

Balikesir University, Department of Curriculum and Instruction, Turkey faygoren@hotmail.com

Assoc. Prof. Dr. Kemal Oğuz Er

Balıkesir University, Department of Curriculum and Instruction, Turkey keoguzer@gmail.com

ABSTRACT

This research is designed to develop the I-CODE model, which is a unique approach to evaluate curricula. Basic features of the model, design process, code of practice, feasibility and functionality were investigated.

It was concluded in accordance with the first sub-objective of the study that the model has features such us having a subjectivist and utilitarian philosophy; relativist and consumerist ideology, a design which is consumer-oriented and participant-oriented; externally-directed regarding the types of evaluation; and making informal, input, process, output, impact evaluation and inspired by Goal Free, Consumer-Oriented, Responsive curriculum evaluation models.

In the design process of I-CODE model, analyses of the needs of the consumers were made through an interview and these analyses was supported by literature review and curriculum evaluation questions of the model were determined. Accordingly, icode.com.tr curriculum evaluation website belonging to I-CODE model was designed and has been put into practice as a pilot project for the evaluation of private schools. The process to develop the I-CODE model continued through feedback from the pilot project and expert perspectives.

Implementation principles of the I-CODE model have been clarified through interviews and literature review. This model is based on parents' and students' evaluation of the curricula through becoming a member of icode.com.tr website. All private schools in Turkey can be displayed on the system. The evaluation is carried out by the consumers by scoring ten questions out of ten about the school's curriculum. After each beneficiary evaluation, the score is being updated. Furthermore, the general and sub-statistics of the school's curriculum can be displayed separately and continuously.

In accordance with the second sub-objective of the research, it was concluded that this model is need-oriented, functional and useful at curriculum evaluation. The model, while being practicable from an educational point of view, needs to be sensitive to legal aspects.

KEYWORDS: I-CODE model, icode.com.tr, Curriculum Evaluation, College, Private School

INTRODUCTION

While the world is in great desire for innovation, the education world must keep pace with these rapid developments (Bobbitt, 1918: p. 9). In this regard, curricula are the leading things that need to be continuously developed. Curricula must be evaluated continuously in order to create curriculum structures that can meet needs and maintain continuity. The evaluation of curricula, the identification of their effectiveness, and hence its development is an almost instinctive effort for educational scientists since evaluating curriculum is an important feedback mechanism for improving curricula. (Lunenburg and Irby, 2006: p. 60; Belvis, 1989: p. 247) Many philosophies, ideologies, designs, evaluation types, and models have been produced in order to evaluate the curricula in this direction.

In this study, a new model is proposed which is different from the models developed in the field of curriculum evaluation. The I-CODE (Internet and Consumer Oriented Dynamic Evaluation) curriculum evaluation model developed by the researchers is the internet-based and continuous evaluation of the curricula of private schools by parents and students through the icode.com.tr website. Thus, parents and students take the lead in evaluating their curricula. The integration of the Internet, information technology and evaluation areas of curricula have the characteristics of consumers' (parents and students) roles in direction, establishing continuity and creating curriculum evaluation databases. However, the proposal of this model is accompanied by questions such as what



the I-CODE model is, what features it contains, its principles, practicality or functionality. These questions constitute the problem of research.

The purpose of this research is to develop I-CODE which is likely to be the new model in the evaluation of curricula, to test it on private schools' curricula and to question its usefulness. In response to this general objective, the following questions will be asked:

- 1) Web-based I-CODE curriculum evaluation model's:
 - i) What is the basic curriculum evaluation features?
 - ii) What is the operations in the design process?
 - iii) What is the codes of practice?
- 2) Web-based I-CODE curriculum evaluation model's:
 - i) How is the applicability in education?
 - ii) How is the functionality?

PROCEDURE

In the study, grounded theory among qualitative research methods was used since a unique model is proposed in the field of curriculum evaluation. Developing theories to explain phenomena, the theories emerging from the data rather than being prefigured or predetermined (Cohen, Manion and Morrison, 2007: p. 170). Grounded theory provides a systematic and comparative framework when constructing a theory inductively (Punch, 2000: p. 103).

Interviewing, observation and document analysis are the most commonly used data collection methods when developing theories (Yıldırım and Şimşek, 2006: p. 76). In this regard, literature review, individual interview and focus group discussion were used in the research process. Grounded theory is an iterative process, moving backward and forwards between data and theory until the theory fits the data (Cohen, Manion and Morrison, 2007: p. 185).

Grounded theory methods can be applied both to provide systematic procedures for shaping and using qualitative materials and also on quantitative data. Grounded theory has the following characteristics:

- 1) simultaneous involvement in data collection and analysis phases of research;
- 2) creation of analytic codes and categories developed from data, not from preconceived hypotheses;
- 3) the development of middle-range theories to explain behavior and processes;

4) memo-making, that is, writing analytic notes to explicate and fill out categories, the crucial intermediate step between coding data and writing first drafts of papers;

5) theoretical sampling, that is, sampling for theory construction, not for representativeness of a given population, to check and refine the analyst's emerging conceptual categories and;

6) delay of the literature review (Charmaz, 2005: p. 28).

Grounded theory can help to forestall the opportunistic use of theories that have dubious fit and working capacity. So often in journals we read a highly empirical study which at its conclusion has a tacked-on explanation taken from a logically deduced theory (Glaser and Strauss, 2012: p. 4). In this context, the explanations about the I-CODE model that the research attempt to find, tried to be carried out with the analyses and interpretations repeated in the research process.

Research process flowchart is shown in Figure 1.





Figure 1. Research process flowchart

Collection and Evaluation of Information Related to the First Sub-Objective of the Study

Literature review and interview were used for the first sub-objective of the research. In the literature review, researchers tried to reach national and international written sources. In this respect, it is benefited from the available print and digital sources. The sources of information were examined by researchers, the concepts were tried to be understood and categorized as curriculum features.

Individual interviews with parents and focus group discussion with the students were held in research. Semistructured interview method through interview form developed by the researcher was used in individual interviews and focus group discussion. Like the structured interview, the semi structured interview is constructed around a core of standard questions. Unlike the structured interview, however, the interviewer may expand on any question in order to explore a given response in greater depth (Mitchell and Jolley, 2010: p. 277).

With semi-structured interviews, the investigator will have a set of questions on an interview schedule but the interview will be guided by the schedule rather than be dictated by it. Here then:

- 1) There is an attempt to establish rapport with the respondent;
- 2) The ordering of questions is less important;
- 3) The interviewer is freer to probe interesting areas that arise;



The interview can follow the respondent's interests or concerns (Smith, 2005: p. 12).

The results of the interviews were coded and then interpreted in accordance with the structure of research method. Coding is a specific labeling activity that initiates data analysis and continues during the analysis (Punch, 2005/2014: p. 195).

Open coding used in grounded theory was used in the research. Open Coding includes labeling concepts, defining and developing categories based on their properties and dimensions. The purpose of open coding is to develop categories (Punch, 2000: p. 106).

In the research process, descriptive analysis was used to interpret the data after coding. In the descriptive analysis, direct quotations are frequently included to reflect the views of the individuals interviewed or observed. The purpose of such analysis is to present the findings to the reader in an organized and interpreted way. The data obtained for this purpose are first described systematically and explicitly. Afterwards, these descriptions are analyzed, interpreted, cause-effect relations are examined and some results are achieved. The association, interpretation of the emerging themes and making future prediction may also be among the researcher's comments (Yıldırım and Şimşek: 2006: p. 224).

In order to be able to prepare the interview form, a draft based on the literature review was first formed. Expert opinions were obtained for the draft form and preliminary applications were made. The experts have contributed to the structuring of the interview form, its reliability, and validity. The form is finalized and shaped after the checks and corrections.

Feedback was provided through the basic features, design process and implementation principles of the I-CODE model and I-CODE curriculum evaluation questions have been developed to be used in the model. The questions on the interview form and the process of preparation of curriculum evaluation questions developed through these interviews are shown in Figure 2.



Figure 2. Interview Form and I-CODE Curriculum Evaluation Questions Preparation Process Collection and Evaluation of Information Related to the Second Sub-Objective of the Study



Individual interviews with experts were conducted to find the answer to the question "How is the Web-based I-CODE curriculum evaluation model regarding functionality and applicability?" which the second sub-objective of the study is. A draft based on literature review was developed, expert opinion on the draft was obtained, preliminary application was made and final form was given in order to developed the interview form to be conducted. This form was used in the interview process with experts. During the research process, three specialists from the field of curriculum and a specialist from the field of information technology were interviewed. Also, an unstructured interview was held with a legal expert and a lawyer about the legal applicability of the I-CODE model.

The data obtained from the interviews were coded and interpreted in accordance with the structure of research method. In the descriptive analysis, direct quotations are frequently given to reflect the views of the interviewed or observed individuals dramatically (Yıldırım and Şimşek: 2006, p. 224). In this context, interpretations were made through giving direct quotations of experts' expressions. The findings were tried to be presented to the reader in an organized and interpreted way.

FINDINGS

Findings related to the first sub-objective of the research

Basic Characteristics of I-CODE Model

The I-CODE model is an adapted type of evaluation which has already begun to be used through developing technology and internet facilities at the field of curriculum. It is used to evaluate school's curriculum through the website. The points that parents and students gave, in other words, beneficiary scores are presented in a continuous, changeable way and it is also open to the public.

The curriculum definition, curriculum evaluation philosophies, curriculum evaluation ideologies, curriculum evaluation designs, curriculum evaluators role, curriculum evaluation format, curriculum evaluation type of the I-CODE model and models which affected the model were defined within the scope of the research. Findings about these are:

Curriculum Definition of I-CODE model

The curriculum has been redefined during the development process of ICODE model. Curriculum is all the deliberately planned circumstances that affect the learners and create experience including both internal and external school factors regarding curriculum. In this respect, I-CODE model suggests taking all experiences that affect the learning of the learners and all the circumstances that reveal these experiences into consideration while evaluating curriculum. The curriculum is accepted in its macro-scale in other words in its widest scope.

Curriculum Evaluation Philosophy of I-CODE Model

Curriculum evaluation philosophies obtained from literature review within the scope of research were defined as follows: objectivist, subjectivist, utilitarian and pluralist. The I-CODE model can be regarded as subjectivist since it is based on the subjective opinions of parents and students in other words consumers. The subjective point of view argues that this point of view consists of subjectivity and experiential practice rather than scientific method (Lawrenz and Thao, 2014: p. 760).

Furthermore, evaluation is made by consumers; thus, results from the evaluation directly provide feedback to consumers and to the individual interested. In this sense, it can be said that the I-CODE model is in accordance with the utilitarian philosophy. The primary aim of the utilitarian philosophy is to work for the benefit of the whole community and to maximize satisfaction.

Curriculum Evaluation Ideology of I-CODE Model

Within the scope of research, curriculum evaluation ideologies were defined through literature review as follows: separatist, positivist, managerial, relativistic and consumerist. The I-CODE model can be regarded as particularly close to these ideologies relativistic and consumerist. Scriven attaches much importance to subjectivity rather than objectivity as opposed to relativistic and positivist ideologies (Stufflebeam and Coryn, 2014: p. 361). Within the scope of the curriculum evaluation logic of the I-CODE model, subjectivity is prioritized rather than objectivity. Parents' and students' subjective judgments about the school's curriculum can give insight into the effectiveness of the curriculum. In addition, the I-CODE model provides appropriate options for consumers to participate in the evaluation process. Consumerist ideology is the involvement of affected individuals in the evaluation process (Scriven, 1993: p. 249).



Evaluation is made for consumers. In this context, it can be said that the I-CODE curriculum evaluation model is in accordance with the basic logic of consumerist ideology.

Curriculum Evaluation Design of I-CODE Model

In the scope of the research through literature review, six curriculum evaluation designs were determined. These evaluation designs are as follows: objectives-oriented, management-oriented, consumer-oriented, expertize-oriented, adversary-oriented and participant-oriented. The I-CODE model can be evaluated within the scope of consumer-oriented and participant-oriented designs. In the consumer-oriented design, curricula are evaluated for the consumers. Information about the quality of the curriculum or service is given openly. Summary evaluation logic is used (Yüksel and Sağlam, 2014: p. 71). In the I-CODE evaluation method, the information gathered from the parents and students is analyzed and presented back to them through the website. Consumers may benefit from the evaluation results when choosing a school or developing a curriculum. In this context, the application process falls into the consumer-oriented design category; moreover, the I-CODE model has also participant-oriented design feature. Participatory curriculum evaluation is based on the involvement of the stakeholders in the process of determining the effectiveness of the curriculum. Instead of evaluating the curriculum on its own, the curriculum includes shareholders in the process. Likewise, in the I-CODE model, the evaluation process is carried out directly with the parents and the students. In this regard, the I-CODE model can be considered within the context of participant-oriented evaluation.

Curriculum Evaluator Role at I-CODE Model

Evaluation of the curriculum according to the evaluator role is done in three ways consisting of internal, external and externally-directed. The I-CODE model can be considered as an externally-oriented evaluation in terms of the evaluator's role. Externally-directed evaluation is a kind of evaluation in which the evaluation process is largely done by external auditors with the help of people in the organizational structure (Thomas, 2010: p. 416). In the I-CODE model, what information will be collected during the curriculum evaluation process, what types of data sets and in which quality these data sets will be, data analysis, data collection tools, what dimensions will be assessed in the evaluation process and how the evaluation results will be presented are determined by the researcher. In other words, the researcher, who is from outside the organization, helps with the technical issues required. However, the role of evaluation is given to consumers within the education organization, that is to say, judgments about the organization are obtained directly from the consumers. In the I-CODE model, the evaluation is made by the researcher who is the curriculum development expert and the I-CODE curriculum evaluation questions. In this regard, the evaluation made within the scope of the I-CODE model can be said that it is in accordance with externally-directed evaluation.

Curriculum Evaluation Form of I-CODE Model

Curriculum evaluation can be said formal, informal and blended evaluation according to its form. The I-CODE model uses the concept of informal evaluation in the curriculum evaluation process. Informal evaluation is a kind of evaluation using variables and tools such as interviews with individual or group, observation and questionnaire (Dessinger and Moseley, 2004: p. 83). Since the evaluation questions are developed and applied by taking the opinions of the consumers and experts, it is can be said that it is in line with informal evaluation.

Evaluation Type of I-CODE Model According to System Dimensions

Curriculum evaluation can be expressed in four dimensions as input, process, output and impact dimensions when the curriculum is accepted as a system. In this regard, the I-CODE model more or less consists of all of the input, process, output and impact evaluation dimensions.

Input evaluation can be expressed as the dimension that can be used to analyze the needs of the curriculum for the people concerned. The input evaluation is largely related to the needs analysis (Guerra-Lopez, 2008: p. 109). It can provide suggestions for the needs of curricula or institutions. Input evaluation can recommend a better alternative if there is a non-satisfied application on the basis of literature review (Stufflebeam, 2003: p. 45-46). The I-CODE model can provide useful information about the inputs of curricula. They can provide comparable information about schools' curriculum. Institution managers can use the I-CODE model as a needs analysis system. The beneficiary groups are able to make a choice from the I-CODE system when logging in the school system. In this sense, I-CODE model is in concordance with input evaluation.

The objective of the process evaluation is to display the performance (Guerra-Lopez, 2008: p. 109). The process evaluation enables to decide the degree of the curriculum reaches the target group, the satisfaction of the curriculum, the curriculum activities or elements applied, the quality of the equipment (Girgis, 1998: p. 110). I-CODE model can be said to reveal the degree of meeting the needs of the target groups and satisfaction of the


curriculum through the evaluations of parents and students. It can also be said that I-CODE model can provide information to curriculum specialist, relevant institutions such as the ministry of education and institution owners and also to consumers about the effectiveness and qualifications of the curriculum being implemented. In this context, I-CODE model can be regarded as suitable for process evaluation.

Output evaluation is a kind of evaluation focuses on the long-term effects of the curriculum (Girgis, 1998: p. 110). It provides feedback for the development or abandonment of the evaluated system (Guerra-Lopez, 2008: p. 109). The I-CODE model has a structure that is evaluated and measured by the consumers of the curriculum. There is no time limit for evaluations. The evaluation results are renewed on each new evaluation. In the long run all the results are kept ready to be shown to the interested person. Long-term evaluation results of schools or educational institutions can be viewed through the website. In this respect, it can be said that the I-CODE model is in accordance with the output evaluation.

Impact evaluation is a kind of evaluation focuses on short-term effects of the curriculum (Girgis, 1998: p. 110). Impact evaluation is concerned with which goals of the curriculum are met. Some people call this evaluation type as short and medium-term outputs (Baker and Goodman, 2003: p. 185-186). The I-CODE model is designed to allow parents and students, ie, consumers, to make instant and ongoing evaluations over the website. Thanks to the Internet and technological facilities, the extent to which the needs of the consumers are met can be shown in the short term. Curriculum specialist and people relevant to, can display the effects of curricula without any waiting and with continuous analysis. In this regard, the I-CODE model can be considered as evaluating the impact dimension of the system, since the short and medium-term effects are immediately reflected.

The basic principles and prominent features of the I-CODE curriculum evaluation model can be seen in Figure 3 as a summary.



Figure 3. Basic Features of I-CODE Model



Design Process of I-CODE Model

The starting point of I-CODE model and the preparation of the process of the website was carried out in parallel with the preparation of the evaluation questions process. In the design process of the I-CODE model, curricula and literature review on the evaluation of curricula, interviews conducted with the consumers, namely parents and students have played a role in shaping the model. In addition, expert interviews within the scope of the second objective of the research in which the applicability and functionality questioned has given feedback on the design of the model.

Literature review, the opinions of the consumers, curriculum evaluation questions are used in order to demonstrate the basic features of the I-CODE model. The interviews which have a great role in the structure of the model, in the development process and in finding the evaluation questions to be used on the site were thematized and the evaluation questions were structured on these themes.

In the process of thematization for the questions to be used during the curriculum evaluation, three main themes have emerged as follows: quality of education and training, organizational/institutional quality, quality of physical conditions. These three main themes are divided into ten sub-themes. In addition to the evaluation questions on this main theme and sub-themes, in which dimension the analyze results of the curricula will be presented on the website were revealed.

THEMES

The main themes and sub-themes obtained are shown in Figure 4.



Figure 4. Themes obtained from interviews

These themes also reflect the expectation of parents and students from private schools. Analyses made can also be seen as needs analysis for private schools or colleges.

Education and Training (Main Theme)

As a result of the interviews conducted with parents and students, foreign language, emotional/social development and teacher quality are seen as the sub-themes within the scope of the education and training. Interviews conducted with consumers have revealed that especially foreign language is considered important which is one of the sub-theme and this has attracted researcher's attention. It can also be said that the quality of the teacher is considered important as well as the foreign language, the socialization of the students and the emotional development of the students are also clearly expected. It can be said that cognitive development is also considered important but putting other sub-themes forefront rather than cognitive development has also caught the researchers' attention.



Foreign Language (Sub-theme)

It is seen that details such as foreign language pronunciation, speaking, understanding, reading and translation are frequently expressed in the opinions of parents and students regarding the foreign language which is in the forefront of the interviews. Some of the views of parents and students are as follows:

Parent (Kindergarten): They teach vocabulary with songs. There is no point. It was a show thing. It was simply for ornament. 02.03.2015

Parent (Primary School): I chose this school for foreign language. I think this is the only difference between private schools and public schools. 28.02.2015

Parent (Secondary School): Children can understand but cannot speak. There should be more conversation lessons. 02.03.2015

Student (Secondary School): I also want French and Chinese classes. 26.02.2015

Student (High School): I think English is not a problem, but they are not good at teaching the third language. Not good at all... 26.02.2015

As a result of the individual interviews with the parents, the focus group interviews made with the students the results shown above were obtained. Thanks to the data and quotations, it is noticed that foreign language teaching is considered important in private school curricula. It can be said that this expectation is due to the fact that foreign language courses cannot be given at the desired level in public schools, but much more foreign language course hours are given in private schools. Owing to realize this difference, parents and students may tend to choose private schools and have great expectations.

Teacher (Sub-theme)

It is seen that parents and students are very eager to talk about the teachers in the research process and they attach great importance to this dimension. It can also be said that they have expectations about having comprehensive knowledge of the field, teaching skills, general knowledge, experiences, characters, the ability to provide authority, and the stability that the school provides in its staff. Some of the opinions about teachers which is considered important by both parents and students, are as follows:

Parent (Kindergarten): We sent our kid to this school just because of this teacher. She started to work in a public school in the second semester. 02.03.2015

Parent (Primary School): Nobody wants teacher difference during the academic year. 28.02.2014

Parent (Secondary School): They are young, inexperienced, unable to provide authority in private schools. 02.03.2015

Parent (Secondary School): English teacher has changed. 28.02.2015

Parent (High School): I expect that the quality and competencies of the teachers are high. But at least I expect it to be different from a public school. 02.03.2015

Student (Primary School): We had Kenan Teacher in the first grade. He left. I wish he had taught us again. 26.02.2015

Student (Secondary School): I want our teacher to be very knowledgeable. He is already very knowledgeable. 26.02.2015

Student (Secondary School): I want my teacher to teach smilingly. 26.02.2015

Student (High school): Young teachers cannot provide much authority and discriminate students. Especially the ladies... 26.02.2015

As a result of the individual interviews with parents and focus group interviews made with the students, it can be said that the teacher dimension is considered to be very important within the scope of the curriculum. Experience and quality of the teachers, the stability of the staff seem to be taken care of by the consumers. In this regard, it can be said that the dimension of the teacher in private schools is very important in terms of the success of the curriculum.

Emotional Development (Sub-theme)

The contribution made by the private school to the emotional and social development of the students is considered important within the scope of the main theme of education and training. It is seen that the



development of self-confidence, personal development, respect, tolerance and positive attitudes are among the spoken details. Opinions of some parents and students in this regard are as follows:

Parent (Kindergarten): I want my kid to be happy. I want him to go to school willingly. I don't want to force. 02.03.2015

Parent (Elementary School): I thought more about self-confidence. They give more importance to it in such places... They motivate the students even when they do just a little thing. 28.02.2015

Parent (High School): Self-esteem, emotional development, foreign language... Other schools are focusing on the things except these... 02.03.2015

Student (Primary School): I think the most beautiful things happen in social activities. 26.02.2015

Student (Secondary School): I think that the best things are social activities. I enjoy with them. 26.02.2015

Student (Secondary School): The school gives great support in terms of achievement, discipline. Apart from these, having fun is also important for us. 26.02.2015

As a result of the individual and focus group interviews, it is seen that emotional developments including selfconfidence development, personal development and teaching positive attitudes such as respect and tolerance are considered important by consumers. This can be regarded as the result of the change from cognitive learning based on traditional, essentialist or realistic logic for many years to student-centered, pragmatic, progressivist and constructivist education. It can be said that the current education approaches to this direction have led the consumers to realize the importance of education in this direction.

Mental/Cognitive Development (Sub Theme)

Giving much importance to foreign language and social/emotional development rather than mental/cognitive Development has attracted researcher's attention. Opinions of some parents and students in this regard are as follows:

Parent (Kindergarten): I don't have any expectation from the school regarding mental development. 02.03.2015

Parent (Primary School): It is good in terms of success. I find what I'm looking for. But I feel like they are saying good things about each child... 28.02.2015

Parent (Secondary School): I would like academic discipline. I would not accept the assignment that my child did. 02.03.2015

Parent (High School): I do not think it is very different from the public school. 02.03.2015

Student (Secondary School): Teachers are more interested in private school than public school. 26.02.2015

Student (High School): Teachers always answer our questions. I could not get into the teachers' room when I was in public school. We can study with the teacher individually here. 26.02.2015

The sub-theme of mental development was obtained from the focus group interviews made with students and individual interviews made with the parents. Mental learning has been mentioned in the interviews as the tendency of the Turkish educational system has adopted the realistic and essentialist logic until 2005.

What is interesting is that this dimension was not spoken much. Even though the consumers mentioned about mental/cognitive development just because of the questions asked in the interview, their focus was much more on emotional dimension. This can be interpreted as an effect of the changing educational philosophies of curricula in 2005. Parents and students may have realized the importance of emotional development as much as –or perhaps even more- the knowledge in real life or mental development.

Organizational/Institutional (Main Theme)

It is seen that; the especially the security dimension has been foregrounded by the parents and students within the scope of organizational/institutional main theme. Besides, there are some remarkable expressions including individual and realistic communication and quality of staff. The sub-themes deepened within this main theme are as follows.

Security (Sub-theme)

It is seen that; the security dimension has been foregrounded by the parents and students within the scope of organizational/institutional main theme. There are some ideas that have been foregrounded including school entrance security, being ready for emergency situations and providing health service when there is a problem. Opinions of some parents and students in this regard are as follows:



Parent (Kindergarten): I find what I expect from the private school. 02.03.2015

Parent (Primary School): No private vehicle should be taken to the school garden. I can go in and out comfortably, for example. 28.02.2015

Parent (Secondary School): Satisfactory. Strangers are not taken to school. They are calling when there is a problem. You cannot get into the school freely. 02.03.2015

Parent (High School): The reason I chose a private school is security. They must be awake. They must take care of who is coming to school. 02.03.2015

Student (Secondary School): There are cameras. There is security staff. We are also conducting drills. 26.02.2015

Student (High School): They do not allow me to leave. But I once ran away from the door. 26.02.2015

In the light of the above-cited quotations, it can be said that the security dimension in private schools is remarkably important. It has been noticed that the parents especially emphasize this issue and this affects the way the parents choose a school. It can be argued that this is the result of the security weaknesses in some public schools which scare the consumers.

Staff (Sub Theme)

It is seen that the staff dimension has been foregrounded by the parents and students within the scope of organizational/institutional main theme. Some of the views on staff such as managers, psychologists, counselors, security staff, secretaries, health workers, and servants as well as teachers are as follows:

Parent (Kindergarten): They must have love towards children. They also need to have clean criminal record. 02.03.2015

Parent (Elementary School): The staff must pay attention to hygiene. 28.02.2015

Parent (secondary School): They need to know all the students. For example, the staff knows me. 02.03.2015

Parent (High School): I expect a certain corporate culture. Everyone needs to do what is expected from them. I expect better quality. 02.03.2015

Student (Primary School): They do not give food when we want to. They give it to the first and second graders. 26.02.2015

Student (Secondary School): They were yelling at the public school saying "I just cleaned this place." There is no such thing here. 26.02.2015

Student (High School): We call the staff by their name. There is sincerity and also respect between us... 26.02.2015

It can be said that the staff except teachers is another dimension which is considered important by consumers according to the result obtained from individual interviews with parents and focus group discussion with students. It can be deduced that the expectation of the staff quality of the consumers is seen only as an intramural planned event.

Communication (Sub-theme)

It is seen that the communication dimension is also considered important by the parents and students within the scope of organizational/institutional main theme. In particular, it seems that informing students and parents in a timely manner, getting involved with the problems personally, efficient parent meetings or individual meetings are also considered important. Opinions of some parents and students in this regard are as follows:

Parent (Kindergarten): If there is a health problem or if they are unhappy, they should call immediately 02.03.2015

Parent (Primary School): Parent meeting must be done individually. It's usually done for advertising or for show purposes. 28.02.2015

Parent (Secondary School): When I say something, I must take immediate reaction from the school. 02.03.2015

Parent (High School): Consulting is made superficially, like a mission to fulfill. It's not like coaching. 02.03.2015

Student (Secondary School): Parent meetings are okay... It would be nice if there were such things as breakfast. We would be with our friends. 26.02.2015



Student (High School): They're meeting with our parents one by one. It's not a mess. 26.02.2015

It can be deduced that the dimension of communication is considered important by consumers. Parents' meetings and getting in touch to inform about coaching system are especially considered important by consumers. In the light of the findings, it can be said that the communication is thought to have a vital role in success of curriculum. Paying attention to communication can be considered as an important detail for success of the curriculum.

Physical Conditions (Main Theme)

Within the scope of physical conditions main theme, the sub-themes such as areas of social activity, and location of school and canteen were obtained from the interviews. Details of these sub-themes are described below.

Canteen/Dining Hall (Sub Theme)

Within the scope of the main theme of physical conditions, parents and students have expressed that there should be a variety of food, providing healthy, quality products, organizing canteen comfortable for students. Opinions of some parents and students in this regard are as follows:

Parent(Kindergarten): They shouldn't give any food that I don't want him to eat at home. 02.03.2015

Parent (Primary School): I care about feeding my kid regularly. They should not use cheap stuff... 28.02.2015

Parent (Middle School): They give things that kids can eat easily. Pasta, potatoes, meatballs... 02.03.2015

Parent (High School): I think it is important to have a healthy diet. I expect my child to be fed to meet his daily needs rather than giving pasta or hamburger continuously. 02.03.2015

Parent (High School): The reason why I chose a private school is food. I did not send him to the Anatolian High school (public school) because there was no cafeteria, everyone was going out to eat. 02.03.2015

Student (Primary School): The canteen's rent is a bit high. So my sister said that's why they are selling food expensively. 26.02.2015

Student (Secondary School): The thing which is 25 piastre at a supermarket is 1 TL here. It needs to be decreased. 26.02.2015

Student (High School): They do not give extra food when we want to but they give it to the first and second graders. 26.02.2015

Student (High School): I am not pleased with the canteen. The teachers are also complaining about it. They are always saying the rent is high. They even sell Didi (a kind of beverage) to 3 TL. 26.02.2015

In the light of the above-cited quotations, it can be said that the canteen and dining hall in private schools is seen remarkably important. The parents not only expect private schools to meet students' education needs but also their physiological needs. Thus, seeing canteen and dining hall important might be the result of these expectations.

Areas of Social Activity (Sub-theme)

Areas of social activity is another sub-theme of physical conditions. In this sub-theme, the parents and students express the desire of the classrooms to be useful and they also want extra areas of social activities such as swimming pool, ice rink, library, laboratory. Opinions of some parents and students in this regard are as follows:

Parent (Kindergarten): I don't want any insecureness. It should be a place where they can mingle with soil 02.03.2015

Parent (Primary School): They are not doing exactly what they promised in social activities. The ice rink was used once a year. I chose this school just because of these. 28.02.2015

Parent (Secondary School): It is important to have social activity areas other than school; swimming pool, tennis courts, basketball court...02.03.2015

Parent (High School): There shouldn't be any superficial structures. The structures should be ergonomic and, in a way, that the students quit in danger. For example, there are almost no emergency signs. 02.03.2015

Student (Primary School): Activities must be open to everyone. 26.02.2015

Student (Secondary School): There are more activities for boys. 26.02.2015

Student (High School): This school is in trouble during the hot months... One-fourth of the windows can be opened. It is airless. It looks nice from the outside. It is like a hotel but the inside is not... 26.02.2015



Student (High School): I think there should be at least one swimming pool. It should not be just for kids. 26.02.2015

Student (High School): Public schools also have basketball court and football pitch. 26.02.2015

Student (High School): They give great importance to basketball in private schools. Most of the private schools are like this. 26.02.2015

The above-mentioned data are obtained from the interviews made with parents and focus group discussion made with students. In the light of these data and quotations, it can be said that the school building and the social activity areas are considered very important in private school curricula. The reason why the curricula of private schools are considered so important is the expectations of a diversity of social activities that public schools cannot offer.

Location (Sub Theme)

Within the scope of the main theme of physical conditions, expressions such as the location of school which is far away from urban stress but easy to access have attracted the researchers' attention. In addition, there also expressions including closeness to both decent and natural living environment. Opinions of some parents and students in this regard are as follows:

Parent (Kindergarten): It's good to be away from the city. There shouldn't be a traffic jam. 02.03.2015

Parent (Primary school): It shouldn't be far away from the city. It should be close to the railway, highway. 28.02.2015

Parent (Secondary School): It is important for the area to look better because my child is watching around as he comes to the school. The neighborhood is important. 02.03.2015

Parent (High School): It should be easy to access. It should also be close to natural environment. It must be far away from the urban stress and the factors that can distract them. 02.03.2015

Student (Primary School): I am not satisfied with my school bus. Other services draw up at the supermarket but ours does not. 26.02.2015

Student (Secondary School): They do not want us to fasten seatbelts. Little ones are fastening. Big guys do not. They usually stand. 26.02.2015

Student (High School): I am coming to school with public transportation. The bus draws up just in front of the school. It's very good. Sometimes you have to wait in the evening. Sometimes the teachers are taking me to home by car. 26.02.2015

As a result of the data obtained from the interviews, it is seen that consumers attach importance to the location of the schools. It can also be said that consumers expect schools to be far away from the urban stress and they also expect high-quality transportation service. This expectation can be interpreted as taking into account the problems created by the growing population and urbanization. Consumers also establish a relationship between the quality of a school and how much the school meets their expectations. The main and sub-themes were obtained from the interviews conducted to clarify the needs of parents and students and reveal the evaluation questions of I-CODE model. The I-CODE model was shaped by these main and sub-themes. The themes obtained from the interviews directly or indirectly affect the basic features of the model, the design process, and the implementation principles. Curriculum evaluation questions from the themes, and significant conclusions in the design process and implementation principles of the model were obtained.

Design Process of the I-CODE Model's Website

Within the scope of the first sub-objective of the study, the design process of the I-CODE curriculum evaluation model was carried out in parallel with the preparation of evaluation questions. As the research process was proposed as a new model development, any finding of other research questions of the research contributed to the design of the model. Each step of the research is carried out in the form of intermingling process in accordance with the grounded theory.

The design logic of the model starts with the determination of the needs of the consumers through interviews and literature review analysis. Briefly, presenting questions based on the needs of the consumers to the consumers via www.icode.com.tr and analyzing the answers via the website are the basis of this model. For this reason, the design process of the model has been carried out together with the design of the website. The website preparation process following the needs analysis of the consumers is shown in Figure 5 below.



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The Idea Phase

The I-CODE model is an internet-based curriculum evaluation approach. It is intended that model website have the following features:

- The curriculum evaluation specialist organizes the system and site interface.
- Evaluation is done by the members through scoring the I-CODE curriculum evaluation questions developed by the researcher.
- The I-CODE curriculum evaluation questions are prepared to address the needs of the consumers based on the needs analysis.
- The I-CODE curriculum evaluation questions use graded scoring keys which are based on giving points between one to ten for ten questions.
- Results are immediately and consistently updated.
- Membership is a must for evaluation.
- The new evaluation of a consumer (parent or student) is taking place in the old ones.
- Up to 5 members of the same IP are allowed to evaluate.
- A fast, simple, high-clarity interface is intended.
- I-CODE scores are not prioritized statistically without thirty voting for a school's curriculum.

I-CODE Website Design

The website design is done by researcher Fatih Aygören and software developer Tarcan Cantürk. Logo design, color selection, emphasis, symmetrical balance are done. Illustrator cc program of Adobe company was used in the design process. After the design process, Dreamweaver program of Adobe company was used again for html5 and css3 coding. With Html and css3, responsive (the responsive expression mentioned here has a different meaning than the definition in the field of evaluation) that is, designs suitable for mobile devices have been produced. The design process of the internet site lasted about three months.

I-CODE Website Software-Coding

The physcript language is used in the encoding process for creating the software of the I-CODE model website. In the database creation section, the Mysql database is used. Search engine optimization (SEO) is being implemented so that users can easily access the website and get to the forefront of search engines on the Internet. The part of the software and coding process up to the pilot implementation lasted about a month.

Domain, Hosting and Security

The I-CODE model is an Internet-based curriculum evaluation concept, so there is a 'domain' on the Internet, ie the Internet address. Domain is an organization area such as .com, .edu, .fr on the Internet (Sankur, 2008: p. 233). A simpler definition, it is the contact address of a networked computer on the Internet (Docaiw, 2001: p. 82). The domain of the I-CODE model, ie the address on the Internet, is www.icode.com.tr. Since the website



can be opened after the patent is obtained, myicode.com website was used first, then icode.com.tr is started to be used. Those who log in to myicode.com can use the system in the same way by being directed to icode.com.tr site. Domains were purchased from service providing company on 04.11.2014 for 10 years. Service company that provides web hosting services was used for the storage and publishing of pages, images, files to be displayed on I-CODE model website. Web hosting is a service that contains necessary data and programs which allow users to access through their own computers, network or modem (Docaiw, 2001: p. 134). The hardware server features of the hosting service include 10% CPU power, 128 MB RAM, unlimited web space, unlimited traffic, unlimited MySQL and Linux operating system.

The website of the model is designed to serve as a database for the curriculum evaluation. It is crucial that this database is reliable, that keep profile information of the users and institutions' curriculum evaluation data and results private. It needs to be protected from security flaw on the internet. For this reason, a security certificate, ie SSL service, is obtained from the service provider that provides the security service. SSL is used as an abbreviation for Secure Sockets Layer, which means creating a secure login layer on the Internet. The security certificate features to be used on the I-CODE website are ComodoPositive SSL, 2048-bit SSL certificate. Thus, it is aimed to create a more powerful security wall against a cyber-attack more than a normal website.

Pilot Implementation

Beta version of website to be used in pilot implementation has been made ready on 29.06.2015 in order to implement I-CODE model; determining the main ideas and aims (step 1), design of I-CODE website (Step 2), completion of coding and software of I-CODE website (step 3), completion of domain, hosting and security services. Pilot implementation was made between 30.06.2015-18.08.2015. Approximately two and a half months' application (Beta version) was followed by the final step, feedback was received, revisions were made where necessary. This feedback, pilot implementation evaluations, and revisions are explained in the next section.

Evaluation / Feedback / Revision

Some of the details that are noticed and revised during the pilot implementation of the model's website are:

- Expressions that are difficult to understand by consumers have been changed.
- The shape and color of the links / buttons that need to be clicked by the consumers have been improved.
- Automatic redirection of consumers registered to the system to the required web pages has been improved.
- Member registration difficulties have been eliminated.
- The problem that the consumers making the evaluation do not reflect on the time when they make a new evaluation has been corrected.
- It has been noted that schools in other words the administrators may be given feedback via e-mail.
- The site does not accept English characters in its own search engine, and therefore the problem of missing sought schools has been resolved.
- Design changes have been made so that the site's homepage interface can be better understood by the consumers and improved.

The system experienced a slowdown due to the hosting of 6164 private school system databases and accumulation of statistics. In order to prevent this, hosting has been upgraded and the problem has been solved.

Implementation Principles of I-CODE Model

The following principles should be considered for the implementation of the I-CODE model:

- 1. The curriculum is considered in an integrative and macro scale way.
- 2. The consumers decide on the quality and effectiveness of the curriculum.
- 3. Evaluation is carried out through the website.
- 4. Membership is a must to evaluate.
- 5. Being a parent or student is a must for being a member.
- 6. Member's name, surname, gender, education status, e-mail address and a password that they will determine to the students; name, surname, gender, age, education status, e-mail address and the password they will determine to the parents are asked.



- 7. Once the consumers have found their schools on the system, they evaluate the I-CODE curriculum with model's evaluation questions.
- 8. Evaluation is conducted on a graded scale that ten questions can be graded up to ten points.
- 9. Upon completion of the evaluation, a general I-CODE score out of ten on school's curriculum will be generated.
- 10. Apart from the general I-CODE score, sub-dimensions of the school's curriculum are also shown statistically.
- 11. Evaluation results are also shown under three main themes (educational quality, organizational quality, and physical conditions quality).
- 12. The evaluation results based on ten sub-themes (foreign language, emotional / social development, teacher quality, mental development, security, staff, communication, areas of social activities, location and canteen/ dining hall services) are also shown.
- 13. The results of the evaluations made are shown in terms of gender with different evaluation dimensions (male parent, female parent, male student, female student).
- 14. Evaluation results are shown by age groups of the parents.
- 15. The results are also shown according to the educational status of the consumers (parents and students).
- 16. The monthly score distribution of the evaluation results is shown on the diagram.
- 17. Results are updated instantly and continuously by the website.
- 18. Consumers have the right to assign one value to the school's curriculum. If the evaluation process is repeated with a different value for the same school, the score of the previous evaluation is deleted by the system and a new value is assigned.
- 19. Members have the right to evaluate different schools (circumstances such as transfer or having nursery school, primary school, high school in different schools are taken into considerations).
- 20. The consumers have the right to evaluate two school curricula at the same level (circumstances such as transfer or having nursery school, primary school, high school in different schools are taken into considerations). The system will reject the request of a third school to evaluate the curriculum.
- 21. There is IP restriction in the evaluation process. After five consecutive memberships to be made from the same IP, system limitations become active.
- 22. The evaluation of the beneficiary, who issues the same values for the ten curriculum evaluation questions in the evaluation process, will be deemed invalid by the system (for example, all one or ten given cases).
- 23. The consumers who are members can evaluate, review the results and make use of the website.
- 24. Non-members may review the results, make use of the services of the website but cannot make evaluations.

In the I-CODE model, the curriculum is evaluated by parents and students, ie consumers. Parents or students give points to ten questions to evaluate the curricula after becoming a member of the website and choosing their schools on www.icode.com.tr.

An I-CODE score is generated for each school by calculating an arithmetic mean of the sum of all evaluation scores. This score is variable and dynamics. Consumers can re-evaluate their schools. However, since each evaluation takes the place of previous one, a beneficiary can evaluate only one item. In this context, the scores of schools are not constant. Parents and students may be dissatisfied with the school's curriculum later which they are pleased with today. The school performance in the beginning of the year may not be the same as the year-end performance. Change of teachers, change of administrators, change of systems can affect the success of schools' curricula. At this point, I-CODE model is able to provide continuous evaluation of schools by using the internet and technology. Consumers (parents or students) can change their scores. Thanks to the internet and students can access the I-CODE system from technology-supported devices (PC, tablet, mobile phone, laptop etc.) at any time and evaluate their school's curriculum. Thus, a database is created for each school's I-CODE score. This is the main logic that the I-CODE model contains and targets.



The model has features such us having a subjectivist and utilitarian philosophy; relativist and consumerist ideology, a design which is consumer-oriented and participant-oriented; externally-directed regarding the types of evaluation; and making impact, informal, input, process, output evaluation and inspired by Goal Free, Consumer-Oriented, Responsive models and it is also a model where direct beneficiary, ie parents and students, assume the role of evaluation. It can also be used as a mechanism to provide feedback to the beneficiary, the school, the public and the system with the obtained results.

Findings Related to The Second Sub-Objective of The Research

Applicability of I-CODE Model

The I-CODE curriculum evaluation model is the first and only model that gives the responsibility of evaluating only to consumers (parents and students). In addition, the curriculum is designed as a new model that provides complete continuity and running the evaluation process entirely on the Internet. However, the applicability of this proposed new model creates an important question. In order to question the applicability of the I-CODE model, that is to say, the suitability of real life and its realism, interviews were held with three experts specialized in curriculum development and an academic specialized in information technology. The outcome of the interviews revealed three main themes: "Academic Dimension", "Data Security Dimension" and "Legal Dimension". In the process of designing the model about the legal dimension emerging as the third theme, an unstructured interview was held with a jurist and a lawyer. Additional opinions on the legal dimension were requested and these opinions were added to the legal dimension theme and interpreted. These three themes and their opinions on this matter are explained under the title of themes.

Themes

Academic Dimension

Expert 1 (Curriculum Development Specialist): Model development work is hard and challenging work that involves quite a long time. Your website seems to deal with choosing and evaluating private schools more than a model design... 27.11.2015

Expert 1 (Curriculum Development Specialist): You used contradictory expressions in the subdivision of the philosophy, ideology and design, and the name of the model, general introduction. You used expressions like participant-focused somewhere and then you shifted to beneficiary-oriented. Even, it may be perceived by the reader as having been centered on the Internet. 27.11.2015

Expert 1 (Curriculum Development Specialist): You are studying for your doctoral dissertation in Curricula and Teaching. However, what you are designing as a model seems to be a very effective school evaluation study rather than a curriculum evaluation study. 27.11.2015

Expert 1 (Curriculum Development Specialist): The questions and variables that you set as the evaluation criteria seems more covering hidden curriculum and evaluating the educational environment. Thus, it seems more like a study for Education Management rather than a study for Curricula. 27.11.2015

Expert 1 (Curriculum Development Specialist): You have also left the evaluation to the parent or student initiative. In fact, you need to set a standard here. Who do you call as a consumer? 27.11.2015

Expert 2 (Curriculum Development Specialist): It is difficult to use this in the field of curriculum evaluation. Because I understand what curriculum evaluation is different. For example, I understand the evaluation of the curriculum of a mathematics course. 11.05.2015

Expert 2 (Curriculum Development Specialist): Rather than evaluating the curriculum, it is more like evaluating satisfaction. 05.11.2015

Expert 2 (Curriculum Development Specialist): It can be implemented in real life. 05.11.2015

When the opinions of the experts are examined, it is seen that there are question marks about the belonging of the I-CODE model to the field of curriculum evaluation. Almost all experts emphasize that the evaluation of curricula has different features in scope. The experts focus on whether the I-CODE model meets the usual curriculum evaluation criteria. However, another thing worth mentioning here is that among experts' opinions there are also some ideas that the evaluation of the curriculum is narrow in Turkey and accepted as the curriculum evaluation. It is seen that academicians who have worked in many curricula such as Bobbitt, Dewey, Oliva, Varış and Demirel have included in-school and out-of-school, directed and even undirected factors in the definitions of curriculum. The emphasis of Eisner, Taba, Oliva, and Bobbitt on the difference between the way we define the curriculum has been expressed in the relevant part of the research. The reason why the experts respond to the I-CODE curriculum evaluation theory doubtfully can be interpreted as being familiar with the models that accept micro definitions and questioning targets, content, educational situations, evaluation subjects



when it comes to curriculum evaluation in Turkey and even around the world. Among expert opinions, the selfcriticism made on this issue is remarkable.

Expert 2 (Curriculum Development Specialist): We are doing micro definitions. Unfortunately, this is not a curriculum evaluation definition, according to our way of growing. It is obvious that we define it very narrowly when we look at the foreign literature. Unfortunately, we are mostly looking at the curriculum. 05.11.2015

Expert 2 (Curriculum Development Specialist): If we define the curriculum in a broad sense, that is to say, if we see curriculum as a cognitive, emotional, psychomotor development document, we cannot provide it only with the lesson we give. The position of the school and the competence of the staff will also be effective. We need to expand our curriculum definition in our minds. In this sense, you have to convince us in the sense of literature. 05.11.2015

Expert 2 (Curriculum Development Specialist): I do not evaluate the course schedule of a school in terms of the curriculum, I also evaluate the school's training curriculum. You should say I am evaluating the school's curriculum. 05.11.2015

Expert 3 (Curriculum Development Specialist): A qualified training curriculum brings a lot with it. Conditions such as hidden curriculum, social experiences, atmosphere should be included in the field of contemporary curriculum. 05.01.2016

Expert 3 (Curriculum Development Specialist): The curriculum is exactly this (that you defined) ... 05.01.2016

When expert opinion and the relevant literature review are examined, it appears that there is still no full consensus around the world at the point of defining curriculum. However, when the opinions are examined, it can be said that micro-scale definitions of curriculum are accepted in Turkey and therefore curriculum evaluation theories are perceived accordingly. In addition, it can also be said that there is a need to clarify the division in the field of school supervision, school management and evaluation of curricula. According to the researcher, the curriculum is defined in a macro-scale and all the conditions that affect the learners and the learning can be accepted under the curriculum. While the existence of the hidden curriculum is slightly expressed in the last period, it can be said that it is very restrictive to view the curriculum as a written document only. The curriculum is an abstract concept defined in different ways by different educators in the field. Perception of such an abstract concept as a written document with only objective, content, educational situations and evaluation dimensions can be interpreted as a focus on the syllabus and training concepts rather than the education curriculum.

The I-CODE curriculum evaluation model, which is being developed by the researchers, is designed to evaluate the curricula through consumers. The success or failure of the model may be an effort that can contribute not only to the field of curriculum evaluation, but also to clarify the definition of the curriculum. Examples of expert opinions in support of this idea include the following:

Expert 2 (Curriculum Development Specialist): Actually, the definition you give convinces me. I think it would be better if you can support this definition. 05.11.2015

Expert 4 (Information Technology Specialist): This will contribute to the literature. 20.10.2015

Expert 2 (Curriculum Development Specialist): Why do we take children to school? We are giving the education to provide cognitive, affective, psychomotor development. Well, can we just look at it on the basis of teaching and curriculum? Then I do it at home. Why do I need special education environments? When we think that these are included in the curriculum, our literature description will change our minds. 05.11.2015

When the expert opinions given above are examined, it can be deduced that the I-CODE model can be used in the field of evaluation of the curriculum when the curriculum description is supported by the literature. When expert opinions are examined once again, it can be interpreted that the definition of the curriculum apart from the curriculum evaluation is open to the development of the programmers' mind in Turkey, but it needs to be supported by the literature.

Data Security Dimension

The importance of data security has been emphasized when the feasibility of the I-CODE model is questioned in interviews with experts. Some of the expert opinions in this regard are:

Expert 2 (Curriculum Development Specialist): There is security as an obstacle to implementation, but something has been done for security. 05.11.2015

Expert 2 (Curriculum Development Specialist): Inclusion of expert opinions might affect in a positive way in the following periods. 05.11.2015



Expert 3 (Curriculum Development Specialist): As participation increases, more reliable results will emerge. It may start to be considered important statistically when evaluated over fifty. 05.01.2016

Expert 4 (Information Technology Expert): The more user means the more reliable the results. 20.10.2015

When experts' opinions are examined, concerns over data security draw attention. This can be interpreted as the fact that the I-CODE model has a risk of manipulating. In the process of interviews, when the measures taken by the model in order to ensure data security are expressed by the researcher, it can be said that experts expressed their ideas which can be regarded as positive. However, it is stated that the model needs to develop on data security. In particular, the identity of the participants, whether they are indeed parents or students, possibilities of re-entry, deliberate manipulations, misleading evaluations to profit from, the risk of misappropriation of credentials, the lack of sufficient participation in the evaluation process and the complete elimination of the objectivity can be said to be very vital.

Legal Dimension

Expert 1 (Curriculum Development Specialist): It is necessary to pay attention to the legal procedures before applying these types of studies and designs and to get approval from the Ministry of Education / Provincial Directorate of National Education since on the other side, there is an important issue that deals with the economic inputs such as the quality of private schools and the preference of schools. 27.11.2015

Expert 4 (Information Technology Expert): Can schools complain about the legal aspect? 20.10.2015

Expert 4 (Information Technology Expert): Not applicable unless the required permissions are obtained. 20.10.2015

When the opinions of the experts in education are examined, it is noteworthy that these kinds of informaticssupported studies to evaluate the curricula of private schools can create legal concerns. The reasons for these concerns can be seen in the scientific work processes in Turkey- especially those involving institutions- that schools or related institutions do not allow researchers to collect information during the information gathering process, insist on permission documents, and refraining from their superiors. The obstacles that institutions can create due to refraining from the superiors can tire researchers and even can change the process of research. Putting up with bureaucratic obstacles, such as data gathering, analysis and access to evidence, which are inherent in science, can greatly affect research dynamics. In this context, experts may have been sensitive to carry out the research on the legal ground because of the possibility to experience bureaucratic obstacles. The views of the legal experts were consulted at the beginning of the investigation to pave the way for future research. The views of the legal expert and the lawyer are as follows:

Legal Expert: Institutions sue the website for being mentioned in the research, but there is no trouble as long as there is no attack on personality rights. If they do, they cannot win the case. 16.07.2015

Legal Expert: If there is a forum on the website then there may be problems. There may be insults to the schools on that part and it will be legal problem. 16.07.2015

Lawyer: I have checked the website carefully. There are not any expressions, opinions and beliefs contrary to the personal rights recognized by The Constitution of the Republic of Turkey and the laws of the Republic of Turkey. There isn't any problem regarding legality. 05.01.2016

As a result of the negotiations for eliminating the risks that may be experienced regarding legality, opinions are noteworthy in contrast to what education experts think. It can be said that I-CODE model and the functioning of the website are not interfering with the natural person or legal identity according to the opinions given above. In the light of these views, it can be said that the website of the I-CODE model can be sued but the case cannot be won. It can be predicted that there is no problem regarding legality, but there is a need to make research and development (R&D) works on the legal grounds. In addition to these comments, there has been no official objection of approximately 298,372 unique visitors, evaluated 363 private schools and 1443 official members throughout Turkey over the two-year period (July 2015-July 2017) since the activation of the model's website. On the contrary, it has been seen that the educational institutions consider this site as important and communicate verbally and in writing that they want to take part in the site. This can be noted as a detail that can be examined by another research.

Functionality of I-CODE Model

As a result of the research, the questions of if developed I-CODE model is applicable and, whether it achieves its goals or not are considered important. It is a fact that every applicable model is not functional. In order to understand the function of the model, it was tried to clarify the subject through interviews made with experts. The findings obtained from the opinions of one information technology expert and three curriculum development experts were interpreted by the researcher in this section. Some prominent expert opinions in this regard are:



Expert 2 (Curriculum Development Specialist): It serves a purpose in broad definition. In terms of both parents and students, I find the evaluation of the curriculum useful in general. 05.11.2015

Expert 2 (Curriculum Development Specialist): I do not see this as just a thesis; it's something perfect, and it can be something like Google after the doctorate. 05.11.2015

Expert 2 (Curriculum Development Specialist): The school also will benefit from it. Maybe it will say my foreign language education is not very much liked. 05.11.2015

Expert 2 (Curriculum Development Specialist): This is open system evaluation of operations at the same time... 05.11.2015

Expert 2 (Curriculum Development Specialist): When a parent wants to send a child to a school, he or she is looking for a school through straining their every nerve. There is a need. 05.11.2015

Expert 3 (*Curriculum Development Specialist*): I think it is very functional because it has an integrative curriculum evaluation rationale. It has a holistic rationale that focuses on assessing the extent of the curriculum rather than the course itself. 05.01.2016

Expert 4 (Information Technology Expert): A good curriculum that can be launched to the market. I liked it too. 20.10.2015

Expert 4 (Information Technology Expert): It becomes more useful when it is developed and finalized. They may even want to buy it. 20.10.2015

Expert 4 (Information Technology Expert): The parents may benefit from it through seeing the evaluations of other parents and have an opinion. It is useless for the learners because they are not interested. It may also help the managers to make the school more attractive, to correct the missing aspects and to present it on the site ... 20.10.2015

Within the scope of the research, the basic idea of developing the I-CODE model and questioning its applicability, functionality has been set out. In the light of findings and interpretations, it can be said that the model can contribute to the field, and the model is assumed to be practical and functional. It is important to integrate the field of evaluation of curricula to the internet, social media and mobile technology which have started to affect the world in the 2000s and lifted its effectiveness in 2010s. In this direction, an attempt has been made to develop a system that is internet based and can be reached anytime, anywhere. In the light of findings and interpretations, it can be said that the I-CODE system is capable of achieving these. However, the needs to update this model, self-renewing according to the feedbacks to keep pace with the rapid change of the digital era are considered important. Nowadays, the preparation of a website can be accomplished in a very short time. The main problems are the dissemination of the digital infrastructure to be prepared, the announcement of it and investment. In the research process, efforts to disseminate have required considerable effort as well as the preparation of basic characteristics of the model and the system infrastructure. It may be useful to consider these requirements in similar studies.

DISCUSSION, RESULTS, AND IMPLICATIONS

Educational evaluation is seen with a slightly different logic especially in America in the 1800s. There are comparative studies conducted through tests (yearly) on this subject by Boston School Committee in 1845 and 1846 and also with the effect of Horace Mann in Massachusetts (Fitspatrick, Sanders and Worthen, 2004: p. 31). According to some sources, the first study to be accepted by the curriculum evaluation is a comparative study of Joseph Rue's spelling performance on 33,000 students in 1897 (Patton, 2008: p. 15; Erden, 1998: p. 10). Although Rue's work seems to be the first study, it appears that the evaluation of curricula has increased significantly after the 1950s (Ornstein and Hunkins, 1993: p. 324). Especially the "Sputnik Event" which was experienced in 1957 can be considered as a turning point for the evaluation of the curriculum in education.

In 1957, when the Russians sent Sputnik 1 and Sputnik 2 into space, it caused the American education system to criticize itself severely the which saw itself as a pioneer in the field of education. (Alderson and Beretta, 1992: p. 12-13; Patton, 2008: p. 15; Popham, 1993: p. 2-5). The Sputnik Event is a milestone in the field of curricula. Because of the Sputnik event, which created the image of the Russians ahead in space science and therefore in education, the American government and its educators began to take their curricula more seriously spent much more time on the evaluation of the curricula with the help of state (Alderson and Beretta, 1992: p.13; Popham, 1993: p. 2-5). This historic development clearly has revealed the need to evaluate curricula.

Tyler's Objective Model, Stufflebeam's Context-Input-Output-Output (CIPP) model, Stake's Countenance Model, Stake's Responsive Model, Provus's Disperancy Model, Scriven's Goal Free Model, Eisner's



Connoisseurship Model, Alvin's UCLA Model and Scriven's Consumer Oriented Model are preliminary models in curriculum development. Remarkably, the appearance of most of the mentioned models except Tyler's Objective Model, are seen after 1957 Sputnik Event. It can be said that in literature review process, researchers inspired by especially Consumer-Oriented, Goal-Free, and Responsive models and these models can be said to close to the I-CODE Model.

Consumer-Oriented was proposed by Scriven in 1967 (Spaulding, 2014: p. 55). It focuses on whether the needs of the consumers and the social aims can be met, rather than looking at the achievement of the goals defined by curriculum developers. It helps the consumers to define and assess the value of service, and also to define alternative products and services (Stufflebeam and Coryn, 2014: p. 343). The I-CODE model can be said to evaluate in order to benefit consumers with a logic parallel to the Consumer-Oriented Model.

It is important to know the advantages and disadvantages of the Consumer-Oriented Model because it is the source of inspiration to the I-CODE model. This approach has many advantages. It can easily be applied through using a checklist, likert scale and form of a questionnaire or evaluation (Green, 2011: p. 24). This approach helps to make clear, well-informed and reliable decisions with clear questions (Green, 2011: p. 24). Independent appraisers can evaluate mercilessly. Thus, other consumers can be protected from poor or exaggerated services, products, curricula (Stufflebeam and Coryn, 2014: p. 183). In this context, the use of I-CODE model can be easy, fast and economical. It may guide those who already use the curriculum or the candidate consumers.

There are some points where the Consumer-Oriented Model is criticized. Excessive use can cause a problem. If they are asked to fill too frequently, ongoing customer or employee may not take the evaluation forms seriously (Green, 2011: p. 24). If it is too independent from the team, there may be some problems. Consumers making the evaluation may not be able to focus on the correct spot. Consumers may be insufficient to provide accurate feedback (Stufflebeam and Coryn, 2014: p. 183-184). It is difficult to find bulletproof evaluators (Stufflebeam, Madaus and Kellaghan, 2002: p. 66). In this context, the competence of the parents or students evaluating the curriculum may become a problem in the use of I-CODE Model. Evaluations coming from the ones who hasn't got any idea about the educational philosophy, the approaches that it adopts or applications may affect its validity in a bad way.

Scriven's Goal Free Model suggests looking at the curriculum's values, by-products, and even emotional factors, rather than just looking at the target dimension of the curriculum. Attention is paid to their importance and quality by observing without a checklist and recording all valid data (Boulmetis and Dutwin, 2011: p. 200). The I-CODE model is designed just as the Goal Free Model regarding focusing on the curriculum's values, by-products, and even emotional factor as opposed to limiting the curriculum through focusing on the target dimension in a systematic and objective framework. The curriculum's observable outputs and participatory needs based on the documentable effects are assessed (Imas and Rist, 2009: p. 186).

It may be important to know the advantages and disadvantages of the independent evaluation approach as it is the source of inspiration to the I-CODE model. This approach has many advantages. It is more useful than target-oriented evaluation. It is more appropriate for medium-term objectives (Stufflebeam and Shinkfield, 1988: p. 317). It is better at finding side effects. It is less inclined to social, perceptual or mental prejudices It provides a wide variety of fair and professional evaluations (Stufflebeam and Coryn, 2014: p. 348). It is less influenced by politics. The interaction of evaluators and politicians is very small compared to other methods (Crabbé and Leroy, 2008: p. 78). Apart from all these advantages, Goal-Free Model is an assistive technique in applying the Consumer-Oriented Model (Stufflebeam and Shinkfield, 1988: p. 317). In this context, it can be said that the I-CODE model evaluates independently from the goal to help the Consumer-Oriented Model. It can be expected to offer a fair and professional evaluation that is less affected by politics and prejudices, offering diversity.

There are some disadvantages of the Goal-Free Model. The evaluation criteria are determined by the evaluator and it is difficult not to be influenced by politics (Crabbé and Leroy, 2008: p. 78). It can be very time consuming. In order to be able to discover all the possible products, a process and time may be required where the technical information is used well. If it is not done well, things that are accomplished well may not be noticed (Bee and Bee, 2000: p. 77). In this regard, the I-CODE model may be said to have a risk of being affected by politics while setting the evaluation criteria. When evaluating, it can be said that an effective process should be provided and attention should be paid to details.

One of the models that was effective in developing the I-CODE model was the Responsive Model. The Responsive Model was developed by Stake at the beginning of the 1970's while he was working as an evaluation specialist at the University of Illinois (Crabbé and Leroy, 2008: p. 182). Side effects and coincidental gains are also identified and tested as outputs of the curriculum (Stufflebeam and Coryn, 2014: p. 192). In Responsive Model; the evaluator must work with and serve at the same time with a group of service providers consisting of a wide variety of individuals, such as teachers, managers, taxpayers, lawmakers and financial sponsors. People who are getting service is the consumers who are giving advice to understand, evaluate and develop the



curriculum; need the advice of the evaluators, and the one who is in search of these (Sufflebeam and Corny, 2014: p. 192). It can be said that the evaluation of the I-CODE model is seeking a response by working with the ones who are getting service to see if the curriculum meets the needs, as in Stake's Responsive Model.

It may be important to know the advantages and disadvantages of the Responsive Model as it is the source of inspiration to the I-CODE model. This model has many advantages. The Responsive Model is relative. The approach allows comparing data collected from different, often contradictory, views of different stakeholder groups. It reveals the complexity of social reality (Crabbé and Leroy, 2008: p. 182). The Responsive Model focuses on the reactions, concerns and problems of the curriculum and stakeholders (Green, 2011: p. 25). Apart from the anticipated political effects, it may include side effects and incidentally acquired values. It has an adaptive design that adapts to changing situations. It provides to inform the stakeholders (Crabbé and Leroy, 2008: p. 182). In this regard, the advantages of I-CODE Model can be said such as focusing on the different effects of the curriculum, informing the stakeholders, considering the social reality relatively in parallel with the Responsive Model.

There may also be the disadvantages of Responsive Model such as focusing overly on subjective data. Stake acknowledges that he has been compromising on certainty of the measurement even when trying to reduce this by blending it with different data collection techniques. However, it is argued that this altruism enhances usability (Crabbé and Leroy, 2008: p. 182). In this context, it can be said that the I-CODE model compromises the accuracy of measurement and is highly subjective.

The results of the research are as follows:

- 1. Curriculum according to I-CODE model; are all plannable internal and external factors that affect the student, create experience for him / her, and meet their needs.
- 2. Model has features such us having a subjectivist and utilitarian philosophy; relativist and consumerist ideology, a design which is consumer-oriented and participant-oriented; externally-directed regarding the types of evaluation; and making impact, informal, input, process, output evaluation.
- 3. The evaluation process is also the model's feedback mechanism.
- 4. The model carries applicable features in the field of curricula.
- 5. It is applicable in terms of legality.
- 6. It is functional in terms of evaluation of the curricula.
- 7. It benefits the curriculum development specialist, educators, parents, students and institutions.

The suggestions that the survey reveals are listed below:

- 1. Studies can be done to increase the reliability and validity of the I-CODE model.
- 2. Improvements in security and website infrastructure can be made by following developments based on the use of Internet infrastructure.
- 3. The ease of use and the prevalence of the model can be improved as technological facilities are developed.
- 4. The I-CODE model may include an expert evaluation and scoring on the evaluation process.
- 5. Applications seen as useful by examining today's social media trends can be included in the evaluation field.
- 6. In order to overcome the model redundancy in the field of curriculum evaluation and the complexity created by this situation, studies can be done to classify the curriculum evaluation area.
- 7. The curriculum evaluation database can be expanded by including all institutions that are formal and non-formal in Turkey.
- 8. Once worldwide needs analysis has been carried out on behalf of all education and training institutions and curriculum evaluation questions have been obtained, evaluations can be done through the model's website.
- 9. Evaluation by other affected people may be added besides the parents and students.
- 10. Studies can be done on the clarity of the model.
- 11. It can be studied on social media and curriculum evaluation.



- 12. The quality of curriculum evaluation questions of the model can be increased.
- 13. The model can be applied by Ministry of National Education.
- 14. It can work as a model for the teachers in planning and in the education process.
- 15. The participation of all formal and non-formal education institutions in the world and Turkey can be provided.

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Responsive or Adaptive Educational Mobile Websites: The Impact of Different Designs on Students' Preferences at Jouf University – Saudi Arabia

Assist. Prof. Dr. Mohammed H. Ragab Khalaf

Department of Education Technology, Faculty of Education, Alexandria University, Egypt The Education and Psychology Department, Faculty of Science and Arts, Jouf University, Saudi Arabia. mhragab@ju.edu.sa

ABSTRACT

The current research aimed to develop & compare between two different learning mobile websites designs, which are responsive versus adaptive. The best design amongst them is determined in terms of learners' preferences. To conduct this, the researcher formulated a preference level test (PLT) and installed it on both websites. 84 undergraduate students participated in the main experiment. They were divided into two experimental groups; each group consisted of 42 students. The first group used the responsive website (RW), while the second group used the adaptive website (AW). The results showed the superiority of the second group in the PLT with a statistically significant difference. The research recommended the necessity of raising awareness about the importance of mobile learning, as well as the adoption of effective designs, which enhancing the students' level of preference.

KEYWORDS: responsive design, adaptive design, mobile websites and preferences level.

INTRODUCTION

The rapidly wide usage of mobile in browsing the websites led to make a problem in the design of these sites, and its suitability to different mobile screens in terms of size and resolution (Cazañas, & Parra, 2017). The fixed design became inappropriate method to develop websites, which displayable on different mobile devices (Lestari, Hardianto, & Hidayanto, 2014). Hence the need emerged to adopt other methods for designing websites capable of reformulating themselves to suit the multifarious features of diverse mobile devices (Baturay, & Birtane, 2013). AW or RW is the best solution, because it is convenient to the different mobile devices and guarantee the display of full page without the loss or hiding parts of it. The transformation towards RW or AW has become inevitable to design suitable websites displaying information in a way that suit diverse mobile devices, but in this context, which will be better and more suitable for all variables such as users' expertise, features of devices, cost, usability and navigation type? (Krbecek, & Schauer, 2016). Despite the development of mobile websites developing field, still there are challenges related to the webpage's flexibility, therefore a balance must be achieved between design and use either on the technical or artistic level to reach the most appropriate design that satisfy the learner and leads him to higher level of preference (Groth, & Haslwanter, 2015).

Practitioner Notes

What is already known about this topic

- Millions of learners can access the internet using diverse smart mobile devices.
- The diverse mobile phones and their features pose the greatest challenge in designing sufficiently suitable learning websites.

• The RW and AW represent the best solutions to build suitable learning websites for all types of devices. What this paper adds

Determining the best design (RW or AW) based on the students' level of preference. Implications for practice and/or policy



determining the best way to design learning websites that are effective and appropriate for various mobile devices characteristics. determining the basics of designing learning mobile websites that can be accepted and preferred by students.

LITERATURE REVIEW

The RW concept emerged in 2010 by "Ethan Marcotte". Since then it has been used to create several sites (Marcotte, 2011). It was widely used under several names sharing the basic features that characterize it such as "fluid, liquid and flexible design" (Frain, 2012). The RW is characterized by its dynamics as it enables resizing and rearranging the content of the page to suit the available display proportion, as well as the screen size (Hussain, & Mkpojiogu, 2015). Automatic adjustment of web pages is conducted by two features of the RW; namely "flexible grid layouts" and "flexible images and media" (Peng, & Zhou, 2015; Peterson, 2014). So, there is no need to create several separate designs, but only one responsive design can operate on the different devices, by using "HTML5, & CSS3 script language" (Carver, 2014).

In procedural terms, the researcher defines RW as "the designing technique of web pages in a flexible manner, to adjust the display dimensions of the web page and its contents to the device screen dimensions and its resolution, in order to enable a full view of the page". In the learning context, RW enables learners to optimize their performance, without the web developers having exert more effort in creating convenient sites for each device (Tabor, 2016). RW also allows accessing important information easily, rapidly and at lesser effort and cost possible (Bernacki, Błażejczyk, Indyka-Piasecka, Kopel, Kukla, & Trawiński, 2016). Furthermore, there are several advantages of RW, it represents a more appropriated mobile learning environment as it is more readable, enjoyable and useable (Lajis, & Rahim, 2015). RW doesn't distract learner by unnecessary navigation and create high-quality and easily uploaded presentations versus flash-based content presentations (Baturay & Birtane, 2013).

Despite previous advantages, RW is not suitable for building all websites and it requires more improvements by researchers (Peng & Zhou, 2015). One of disadvantages of RW that many mobile devices are not compatible with CSS3 media queries and take more time in the side of image resizing (Rekhi, 2013). The results of a research conducted by Lestari, Hardianto & Hidayanto (2014) indicated that the RW wasn't useful in the aspect of information structure and navigation. The length of navigation menus is a one of navigation problems in the RW (Kumar & Jenamani, 2017). So, exploring the RW navigation menus by mobile devices require searching to see the hidden section of the menu leading to more waste of time, and less usability (Mahajan, Abolhassani, McMinn & Halfond, 2018).

The goal arises in this context is developing learning mobile websites that satisfy learners and grab their attentions (Almaiah, Jalil, & Man, 2016). To achieve this goal, web developers must begin at the principle stating that, the learner really cares for while using mobile websites in accessing all the required information with the least effort and as fast as possible (Sarrab, Al Shibli, & Badursha, 2016). Though the current trend is moving towards RW, there are still paradoxical impressions about the factors related to optimizing its usage, so the researchers are urged to find the best RW design or thinking of another design style such as the AW to reach the level of acceptance, satisfaction and optimal usage (Groth & Haslwanter, 2015).

AW is another method of building mobile website (Harris, 2015). The AW was first introduced by the web designer "Aron Gustafson" as "progressive enhancement of a website" (Soegaard, 2018). In the AW, the java script is used to determine the characteristics of the receiver device, then upload the appropriate template of the website (Burk, 2013). Thus, the AW is concerned with predefine the characteristics of the devices to be taken into consideration while developing the site (Gustfson, 2015). Accordingly, the AW contributes to reducing the unnecessary navigation processes compared to the responsive design, since the site is based on a unique design for each device, so six layouts have been developed for the most common six types of screens: 320, 480, 760, 960, 1200 and 1600 pixels (Cazañas, & Parra, 2017; Soegaard, 2018).



In procedural terms, the researcher defines the AW as "the designing technique according to which several different versions of sites are built to suit each mobile device characteristics, which enable users to interact with their diverse devices". Although both AW and RW are based on the same principal, yet AW is characterized by additions that works on progressive enhancement with the aim of building specialized experience for each device (Gustafson, 2011; Harris, 2015). The AW is similar the RW in that it operates with the users by a single link to all its templates (Gonzalez-Cepero, 2017). Meanwhile, the AW differs from the RW in that it doesn't operate through enhancing the layout only, it employs the "Java Script" to add several functions and features based on the device and the browser capabilities as well as the screen resolution, where high resolution images are provided to the devices that are characterized by their high resolution and vice versa (Burk, 2013).

The AW production depends on single base markup (HTML) to all devices, which means the ability to use the basic code within each layout, the developers no need to draw board and re-codes the existing website from scratch (Pratap, 2013; Charlton 2014). Also, the AW is characterized by its ability to let each device receive what suits its capabilities only, which positively affects the performance & speed of the website (Harper, 2017). In addition, the AW allows a wide class of users to interact through the website, regardless of the internet speed they have by supply of small size templates to be easily uploaded (Bawab, 2017; Tech, 2016).

Bawab (2017), Gonzalez-Cepero (2017), Lang (2018), and Schwarz (2016) highlighted the differences between AW & RW. The first employs the Java Script to determine the device used in browsing and accordingly determine the suitable template for the device features. The other; meanwhile, employs CSS media queries to build flexible layouts for the website that can be resized based on the screen size of the device used. Whereas the RW attempts to deliver the same content to different devices browsing the same website, the AW seeks to deliver a partially different content for each device browsing the same website. Furthermore, the maintenance cost for the AW is higher than the RW because in AW there are more than one template per website need to be maintained. The RW have the lowest performance because it delivers the same content to all different devices, but The AW ranges between medium and high performance based on the construction technique it employs. In terms of navigation, the RW depends on building a single navigation structure for all devices, but the AW employs different navigation designs.

Based on the aforementioned information, the RW is characterized by lesser costs, but it is lower in performance in contrast of the AW (Alexanian,2013; Faletski, 2013). In the learning context, can AW be chosen regardless of the cost? Or can the low performance of the RW be ignored in favour of the low cost especially with the increasing number of online learners using smart phones? (Schmitz, 2014; Cazañas, & Parra, 2017). Or is there another standard to be checked in order to choose the better design; such as the students' preference? In this paper the researcher attempts to answer this question.

The preference level is one of the most significant standards that can be used to judge the learner's motives while interacting with the websites (Bonk, Lee, Kou, Xu, & Sheu, 2015). However, there are many considerations that can affect on the learners' preference level while using the learning websites; such as the template they used to deal with the menus locations as well as the distribution of content and the navigation styles, for example it would be better to navigate websites by horizontal swiping instead of the scroll down and click on buttons (Hasan, 2014; Dou, & Sundar, 2016; Punchoojit, & Hongwarittorrn, 2017). With the increasing number of the different mobile devices used to access the internet, it has become difficult to construct a learning website that suit all the considerations, which increase the importance of determining the elements that would lead to high satisfaction and preference in a way that would help in constructing learning websites capable of motivating the learners to engage in the learning process (Martín-Rodríguez, Fernández-Molina, Montero-Alonso, & González-Gómez, 2015; Mirriahi, & Alonzo, 2015).

There are several indicators revealing the users' preference to the learning websites, among these is the average click ratio, which mean the higher the average click ratio is, the lower the user's preference is, because its increase signifies the learner's confusion within the content and drifting off the right track to complete the targeted assignment while wasting more time in meaningless navigation processes (Kumar, & Jenamani, 2017). Another indicator of the user's preference is the time consumed to navigate the website,



and its relationship with the achievement criterion, if it was positive, it indicates a higher level of user's preference (Chen, 2018; Pan, 2015; Yu, & Kong, 2016). Moreover, enjoying the website is another significant indicator revealing the user's preference, whereas the frequency of accessing the website and the time learners spend interacting on their content without having tasks to accomplish indicates their desire to enjoy it (Groth, & Haslwanter, 2015).

In procedural terms, the researcher defines the preference level as: "the significant indicators revealing the learners' easy access to the learning website browsed through a mobile phone and their interest in it, which are determined by the number of tasks accomplished through the website, the total time consumed, the web pages browsed to accomplish these tasks, the scrolling and clicking rate as well as the frequency of accessing and the time spent in interacting without having tasks".

Garett, Chiu, Zhang & Young (2016) determined seven pivotal design elements impacting the learners' preference of learning websites, which are navigation, graphical representation, organization, content utility, purpose, simplicity and readability. Furthermore Clay (2018) has given recommendations in designing navigation structure of learning mobile websites such as; maintaining short & catchy navigation links, placing the most important links on top of the navigation menus, finding logical navigation tracks, paying attention to the font style and diversity of design and ensuring that the design is compatible with touch screens with diverse features. As well Muniasamy, Ejalani, & Anandhavalli (2014) recommended taking into consideration the learners' preference when designing e-learning tools, because its study result concluded that although Saudi universities have provided several e-learning tools via mobile, learners neither share nor use those tools efficiently, which might be due to their rejection or not preferring those tools as they are not well designs that can be compatible with diverse mobile phones, which should provide learners with compatible websites and protects the learners from wasting more time and efforts to reach the targeted information.

Based on the results above, there is a need to define the most preferred design of learning mobile websites from the most compatible designs for diverse mobile phones; either AW or RW, to be generalized in developing different learning websites at Jouf University.

METHODOLOGY

the quasi-experimental methodology was followed; two experimental groups with no control group design, to examine the following research hypothesis: "there is no significant difference between the average scores of the RW group and the AW group at the preference level test".

Participants

The research community were (386) students, who enrolled in the course "university life skills" during the academic year 2018/2019. The participants chosen are those who have online connected smart phones. To make sure they are equivalent in the skills of using smart phones, they were assigned a learning activity via the "Blackboard application". The participants who accomplished their tasks through the mobile correctly were (104) students. Twenty students were chosen to the pilot experiment and (84) students were chosen to the main experiment. They were distributed among the two experimental groups. Each group comprised (42) students.

Procedures

First, constructing and hosting the learning RW and AW. To create the RW, "HTML, CSS3" was used whereas "HTML, JavaScript" was used to create the AW. The pages and the navigation structures of the two produced websites are cleared by the following figure:





Responsive VS. Adaptive

Figure 1: the difference between the RW & AW.

Secondly, building the PLT. This test aims at measuring the learners' preference level while using the produced websites. In order to achieve this, several research papers that are relevant to the preference level are reviewed such as (Groth, & Haslwanter, 2016; Lee, & Koubek, 2010; Lestari, Hardianto, & Hidayanto, 2014). In this context, the researcher suggested the preference indicators and its verification tasks, then it is previewed by five specialists on educational technology. After that the agreed amendments was carried out and a final list of preference indicators and its verification tasks are reached.

The final preference indicators determined in the time, number of browsed pages, clicks rate, scrolling & dragging rate used to accomplish each task as well as the frequency of accessing without having tasks "free accessing" and the total time spent without having tasks to accomplish. The two produced websites programed to automatically calculate these indicators and record it in the control page.

To estimate the scores of the PLT, researcher had to change the raw scores recorded after each task into marks by transforming them to standardized scores (\mathbf{z}_{PL}) , where the average $(\mathbf{\bar{x}})$ and the standard deviation $(\mathbf{z}_{\mathbf{x}})$ are known and by applying the equation $(\mathbf{z}_{PL} = \mathbf{x} - \mathbf{\bar{x}}/\mathbf{\sigma}_{\mathbf{x}})$. This method was applied to several previous researches to compare the scores with different nature and measurement (Kapri, 2017; Kranzler, Floyd, Benson, Zaboski, & Thibodaux, 2016; Miciak, Fletcher, & Stuebing, 2016; Taylor, Miciak, Fletcher, & Francis, 2017). The standard scores refer to the increase or decrease of preference level through estimating the rate of deviation for the learners' raw scores for all the tasks away from the average. Positive deviation from the average indicates an increase in the mark which in turn indicates a decrease in the preference level in the first four indicators. Meanwhile, it indicates an increase in the preference level within the fifth and sixth indicators. In order to tackle the standard scores easily, they are transformed to "T-scores" through the equation (T-score = ($\mathbf{z}_{PL} * 10$) + 50).

After completing both websites with PLT, the specialists had reviewed them, then the agreed-on amendments had been done, and then the pilot experimentation was carried out for both websites. The results of the pilot experiment indicated that both websites operate efficiently, and the PLT had acceptable validity and reliability, as shown in the following tables:



PLT Indicators	The average for the higher and lower values for the PLT indicators	The Standard Deviation for the higher &lower values of the PLT indicators	The Difference between both Averages	The value of (T)	Significance
Accomplishment	434.60	8.99	79.00	11.42	.000
Time	355.60	12.58			
Number of Pages	45.80	2.61	10.20	8.06	.000
	35.60	1.10			
Clicit Data	110.80	2.28	13.00	9.24	.000
Click Rate	97.80	2.17			
Scroll and	147.00	9.02	29.40	5.15	.001
Dragging Rate	117.60	9.03			
The Frequency of	4.20	.55	2.60	8.22	.000
Free Accessing	1.60	.45			
Total Time Spent	315.60	5.32	113.20	5.21	.001
in Free Interaction	202.40	48.27			

Table 1: differentiation validity for the PLT-N=20

The previous table indicates that, the T- value for all indicators shows a significant difference between the highest quarterly and the lowest quarterly. This proves the differentiation validity for the PLT.

Pairing Factors	Paired Samples Correlations	Correlations Sig.	Paired Samples T-Test	T-test Significance
Total marks of the				
accomplishment time	.89	.000	.76	.459
(test and retest)				
Total marks of the number of				
pages	.77	.000	.08	.935
(test and retest)				
Total marks of the click rate	70	000	25	720
(test and retest)	.19	.000	.55	.732
Total marks of the scroll and				
dragging	.74	.000	.61	.546
(test and retest)				
Total marks of the frequency				
of free accessing	.87	.000	.44	.666
(test and retest)				
Total marks of the time spent				
in free interaction	.89	.000	1.12	.278
(test and retest)				

Table 2: The reliability of the PLT-N=20

The previous table indicates that the values of paired samples correlations ranged between (0.74, 0.89). All the values of the paired samples T-Test were insignificant. This proves the reliability of the PLT. Thirdly, beginning the main experiment by meeting the participants in both experimental groups, each group on its own, to inform them with the the required instructions and objectives of the experiment. The experiment lasted for eight weeks from 16/9/2018 to 8/11/2018. The experiment took place from two to



three sessions per week (an hour per session) for each experimental group, each on its own in the classroom at the college. Having completed the assigned tasks, the websites became available for recording the frequency of free accessing and the time spent in free interaction by participants. By the end of the eighth week of the main experiment, the recorded raw scores on the control page were retrieved. They are then processed and converted to their final form to be ready for statistical processing.

RESULTS

Having completed the procedures of the main experiment and recorded the learners' scores in the PLT, the researcher used the 21st program edition of Statistical Packages for Social Sciences (SPSS) for statistical processing. To validate the authenticity of the research hypothesis, the difference between the participants' average T - scores in the post measurement for the PLT was calculated by using "Independent Samples T-test". The effect size (η 2) was calculated to recognize the experimental effect size for the contrast rate between RW and AW within the preference level. The values of the effect size range from zero to one. Cohen's criteria (Cohen,1988) was used to evaluate the value of the effect size, which determined in the following "the effect size (0.01) of total contrast indicates a low effect, the effect size (0.06) of total contrast indicates a large effect". The following table shows the research results:

 Table 3: The Independent Samples T- test Scores for the differences between the two Experimental Groups'

 T- Scores averages in the PLT Post measurement

PLT Indicators	The First Experimental Group (42)		The S Experimen (4	econd 1tal Group 12)	Ariti	hmetic "T"	Effect Size (η2)	
	Arithmetic Average	Standard Deviation	Arithmetic Average	Standard Deviation	Value	Significance	Value	Significance
Accomplishment Time	59.64	2.07	40.36	2.78	36.05	.000	0.94	Large Effect
Number of Pages	59.77	2.09	40.23	1.57	48.52	.000	0.96	Large Effect
Clicks Rate	59.51	3.12	40.49	2.71	29.83	.000	0.91	Large Effect
Scrolling and dragging rate.	59.69	2.49	40.31	2.00	39.28	.000	0.95	Large Effect
Frequency of free accessing.	40.61	1.95	59.39	4.26	25.96	.000	0.89	Large Effect
Total time spent in free interaction	41.11	5.29	58.89	3.55	18.09	.000	0.79	Large Effect
Total test score	320.33	9.58	279.66	11.15	17.93	.000	0.79	Large Effect

The value of table "T" at free degree (83) and a significance level of (0.05) = 1.99

The value of table "T" at free degree (83) and a significance level of (0.01) = 2.64

It is clear from the previous table the existence of the statistically significant differences between the average t-scores of the two experimental groups in the PLT post measurement, in favor of the second experimental group. The first four indicators (accomplishment time, number of pages, clicks rate and scrolling and dragging rate) were lower than the average T- scores of the first group in the same indicators, which mean the students of the second experimental group spent less time, browsed fewer pages, and did lower clicks, scrolling, and dragging rates to accomplish the assigned tasks compared to the first experimental group. This may reflect the superiority of the AW in terms of organizing the content and the smooth navigation system, which supported the learners in accomplishing the tasks quickly and easily compared to the RW. Meanwhile, when it comes to the indicators reflecting the interest in the site and the students' satisfaction with the technical and aesthetic efficiency of the site, the fifth and sixth test indicators (the number of free accessing and the total time spent in the free interaction) the average T -scores of the second group were higher than the average T- scores for the first group. This indicates the superiority of the AW over the RW in this area. Generally, the total test scores indicate the increase of preference level for AW compared to the RW. Hence the thesis hypothesis is rejected. The large size effects for the preference level for AW varied from (0.79 to 0.96). This indicates the efficiency of AW design in the learners' preference increasing for learning through mobile phones.



DISCUSSION

The current research results are attributed to the fact that the AW is characterized by more variable features compared with the responsive design. It is characterized by an easily accessible navigation style that enabled learners to access any part of the content just by clicking the icon representing the targeted section of the content. Major sections of the content are designed in the form of icons. When any of them is pressed, the page is loaded in the form of a pop up window. The learner can navigate within the page by dragging left or right. To go back to the main page, the window is closed and there would not be a need to load the main page once more. This in turn leads to easy access to the required information. The content icons are clarified using texts and visual symbols; each expressing the content it comprises. These in turn enables the learners to easily access and recognize the targeted sections of the content. It reduced the need to browse a larger number of pages, to do a higher rate of scrolls and dragging. Eventually this is translated into easy access to the information required to accomplish the targeted tasks.

Meanwhile, in the RW, the learner needs to do more scrolling and dragging downwards and upwards to review the elements of the pages. For example, when clicking each link, the affiliated page is loaded, and to go back to the main page, the learner has to click the main page link from the main menu to reload it once more; which takes more time especially if the internet speed is limited. This navigation style leads to a higher rate of clicks and scrolling and wasting more time to accomplish the targeted tasks.

The previous results contend with what previous research indicated (Bawab, 2017; Gonzalez-Cepero, 2017; Harper, 2017; Lang, 2018) concerning what distinguishes AW over the RW in terms of the nature of the adaptive design, which designed specially to suit the capabilities and features of smart mobile phones. This feature does not exist in the responsive design, which is originally constructed for personal computers with technology makes it capable of responding to any device. Yet with the consistency of the design in all the devices and stability of the navigation structure, the design cannot simulate the potential of each device or individually change the content displayed based on the speed of the Internet available to each user whether by the display of some elements and parts of the content or not. Meanwhile the adaptive is capable of all that. It can also consider the characteristics of the browser used to access the website to give the highest performance possible.

The AW excellence is also due to the students' satisfaction with the technical and aesthetic efficiency of the design because the AW is characterized by the good content organization, so that the learner feels the unity of the subject and can form a comprehensive idea of the website content. The easy use of AW navigating tools led to increased integration of the learners with the website content, which reflected to the frequency of free accessing and the time spent in the free interaction.

CONCLUSION

The current research found a high level of student preference for the use of learning mobile websites designed according to AW technology compared to learning mobile websites designed with RW technology, with a statistically significant difference. This is due to the AW features such as the easy navigation system and the good content organization. Moreover, the design focuses on the elements of the interaction and elements of the main content without distracting attention between the elements and links or other incomplete parts of the content. It is a design specifically framed to work on certain phones and is compatible with their characteristics and their diverse capabilities. This, in turn, led to its superiority over the RW in the aspect of learners' interest and interaction with the website and its components.

The results of the current research as well as previous researches have led to several recommendations. First there is a need to spread awareness about the importance of learning through mobile while depending on effective designs. Second, considering the learners' preference as a one of the significant factors that motivates learners to use mobile technologies in learning effectively, so it has to be given a due attention in further research. The researcher suggests conducting further research to measure the difference between the responsive and adaptive designs in the presence of other variables such as visual thinking, mental capacity, cognitive load and engagement in instruction. The same research can be conducted with the addition of other devices such as tablets, laptops to widen the comparison range and find more differences by applying the experiment to more participants.



Limitations of the study

The current research limited to designing the third chapter entitled "communication skills in university environment" in the course named "university life skills" by Dr. Abdul Majid El Grewy, the major reference to the course. The chapter was presented by developing two learning websites; one employing RW technique whereas the other employs the AW technique. The research tools were applied to a group of the undergraduate students at the Faculty of Science and Arts in Jouf University, Saudi Arabia during the first semester of the academic year (2018).

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Statements on open data, ethics and conflict of interest

Data can be accessed by contacting the author (saved in a personal repository). Ethical approvals were gained from the hosting institution. No conflict of interest declared.

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School Attachment and Video Game Addiction of Adolescents with Divorced vs. Married Parents

Besra TAŞ

Istanbul Sabahattin Zaim University, Faculty of Education, Department of Psychological Counselling and Guidance, Faculty Member -İstanbul/TÜRKİYE <u>besra.tas@izu.edu.tr;</u> tas.besra @gmx.de

ABSTRACT

As in all societies, one of the central issues in our society is the adolescents' problems and psychological conditions. Even children with a soft temperament may have their adolescence as troubled and problematic. Especially if the parents of these adolescents are divorced, this process is experienced as a more difficult and problematic process for adolescents. In this process, the academic process is experienced and there are problems in the field of school attachment. One of the central problems of today is Video Game Addiction. This problematic situation in children and adults has become a more central problem for adolescents. Many parents mention that adolescents have withdrawn themselves in the social environment, that their academic success has declined and that they have Video Game Addiction. Especially the divorced parents stated that their adolescents had problems in this area. For this reason, this study aimed to examine the areas of school attachment and Video Game Addiction of adolescents with divorced parents or with married parents. Descriptive screening method was used in the study. The study group was attended by 209 high school and secondary school students receiving education in Istanbul in 2018as 102of them were the adolescents with divorced parents and 107 of them were the adolescents whose parents are not divorced. At the end of the study, the levels of school attachment and gaming addiction of the general adolescents do not change according to whether the parents of the adolescents are divorced or their parents are married. In terms of gaming addiction, when the results were analyzed according to gender, it was determined that boys' gaming addiction scores were higher than girls. Adolescents' internet usage time increased to 5 hours and more, game addicts increased as a result. When the levels of Video Game Addiction of the adolescents with divorced parents are examined, it is concluded that Video Game Addiction varies according to gender and that men have higher level of Video Game Addiction than girls.

Internet, Social Media Use and Game Addition of Adolescents

In the study of Dursun and Eraslan-Çap (2018), it was determined that the reasons of adolescents to apply to the Internet are to use social media, to do homework, to play game and to chat. In the study, it was seen that adolescents frequently prefer internet to play games. In particular, a large proportion of adolescents were found using the mobile phone to the Internet. In the studies of Yalçın Irmak and Erdoğan titled "Digital Video Game Addiction of Adolescent and Young Adults" in 2015, it was found that digital games were used as a popular and widespread entertainment tool among the young and adolescents. They emphasized that uncontrolled violence and other content of digital games threaten their mental health. Educational, instructive and developer digital games can contribute to the development of adolescents if they are played within appropriate time measures and under control. In the studies on internet addiction conducted with secondary school and high school students in Sakarya, it was determined that the two-thirds of the participants are the normal internet user, and one third of them are the internet addicts (4.1%) and internet addiction risk is (28.5%). Boys and secondary school students were more at risk of internet addiction than girls and high school students (Taylan, Işık, 2015). In a study conducted by Tas in 2018, a positive correlation was found between internet addiction and psychological symptoms. At the same time, parental attitudes were related to internet addiction and psychological symptoms in adolescents. Besides, it was concluded that internet access for games, entertainment and chat was related to internet addiction. In the area of class level and age and psychological symptoms, the results were found to be related to each other. In the study of Taylan and Işık (2018), the reasons of using the internet more than three hours a day for the middle school and high school students in the city center of Kocaeli is mostly the social media, chat-chat, series, film, video viewing and uploading purposes. In this study, they obtained the result that two-thirds of the students were normal, one-third of them were under risk and problematic Internet users. In this study, in the area of gender variability, males were found to use internet more problematic and in terms of age, the ones between the ages of 13 and 15 were found to use internet more problematic than the ones who are older than 16 years old. In addition, as the time spent on the internet, social media and digital games increased, the



possibility of problematic internet usage was increased. In the study of Anlı (2018) on high school students' relationship between interpersonal sensitivity and internet addiction in terms of various variables, it was found that there was a significant and positive relationship between interpersonal sensitivity and internet addiction levels. It was found that internet addiction levels showed significant differences in terms of gender, but did not differ significantly in terms of perceived income level and parental attitudes.

School Attachment and Academic Success of Adolescents

Griffiths (2010) emphasizes that there is little information about the long-term effects of regular computer game play on the social development while indicating that the computer game is a popular leisure activity. In a study conducted with 144 undergraduate students, the relationship between students' play behavior and social insufficiency is frequently investigated. In the social status questionnaire designed to detect social insufficiency, the aim was to reveal the frequency of computer game play behaviors. As a result of the study, high frequency computer game players have found that they often show more anxiety than low frequency game players. In describing this result, the possible explanations for this relationship explain the high frequency of computer games that endanger the acquisition of social skills during childhood and adolescence. In divorced-family adolescents, being addicted to the internet brings together Video Game Addiction. In general, people are surprised by the attitude of adolescents towards divorce. They think that adolescents are old enough to understand their parents. The psychological pressure of divorce on adolescents is not taken into consideration. Normal concerns experienced during adolescence are strengthened by parental divorce. Parents' divorce status creates anger and tense feeling for adolescents (Wallerstein and Blakeslee, 1989, p. 336). Or, in the divorce of parents, some other adolescents take on too much responsibility, and some adolescents complete the school tasks and become dominant in many decision-making areas. This may lead to the adolescent maturation, but the risk here is that they may miss the period of normal adolescence they should have experienced (Wallerstein and Blakeslee, 1989, p. 336). In the case assessing the divorce of parents by means of gender differences, Wallerstein and Blakeslee (1989) concluded that girls and adolescents handle the parental divorces more positive in terms of social, emotional and success areas than boys and adolescents. In the field of school achievement, adolescents who did not have any problems experienced decrease in success at the period when their parents are divorced. In addition to the success decreases in school, adolescent males showed aggressive behaviors. It is observed that there are problems especially in the field of school attachment (Wallerstein and Blakeslee, 1989, p. 95). In the study of Wallerstein and Blakeslee (1980), it was found that adolescents also feel upon their parents divorced as they left them alone. In this process, the success of the children is generally decreases. Children also have a problem of concentrating and focusing on lessons due to the divorce of parents. This causes their grades to decrease. The decrease in success of children at school is due to the fact that their minds are engaged in divorce. Even if parental divorce is experienced before adolescence, the negativity remaining on the child is seen again during adolescence, especially when the level of school achievement decreases, especially boys show this decrease. Parental support in this field plays an active role in the re-education of children. (Figdor, 1997, p. 71). In this process, adolescents find themselves in social media or on the computer to play most of their time in order to avoid problems or to forget. Bozkurt, Sahin and Zoroglu (2016) stated as a result of their reviews on internet addiction and current studies that Internet use has become an indispensable part of life, the pathological use of the Internet has begun to lead to internet addiction which can be defined as new addiction type and the long time uncontrolled use of internet may cause individuals to have physical, psychological, social, cognitive, social, cognitive health problems and their lives are adversely affected. It is stated that, in your country, this addiction is more prevalent in young people and children who are more dominant in technology. The study aimed to investigate the areas of school attachment and Video Game Addiction of adolescents with Divorced vs. Married parents. The following questions have been sought.

- 1. Is there a significant difference between the adolescents with Divorced vs. Married parents in terms of school attachment?
- 2. Is there a significant difference between the adolescents with Divorced vs. Married parents in terms of Video Game Addiction?
- 3. Is there a significant difference between the adolescents with Divorced vs. Married parents in terms of school attachment and Video Game Addiction?
- 4. Do the levels of school attachment and Video Game Addiction of adolescents with divorced parents and married parents change according to the gender, according to the marital status of the parents, according to age, daily use of the Internet, according to the type of school, to the current economic situation, to the parental education style?



METHOD

Research Model

This research is a relational study in the screening model, which aims to examine the levels of addiction and school attachment of high school students living with their families and the ones with divorced parents (Karasar, 2004). Quantitative data collection methods were used in the study. Video Game Addiction and school attachment levels of high school students living together with their families and the ones with divorced parents were investigated according to various demographic variables.

Study Group

In this study, a total of 211 students participated, 102 of them are the ones with divorced families and 109 of them are the ones from non-divorced families, who have received education in 2018-2019 in İstanbul. The mean age of the participants was 15.4 and the standard deviation was 1.1.

Data Collection Tools

School Attachment Scale:

The school attachment scale developed by Savi Çakar and Karataş (2014) measures attachment to school in children and adolescents. The measurement tool consisting of 15 items is a 5-point Likert-type scale. The lowest score is 15 and the highest score is 75 and the high score indicates the highest school attachment. The validity and reliability studies conducted by Savi Çakar and Karataş (2014) showed that the scale is a valid and reliable measurement tool in adolescents.

Video Game Addiction Scale:

The Video Game Addiction scale developed by Anlı and Taş (2018) is a 9-item Likert-type scale. The items in the scale are 5-point Likert-type grading "Never", "Rare", "Sometimes", "Often" and "Always". The lowest score is 9 and the highest score is 45 points and the highest score indicates high Video Game Addiction. The validity and reliability studies conducted by Anlı and Taş (2018) showed that the scale is a valid and reliable measurement tool in adolescents.

Data Collection and Analysis:

For analysis, the between-groups variance analysis (ANOVA) was used. Because the parametric analyzes were used, the distribution of variables was examined and the values for deviancy and kurtosis were found to be (0.63-0.14) for the Video Game Addiction and (1.2-0.9) for school attachment respectively and it was concluded that the distribution was normal. Variance analysis was used to determine whether the variances were equal or not and that the variances were equal for all analyzes.

FINDINGS

In this study, firstly, it was compared whether adolescents with divorced parents and married parents showed difference according to variables such as gender, Divorced vs. Married parents, age, education style, daily internet use. Then it was discussed whether the adolescents with divorced parents are different in terms of gender, age, type of schooling, current economic situation, and parental education style. Finally, the differences between the levels of school attachment and Video Game Addiction of adolescent with married parents in terms of gender, age, type of school, current economic situation, and parental education style were studied.

Within the scope of the study, reliability analyzes of the scales were performed and high values were found for the school attachment scale (Cronbach $\alpha = 94$) and the Video Game Addiction scale (Cronbach $\alpha = 91$). For the additional reliability analysis, the item total correlation values were checked and it was found to be between 0.38 and .81 for Video Game Addiction and between 0.55 and 0.80 for school attachment, and it was close to the ideal (Pallant, 2001). Total scores for school attachment and Video Game Addiction were calculated for the procedures to be performed after this analysis.

Findings Regarding the Investigation of Attachment to School and Video Game Addiction Levels According to the Adolescents with Divorced vs. Married Parents

In the study, it was aimed to examine the students' attachment to school and Video Game Addiction in terms of the adolescents with Divorced vs. Married parents. The results of the t test performed for this purpose are presented in Table 1.



Table 1. t test table for Levels of school attachment and Video Game Addiction of adolescents with Divor	ced vs.
Married parents (Levene: school attachment 0.5; Video Game Addiction0.9)	

Variables	Group	Ν	Mean	SD	t	df	р	Cohen's d
School attachment	Married	109	32.8	11.5	-0.922	209	0.35	-0.12
	Divorced	102	34.2	11.1				
Video Game Addiction	Married	109	15.7	6.9	0.322	209	0.74	0.04
	Divorced	102	15.4	7.01				

As can be seen in Table 1, school attachment scores indicate that Adolescents with Divorced Parents have slightly higher average scores than Adolescents with Married Parents, but this difference is not statistically significant. t (209) = -0.92, p 0.35. When the Video Game Addiction scores of the adolescents were examined according to the ones with divorced and married parents, it was seen that there was no noticeable difference between the two groups. It is observed that this observation is confirmed statistically. There is no difference between the scores of Video Game Addiction of adolescents with Divorced vs. Married parents. t (209) = 0.32, p 0.74. As a result, school attachment and gaming addiction do not differ according to whether the parents of the adolescents are divorced or their parents are married.

Finding Regarding the Examination of School Attachment Levels of Adolescents with Divorced vs. Married parents in Terms of Gender, Divorced- Parenthood, Married-Parenthood, Age, Training Style, Daily Internet Use

Adolescents' levels of school attachment were examined and in this context the variables as gender, divorced parents and married parents, age were studied together. To analyze whether the differences between the averages were significant, 2 (Gender) * 2 (Divorced Parents and Married Parents) * 4 (Age) groups of ANOVA analysis was performed and the results are presented in table 2.

As seen in Table 2, there is no difference in terms of school attachment for boys and girls (F = 2.964, p = 0.08). When the divorced parents and married parents are studied, there is no difference between the students with divorced parents and the married parents. (F = 0.005, p = 0.9). Similar findings were found in age and there was no difference in terms of age-related attachment to school. (F = 1.727, p = 0.1). Similarly, it was found that there is no significant difference between gender, divorced parenthood and married parenthood, age by means ofprimary and secondary effects and as a result, it was determined that students' school attachment did not change according to gender, parental marital status and age.

Source		Type III Sum of Squares	df	Mean Square	F	р	η²
Gender		382.033	1	382.033	2.964	0.087	0.014
Divorced parents a parents	ind married	0.583	1	0.583	0.005	0.946	0.000
Age		667.835	3	222.612	1.727	0.163	0.025
Gender*Divorced p married parents	parents and	8.791	1	8.791	0.068	0.794	0.000
Gender*Age		162.950	3	54.317	0.421	0.738	0.006
Divorced parents a parents * Age	ind married	288.243	3	96.081	0.745	0.526	0.011

Table 2. 2*2*4 between-groups ANOVA table for comparison in terms of gender, divorced parents and married parents and age for school attachment scores (Levene= .36).



Gender*Divorced parents	and	427 508	3	142 503	1 106	0 348	0.016
married parents*Age		727.300	5	142.303	1.100	0.540	0.010
Residual		24.747.488	192	128.893			

It was analyzed whether the school attachment scores of the adolescents were changed according to the education style and daily internet usage. In this analysis, the variance analysis between the groups was carried out (4), and the results were presented in table 3. As it will be seen in Table 3, the students' attachment to school scores do not differ according to the education style. (F = 2.386, p = 0.7). Similarly, attachment to school (F = 0.761, p = 0.5) did not differ according to daily internet usage.

Table 3. 4*5 between – groups ANOVA (levene= .51) table for comparison in terms of training style and daily internet use of students for school attachment scores

Source	Type III Sum of Squares	df	Mean Square	F	р	η²
Training Style	816.929	3	272.310	2.386	0.070	0.033
Daily Internet Usage	347.456	4	86.864	0.761	0.552	0.014
Training Style*Daily Internet Usage	2.100.331	12	175.028	1.534	0.115	0.085
Residual	21.569.432	189	114.124			

Finding Regarding the Examination of Video Game Addiction Levels of Adolescents with Divorced vs. Married parents in Terms of Gender, Divorced-Parenthood, Married-Parenthood, Age, Training Style, Daily Internet Use

Similar analyzes were performed for Video Game Addiction, which is another dependent variable of the study. In order to analyze whether the mean differences between the variables were significant, 2 (Gender) * 2 (Divorced Parents and Married Parents) * 4 (Age) groups of variance analysis was performed and the results are presented in table 4.

As seen in Table 4, it was found that the main effects were not significant for the ones with divorced parents, with married parents (F = 1.842, p = 0.9) and age (F = 0.647, p = 0.5) on the other hand, that the main effects were significant for gender (F = 7.505, p = 0.01, $\eta^2 = 0.036$). This effect has a moderate effect size. Post hoc analysis results were significantly higher in boys than in girls. It was determined that the primary and secondary effects were not significant gender, divorced parents and married parents and for age. According to this result, boys' addiction scores are higher than girls. Video Game Addiction scores of adolescents do not change according to divorced parents and married parents. Similarly, the addiction scores of adolescents do not show any change according to age.

Table 4. 2 * 2 * 4 between-groups ANOVA (Levene = .20) table for comparison of gender, divorced parents and married parents and age for Video Game Addiction

Source		Type III Sum of Squares	df	Mean Square	F	р	η²
Gender		354.461	1	354.461	7.505	0.007	0.04
Divorced Parent an Parents	d Married	0.009	1	0.009	1.842	0.989	0.000
Age		91.679	3	30.560	0.647	0.586	0.009
Gender*Divorced P Married Parents	arent and	125.546	1	125.546	2.658	0.105	0.013
Gender*Age		52.234	3	17.411	0.369	0.776	0.005



Divorced Parent Parents*Age	and	Married	9.342	3	3.114	0.066	0.978	0.001
Gender*Divorced Married Parents*A	Paren .ge	nt and	159.466	3	53.155	1.125	0.340	0.016
Residual			9.067.859	192	47.228			

It has been analyzed whether or not the Video Game Addiction changes depending on the student's education style and daily internet usage. In order to test the difference between the averages of the educational style and daily internet usage variables for the Video Game Addiction, 4 (training style) * 5 (daily internet usage) variance analysis between-groups was performed for the Video Game Addiction and the results were presented in table 5.

As seen in Table 5, it was found that the main effects were not significant for the education style (F = 0.516, p = 0.7) of student whereas for the daily internet use (F = 8.466, p = 0.001, $\eta^2 = 0.14$) the main effect was found to be significant. This effect has a large effect size. The results of post hoc analysis of the students using internet for 5 hours or more are significantly higher than those who use 1,2,3,4 hours respectively. It was determined that the primary effects for the style of education and daily internet use were not significant. According to this result, people who use internet for 5 hours or more have higher scores of Video Game Addiction than people using 4 hours or less. On the other hand, Video Game Addiction scores do not change according to the education style of the students.

Table 5. 4 * 5 between groups ANOVA (levene = .07) table for comparisons in terms of the training style and daily internet use of students for Video Game Addiction scores

Source	Type III Sum of Squares	df	Mean Square	F	р	η^2
Training Style	62.57	3	20.857	0.516	0.671	0.01
Daily Internet Usage	1.367	4	341.972	8.466	.001	0.14
Training Style*Daily Internet Usage	801.12	12	66.760	1.653	0.080	0.08
Residual	7.634	189	40.393			

Findings about the examination of school attachment levels of adolescents with divorced parents according to gender, age, type of school, current economic situation and parental education style. In the study, it was aimed to examine whether there was a significant difference between boys and girls in terms of the school attachment levels of adolescents with divorced parents and the results of independent sample t test are given in Table 6 for this analysis.

Table 6.	Independent	sample	t-test	results	for	gender-based	comparisons	of	school	attachment	levels	of
adolescent	s with divorce	ed parent	ts									

Group	Ν	Mean	SD	t	df	р	Cohen's d
Boy	47	35.4	13.3	0.964	100	0.33	0.191
Girl	55	33.3	8.9				

Table 6 shows when the average of school attachment levels of adolescents with divorced parents is examined; it is seen that the scores of the boys are relatively high when compared to girls. However, no statistically significant difference was found between the t-test results of these scores, t (100) = 0.96, p>. 33. According to these results, it can be stated that boys and girls are similar to each other in terms of school attachment levels of adolescents with divorced parents.

The aim of this study is to examine whether the Adolescents with Divorced Parents differ significantly in their school attachment levels according to their age and the results of the mean and standard deviations and the ANOVA results are presented in Table 7.

Age	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
14	33.7	10.8	18	Age	307.33	3	102.4	0.818	0.48	0.024
15	31.6	9.59	23							
16	36.4	12.4	31							
17	34.4	11.2	30							

Table 7. One-way analysis of variance (ANOVA) table for age based comparison for school attachment scores (levene= .86)

As seen in Table 7, it is seen that school attachment scores are the lowest among the 15-year old adolescents when compared to other age groups and are the highest among the 16-year old adolescents. When we examine ANOVA results to examine the effect of these averages, it was found that the Adolescents with Divorced Parents did not differ significantly in school attachment scores according to their age, F (3, 98) = 0.818, p> .48, $\eta 2 = .024$.

It was requested to examine whether there is a significant difference depending on the parental education style of adolescents between the school attachment level of adolescents with divorced parents and the results of this analysis regarding the averages on parental training style and standard variations and one – way variance analysis (ANOVA) are presented in Table 8.

Table 8. One-way analysis of variance (ANOVA) table for comparisons according to the parent education style in which they are educated for school attachment scores (levene= .18)

Parental education style	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
Democratic	32.4	9.4	35	Between Groups	396.8	3	132.2	1.064	0.36	0.03
Authoritarian	34.5	10.5	42							
Negligent	40.5	12.7	7							
Over Protective	34.7	14.5	18							

As it is seen in Table 8, when the school attachment levels of adolescents with divorced parents are examined according to the parental education style, it is seen that the scores of children whose parents are negligent are higher than those with democratic, authoritarian and overprotective parents. There is no noticeable difference between the other groups. When we examine the ANOVA results to examine the effect of these averages, it was found that there was no statistically significant difference in school attachment scores according to the parental education style of the adolescents with divorced parents. $F_{(3,98)} = 1.064$, p > .36, $\eta^2 = .03$.

In this study, it is aimed to examine whether there is a significant difference between school types of adolescents with divorced parents and independent sample t test results of this analysis are presented in Table 9.

Table 9. Independent sample t-test results for comparing school attachment levels of adolescents with divorced parents according to school types

Group	Ν	Mean	SD	SE	t	df	р	Cohen's d
Anatolian High School	86	33.9	11	1.192	-0.640	100	0.524	-0.174
Vocational ar Technical Hig School	n gl 16	35.9	11.9	2.984				

In Table 9, the mean scores of school attachment levels of adolescents with divorced parents are examined by school type; it is seen that the scores of those who study at vocational and technical high schools are relatively high compared to those of Anatolian high schools. However, no statistically significant difference was found


between the t-test results of these scores, t (100) = -0.640, p>. 52. According to these results, it can be stated that adolescents with divorced parents have similar levels of school attachment according to school type.

The aim of this study is to examine whether the adolescents with divorced parents differ significantly in school attachment levels depending on social and economic status.

Table 10. One-way analysis of variance (ANOVA) table for school attachment scores compared to social and economic situation (levene=.61)

Social and Economic Status	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
Low	37.4	12.1	20	Between Groups	643.06	2	321.53	2.666	0.075	0.051
Mid	34.3	10.3	73							
High	27.2	13.1	9							

As seen in Table 10, when the school attachment levels of adolescents with divorced parents were examined depending on the social and economic situation, it was found that adolescents with low social and economic status had higher school attachment scores than those with medium and high social and economic status. When we examine ANOVA results to examine the effect of these averages, it was found that the Adolescents with Divorced Parents did not differ significantly in school attachment scores according to social and economic status. $F_{(2, 99)} = 2.666$, p > .07, $\eta^2 = .05$.

Findings about the examination of Video Game Addiction levels of adolescents with divorced parents according to gender, age, type of school, current economic situation and parental education style

The aim of this study is to examine whether the adolescents differ significantly depending on social and economic situation in terms of the levels of Video Game Addiction and the social and economic situation averages of this analysis and standard deviations and one-way ANOVA results are presented in Table 11.

Social Economic Status	Mean	SD	N	Source	Sum of Squares	df	Mean Square	F	р	η²
Low	16.4	7.9	20	Between Groups	275.4	2	137.7	2.902	0.06	0.055
Mid	14.6	5.8	73							
High	20.2	11.5	9							

Table 11. One-way analysis of variance (ANOVA) table for comparisons depending on social and economic situation for Video Game Addiction scores (levene= .07)

As seen in Table 11, when the levels of Video Game Addiction of the Adolescents with Divorced Parents were examined depending on the social and economic situation, it was found that the adolescents with high social and economic status had higher Video Game Addiction scores than the middle and low group. When we examine the ANOVA results to examine the effect of these averages, it was found that the adolescents with divorced parents did not differ significantly in the Video Game Addiction scores according to the social and economic situation. $F_{(2, 99)} = 2.902$, p > .06, $\eta^2 = .06$.

The aim of the study was to examine whether the adolescents with divorced parents differed significantly in terms of the level of Video Game Addiction depending on age, and the mean and standard deviations and ANOVA results of the analysis were presented in Table 12.

Age	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
14	16.3	7.8	18	Between Groups	120.6	3	40.22	0.812	0.49	0.024
15	16.4	7.4	23							
16	15.7	7.4	31							
17	13.8	5.5	30							

Table 12. One-way analysis of variance (ANOVA) table for school attachment comparisons depending on age (levene= .20)

As seen in Table 12, it is observed that when the addiction levels of the Adolescents with Divorced Parents were examined depending on age, the Video Game Addiction scores were the highest among the 14- and 15-year-old age group and were the lowest among the 17-year old group, respectively. When we examine ANOVA results to examine the effect of these averages, it was found that the Adolescents with Divorced Parents did not differ significantly in Video Game Addiction scores according to their age. F (3, 98) = 0.812, p> .49, $\eta 2 = .024$.

It was requested to examine whether there is a significant difference depending on Parental education style of adolescents with divorced parents in terms of Video Game Addiction level and in this analysis, the averages regarding the parental education style and standard variances and one – way variance analysis were presented in Table 13.

Table 13. One-way analysis of variance (ANOVA) table for comparisons depending on the parent education style in which they are trained for Video Game Addiction scores(levene= .28)

Parental style	training	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
Democratic		16.2	7.9	35	Between Groups	297.8	3	99.2	2.081	0.11	0.060
Authoritaria	n	13.5	5.6	42							
Negligent		17.1	8.6	7							
Over Protect	ive	17.8	6.6	18							

As seen in Table 13, when adolescents with divorced parents are examined according to the parental education style with which their levels of addiction are raised, it is seen that the scores of Video Game Addiction of children of over-protective and negligent parents are higher than those of democratic and authoritarian parents. When we examine the ANOVA results to examine the effect of these averages, it was found that there was no statistically significant difference in Video Game Addiction scores according to the parental education style in which the students with divorced parents were trained. $F_{(3, 98)} = 2.081$, p > .11, $\eta^2 = .06$.

In this study, it was aimed to examine whether there was a significant difference between boys and girls at the levels of Video Game Addiction of adolescents with divorced parents. The results of this analysis are presented in Table 14.

Table 14. Independent sample welch test results for comparison of gender-based levels of gaming addiction of adolescents with divorced parents

Group	Ν	Mean	SD	Test	Statistic	df	р	Cohen's d
Boy	47	18.1	8.1	Welch	3.748	72.126	.001	0.758
Girl	55	13.1	4.8					

Table 14 shows the average score of Video Game Addiction levels of adolescents with divorced parents; it is seen that the scores of the boys are relatively high compared to girls. According to the welch test results, it was found that this difference was statistically significant, t (w) (72.2) = 3.748, p>. 001. According to these results, adolescent boys with divorced parents have higher levels of gaming addiction than girls with divorced parents.



In the study, it was requested to examine whether there is a significant difference between school types depending on levels of Video Game Addiction of adolescents with divorced parents. The results of this analysis are presented in Table 15.

Table 15. Independent sample welch test results for comparing the levels of Video Game Addiction of Adolescents with Divorced Parents depending on school types

Group		N	Mean	SD	Test	Statistic	df	р	Cohen's d
Anatolian School	High	86	15.6	7.4	Welch	1.276	47.286	0.20	0.258
Vocational Technical School	and High	16	14.1	3.4					

In Table 15, the average score of Video Game Addiction levels of adolescents with divorced parents is examined by type of school; it is seen that the scores of those who study in vocational and technical high schools are relatively low compared to those studying in Anatolian high school. However, there was no statistically significant difference between the mean scores of these scores according to the welch test results, t (w) (47.2) = 1.276, p>. 20. According to these results, it can be stated that adolescents with divorced parents are similar to each other according to school type at Video Game Addiction levels.

Findings about the examination of school attachment levels of adolescents with married parents according to gender, age, type of school, current economic situation and parental education style

In this study, it is aimed to examine whether there is a significant difference between boys and girls in terms of school attachment levels among the adolescents with married parents. It is seen that the scores of the boys (33.6) are relatively higher than the girls (32.5). However, there was no statistically significant difference between the t-test results of these scores, t (107) = 0.402, p>. 68. According to these results, it can be stated that boys and girls are similar to each other when their parents are married.

In this study, it was aimed to examine whether there was a significant difference between school types in terms of school attachment levels of the adolescents with married parents and the average scores of school attachment levels of the adolescents with married parents were examined according to the type of school; it is seen that the scores of the students who study in vocational and technical high schools (37.7) are relatively high compared to those studying in Anatolian High School (31.4). According to the t-test results made among these scores, it was found that this result was statistically significant, t (107) = -2.462, p>. 05. According to these results, it can be said that the level of school attachment of adolescents with married parents is higher in vocational and technical high schools than in Anatolian high school.

It was aimed to examine whether the adolescents with married parents differ significantly in their school attachment levels depending on their age and when the age-related differences of adolescents with married parents are examined in terms of school attachment levels, it was seen that the school attachment scores of 16 year old adolescents (36.1) were significantly higher than adolescents in other age groups (15 years: 33.9, 17 years). : 34.1) It is the lowest in the ones with 14 years old (30.1). When we examine ANOVA results to examine the effect of these averages, it was found that the Adolescents with Married Parents did not differ significantly in their school attachment scores depending on their age. $F_{(3, 102)} = 1.514$, p > .21, $\eta^2 = .043$.

The aim of this study is to investigate whether the Adolescents with Married Parents differ significantly depending on the social and economic situation in terms of school attachment levels and the social and economic status averages and standard deviations and the ANOVA results are presented in Table 16.



Social and economic status	Mean	SD	N	Source	Sum of Squares	df	Mean Square	F	р	η²
Low	34.6	10.21	8	Between groups	67.02	2	33.513	0.249	0.780	0.005
Mid	32.6	11.6	100							
High	39		1							

Table 16. One-way analysis of variance (ANOVA) table for school attachment scores compared depending on social and economic situation (levene = .40)

As it is seen in Table 16, it is seen that school attachment scores of adolescents with low social and economic status are higher than the middle group when the school attachment levels of adolescents with married parents are examined. When we examine the ANOVA results to examine the effect of these averages, it was found that the Adolescents with Married Parents did not differ significantly in terms of school attachment scores depending on social and economic situation. $F_{(2, 106)} = 0.249$, p > .07, $\eta^2 = .05$.

It was aimed to examine whether the adolescents with married parents differ significantly depending on the parental education style they were raised in terms of the school attachment levels and the mean and standard deviation of the parental education style and the one-way analysis of variance (ANOVA) results are presented in Table 17.

Table 17. One-way variance analysis (ANOVA) table for the comparisons depending on the parental education style in which they are educated in terms of school attachment scores (levene= .49)

Parental Training Style	Mean	SD	N	Source	Sum of Squares	df	Mean Square	F	р	η²
Democratic	30.3	10.1	56	Between Groups	535.4	3	178.4	1.541	0.208	0.043
Authoritarian	34.3	11.8	39							
Negligent	38.7	9.9	4							
Over Protective	32.5	8.9	8							

As seen in Table 17, it is seen that when the school attachment scores of adolescents with married parents are examined, it is seen that the scores of the ones with negligent parents are higher than those of democratic, authoritarian and overprotective children. Among the other groups, the authoritarian ones are relatively high. When we examine the ANOVA results to examine the effect of these averages, it was found that there were no statistically significant differences in the scores of school attachment according to the parent education style. $F_{(3, 103)} = 1.541$, p > .20, $\eta^2 = .04$.

Findings about the examination of Video Game Addiction levels of adolescents with married parents according to gender, age, type of school, current economic situation and parental education style

It was aimed to examine whether the adolescents with the married parents differed significantly in terms of the level of Video Game Addiction depending on the parent education style and the results of the mean and standard deviations of the parental education style and the one-way analysis of variance (ANOVA) results are presented in Table 18.

Parental trainin style	^g Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
Democratic	15.0	6.3	56	Between groups	112.9	3	37.6	0.757	0.52	0.02
Authoritarian	16.7	7.5	39							
Negligent	18.7	12.2	4							
Over Protective	14.7	6.4	8							

Table 18. One-way analysis of variance (ANOVA) table for comparisons depending on the parent education style in which they are trained in terms of Video Game Addiction scores (levene= .19)



As seen in Table 18, when the Video Game Addiction scores of adolescents with married parents depending on the parental education styles are examined, it is seen that the scores of Video Game Addiction of the children of the authoritarian and negligent parents are higher than those of the democratic and overprotective ones. When we examine the ANOVA results to examine the effect of these averages, it was found that there were no statistically significant differences in Video Game Addiction scores according to the parental education style. $F_{(3, 103)} = 0.757$, p > .75, $\eta^2 = .02$.

It was aimed to examine whether the Adolescents with Married Parents significantly differentiated depending on age in terms of Video Game Addiction and the mean and standard deviations and ANOVA results of this analysis are presented in Table 19.

Table 19. One-way analysis of variance (ANOVA) table for comparisons depending on the age in terms of school attachment scores (levene=.81)

Age	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η^2
14	16.1	7.06	39	Between groups	34.08	3	11.3	0.230	0.87	0.007
15	15.8	6.8	25							
16	15	7.48	26							
17	14.6	6.3	16							

As it is seen in Table 19, when the Video Game Addiction levels of adolescents with married parents are examined, it is seen that Video Game Addiction scores of 14, 15 and 16 year-old adolescents are the lowest relatively when compared to the 17-year old group and the scores of 17-year-old ones are the lowest. When we examine ANOVA results to examine the effect of these averages, it was found that the Adolescents with Married Parents did not differ significantly in Video Game Addiction scores according to their age., $F_{(3, 103)} = 0.230$, p > .89, $\eta^2 = .007$.

It was aimed to examine whether the Adolescents with Married Parents differ significantly in terms of Video Game Addiction levels depending on social and economic situation. The results and standard deviations of the social and economic situation and the one-way analysis of variance (ANOVA) results are presented in Table 20.

Social status	and	economic	Mean	SD	Ν	Source	Sum of Squares	df	Mean Square	F	р	η²
Low			15	8.8	8	Between groups	8.35	2	4.17	0.084	0.91	0.002
Mid			15.8	6.9	100	0 1						
High			14		1							

Table 20. One-way analysis of variance (ANOVA) table for comparisons depending on the social and economic status in terms of Video Game Addiction scores (levene= .42)

As seen in Table 20, when the levels of Video Game Addiction of Adolescents with Married Parents are examined depending on social and economic status, it is seen that the scores of Video Game Addiction of adolescents with high, low and medium social and economic status are at similar levels. When we examine the ANOVA results to examine the effect of these averages, it was found that the Adolescents with Married Parents did not differ significantly in the Video Game Addiction scores according to the social and economic situation. $F_{(2, 106)} = 0.084$, p > .09, $\eta^2 = .002$.

In this study, it was aimed to examine whether there was a significant difference between the Video Game Addiction levels of boys and girls among adolescents with married parents and the mean scores of Video Game Addiction levels of adolescents with married parents were examined; the scores of boys (16.7) are relatively high compared to girls (15.4). According to the t test results, it was found that this difference was not statistically significant, t (107) = 0.838, p>. 40. According to these results, levels of Video Game Addiction are similar among adolescents with married parents.

In the study, it was requested to examine whether there was a significant difference between the level of Video Game Addiction of Adolescents with Married Parents depending on school types and since this variance was not



homogeneous, welch statistics were used. When the mean score of Video Game Addiction of adolescents with married parents is examined according to the type of school; it is seen that the scores of those who study in vocational and technical high school (16.3) are relatively high compared to those who study in Anatolian high school (15.5). However, there was no statistically significant difference between the mean scores of these scores according to the welch test results, t (w) (32,2) = -0,386, p>. 70. According to these results, it can be stated that Adolescents with Married Parents are similar to each other depending on school type in terms of Video Game Addiction levels.

RESULT AND DISCUSSION

In the study, for the school attachment and Video Game Addiction of all the adolescents, there are the analysis depending on being adolescents with divorced parents and married parents, gender, age, parental training style and daily internet use. According to this, general adolescents' school attachment and gaming addiction levels do not change according to whether the parents of the adolescents are divorced or their parents are married. According to these results, it is understood that the parental divorce is similar to other adolescents in terms of school attachment and Video Game Addiction. Similar results were obtained between different genders in terms of school attachment. In the field of Video Game Addiction, the interesting result is that; men have higher addiction scores than girls. A similar result was found in study of Taylan and Işık (2018) with secondary and high school students. As a result of the study, it was found that male students used internet with more problems than girls. As a result of the study, Griffiths (2010) found that high frequent computer game players showed more anxiety than low frequent players. The possible explanations for this relationship explain that the high frequency of computer games endanger the acquisition of social skills in childhood and adolescence. When we look at the results regarding school attachment and play addiction depending on parental training skill, it has been determined that the parent's being democratic, authoritarian, negligent, overprotective does not have an effect on school attachment and Video Game Addiction for the general adolescent group. Finally, it was analyzed whether adolescents' school attachment and Video Game Addiction changed according to daily internet usage. According to this, while there is no difference for school attachment; Video Game Addiction scores of the general adolescent group using internet for 5 hours or more are significantly higher than those who use 1,2,3,4 hours respectively. Video Game Addiction increase when adolescents' Internet usage time exceeds 5 hours. Bozkurt, Şahin and Zoroğlu (2016) state that the use of internet has become an indispensable part of life, the pathological use of the Internet has begun to lead to internet addiction which can be defined as new addiction type and that the uncontrolled and long-time of use computer and internet adversely affect the individuals physical, psychological, social, cognitive health and life. In this direction, young people need to be encouraged to read books or participate in other healthy social activities instead of using their free time with internet usage. In this study, the levels of school attachment and Video Game Addiction of adolescents with divorced parents or married parents were examined according to gender, age, type of school, current economic situation, and parental education style. Firstly, the levels of school attachment and Video Game Addiction of the adolescents with divorced parents were examined and it was found that the scores of school attachment did not differ depending on gender, age, type of school, current economic situation, and parental education style. On the other hand, when the levels of Video Game Addiction were examined, it was concluded that Video Game Addiction varies according to gender and the boys have higher level of Video Game Addiction than girls. In adolescents with divorced parents, male adolescents are more likely to be addicted to games. This is an important finding as in the above. In this direction, in general, it should be studied on how to find and offer solution - based opportunities in game addiction of male adolescents. At the same time, in the studies conducted on adolescents with divorced parents, it was determined that the boys and adolescents have more negative effects than girls in terms of school success areas when there are the divorced parents. In adolescence, the negativity caused on adolescents may be seen, especially in the school, the success rate is very low especially in boys, parent support in this area plays an active role in the re-school success level of children. (Figdor, 1997, p. 71). In order to avoid the problems or to forget negativities of parental divorce, some adolescents find themselves playing on social media or on the computer. In general, girls are more likely to cope with problems after their parents are divorced than boys. In the study of Wallerstein and Blakeslee (1989), it is concluded that girls and adolescents handled the divorce of their parents more socially, emotionally and more positively in terms of success skill. Video Game Addiction of this adolescent group with divorced parents does not differ according to age, type of school, current economic situation, and parental education style. When the levels of school attachment and gaming addiction of the adolescents with married parents are examined according to gender, age, type of school, current economic situation, and parental education style; while there was no change in school attachment levels depending on gender, age, current economic status, parental training style; there was a difference according to the type of school. According to this study, it was determined that the level of school attachment of adolescents with married parents in vocational and technical high schools showed higher school attachment rates compared to those in Anatolian high school. It can be stated that the levels of Video Game Addiction of the Adolescents with



Married Parents did not show any change in terms of gender, age, type of school, current economic situation, and the parental education style in which they were educated; in other words, they are similar to each other.

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The Research of Socio-Economic Development in The European Union Countries With An Application of The Modified HDI Indicator

Aldona MIGAŁA-WARCHOŁ

University of Technology in Rzeszow, Poland amigala@prz.edu.pl

ABSTRACT

The aim of this paper will be the presentation of an alternative, a deeper one compared to the popular measure of the standard of living, which is HDI, a measure of the socio-economic development of residents of the European Union. In this article the synthetic index of the socio-economic development of the European Union countries will be presented. It will be calculated through the use of the following determinants: 'Economy and Finance', 'Science and Technology', 'Health', 'Education' and 'Living Condition'. This index of the socio-economic development of residents of the European Union countries will be created as an arithmetic mean of indicators counted for particular determinants. The index, which will be created, is treated as a modified Human Development Index due to the fact that it will be completed with the added information.

KEYWORDS: Socio-economic development, the European Union countries, HDI index, synthetic index, development index

INTRODUCTION

When we inquire about the prosperity of a nation or a region of the world and about the quality of life of its inhabitants the problem still arises: How do we determine this? What information do we require? Which criteria are truly relevant to human 'thriving'? Most social scientists and economists would agree that GNP per capita is a crude and incomplete measure of quality of life. (Nussbaum, Sen 1993, Szirmai 2015). What in this case is important about human quality of life? The problem is actually more complex. It is not only the money people do or do not have, it is about how they are able to conduct their lives and what factors influence it.

The Human Development Index (HDI) was created by M. ul Haq in 1990 with the help and advice of A. K. Sen, who established the first assumptions of comprehensive measurement of socio-economic development (Anand, Sen 1994). The index operationalized the broad concept of human development by combining health, education and income into a composite index (Aguña, Kovacevic 2010). The indicator itself was systematically improved. The most significant change was made in 2010 and was a reflection of several assumptions made by M. ul Haq, inter alia: possibility of measuring the basic concept of human development to expand humans' choices; including only a limited number of variables (to keep it simply and manageable); to be constructed rather than using plethora of separate indices; covering both social and economic choices; with the use of quite flexible methodology and resistance to missing data (ul Haq 2003). HDI is a synthetic measure based on the average of indicators covering three basic spheres of life:

- 1. The sphere of health, which is assessed by the ratio of the average life expectancy.
- 2. The sphere of education, which is assessed on the basis of the rate of educational attainment, as measured by two indicators of educational designated for the adult population, ie.: literacy (the share of people who could read and write with understanding) and schooling (the average time of education, understood as the average number years of schooling).
- 3. The sphere of income, which is assessed on the basis of GNP (US \$) per capita, calculated according to purchasing power parity (PPP \$).

On this basis, the geometric mean of the indictors is calculated and, in result, the HDI ranks countries on a scale from 0 (the lowest level of human development) to 1 (the highest level).

The necessity of finding a new measurement of the quality of life of societies is emphasized by international organizations and especially scientists. That is why the author decided to modify the standard measure. Nowadays important factors are also science and technology and the standard of human living.

That is why, in this paper the following determinants of socio-economic development will be used:

- 1. Economy and Finance
- 2. Science and Technology



- 3. Health
- 4. Education
- 5. Living Conditions

MATERIALS AND METHODS

The construction of the synthetic measure of development requires the division of diagnostic variables set to stimulants and destimulants. Variables included in the set of stimulants have been marked with the sign (+), while the (-) granted destimulants. The transformation of destimulants to stimulants was made according to the following formula:

$$x_{ij}^{\{S\}} = \max_{i} x_{ij}^{\{D\}} - x_{ij}^{\{D\}}$$
(1)

where:

 x_{ij} – value of the j-th variable for the i-th country, S symbol indicates stimulant, while the symbol D destimulant.

Then, after the transformation of destimulants to stimulants, the normalization of variables was used according to the following formula:

$$u_{ij} = \frac{x_{ij}}{\max_{i} \{x_{ij}\}} (i = 1, ..., n; j = 1, ..., m)$$
⁽²⁾

where:

- u_{ij} normalized value of the j-th variable for the i-th country,
- n number of countries,
- m number of variables.

Synthetic measure of the socio-economic development was calculated by the following formula:

$$u_{i} = \frac{1}{r} \sum_{q=1}^{r} u_{iq}, (i = 1, ..., n; q = 1, ..., r)$$
(3)

where:

 u_{iq} – synthetic variable value for the i-th country calculated on the basis of the variables belonging to the q-th determinant,

r – number of determinants.

In contrast, measures of socio-economic development according to separate determinants was calculated using the following formula (Zeliaś 2004):

$$u_{iq} = \frac{1}{m} \sum_{j=1}^{m} u_{ij}, \ (i = 1, ..., n; j = 1, ..., m)$$
(4)

A detailed list of indicators used for the construction of indicators for individual determinants of socio-economic development has been given below. Indicators have been selected based on the availability of Eurostat data.

I. Economy and Finance

- 1. Unemployment rate (-)
- 2. GDP per capita 1 (+)
- 3. Indicator of real expenditure per 1 inhabitant (+)
- 4. The number of poor people per 1000 inhabitants (-)

II. Science and Technology

- 1. Gross domestic expenditure on R&D (% of total expenses) (+)
- 2. Human resources in science and technology (% of the active population) (+)
- 3. The number of patent applications submitted to the European Patent Office per million inhabitants (+)
- 4. The number of researchers per 1000 inhabitants (+)

III. Health

- 1. Self-perceived long-standing limitations in usual activities due to health problem (-)
- 2. Self-reported unmet needs for medical care due to being too expensive (-)



- 3. Healthy life years (+)
- 4. Number of doctors per 1000 inhabitants (+)
- 5. Number of beds in hospitals per 100 000 inhabitants (+)

IV. Education

- 1. Participation rate in education and training (persons aged 25 to 64 years old) (+)
- 2. The percentage of people with at most lower secondary education and with no further education at the age of 18-24 years old (-)
- 3. The percentage of people obtaining a higher education between the age of 20 and 24 years old (+)
- 4. The percentage of people gaining or with higher education aged 15 to 64 (+)
- 5. The percentage of people with secondary education between the age of 15 to 64 (+)

V. Living Conditions

- 1. The percentage of people who are unable to meet unexpected financial expenses (-)
- 2. The percentage of people who are not able/unable to make 'ends meet' (-)
- 3. The rate of people at risk of poverty (-)
- 4. Share of people living in under-occupied dwellings (+)

RESULTS AND DISCUSSION

The proposed construction of a synthetic measure of socio-economic development is based on five pillars. On the basis of the values of synthetic measures for each determinant of socio-economic development, the final synthetic measure was calculated (table 1 and figure 2). According to the low correlation between variables, the synthetic index was calculated on the basis of all of the analyzed indicators. On the 1. graph the values of HDI index for EU countries are presented. The distribution of HDI values in the EU countries is not very diverse (figure 1), if it is assumed that - hypothetically, this indicator may have values from 0 to 1. In addition, it is a substantive conclusion - HDI is characterized by very low sensitivity for changes in conditions life. Partial indicators included in the HDI: GDP, life expectancy and indicators related to the level of education show high stability over time. Therefore, HDI values, for example, the financial crisis of 2008, which afflicted a country such as Greece, Spain or Ireland, hardly shows, while living standards in the dynamically developing countries of the "new" Union are relatively low (Poland, the Czech Republic, Hungary, etc.).



1 figure. Values for HDI measure (Source: author's calculations)

2 figure. Values for 'Synthetic measure' (Source: author's calculations)



Ranking of the EU countries according to the modified synthetic indicator of the socio-economic development was presented in the table 1. It can be seen that the highest values obtained Scandinavian countries – Sweden, Finland and then Luxembourg. The lowest values Portugal, Latvia and Greece, where the highest impact of financial crisis was observed.

Table 1. Positioning the EU countries according to the modified synthetic indicator of the socio-economic	С
development	

	Economy and Finance	Science and Technology	Health	Education	Living conditions	Synthetic measure
Sweden	4	2	17	1	1	1
Finland	6	1	16	3	3	2
Luxembourg	1	9	4	6	14	3
Denmark	3	3	6	2	17	4
Austria	5	7	5	9	6	5
Belgium	12	5	23	18	5	6
Germany	9	4	9	16	9	7
Netherlands	7	6	15	8	4	8
France	14	8	19	5	7	9
Irland	13	11	13	14	8	10
Malta	2	24	20	28	2	11
Great Britain	11	10	2	4	12	12
Czech Republic	16	13	24	11	13	13
Slovenia	15	12	3	10	21	14
Estonia	10	14	14	7	15	15
Lithuania	18	16	10	12	18	16
Poland	21	21	11	17	16	17
Spain	27	15	7	23	10	18
Slovakia	24	23	1	19	11	19
Hungary	19	18	12	21	28	20
Cyprus	8	25	18	13	25	21
Bulgaria	25	26	26	22	20	22
Croatia	26	27	22	20	19	23
Italy	22	20	27	25	23	24
Romania	20	28	8	26	22	25
Portugal	23	17	21	27	26	26
Latvia	17	19	28	15	27	27
Greece	28	22	25	24	24	28

(Source: author's calculations)

Figures 3-7 present regression models for individual determinants of socio-economic development. Models of regression functions allowed to obtain estimated parameters for synthetic measure in terms of each of the determinants of socio-economic development.









Figure 4. Regression function parameters – synthetic measure in terms of Science and Technology (Source: author's calculations)









Figure 6. Regression function parameters – synthetic measure in terms of Education (Source: author's calculations)





Figure 7. Regression function parameters – synthetic measure in terms of Living Conditions (Source: author's calculations)

Models of regression functions (presented in Figures 3-7) allowed to obtain estimated parameters for each of the determinants of socio-economic development. Their interpretation will allow to state if the synthetic measure increases, if each determinant increases by 1. This will allow to estimate which determinant has the greatest impact on the socio-economic development of EU countries. From the estimated results, it was obtained that Science and Technology (r = 0.88) and Living Conditions (r = 0.83) have the greatest impact on socio-economic development. By interpreting the parameters of the models, we will obtain that if we increase the expenditure on Economy and Finance by 1, then an increase in the synthetic measure by 0.37 will be obtained. In the case of Science and Technology, if we increase the expenditure on this determinant by 1, then we will obtain an increase in the synthetic measure by 0.81 and in Living conditions by 0.44.

CONCLUSION

The aim of this paper was the presentation of an alternative, a deeper one compared to the popular measure of the standard of living, which is HDI, a measure of the socio-economic development of residents of the European Union. It was calculated through the use of the following determinants: 'Economy and Finance', 'Science and Technology', 'Health', 'Education' and 'Living Condition'. The index, which was created, is treated as a modified Human Development Index due to the fact that it was completed with the added information.

Another issue is the fact that the universally used HDI does not show the property of presenting the sensitivity of the processes taking place in individual countries. In a dynamically changing reality, there is the need for creating indicators of the conditions of social life that will be sensitive to the processes taking place in individual countries. The traditional HDI index does not show this property.

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The Use of Expert Systems in Individualized Online Exams

Irfan Simsek

Istanbul University - Cerrahpasa irfan@istanbul.edu.tr

M. Erdal Balaban

Gelisim University mebalaban@gelisim.edu.tr

Hatice Ergin

Istanbul University (Emeritus) htcerginn@gmail.com

ABSTRACT

With the Expert Examination System developed within the scope of this study, questions can be prepared in accordance with the measurement and evaluation criteria in education, which helps measure the students' actual knowledge levels effectively. It is possible to create exam forms by using these questions. The developed Special Examination System records the data of the student and the student's interaction with the system and determines the questions to be used to measure the knowledge level of the student and the order of the system in accordance with the information obtained from the student. In addition, what has also been taken into consideration in the development of this system is that it can be developed according to the needs and student characteristics, and that it can be adapted to the current situation. The aim of this study is to develop an individual exam module where the questions are categorized according to cognitive levels, item difficulty and item discrimination are calculated automatically and difficulty levels are adjusted according to the situation of answering the questions of the person during the examination in both classroom and online environments.

KEYWORDS: online exam, expert system, expert exam system, expert agent, computer adavtive test

INTRODUCTION

In this age when computer technology penetrates every aspect of human life, it is necessary to take advantage of this technology in online exams. Expert Systems are a branch of the subject of artificial intelligence and are mainly programs that use human knowledge intensively in problem solving at a specialist human level. These systems are computer programs that can do the work of a specialist person in any complex system. These systems can also be classified as computer programs that can-do jobs that demand expertise such as advising, analyzing and classification, and are capable of performing diagnosis and so on. These programs combine expert knowledge and the ability to use the knowledge necessary to solve problems (Kidd, 2012). Alberico & Micco (1990) define expert systems as computer programs that can be used instead of experts in problem solving and decision making.

Expert systems can be expressed as a transition from data processing to information processing. In data processing, the database is processed effectively depending on an algorithm; in information processing on the other hand, the knowledge base consists of rules and facts which are removed without being bound by any algorithm (Haque, 2013). The expert system is a computer program that emulates the behavior of the expert who solves real-life problems in a particular area. The creation of an expert system consists of two steps (Baur, 1991). The first step is to collect the information and methods to be used in problem solving from the expert person or people. The second and final step is to rearrange the information and methods in a structure that was created to be used later. These processes fall into the field of information engineering. The most significant difference between expert systems and classical computer programs is that expert systems evaluate the data and the classical computer programs use the data (Kidd, 2012).

It is a fact that the examination modules used in the current e-learning systems in our country do not provide a complete assessment-evaluation facility. This is because, the questions asked are not formed according to the level of questions and it is not checked whether the questions are prepared according to the measurement and evaluation criteria in education. Therefore, it can be seen that student knowledge cannot be measured in a distinctive way and the results obtained from these exams cannot provide an objective evaluation. Since there is no individualized online examination system to meet these needs, a web based expert examination system has been developed.



The problem question of this research is "Is the expert examination system usable for individualized online exams?" The expert examination system developed for this research was prepared based on the criteria of preparing the questions according to different cognitive levels, determining the difficulty levels according to the item analysis, setting the question types according to the student potential (individually), and the criteria based on testing students in the classroom and individually. For the purpose of the study, answers to the question "What are the opinions of the experts about the use of expert systems in individualized online exams? was sought.

LITERATURE REVIEW

Expert Systems

Expert systems are often the ones that perform the tasks performed by the expert of the field. According to Kidd (2012) expert system is a computer program that can solve problems or make suggestions with its expert knowledge and reasoning ability. These programs combine expert knowledge and the ability to use the knowledge necessary to solve problems (Jackson, 1998). Alberico & Micco (1990) define expert systems as computer programs that can be used in place of experts in problem analysis and decision making.

The expert system can normally perform functions that require human expertise or play a supporting role in decision-making. If the person in the decision-making process is an expert, it can consolidate the decisions. People using such programs can reach the expert level in practice thanks to the technical information given by the program even if they are not experts in the subject (Baur, 1991; Pigford & Bauer, 1994).

Expert systems can be expressed as a transition from data processing to information processing. In data processing, the database is effectively processed based on an algorithm, while in the information processing, the information base in the processing is effectively processed by the rules and facts extracted from an algorithm without being bound to it (Durkin & Durkin, 1994; Jackson, 1998).

The expert system is a computer program that emulates the behavior of the expert who solves real-life problems in a particular area. The creation of an expert system consists of two steps (Baur, 1991). The first step is to collect the information and methods to be used in problem solving from the expert person or people. The second and final step is to rearrange the information and methods in a structure that was created to be used later. These processes fall into the field of knowledge engineering. The most important difference that distinguishes the expert systems from the classical computer programs is that the expert systems evaluate the data, while the classical computer programs use the data.

An expert system is ready to be available 24 hours a day, unlike a specialist who has needs such as sleeping, resting, and having a holiday. It is also impossible to have a specialist in many cases, but it is possible to have many expert systems. Unlike humans, an expert system does not die and take away all its information, the knowledge of an expert system can easily be copied and stored. A computer expert system can always be accepted as at the peak of its performance compared to the expert, because the reliability of the recommendations the experts brings when they are tired or sick can be questioned. In contrast, a well-developed expert system will always generate the best possible recommendations within its limits (Collins, 2018; Ericsson, Hoffman, Kozbelt, & Williams, 2018).

An expert system consists of three components; knowledge base, result extraction machine and user interface. The knowledge base contains the necessary definitions, rules and facts that the system will use for a particular problem. The result extraction machine determines when and how the facts and rules are used to decide, or in other words, to solve the problem. The user interface provides the communication between the user who wants to solve the problem and the problem-solving system, the expert systems (Ericsson et al., 2018).

Expert systems are used instead of experts. Comparison of an expert system with an expert is given in Table 1 (Durkin & Durkin, 1994). It visible that the expert systems have more outcomes.



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Factor	Expert	Expert System
Time availability	Work day	Always

Tablo 1: The Comparison of the Expert and Expert System

1 actor	Expert	Expert System
Time availability	Work day	Always
Location	Local	Anywhere
Safety	Can't be replaced	Replaceable
The possibility of loss	Yes	No
Performance	Variable	Consistent
Speed	Variable	Consistent
Cost	High	(usually faster)
		Affordable

The most important feature that distinguishes expert systems from other computer programs is that the expert systems are in a modular structure and to insert the knowledge for the solution of the problem in a portable knowledge base rather than source codes.

Nabiyev, Çakiroğlu, Karal, Erümit, & Çebi (2016) explains the internal structure of expert systems briefly as follows;

- > The knowledge base is the unit that allows the creation of new information from the information that is being stored in a special way. Knowledge base is the cornerstone of an expert system. It can also be defined as the brain of the expert.
- > *The task of the expert* is to provide new information to the system. This process of gaining knowledge is often so complex to be done by an ordinary person.
- > The information gaining module creates an interface between the expert and the knowledge base. It is responsible for taking the information given by the expert in a format appropriate to the knowledge base and placing it in the knowledge base.
- > *The database* is in the form of a traditional relational database. Basic objects or properties are stored in this database.
- > The logical conclusion mechanism is the unit responsible for conducting research on the knowledge base and making logical conclusions using the database. By referring to the rules and facts, they understand what they mean and perform the reasoning function.
- > The auxiliary interpretation module helps the logical conclusion mechanism to produce logical results.
- > The user interface acts as an adapter for the user to communicate with the system. It puts the user questions into a format that the mechanism of conclusion can understand.
- The user is a non-expert person. This person does not have to know about the internal structure of the system.
- Description Unit; explains how the judgments are made. In addition, if the user asks some questions in the communication process and if the user wants to know why this question is asked, the explanation unit makes the necessary explanation.

One of the general techniques of expert systems is character and word matching technique. Any changes to the knowledge base of a developed system will not affect the entire system. There are decision units to decide on their own. These and similar features make expert systems different from the other programs.

Areas Where the Expert Systems are Used

- > Interpretation: Identification of states from sensor transmitters.
 - Area of Use: Voice recognition, Image Analysis, Review
- **Forecast:** Extraction of similar results to given cases
 - Area of Use: Weather forecast, Grain Estimation
- Diagnosis: Detection of system disorders according to observation results Area of Use: Medicine, Electronics
- Design: Object design under limited conditions Area of Use: Circuit Drawing
- Planning: Designing operations
- Area of Use: Automatic programming, Military planning
- Imaging: Comparison of observations to plan sensitivities
- Area of Use: Regulation of Nuclear Power Plants and Cost Management
- Debugging: Delivering deficiencies that cause errors Area of Use: Computer Software



- Repair: Implementation of a defined management plan Area of Use: Automobile, Computer
- Education: Determining and correcting student behavior Area of Use: Consultation, Improvement, Treatment
- Control: Interpretation, estimation, repair and monitoring of System Behavior *Area of Use:* Air Traffic Control, War Control

Individualized Testing in a Computerized Environment

We see that the individualized first test application was developed by Alfred Binet during the development of the Alfred-Binet IQ test. This work of Binet carries all of the features that an individual test has to carry: a pool of pre-prepared items, questions categorized by difficulty levels, the starting choice, a predefined scoring system, a rule for selecting questions from the pool and a predefined termination rule. Although this first application is very simple in comparison to current applications, it can be said that this first application is the basis for today's tests.

Later in the 1950s, there were some studies, but the progress was not possible. In the 1960s, Fred Lord, from the Educational Testing Service, had important work on this subject. The main idea of Lord, (2012) was "a test with a fixed number of questions is not particularly suitable for students with low and high ability levels. If appropriate questions are used, the same test can be performed in less time without any loss of information." After that, it was developed by American Naval Forces (Eggen & Straetmans, 2000; Kingsbury & Weiss, 1983; Olsen, Maynes, Slawson, & Ho, 1989).

For the individualized tests to be effective, it is required that they do simultaneous calculations and speedy selection of the questions from the database, and the speedy selection of the next question, thus, the full implementation of such an application was accompanied by the developments in computer technology and decline in the prices in the 1970s. Thus, the concept of Computer Adaptive Individualized Testing (CAT) "has emerged (Çıkrıkçı-Demirtaşlı, 1999).

Properties of Tests Individualized in a Computerized Environments

Nowadays, individualized tests in a computerized environment are mainly used in TOEFL and GRE tests, but also in many other areas. Those who take these tests do their tests on a computer and answer questions at the computer. The computer does more than just offering a multi-media tool with advanced graphics, sound etc. here. Instead of applying a predetermined set of questions in sequence, the computer selects the questions according to the course of the test. Because asking questions beyond the level of the students (very difficult) or asking questions that are far below the level of ability (very easy) of the individual does not provide much information. In addition, asking questions that are not appropriate to the individual's ability level may cause boredom (Rana, Greenwood, Fox-Turnbull, & Wise, 2018).

To maximize the sensitivity of the exam for gathering information about what the individual knows, the questions to be asked are carefully selected based on the previous questions. According to the point of view of the testee, the difficulty of the examination is shaped according to their abilities. For example; a person who is going to take the test can be tested with a more difficult question if he / she has performed well in a medium difficulty item; or if they performed poorly, they could be tested with a simpler question. Compared to the Static Multiple Choice Tests experienced by almost everyone, computer-assisted tests with a series of invariant items applied to each exam require less items to achieve equal and complete scores (Kingsbury & Weiss, 1983; Thissen, Mislevy, & Wainer, 2000).

Tests applied to the individual in the computerized environment apply the following steps: first pulling out questions from the pool to the level of difficulty appropriate to the level of the individual. Then, throughout the test, continuous adjustment is made at the ability level during the application in order to make the individual's ability estimation in the best possible way. These adjustments are dependent on the performance of the individual until he or she reaches the question. If a question is answered incorrectly, the next question will be easier (point value lower); if the answer is correct, the next question is more difficult (higher score value). The important point is that since the applied questions are applied to hundreds or even thousands of people before being added to the pool, the parameters (difficulty, discrimination index, and frequency factor) are known and the questions to be applied are selected based on these parameters (Thissen et al., 2000).

The progress of such a test application can be summarized in the following steps (Çıkrıkçı-Demirtaşlı, 1999; Hambleton & Swaminathan, 2013; Parshall, Harmes, Davey, & Pashley, 2009):



- 1. An estimate is made about the individual's ability level. It is a good approach to choose a medium-level question here, because the first one is the average difficulty, as we do not know anything about the level of ability of the individual. The item pool is grouped by subjects and / or levels of difficulty and applied to hundreds or even thousands of people and includes well-defined questions. A good pool of material is expected to contain a large number of questions, so the likelihood of applying the same questions is reduced. Over time, it is possible to add new questions to the pool and remove questions from the pool.
- 2. Among the questions in the item pool, the most appropriate one is selected. If the correct answer to this question is given, the more difficult one, and if the wrong answer is given, then the easier question will be asked. Only correct or only incorrect answers cannot be used in estimating skills.
- 3. A new ability estimation is made about the individual. Although there are different mathematical methods for estimating ability, two methods are used: Maximum Likelihood and Bayesian. While the Maximum Likelihood method is based on selecting the question that gives the most information about the individual, Bayesian chooses the question that will minimize the next ability estimation range of the individual.
- 4. Steps 2 and 3 are repeated until a preset stop criterion is met. The criteria used to finish the test can be going below a standard number of errors, a predetermined number of questions or time limit. The difficulty level of the questions asked to the individual is effective in quantifying the questions into scores. While the score value of difficult questions is low, the score value of easy questions is lower. The scores of the individuals who answered the same number of questions vary according to the number of questions they answered.

The important advantages of the individualized test application can be listed as follows (Durkin & Durkin, 1994; Ericsson et al., 2018):

- Shorten the application time of the test,
- Each student receives a test of his or her own level,
- Increases security,
- > Test results can be evaluated instantly,
- The test can be given at any time,
- > The test eliminates the use of paper,
- It is easy to remove unwanted questions from the question pool,
- Expands test standardization,
- Reduces test proctoring time,
- Increases flexibility in question selection.

In addition to these advantages, there are some disadvantages as well (Çıkrıkçı-Demirtaşlı, 1999; Hambleton & Swaminathan, 2013; van der Linden & van Krimpen-Stoop, 2003):

- Not applicable for every subject or skill,
- Limits and cost of computer hardware may be a problem,
- > Fear of computer may cause problems in such applications,
- > The fact that the measured ability is not a one-dimensional requirement is not met,
- > The need to have a large pool of question items

Item Response Theory

The most appropriate mathematical theory that can be used for individualized tests in the computerized environment is the Item Response Theory. The most important aspect of this theory is that it makes ability estimations independent from the applied questions. Even if individuals are tested with different questions, Item Response Theory provides a standard framework for predicting the abilites of different individuals (Hambleton & Swaminathan, 2013; Parshall et al., 2009; Yenal, 1995). Even if two different tests with different questions are applied to the same individual, the predicted ability level is not different. The theory has the assumption that there is only one factor explaining every ability, but it is clear that such an assumption cannot be easily achieved. For example; if we consider the English language proficiency, we cannot say that it consists of a single factor, because it includes factors such as reading comprehension, vocabulary, listening and writing (Embretson & Reise, 2013; Hambleton & Swaminathan, 2013; Lord, 2012).

Ittem Response Theory suggests three different models consisting of one parameter, two parameters and three-parameter models. One parameter model correlates with the item difficulty parameter (bi) and the level of the individual's ability (Bolt, Cohen, & Wollack, 2001; Crocker & Mazer, 2019). In the two-parameter model, the distinction parameter is added to the item difficulty parameter (distinction power of a question between the



low and high ability groups - ai). In the third model, the chance factor parameter (the probability of low-level individuals correct response - ci) is added to the two-parameter model (Hambleton & Swaminathan, 2013).

The three-parameter logistic model of the Item Response Theory is the most suitable for multiple-choice question types in individualized computerized test applications. In this model, there are three parameters for each question: ai, bi, and ci. ai question is the index of discrimination (distinction power of a question between the low and high ability groups at a certain ability level), -bi question represents the degree of difficulty (the level of ability the item provides the most information) and -ci represents the forecast index (Lin & Spray, 2000). These parameters are different for each question. An example item characteristics curve graph calculated based on these parameters according to the probability of giving correct answer to the question in one level is shown in Figure 1.



Figure 1: Item Characteristics Curve

In this graph, the x-axis (theta) represents the ability levels and y-axis (prob) represents the possibility of correct answers of the problem. ai is the slope of the point where the twist point of the graph (probe = 0.5) intersects the x axis. The larger the value of ai, the steeper the chart and the more distinctive it will be. The value of -bi will move the graph to the left or to the right (the probability of the correct answer to the question will vary for the ability levels, the more to the left the question is the easier the question is; the more right the question goes the more difficult it is). ci is the point at which the graph intersects the y-axis, and the ability of those at very low skill levels to make this question, ie, when a random answer is marked, gives the possibility that the answer is correct. The higher the value, the higher the likelihood of correct answer by the lower ability level students (Çelik, Baran, & Sert, n.d.). The selection and grading of the questions in the test application are done according to these parameters. Among the weaknesses of the Item Response Theory are the need for large sample groups, the complexity of the theory and the difficulty of interpreting the results, the need for special software, and a number of assumptions that their provision is more difficult than the classical test theory (Bolt et al., 2001; Hambleton & Swaminathan, 2013).

There are other methods besides Item Response Theory for individualized tests. Lawrence Rudner developed the Measurement Decision Theory to be used to classify individuals. Sequential Probability Ratio Test is an approach used to classify individuals according to their competencies (Kingsbury & Weiss, 1983; Piton-Gonçalves & Aluísio, 2012).

Use of Individualized Tests in Education

Individualized tests in computerized environment are currently used in GMAT (Graduate Management Admission Test), GRE (Graduate Record Examination), TOEFL (Test of English as a Foreign Language) applications. In these tests, individuals are asked questions from a pool of previously prepared questions with known parameters. Each question is determined according to the individual's performance in previous questions. These tests are carried out by prior appointment in certain test centers.

For the application of quantitative and verbal parts in GRE, 58 questions are used and the application lasts 75 minutes. The TOEFL application takes 165 to 210 minutes, but this also includes the application of the listening



and writing parts. Similarly, the GMAT application lasts 210 minutes. These exams provide high reliability information about the level of ability they measure in shorter time using fewer questions (GRE & TOEFL Official websites, 2018).

In a study which included the comparison of individualized tests on computerized environments to pen and paper exams according to validity and reliability (Lord, 2012), the following conclusions were found: individualized tests gave high reliable results than the pen and paper tests with less than half the number of questions used; in large-scale samples, the validity of individualized tests was found to be better. In summary, this study provides verbal aptitude predictions with high reliability when compared to the same length pen and paper tests in 15 item individualized tests.

There is an extensive literature on individualized testing in computerized environments practices abroad. World leading individualized test applications in computerized environment include:(Olsen et al., 1989; Parshall et al., 2009; Thissen et al., 2000):

- ➤ Adaptive Matrices Test (AMT),
- > ASCP (American Society of Clinical Pathologists-Board of Registry Certification Examinations),
- > ASVAB (the Armed Services Vocational Aptitude Test Battery),
- > CAT of Written English for Spanish Speakers,
- ▶ BULATS (Business Language Testing Service) Computer Test,
- ➤ CATE (Computerized Adaptive Test of English),
- > COMPASS series of tests from ACT, GMAT (Graduate Management Admission Test,
- ➢ GRE (Graduate Record Examination),
- ► LPCAT (Learning Potential CAT),
- > MAP (Measures of Academic Progress),
- Microsoft Certified Professional exams,
- > NAPLEX (North American Pharmacist Licensure Examination),
- NCLEX (National Council Licensure Examinations)
- STAR Math, Reading, and Early Literacy tests

Considering the studies on individualized test applications in our country, İşeri (2002) came to the following conclusions by measuring the mathematics achievement with the computerized individualized test by using the question bank compiled from the mathematics parts of the Secondary Education Institutions Selection Placement Exam and of the Private Schools Exam: individualized tests in the computerized environment reliably measure the ability level using less questions; if students were allowed to control their answers, students at high level of talent were estimated as low talent levels; The Bayesian method provided better estimation, and both fixed number and stationary false stop methods yielded good results.

Weller (2019) compared the individualized tests on computerized environments with the pen and paper tests in his study. In this study, he has developed and implemented a test consisting of past University Entrance Exam questions. 14 questions were applied in computerized environment against 50 questions in a pen and paper test. At the end of the study, the test showed significant decreases in application time and number of questions. There was no significant difference between ability estimates.

Şahin & Kışla, (2013) in their study examining the compatibility of the Private Schools Exam data with the Item Response Theory, found that one-dimensionality, local independence, low chance of success were met and that the Item Response Theory was appropriate for evaluating the exam.

METHODOLOGY

The research was designed in a qualitative design. Semi-structured interview form was used as data collection tool. Interviewing is one of the most widely used data collection tools in qualitative research. Creswell (2002) defined the interview as "a process of mutual and interactive communication based on the way of asking and answering questions for a predetermined and serious purpose" (Yildirim & Şimşek, 2005).

The working group comprised of the faculty members of the Istanbul University Hasan Âli Yücel Faculty of Education, Teaching Principles and Methods, and eight assessment and evaluation experts (3 males, 5 females). At the same time, these faculty members (1 Professor, 3 Associate Professor, 4 Assistant Professors) are experts in the field of assessment and evaluation, who have been teaching Assessment and Evaluation and Teaching Principles and Methods for at least five years. In order to obtain the expert opinion in the preparation of the exam form and in the interpretation of the results of the evaluation, objective sampling has been accepted. In this type



of sampling, it is aimed that the researcher believes that he / she will find answers to their problems and that, in accordance with the objectives of the research, only one part of the whole body is observed.

The main features of this system are as follows;

- > It records the data of the student as a result of the interaction of the student with the system,
- ➢ In the light of the obtained data, it determines the questions to be used in measuring the level of knowledge of the student and the order of operation of the system,
- The system can improve itself according to the changing needs and student structures and adapt itself to the current situation.
- > Questions are categorized according to cognitive fields and goals and outcomes,
- Since the content validity measurement is performed by experts who experts in evaluation are, each student has the same question level, but the program can ask different questions.
- Content validity, item difficulty and item differentiation has been measured for each cognitive level for exams which will not be performed online, thus serves as a quality question bank,
- An infrastructure to perform a personalized examination is developed and a real assessment can be done.
- ▶ It helps prepare the exam according in accordance with the test plan steps,
- > By the help of text editor, it allows for alternative question techniques to be used in the questions and choices.
- ➤ While preparing the question and the exam form, the expert agent helps to prepare them according to the educational measurement and evaluation criteria.

FINDINGS

All the participants have confirmed the necessity of such a system when asked "Is there a need for such an expert examination system when preparing the exam form? If so, why?" two of the participants answered as follows:

"I think it is absolutely necessary to have such a system when preparing the exam form. Although teachers have prepared samples of questions having taken assessment and evaluation courses, we see that sometimes people do not internalize assessment and evaluation criteria since they do not have control system (feedback) and sometimes they prepare questionnaires filled with errors without being aware of them. This system gives feedback to the teacher at every step and ensures that the questions are prepared in accordance with the assessment and evaluation criteria. In addition, getting feedback from 3 different experts related to each question further strengthens the system. Thus, the teacher's awareness increases his knowledge and skills."

"There is a need. It will make assessment and evaluation process more reliable, valid and objective. In addition, it will be possible to ask questions from all levels and it will be possible to differentiate between the ones that learn and the ones that do not learn. These transactions will not be left to chance. It will eliminate the differences in terms of the quality of preparing questions among teachers who give the same course in an institution. Unfortunately, sometimes a teacher with 1 or 2 questions can be found. It can be seen from some teachers that 90% of the class has 90 or more points. There is a need for this system in order to prevent the preparation of questions in a way that does not comply with the assessment and evaluation criteria like this and to prepare quality questions."

To the question "*Related to this Expert Examination System, in which Expert Agents and individuals interact; What do you think about the cooperation of expert agents and individuals?* two-thirds of the participants stated that the teacher's knowledge and skills will improve with a cooperative study.

"With this cooperation, it will be possible to prepare more quality questions in a shorter time. Moreover, it will be a system that the teacher can trust."

"I think the points that can be overlooked by the expert agent can be easily captured. This will help the person to feel safe when using the system."

"It is easier for the expert to control each problem in terms of assessment and evaluation criteria. The expert examines the questions in more qualitative terms and gives feedback."

"It is not always possible for a teacher to talk to an expert. However, I think it is a chance for this expert to be brought to the teacher's feet as a computer program."

All participants answered "yes" to the question "Expert Agent interactions; Is it instructive to help the questioners in terms of assessment and evaluation criteria?"

"Yes it is instructive. In fact, it is accepted that the people to prepare the questions learned these criteria and graduated, and they know the criteria after graduation. In practice, however, it is often observed that no questions have been prepared in accordance with these criteria. With this system, it



will be possible for the them to remember what they have learned, to re-learn what they have forgotten, and to reinforce what they have learned."

"It is absolutely instructive. Because almost every stage has defined criteria, it gives regular feedback. Through this feedback, we prepare questions that are appropriate to the criteria and on the other hand, the criteria are learned."

"As it is an interactive process, it is possible to say that it will contribute to this direction."

"It will enable the teacher to develop as it gives feedback to the teacher in all stages of preparing questions and creating test forms."

Some answers of the participants to the question "Expert agent in the Expert Exam System, what do you think about the facilitation of experts' task by checking if each question is in compliance with the criteria for assessment and evaluating? are as:

"It is easier for the expert to control each problem in terms of assessment and evaluation criteria. The expert examines the questions in more qualitative terms and gives feedback."

"The fact that the Expert Examination System checks the compliance of each question with the criteria for preparing an assessment and evaluation question ensures that the expert does not spend time and energy on the quality of the questions. "

"If the Expert Agent is programmed very well, it will make the teacher's job much easier."

Some of the answers given by the participants to the question "What is your criticism towards such an Expert Examination System when you were preparing an exam form, what are the challenges?" are given below:

"I believe that it is very useful in the long run, even though it is a bit time-consuming until the question bank is created at the beginning. There may be disruptions if the experts do not provide feedback during the specified time. There may be difficulties in finding an expert."

"I believe that when the system is well-structured, it will provide a lot of convenience and benefit on the contrary."

"Anyway, if teachers believe that there are questions in the question bank and whenever they want to mix them they can do so, it can push teachers to laziness about creating new questions. I have concerns about getting past with other teachers' questions."

"Criticism may occur when the system is applied rather than to exam questions and forms. In the current framework, it is a system consistent with its objectives. However, new and unexpected situations encountered in the application will allow for further development of the system."

Some of the answers given by the participants to the question "What are your suggestions for such an Expert Exam System when preparing the exam form?" are given below:

"Teachers preparing questions may be resistant to implementing this system. Methods and strategies to reduce this resistance and encourage teachers to use this system can be developed. Because this system is a system that requires constant renewal. However, teachers can ask for the same questions for 10 years. For this reason, it is recommended that the teachers use the system together in the department."

"Before the application of this system, the teachers who will prepare questions in this system can be given a training on the assessment and evaluation criteria. Thus, negative feedback and loss of time can be prevented. I can especially recommend that branch teachers in schools use this system in common."

"I can suggest that the Expert Exam System is a structure where teachers can create their own question banks within the system and share the questions they want."

CONCLUSIONS

In the interview with the Assessment and Evaluation Expert Instructors, they stated that such an Expert Examination System is required in preparing the exam form, and that even though the teachers have the knowledge of assessment and evaluation, when they do not have feedback, they sometimes prepare the wrong exam forms without being aware. The feedback from three different field experts strengthens the system. Quality questions can be prepared in a short time by means of a collaborative study by expert agents and individuals. It will also make the person feel safe when using the system. At the same time, it will help remember the forgotten information and reinforce the existing information. As there is a regular feedback, it is instructive in terms of assessment and evaluation criteria for the question preparing individuals.

The Expert Agent in the individualized online Expert Exam System will enable the expert to facilitate the task of the individual by checking whether each question meets the criteria for preparing an assessment and evaluation, allowing the expert to provide feedback to the questions in a more qualitative way. The criticism about the Expert Examination System is that it does not appear to be useful until just a sufficient number of questions are piled at the beginning of the question bank, and that it will create malfunctioning when the system does not give feedback



during the specified time. There are also criticisms that the ready-made question bank could lead the teachers to laziness about preparing new questions. Although the questioners might resist to use such a system at the beginning, the resistance will be reduced, especially after a sufficient number of questions are piled in the question bank. Besides, it is clear that negative feedback will decrease if the teachers are given a training about the criteria for preparing assessment and evaluation. This system is especially important for the use of branch teachers and to create a common question bank.

Thanks to the Expert Examination System which the Expert Agents and individuals interact with, a quality question bank can be created in accordance with the assessment and evaluation criteria in education. The system has an infrastructure that can perform individual tests. In addition, after the online exams are conducted, an individualized examination can be made as the questions' item analysis are performed. It is also important that the developed Expert Examination System is a system that not only facilitates the preparation of an effective question in accordance with the assessment and evaluation criteria but also eliminates the deficiency of knowledge of the person preparing the questions, thus improves them.

Some of the rules defined by the Expert Agent are as follows:

- When preparing a multiple choice question; to select the number of options it determines 3 choices for classes 1-3; 4 choices for classes 4-8. and 5 choices for classes 9-12.
- Warns the person who prepared the question in case of using "none" or "all" in the correct answer or in or in the distractors.
- Warns the person who is preparing a question about the choices should be given in order if they contain dates or numbers.
- ➢ In the case of the matching question type, it is recommended that the premiss should be at least 6 and maximum 15, and that the answer list should be at least 3 more than the premiss.
- When preparing a question in the fill in the gap question type; the question is not to use more than one gap, the beginning of the sentence should not start with a blank, and the sentence should not end in auxiliary verb.
- It helps the person who prepares questions with sample questions and questions about what to look for while preparing a question according to the chosen level of cognitive domain.
- Warns the person who prepared the test that a test form can be used with up to three different types of questions, at the same time matching question type, true / false and gap-filling question type trio should not be used together in the form of an exam form.
- In the form of an exam, there should be questions in each cognitive level and the distribution should be balanced.
- Calculates and shows the number and distribution of questions according to content in the developed exam form.
- Calculates the item analysis and creates question cards after the online exam.
- Calculates the success level of the students after the examination. It also calculates the success level and percentage of the questions asked in the exam according to the cognitive levels.

"Expert Examination System"; as the questions are grouped and stored by the question categories, the teacher has the opportunity to make a real assessment and evaluation since he can access the questions related to the question type at every level while preparing the exam form. As the question category in the "Expert Exam System" is a dynamic structure; when preparing a question, people who do not want to prepare the questions according to Bloom's taxonomy or who want to prepare according to the revised new taxonomy can easily determine the difficulty levels. "Expert Examination System"; unlike the online exam modules included in other e-learning systems sends the questions uploaded to the system to be checked by at least three field experts before signing up to the system. This check is made to evaluate whether the questions to be stored into the system are appropriate for the category in which they are intended to be prepared. The questions are recorded in the system after at least two of these three experts have approved.

In applications developed for commonly used learning management systems such as Moodle, Blackboard and other online exams; it is observed that the exam questions are not prepared according to the assessment and evaluation criteria and the questions are not categorized according to cognitive levels. The "Expert Examination System" has been developed since the questions are not prepared according to cognitive levels and in order to contribute to the elimination of this deficiency, and because preparation of questions is left at teachers'goodwill. "Expert Examination System" has been developed in an object-oriented structure using open source PHP programming language and MySQL database so that it can run smoothly on every platform. Because the system is prepared on the internet, people who want to use this system can access the system with modern web browsers and use the system without any problem. In addition, web service infrastructure has been prepared in order to draw courses, lecturers and students from the automation systems used in the institution.



After the student has passed the exam the "Expert Examination System" provides the students with information about how many correct answers the student made in the exam, how many questions he answered incorrectly, and how many questions he has not answered at all. In addition to this, it also provides information about how many questions are asked in what question category, how many of them could be answered and how many of them are not answered. According to these results, the teacher can see the student's deficiency and direct the student to complete the deficiency. The "Expert Examination System" provides teachers with the opportunity to prepare questions with a high degree of validity and reliability by reducing the errors in preparation to the least. In this way, high validity and reliability are ensured.

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