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Sakarya-Turkey

Message from the Editor-in-Chief

Dear Colleagues,

TOJET welcomes you. TOJET looks for academic articles on the issues of educational technology. It contributes to the development of both theory and practice in the field of educational technology and accepts academically robust papers, topical articles and case studies that contribute to the area of research in educational technology.

The aim of TOJET is to help students, teachers, academicians, scientists and communities better understand the development of educational technology. The submitted articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. It provides perspectives on topics relevant to the study, implementation of educational technology.

I am always honored to be the editor in chief of TOJET. Many persons gave their valuable contributions for this issue. I would like to thank the guest editor Dr. Amirul Mukminin from Jambi University and the editorial board of this issue.

TOJET will organize IETC 2018. IETC (International Educational Technology Conference – www.iet-c.net) will be held between August 8-10, 2018 in Indiana University, Bloomington, In, USA.

July 01, 2017

Editors,
Prof. Dr. Aytekin İŞMAN
Sakarya University

Editorial Board

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Development of Computer-Based Experiment Set on Simple Harmonic Motion of Mass on Springs

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ABSTRCT
The development of computer-based experiment set has become necessary in teaching physics in schools so that students can learn from their real experiences. The purpose of this study is to create and to develop the computer-based experiment set on simple harmonic motion of mass on springs for teaching and learning physics. The average period of oscillation, the displacement-time, the velocity-time and the acceleration-time are relevant to the theory. Based on Constructivism Approach, 96 upper secondary students were tested on this computer-based experiment set. The satisfaction of the samples to their learning activities is at a high level and their pre-test and post-test scores are 9.22 and 73.80 % respectively. With the developed experiment set, learners will have an easier way to study the simple harmonic motion of a hanging mass on spring and an easier way to measure the position of an oscillating mass as a function of time. Thus, learners would get their physics concept more precisely and more quickly than ever. Learners' laboratory skills are promoted both inside and outside classrooms. Physics teachers are able to construct experiment sets on their own with low cost, and this experiment set will certainly benefit their physics teaching.

Keywords: Computer-based experiment set, Simple harmonic motion, Teaching and learning physics

INTRODUCTION

The basic knowledge of physics is necessary to technological innovations because physics is the basic of technologies (Hartmann & Mittelstrass, 2002). Physics helps us to understand the operation of all devices around us such as telephones, computers, cameras, light bulbs, air-conditioners, photocopiers, etc. It also helps us to understand the causes of the natural phenomena such as rainbows, tides, floods, earthquakes, seismic sea waves, storms, etc. Although physics is necessary and useful, some students do not like to study it. They consider it too difficult and do not enjoy taking it (Ornek, Robinson & Haugan, 2008). Physics is inevitably difficult if it is solely studied through imagination. It is hard to imagine learning to do science, or learning about science without doing laboratory experiments or field work. Physics is a complex process and causes frustration for teachers and students. Therefore, the inventions of devices to represent physical concepts instead of using only physical or mathematic formulas and calculations have become indispensable for researchers.

Nowadays computer simulations have become available for a wide range of science subjects including physic. Several researches about simulation of physic theory have been done such as projectile and circular movement (Holec, Pfefferová & Raganová, 2004, Aravind & Heard, 2010, Hutem & Kerdmeee, 2013). For the efficiency of computer simulation, most of the studies that compare condition with or without simulations report positive results. The computer simulation can be used to replace or enhance traditional instruction (Rutten, van Joolingen & van der Veen, 2012).

In addition to computer simulation, Computer-Based Experiment (CBE) also assists students to understand the contents of physics more easily (Trumper, 2003, David, Priscilla & Ronald, 2007). Computers help students to collect data and display the graphs in real time rapidly. Students understand the relation between the theoretical knowledge and observation. Besides, students can practice drawing graphs displaying the results of the experiments on their own or are able to analyse the involved variations later (Amrani & Paradis, 2010). CBE has been an effective inovation which benefits the process of studying physics and stimulate the students to have a concept of what they have learned. During the experiment students have their own views over the experiment which they already have done. With CBE, students have more time to be able to summarize their knowledge in physics (Pierri-Galvao, 2011).

The construction and development of CBE set using computer interface consists of a microcontroller connected with a computer and an electronic circuit in order to control an experiment and to sensor other variations. The Arduino microcontroller is a very favorite make because it is easily operated. It is also and affordable. Its software can be downloaded free (Naveenkumar & Krishna, 2013, Luiz, et.al, 2013, Vasquez, 2013, Zachariadou, Yiasemides & Trougkakos, 2012).

The objective of this research is to create and develop the computer-based experiment set for teaching and learning physics on simple harmonic motions of mass on the springs with an Arduino microcontroller connected with a computer and a sensor device. The relevant of experimental result to the theory could be determined together with the efficiency of the experiment set and the satisfaction of student samples.

METHOD

The construction and the development of the equipment for the research implementation and the collection of the data are as follows:

Design and Construction of Computer-Based Experiment Set

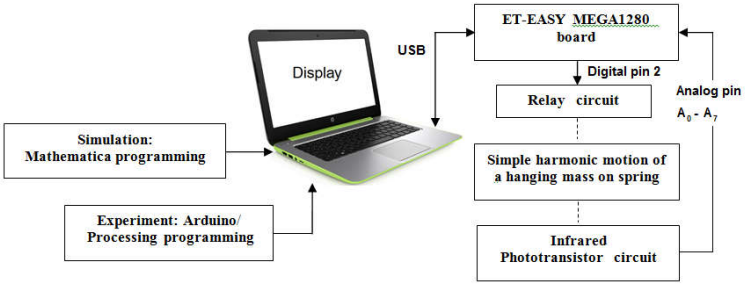


Figure 1. Computer-based experiment set

The computer-based experimental sets consisted of hardware, software and performance as shown in Figure 1. The hardware part is Arduino board, ET-EASY MEGA1280 (Duino Mega, Figure 2) connected to a computer or a notebook via a USB port, a relay circuit with digital pin 2, a simple harmonic motion of a hanging mass (Figure 3) on springs, an infrared phototransistor circuit with analog pins 0-7 of an Arduino board, a piece of cylindrical metal, a spring and voltage power supply. For the software, the operating system is Windows 2010 Profession. Arduino1.5.2 controls the experimental performance while Processing 1.5.1 displays output for displacement vs. time in real time graphs. Mathematica 9.0 is used to show theoretical simulation and to plot a graph of the period of oscillation vs. mass, displacement vs. time, velocity vs. time and acceleration vs. time and in order to find the best curve fitting.

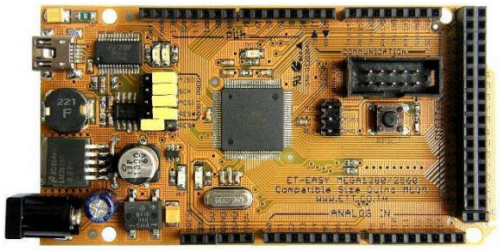


Figure 2. AVR microcontroller board; ET-EASY MEGA1280

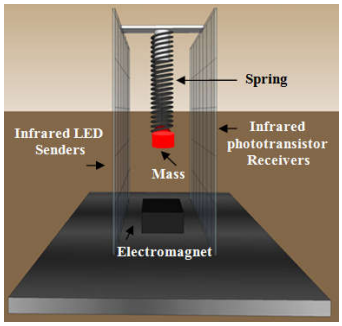


Figure 3. The construction of simple harmonic motion of a hanging mass on spring

Figure 4 is a relay switch, ET-BUSIO-RELAY that turns on or off, based on an external electrical signal (ETT Co., Ltd., 2012). Digital pin 2 of AVR microcontroller is connected with the relay and an electromagnet will be activated by making the digital pin 2 high, and it will be deactivate by making the digital pin 2 low.

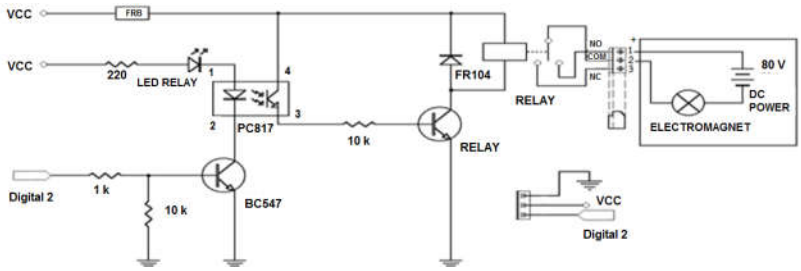


Figure 4. ET-BUSIO-RELAY

Infrared sensor and LEDs

An Infrared sensor is a fundamental circuit which is composed of a pair of an IR (infrared) LED sender and a phototransistor receiver shown in Figure 5. There are 2 resistances of 330 kΩ and 200 Ω, ¼ w. The 330 kΩ is for the receiver and the 200 Ω is for the sender. Electric power of the system is 5 volt of a direct current. When the infrared reaches the phototransistor, the output voltage is at 0 volt and when the infrared is obstructed by an object, the output voltage changes to 5 volt. The signals of the output voltage are used to measure the time of an oscillating mass at various points with an Arduino program.

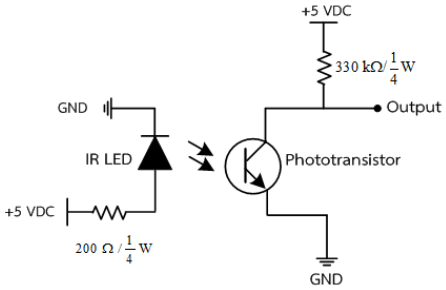


Figure 5. Infrared sensor circuit

The 8 infrared LEDs are fixed in a row (Figure 6), each of which is parallel connected with a range of 1.2 centimeters so that the moving object will never go out of the detected area. In Figure 8, 8 phototransistors are also fixed in a row. The output voltage is connected to IC or gate CD4078BE since each pair of the senders and the receiver has to work compatibly.

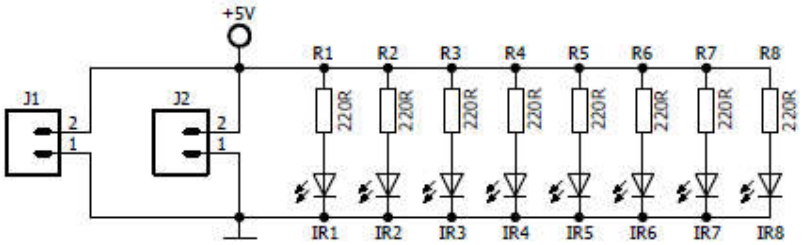


Figure 6. Infrared LEDs circuit

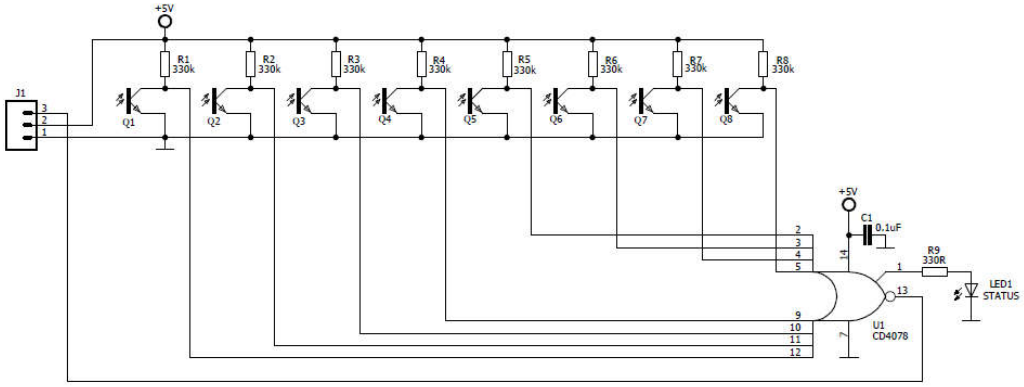


Figure 7. Infrared phototransistor receiver circuit

The infrared sensor was designed in a sensor plate of 30 centimeters (high) × 10 centimeters (wide). There are also 8 rows of 8 phototransistors fixed along the height opposite to 8 rows of 8 infrared LEDs, each of which is 3 centimeters long between one another. When the infrared is sent from the sender, the receiver in the opposite side will be on charge to work.

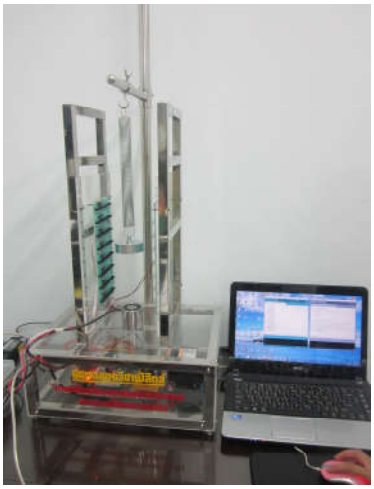


Figure 8. Computer-based experiment set for simple harmonic motion of mass on springs

Figure 8 shows the computer-based experiment set for simple harmonic motion of mass on spring experiment. A microcontroller is connected to a computer and an electronic circuit in order that the time at any fixed points will be read. Then the real time graph of displacement vs. time of the steel ball will be displayed. There is a relay switch to turn on and off the circuit. The cylindrical metal at the end of the spring is caught when the switch is on and released when the switch is off. When the cylindrical metal is released from 0.30 m height, it moves in simple harmonic motion through the infrared phototransistors and makes the voltage output of the infrared receivers change from 0 to 5 volt. The output from the receivers is sent to the microcontroller. Arduino program takes charge to check for the time the object consumes in five periods, and then the data are stored in the computer. Figure 9, Processing 1.5.1 displays the output for displacement vs. the time in real time experiment.

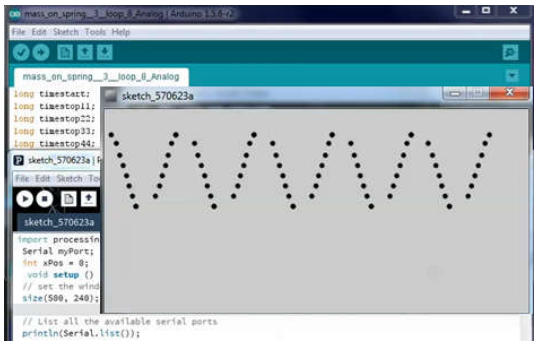


Figure 9. Graphs of displacement vs. the time in the real time graphs.

Simple harmonic motion of mass on spring theory

In Figure 10, when the mass starts at x = 0 at the time when t is 0. The analysis shows that the period (T) of the motion depends on the spring constant (k) and the mass (m) in the following fashion:

$$T = 2\pi\sqrt{\frac{m}{k}} \quad (1)$$

The angular frequency is,

$$\omega = \frac{2\pi}{T} = 2\pi f \quad (2)$$

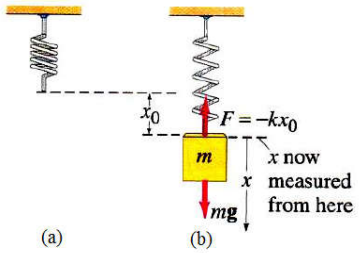


Figure 10. (a) The free spring is hung vertically. (b) The mass is attached to the spring at the equilibrium position, which occurs when $\sum F$ equals 0 or $\sum F = kx_0 - mg.$ (Giancoli, 2000)

where the displacement is given by:

$$x(t) = A\cos(\omega t + \phi) \quad (3)$$

taking two time derivatives,

$$v(t) = \frac{dx}{dt} = -\omega A\sin(\omega t + \phi) \quad (4)$$

$$a(t) = \frac{dv}{dt} = -\omega^2 A\cos(\omega t + \phi) \quad (5)$$

where $x(t)$, $v(t)$ and $a(t)$ are displacement, velocity and acceleration at time t, ω is the angular frequency. The maximum displacement is called the amplitude, A. The constant ϕ is called the initial phase constant or phase angle.

Experimental procedure

The spring constants, k of the springs are k_1, k_2 and k_3. Determination of the spring constant by Hooke's law as follows: k_1=3.40544 N/m, k_2=7.53294 N/m and k_3=12.17026 N/m. The spring constant can be determined by measuring the period of oscillation for different hanging masses from computer-based experiment set, as detailed below.

1. Hang one end of a k_1 spring to the hook of the set and hang a cylindrical metal of m=0.095 kg at the other end of the spring.

2. Adjust the distance from the object to the start to be the same length as the most extending spring after hanging the object.
3. Switch the power on and run the Experiment Arduino program and results Processing program respectively.
4. Set the object to the start point.
5. Put off the switch to launch the object.
6. Observe the points which display how the object moves, record the time for 5 periods' movement of the object, and then switch off the program.
7. Change the object to 0.100 kg, 0.125 kg, 0.135 kg, 0.150 kg, 0.163 kg, 0.175 kg, 0.190 kg and 0.200 kg, and then repeat 2-5.
8. Change the spring to k_2, hang a cylindrical metal of each mass at a time to the hook, and then repeat 2-5.
9. Change the spring to k_3, hang a cylindrical of 0.135 kg to the hook, and repeat 2-5.
10. Change the object to 0.150 kg, 0.163 kg, 0.175 kg, 0.190 kg and 0.200 kg, and repeat 2-5.

The supplemental physics lessons

The supplemental physics lessons were designed due to Constructivism Approach for upper secondary school students in order that the students chosen as samples would have their handbooks for the experiment. The supplemental physics lessons contain the content of simple harmonic motion of a hanging mass on spring. There are 2 types of experiment in students' book. One is real experiment with the computer-based experimental set and the other is the experiment of theoretical calculation or in other words is a graph simulation of the object's motion for the data. In experiment part, topic, objectives, experiment's tools, procedure, recording tables, analyzing part, concluding part, post experiment questions, and revision exercises are provided for the students.

The computer-based experiment set was tested in physics classes with Constructivism Approach

The computer-based experiment set together with the lesson is tested in physics classes according to Constructivism Approach. To find out whether the effectiveness of the experiment set together with the lesson reaches the fixed criterion at 70/70. The sampple group was composed of 96 upper secondary students studying science and mathematics in grade 10 at Princess Chulabhorn's College Nakhon Si Thammarat. The Pre-test, the post-test, the post experiment exercise, the achievement test, and the satisfaction test were assigned to use during 6 periods of the instruction. The process of learning activities of Constructivism Teaching (Matthews, 1994), are as follow;

1. Orientation-purpose and motivation for learning
2. Elicitation-clarify ideas or criteria for the topic
3. Restructuring Ideas-Clarification, exchange of ideas, evaluation of the new ideas
4. Application of the ideas-use the ideas in a variety of situations (new and old)
5. Review-reflect on how ideas have changed or developed

RESULTS

The trial of experimental set yields the result as shown in the table below. The relationship of the period and the mass in a curve was shown Figure 11. Increasing the mass resulted in increasing the period in non-linear regression. When the spring constant is increase, the period of an oscillation mass on a spring is decrease. The experiment period values were compared with the theoretical values (Figure 12). The graphs show significantly relevant between experimental result and the theoretical calculation result.

Table 1. The period of mass on a spring.

Mass, m (kg)	***Period, T(s)***		
	Spring 1(k_1)	Spring 2 (k_2)	Spring 3(k_3)
0.095	1.1251	0.7733	
0.100	1.1573	0.7981	
0.125	1.2557	0.8695	
0.135	1.3065	0.9046	0.6766
0.150	1.3633	0.9425	0.7096
0.163	1.4208	0.9826	0.7393
0.175	1.4757	1.021	0.7676
0.190	1.5396	1.0638	0.8008
0.200	1.5691	1.0851	0.8157

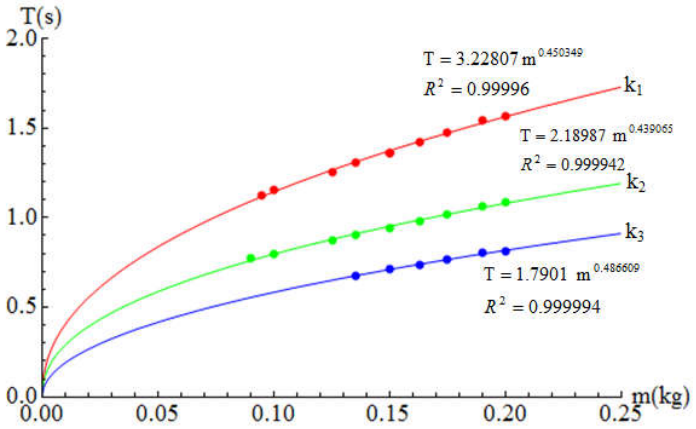


Figure 11. Graph of the spring period vs. the mass attached to the springs.
The dots represent the value taken from the experiment whereas the lines are obtained from the curve fitting.

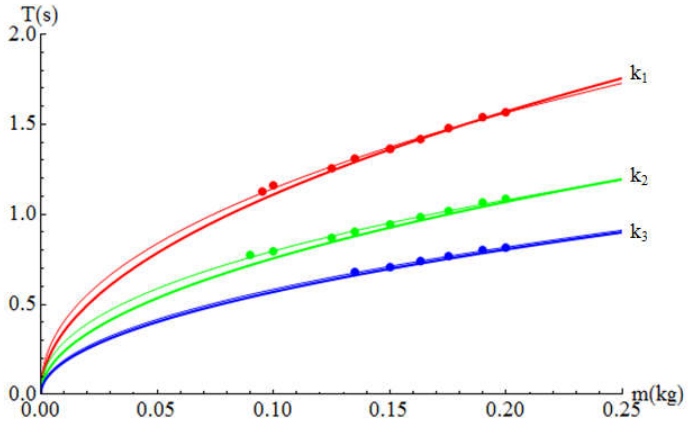


Figure 12. The experimental result is compared with the theoretical calculation result. The dots represent the value taken from the experiment whereas the lines are obtained from the curve fitting. The thick lines represent theoretical calculation result.

The graph in Figure 1**3** shows the period squared as a function of mass. As the mass on the spring increases, the period squared increases proportionally. The relationship of T^2 and mass appears to be linear.

The equation for our experiment was $T^2 = 11.4515\,m + 0.167937$, $T^2 = 5.30849\ m + 0.108989$ and $T^2 = 3.25372\,m + 0.017669$. Then the springs are k_1=3.44744 N/m, k_2=7.43685 N/m and k_3=12.1333 N/m. respectively.

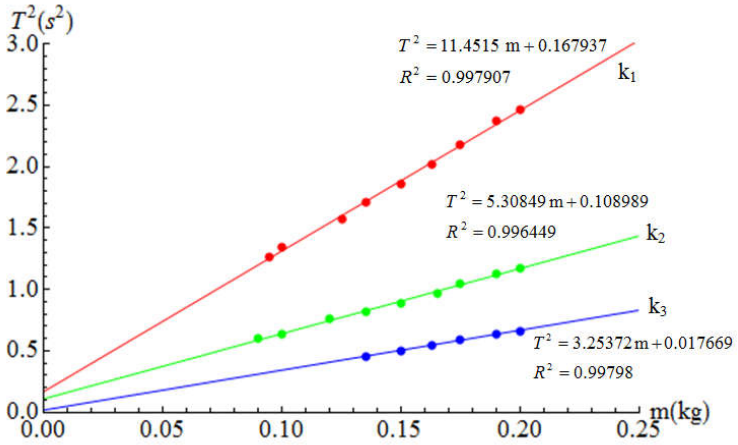


Figure 13. The graph shows the relationship of period squared (T^2) versus mass (m).
The dots represent the value taken from the experiment whereas the lines are obtained from the linear fitting.

The calculation of the percentage difference between the k's are obtained from the Hooke's laws and the oscillating masses.

$$\%Difference = \frac{|Difference\ of\ the\ two\ values|}{Average\ of\ two\ values} \times 100 \qquad (6)$$

After that the means of the spring constant is conducted by using Hooke's law and the period of oscillation of mass on the springs is measured. The different percentage is k_1=1.22576 % , k_2=1.28377 % and k_3=0.30419 %. The average percentage difference is 0.93791 %.

The relationship of displacement-time, velocity-time, and acceleration-time.

The experiment result for displacement-time was obtained by using k=12.133 N/m, and m=0.135 kg. Graphed with Mathematica 9.0 as shown in Figure 14, dots represent experimental value whereas lines were obtained by linear fitting. The equation for displacement is as follows:

$$x(t) = 0.117136\cos(9.20876t) \qquad (7)$$

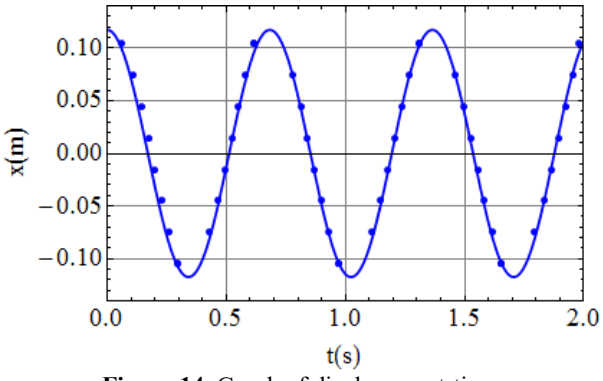


Figure 14. Graph of displacement-time

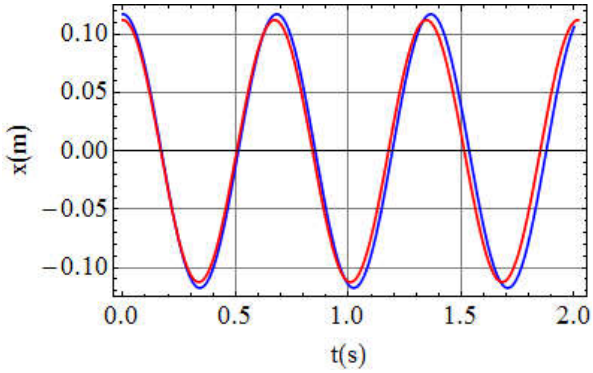
The velocity of the simple harmonic of mass on springs at time t is then obtained by differentiating the $x(t)$ .The equation for velocity as in the equation (8).

$$v(t) = -1.08031\sin(9.20876t) \qquad (8)$$

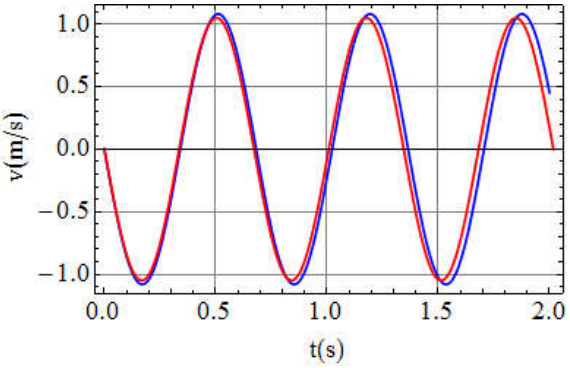
The acceleration of the simple harmonic of mass on spring at time t is then obtained by differentiating the $v(t)$. The equation for acceleration is as in the equation (9).

$$a(t) = -9.94834\cos(9.20876t) \qquad (9)$$

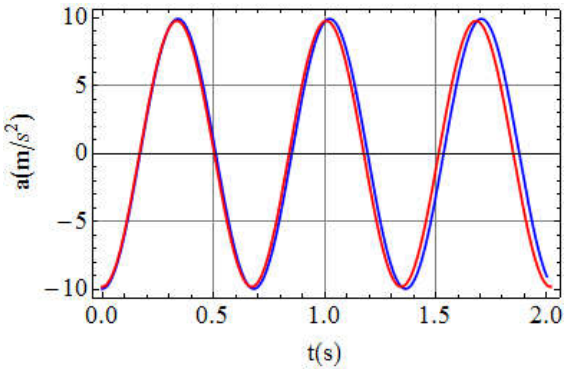
Figure 15 shows significantly relevant between experimental result and the theoretical calculation result of displacement-time, velocity-time, and acceleration-time.



(a) Displacement-time



(b) Velocity-time



(c) Acceleration-time

Figure 15. (a) Displacement-time, (b) velocity- time and (c) acceleration-time of the simple harmonic of mass on spring. The blue lines represent experimental result and the red lines represent theoretical calculation results.

Effectiveness of the computer-based experimental set with the Physics lesson.

To determine the effectiveness of the computer-based experiment set together with supplement lessons when using in Physics class, the pre-test, post-test, post experiment exercise, and achievement test and satisfaction test

were assigned to 96 student samples during 6 periods of the instruction. As shown in Table 2, the average post-test scores are higher than pre-test. The achievement score was determined during laboratory activity and from lab report including post-exercise question, discussion and conclusion. The post experiment test score compared with the achievement test score is 9.22/73.80. Based on the scores, it proves that the effectiveness of the experiment set together with the lesson perfectly reaches the criterion of 70/70. The satisfaction of the samples groups with their learning activities is at a high level.

Table 2. Pre and post achievement scores

Level Grade 10 4 classes	*Number of samples (N)*	*Pre-test*		*Post-test*		*t-test*
		$\bar{x}$	S.D.	$\bar{x}$	S.D.	
4/1	24	2.92	2.12	35.83	4.13	39.47**
4/2	24	0.17	2.21	33.83	4.46	34.64**
4/5	24	4.25	3.77	33.25	4.47	31.49**
4/6	24	1.92	1.25	34.58	3.83	37.84**
Total	96	2.31	2.51	34.37	4.23	39.47**

** Significant at 0.01

Satisfaction to the Computer-based experimental set together with the lesson.
The satisfaction test was invented to find out level of satisfaction to the computer-based experimental set with the lesson through the following topics and the results are shown below.

Table 3. Satisfaction mean scores to the Computer-based experimental set together with the lesson.

Number	Inquired topic	Satisfaction Score			
		$\bar{x}$	S.D.	Level of quality	Ranking
1	Instructor	3.71	0.81	high	3
2	Lesson content and learning activity	3.64	0.87	high	4
3	Documents and teaching aids	3.92	0.81	high	1
4	Learning atmosphere	3.86	0.82	high	2
5	Learning achievement and what can apply from learning	3.57	0.90	high	5
Satisfaction mean of 5 topics		3.73	0.84	high	
Holistic satisfaction		3.80	0.87	high	

The table displays satisfaction scores to the computer-based experimental set together with the lesson in every inquiring topic at a high level. The satisfaction mean scores for all 5 topics reveals at a high level of $\bar{x} = 3.73$ and $S.D. = 0.84$. For holistic satisfaction, mean score also reveals at a high level of $\bar{x} = 3.80$ and $S.D. = 0.87$.

DISCUSSION
The computer-based experiment set for simple harmonic motion of mass springs is developed in this study and used for teaching student samples. For the experiment set, the signals of the output voltage of the infrared sensor circuit is used to measure the time of an oscillating mass at various points and the Arduino program record the time on computer. The period of oscillation can be measured with high accuracy and significantly relevant to theory. Comparing of this results to the studies using an ultrasonic distance sensor to measure the position of oscillation of masses (Amrani & Paradis, 2010, Galeriu, Edwards & Esper, 2015), indicate similar accuracy. In addition, it has greatly benefited to students, enabling them to collect, display, and analyzes data in real-time (Zachariadou, Yiasemides &Trougkakos, 2012). By fixing the position of moving objects and measuring the time of oscillation, the student samples can understand the experimental concept more clearly and quickly. Similar to several studies about computer-based experiment set, the academic achievement of student samples is increasing and they are satisfied with it. The experiment set can be easily and inexpensively constructed. Besides, physics teachers are able to make this device and schools can save a lot of money on buying laboratory apparatuses.

CONCLUSIONS

The development of the computer-based experiment set on simple harmonic motion of mass on springs has made use of an Arduino microcontroller connected with a computer and the infrared sensor. The experiment setup is a simple and inexpensive construction. These tools are applied in a variety of appropriate tasks. The average percentage difference of between the determinations of the spring constant from Hooke's law and the period of oscillation of masses is 0.93791 %. The displacement, velocity and acceleration of the oscillations as a function of time are relevant to the theory. Testing of the experiment set in classes with Constructivism Approach resulted to higher post-test score than pre-test and the satisfaction score according to the students' attitude is at a high level. The computer-based experiment set has become necessary in teaching physics in schools so that students are able to learn from their real experiences. This approach helps them to comprehend physics conception and develop their learning skills. In the future, we plan to construct a physics laboratory set on force and motion for the upper secondary level using computer-based experiment learning of Constructivism Approach.

ACKNOWLEDHEMENTS

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Digital Game-Based Textbook vs. Traditional Print-Based Textbook: The Effect of Textbook Format on College Students' Engagement with Textbook Content outside of the Classroom

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ABSTRACT
The relatively little amount of time that some college students spend reading their textbooks outside of the classroom presents a significant threat to their academic success. Using Prenksy's (2001) digital game-based learning (DGBL) principles and Astin's student involvement theory as frameworks, the purpose of this true experiment was to determine whether a significant difference in engagement, as indicated by mental effort and time on task, existed between college students who used a digital game-based textbook and students who used a traditional print-based textbook. A customizable digital game-based textbook designed using DGBL principles in a popular gaming genre embedded with textbook content identical to content in a traditional print-based textbook was used. Fifty-four undergraduate college students were randomly assigned to experimental and control groups. The results showed a statistically significant, Hotelling's T^2 (2,52)=25.11, p<.001, D^2=1.86 difference in engagement between participants in the experimental and control groups and a large overall effect size. Post hoc analyses indicated the digital game-based textbook group, exerted significantly greater mental effort (t = 2.38, p<.001, d=.65) and spent significantly more time on task (t = 4.61, p < .025, d=1.25) than the traditional print-based textbook group.

Keywords: digital games, game-based learning, mental effort, student engagement

INTRODUCTION

Although a number of students are not compelled to engage in reading the college textbook outside of the classroom (Arum & Roska, 2011; Culver & Morse, 2012; Yonker & Cummins-Sebree, 2009), research indicates that some college students are very willing to engage in playing videogames outside of the classroom (Alsagoff, 2005; Moshirnia, 2007). In fact, researchers found that college students can spend as many as 10,000 hours playing video/computer games by the time they graduate (Pivec, 2009; Prensky, 2003; Riegle, 2005). If researchers can identify a digital game format for textbook content that is compelling to students for entertainment purposes and simultaneously increases student engagement with academic content outside of the classroom, then there would be a viable learning tool that may be effective for learning.

In the educational environment, digital games, as a learning tool, have gained very little headway. Although many educators do agree that learning should be interesting and fun, they are very apprehensive about including digital games as a part of the course curriculum (Gros, 2007), because there is a misconception that games cannot be used for learning (Hirumi, Appleman, Rieber, & Van Eck, 2010). At the same time, many education institutions are realizing that a number of students are not performing well on the variety of assessments designed to evaluate students' mastery of curriculum content and/or student progress (Arum & Roska, 2011). What appears to be missing is research on whether the digital game-based approach truly engages learners in the process; information that might compel faculty to reconsider it as an option. Although modern textbooks may be an efficient learning tool, some modern textbooks appear to be failing to elicit the interest of college students. According to Astin (1999), "The theory of student involvement argues that for a particular curriculum, to achieve the effects intended, must elicit sufficient student effort and investment of energy to bring on the desired learning and development" (p. 522). Astin's (1999) comment begs the question as to why colleges and universities are not demanding a textbook design that would elicit student engagement, particularly outside the course.

Research has demonstrated (Stratton, 2011), many students are not engaging sufficiently, and in some cases not engaging at all with the college textbook, outside of the classroom. Many students are disinterested in reading their college textbooks outside of class, despite the fact that the college textbook is typically the primary learning resource that students are expected to use outside of the classroom (Lord, 2008). If traditional textbooks are not

eliciting mental effort and time on task, educators should be focusing on methodologies that do. One such methodology may be digital game-based learning. Digital game-based learning (DGBL) theory emerged as the result of the contributions of several scholars focused on this area (Dziorny, 2005), and in particular Prensky (2001). Prensky's (2001) book, Digital Game-Based Learning, introduced the concept of DGBL. Essentially, the premise behind DGBL is about merging game design with instructional design. "A DGBL game should feel just like a video or computer game, all the way through. But the content and context will have been cleverly designed to put you [the student] in a learning situation about some particular area or subject matter" (Prensky, 2001, p. 146). According to Prensky, DGBL involves an educational game located online or on a computer. DGBL is about using key elements, like fun and interactivity, to generate continuous engagement for students accompanied by learning of educational content. Prensky (2001) noted that there are six characteristics of compelling digital games: a) incorporation of goals and objectives, b) representation/story, c) rules, d) interaction, e) outcomes and feedback, and f) challenge in the form of competition, conflict, or opposition.

Digital game-based learning theory served as the theoretical framework for using a customizable digital game-based textbook, which was a customizable digital-game in a popular gaming genre designed using DGBL principles. Astin's (1999) student involvement theory served as the guiding theoretical framework for understanding student engagement and developing a hypothesis about students' mental effort and time on task. The purpose of this study was to determine whether there was a significant difference in student engagement with textbook content as indicated by mental effort and time on task, based on the textbook format. In this study, the efficacy of using a digital game-based textbook as an alternative to the traditional print-based textbook for increasing mental effort and time on task with college textbook content was examined. For a sample of undergraduate college students, are there significant differences in engagement as indicated by mental effort and time on task, based on textbook format (traditional or digital game-based)? It was hypothesized that there would be a significant difference in engagement as indicated by mental effort and time on task with students using a digital game-based textbook exerting significantly more mental effort and time on task than students using a traditional print-based textbook.

METHOD

A convenience sample of 54 participants ranging in age from 18 to 57 was used. The mean age for participants in this study was 24.83. Most participants were between the ages of 18 to 24 (n=38). Non-traditional aged students included students between the ages of 25 and 34 (n=9), as well as students between the ages of 35 and 60 (n=7). Participants were degree-seeking college students at a public community college. Twenty-six of 54 students were first-year/freshman college students. Twenty-eight were second-year/sophomore college students.

An ethnically diverse sample was obtained including African-Americans (n=24), Blacks (not American) (n=6), European-Americans (n=5), other (n=5), Asian-Americans (n=4), Hispanic Americans (n=4), Asians (not American) (n=2), Hispanics (not American) (n=2), and multiracial students (n=2). Participants identified as female (n = 30), male (n = 23), and other (n=1).

Materials

Digital game-based textbook, a customizable PC-based digital game (Thomas, 2017) designed using DGBL principles in a popular gaming genre embedded with textbook content identical to content in a traditional print-based textbook was used. The digital game is a live-action sequence game with nine levels. The live action sequence game, a twitch game, included 100% of the content from the Introduction to Social Science Research chapter in the *Social Science Research Methods* textbook.

Traditional print-based textbook, one chapter, Introduction to Social Science Research, from *Social Science Research Methods* (Gibbs, 2013) was used. The print-based textbook chapter (see Appendix A) was 8.5 x 11 in (215.9 x 279.4 mm) in dimension and included 37 pages with four major content areas. In addition to four sections and a summary, the textbook chapter included chapter definitions and chapter questions. The chapter questions section includes 32 multiple-choice questions with eight questions for each major content area.

Instrumentation

Mental effort scale**,** the Mental Effort Scale or MES (Paas, 1992), the most widely used measure in this area of research (Paas, Tuovinen, Tabbers, & Van Gerven, 2003) was used due to its psychometric soundness (Paas, 1992; Paas & Van Merrienboer, 1994; Van Gog, Paas, & Van Merrienboer, 2008; Kester, Kirschner, & Van Merrienboer, as cited in Van Gog et al., 2008) and ease of use. The MES utilizes five 9-point Likert-type items. Scores are computed by summing participant responses for each item on the measure, with higher scores reflecting greater mental effort expenditure and lower score reflecting lower mental effort expenditure (Paas & Van Merrienboer, 1994).

Stopwatch, time on task was measured using researcher observation using a stopwatch. The computer screen of each activity session was recorded, so that each participant's time on task could be retrospectively assessed by viewing the recording after all data was collected. Questionnaire, a brief six-item questionnaire that captured demographic data on participant characteristics was used. The questionnaire content includes questions about age, gender, race/ethnicity, college level, and college work completed. Screener, an eligibility screener containing 5 questions was used to exclude any prospective participant who was under 18, not enrolled as a degree-seeking college student, or beyond the second year of college.

Procedure

Setting, the research study was conducted in a controlled setting. A computer lab with individual workstations on a college campus was reserved for multiple dates across a two-month time period. Each computer lab used for textbook activity sessions had individual workstations labeled with ID numbers.

Random assignment, a strategy of random assignment without replacement was used to assure an equal number of participants in both groups. Twenty-seven slips with the name dgbg (digital game-based textbook group) and 27 slips with the name pbtg (print-based textbook group) were placed in small sealed envelopes. Fifty-four participants were randomly assigned to the digital game-based textbook group or traditional print-based textbook group. Each participant drew an envelope on arrival, thus assuring random assignment to conditions of the independent variable.

Textbook activity sessions, after participants were seated at an individual workstation, participants completed an online informed consent process. Upon completion of the informed consent process, participants were instructed to minimize the online informed consent form. Next, participants were given written instructions, which marked the beginning of the textbook activity session. The standard activity session protocol was followed. There was no minimum period of time for the textbook activity session. Participants were limited to a maximum period of time for study participation, which was 2 hours. When a participant indicated that he or she was finished with the activity session, the participant was given the Mental Effort Scale and demographic survey.

Recording textbook activity sessions, for all textbook activity sessions, digital game-based textbook and print-based textbook, screen recording was conducted. The computer screen of each activity session was recorded. When the activity session ended, the activity session data was saved with the ID number of the participant so that each participant's time on task could be assessed by viewing the recording after all data was collected.

Protection of participants, the four primary areas of ethical concern in social research were addressed. In this study 1) no harm came to research participants, 2) informed consent was utilized, 3) no invasion of research participants' privacy occurred, and 4) deception was not be used at any point in the study. The participants in this study were not marginalized in any way. Approval from the related higher education institutions' Institutional Review Boards was obtained, prior to data collection. No participants from vulnerable populations were used in this study. After each activity session concluded, participants who were not in the digital game-based group were given the opportunity to view and engage in the digital game-based textbook activity. There were no reports of adverse effects from participation in this study.

Research participation incentive, each participant received a $10.00 gift card as an incentive for research participation.

RESULTS

The results of a Hotelling's T^2 test indicated that there was an overall statistically significant difference (see Tables 1 and 2) in the mental effort and time on task of participants in the digital game-based textbook group and participants in the traditional print-based textbook group, $T^2(2, 52) = 25.11$, $p < .001$, $D^2=1.86$.

Table 1: Hotelling's T^2 for mental effort and time on task

Dependent Variables	T^2	DF1	DF2	p value	D^2
Mental Effort and Time on Task	25.11	2	52	.00	1.86

The multivariate measure of effect size, Mahalanobis distance, D^2, was computed for overall effect size. A large effect size, D^2 =1.86, was found. Like Cohen's *d*, recommendations for small, moderate, and large effect size indices have been provided (Ferron, Hess, Hogarty, & Kromrey 2004; Stevens, 1980; Stevens 2004), with .25, .64, and > 1.0 representing small, moderate, and large effect sizes respectively (Stevens, 1980; Stevens, 2002).

Post hoc analyses of the means (see Table 2) with univariate *t* tests (see Table 3) were conducted to determine whether the overall significant difference was true for both dependent variables, mental effort and time on task. To control for Type I error resulting from post hoc multiple comparisons, a Bonferroni correction (Field, 2009) was applied. The adjustment was used with the alpha level of .05, which was divided by the number of post hoc tests resulting in an alpha of .025 being used to assess each individual *t*-test.

Table 2: Mental effort and time on task by intervention group

	Mental effort				Time on task				
Group	Mean	*SD*	Min	Max	Mean	*SD*	Min	Max	*N*
Digital game	17.33	5.95	3	27	87.66	33.22	5	124	27
Print-based	13.93	4.46	3	27	48.22	29.57	3	115	27

The results of the post hoc analyses demonstrated a statistically significant difference exists between the digital game-based textbook group and print-based textbook group for the dependent variable mental effort (t = 2.38, p< .025). A medium effect size, d=.65, was found. Mental effort was significantly higher for the digital game-based textbook group. The result of the reliability analysis yielded a Cronbach's alpha of .76, which indicates that the MES was a reliable measure of mental effort for participants in this study.

The results of the post hoc analyses (see Table 3) also showed that a significant difference between the digital game-based textbook group and print-based textbook group exists for the dependent variable time on task (t = 4.61, p < .001). A very large effect size, d=1.25, was found. Time on task was significantly higher for the digital game-based textbook group.

Table 3: Post hoc tests and effect sizes for dependent variables

Variable	*t*	*p* value	Cohen's *d*
Mental Effort	2.38	.02	.65
Time on Task	4.61	.00	1.25

DISCUSSION

It is important for educators who select textbooks to know that college students exerted significantly more mental effort and time on task (p<.001) when using a digital game-based textbook designed using DGBL principles than when using a traditional textbook. Interestingly, a large overall effect size (D^2 =1.86) was found, although the statistical power achieved for this study was only .50. The medium effect size (t = 2.38, p<.025) found for mental effort is compelling, but the very large effect size (t = 4.61, p < .001, d=1.25) found for time on task is undeniably convincing evidence of the ability of the ability of a DGBL video game textbook to increase student engagement with academic content.

Like the Sward, Richardson, Kendrick, and Maloney (2008) and Um, Plass, Hayward, & Homer's (2012) studies, this study found a significant difference in the amount of mental effort of participants in the experimental and comparison group with mental effort exerted by students being significantly (p<.025) greater for the digital game-based group (M=17.33) than the traditional print-based textbook group (M=13.93). In contrast to students in the traditional print-based textbook group who spent an average of 48.22 minutes on the textbook activity session, students in the digital game-based textbook spent an average of 87.66 minutes.

The findings related to time on task match those of Sward et al. (2008), who found that participants in a web-based gaming group spent significantly more time on task than participants in a web-based flash-card group; Adams, Mayer, MacNamara, Koenig, and Wainess (2012), who found that a narrative game-based group of college students spent more time on task when using a modified version of the popular Half-Life 3D digital game than a slide-show presentation of the same content; and (Um et al., 2012), who found that participants in the positive emotional design group spent more time on task than participants in a neutral group when engaged with academic content presented in an interactive multimedia format.

There are several limitations for this study. The scope of this study was limited to the conceptual frameworks of mental effort and time on task, the key concepts discussed in the first three premises of Astin's (1985) student involvement theory and did not include learning as a dependent variable. In addition, a convenience sample was used in this study. Because a convenience sample is a non-probability sampling design, scientific inferences about what exists in the population of interest cannot be made. This shortcoming was largely unavoidable, due to the nature of the study.

The use of a self-report measure of mental effort prevented a determination of whether or not research participants honestly reported their mental effort. However, the nature of the measure did not suggest a need of the participants to lie or give socially desirable responses. A final limitation of this study is that only a single textbook chapter was used that focuses on one subject (research methods). This focus means that scientific inferences about the efficacy of the digital game-based textbook with other subject areas are outside of the scope of this study.

CONCLUSION

The results of this study show that a digital game-based textbook designed using DGBL principles in a popular gaming genre with fun and interactivity as key elements with embedded educational content, is a learning tool that caused students to exert significantly greater mental effort and spend significantly more time on task with textbook content outside of the classroom. The digital game-based textbook was a superior elicitor of mental effort and time on task, because instead of students spending time with a game inside of a learning environment, students were spending time with learning inside of a gaming environment. The live-action sequence game, the digital-based based textbook, was effective because the game integrates all six of Prensky's (2001) characteristics of compelling digital games: a) incorporation of goals and objectives, b) representation/story, c) rules, d) interaction, e) outcomes and feedback, and f) challenge. This study provides stakeholders in higher education with research that may lead to a viable alternative textbook format to the traditional print based-textbook format. It would be useful for textbook authors and publishers to focus textbook development efforts on innovative textbook design of digital game-based textbooks using DGBL principles.

Although previous studies have been conducted on educational games and their relation to student learning (Adams et al., 2012; Alsagoff, 2005; Baek & Heo, 2010; Kiili, 2005, Pivec, 2009), this is the first study to address the gap in the literature on digital game-based learning theory and its relation to student involvement, as conceptualized by Astin (1985), with college course content using a digital-game designed using DGBL principles outside of the classroom. This study adds to our knowledge about the efficacy of alternatives to traditional print-based textbooks for student engagement in outside-of-class studying. This study provides robust evidence that a customizable digital game-based textbook designed using DGBL principles increases college student involvement with textbook content outside of the classroom, which suggests that it may also lead to better learning of college course material and ultimately better academic performance of students in college courses.

Recommendations for Further Research

During data collection, it was observed that some participants in both the digital game-based textbook and traditional print-based textbook voluntarily elected to take notes on the academic content that was presented throughout the textbook activity session. Although note taking was outside the scope of this study, future studies should examine whether or not a significant difference in amount and quality of note taking exists for students using a digital game-based textbook and students using a print-based textbook.

Future studies should also extend this research by including learning as a dependent variable. Astin's (1999) student involvement theory was used as the theoretical framework for this study, and learning is the outcome variable in Astin's (1985) theory, which postulates that increased mental effort and time on task leads to increased learning (Astin, 1985, 1999). Although learning was outside the scope of this study, mastery learning was strategically designed into the structure of the digital game-based textbook through not allowing participants to proceed to the next section without first mastering the current section. The extent to which participants engage in mastery learning could be considered in future studies using a learning assessment instrument.

Finally, it would be useful for researchers to conduct research studies that use digital games in varied formats. There are a variety of popular digital game genres (Baek & Heo, 2010). This study used a live-action sequence game, which is also known as a twitch game in the entertainment market. Twitch games involve the player's thumbs moving at a very fast pace (Prensky, 2001). Additional research is needed to determine if digital game-based textbooks grounded in other popular digital game genres are also effective for increasing student engagement with textbook content outside of the classroom.

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Efficacy of Computer Games on Language Learning

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ABSTRACT
Information and communication technologies (ICT) have become an inseparable part of people's lives. For children the use of ICT is as natural as breathing and therefore they find the use of ICT in school education as normal as the use of textbooks. The purpose of this review study is to explore the efficacy of computer games on language learning and list its benefits and limitations for foreign language learning. This was done by conducting a literature search in the databases Web of Science, Scopus, ScienceDirect and Springer, and consequently by evaluating the findings of the relevant studies. The findings indicate that computer games, especially the educational ones, are effective in the vocabulary acquisition in foreign language learning. In addition, there are other benefits of using computer games in classrooms such as exposure to the target language, increased engagement, or enhancement of learners' involvement in communication. On the contrary, the findings reveal certain limitations of their use in language learning such as the fact that high interactivity may hinder the vocabulary acquisition and learning, not all games are useful for language learning, or a lack of knowledge about computer games among language teachers and institutions hinders their proper use.

Keywords: computer games, videogames, language learning, non-native learners, effectiveness

INTRODUCTION

Present life is unimaginable without the use of information and communication technologies (ICT) since they have already penetrated in all human activities and become an inseparable part of living. For children the use of ICT is as natural as breathing. As Prensky (2001) points out, children spend most of their free time interacting with computers and playing computer games. In fact, the average teenager in America spend 1.5 hour on the Internet and 1.5 hour on playing video games. Therefore it is no wonder that the use of ICT in school education is as normal as the use of textbooks. However, it is the pedagogy of the implementation of ICT in the classroom which is important: the how rather than what (Higgings, Xiao, and Katsipataki, 2012). Thus, research studies now start exploring what type of ICT intervention would be the most effective for learning purposes.

Ang and Zaphiris (2008) maintain that new technologies have completely changed the way games are played. Digital games have been very popular for several decades and are receiving increasing attention (deHaan, 2011). Currently, games frequently deal with more serious matters and can even be educational (Ang and Zaphiris, 2008). Research into the use of digital games in education is relatively novel, but growing rapidly and a lot of language teachers use digital games for teaching second language as it may be effective on every age group, particularly on children (Aghlara and Tamjid, 2011). Nevertheless, there are few investigations of game play and game culture, as well as descriptions or evaluations of using these activities in language classrooms (deHaan, 2011). In fact, various authors (deHaan, 2011) warn that the evidence of language learning benefits of using digital games is not clear cut. Ashraf, Motlagh, and Salami (2014) argue that the teacher should be careful when bringing games into the class. Effective game-based second language teaching and learning is more likely to occur if practical conclusions can be drawn from empirical evidence (deHaan, 2011).

Games create an environment where education is mostly learner-centred, with a good opportunity for socialisation when well-organised, and awakening the will to win and competitive desire inside people (Uzun, 2009). Talking about games, it is important to distinguish between game-based learning and gamification. Findley (2016) shows the difference between Game-Based Learning (GBL) and gamification as follows. *Game-based learning is training that uses game elements to teach a specific skill or achieve a specific learning outcome. It takes your core content and objectives and makes it fun*. On the other hand, *gamification is the*

application of game mechanics in a non-game context to promote desired behavior and drive learning outcomes (Findley, 2016). Thus, the main difference between these two concepts is the integration of game mechanics with training content. GBL fully integrates the two, so the game *is* the training. On the other hand, gamification uses game elements as a reward for completing existing training modules (Findley, 2016). Pappas (2015) defines gamification as a methodology that *involves the use of game design elements and mechanics in activities that are not inherently game-based. This is done to motivate and engage the learners, so that they can become active participants in their own learning process*." On the other hand, Pappas (2015) claims that game-based learning integrates games into the learning process to teach a specific skill or achieve a learning objective.

Nevertheless, it is not clear cut whether or not computer educational games have more positive impacts than negative ones. For instance, Ashraf et al. (2014) focus on vocabulary acquisition as they view it as the basis of any language to be learned and see an advantage of games in vocabulary training in the fact that the use of computers and the Internet is natural for children. Therefore they claim that online games can be effective in vocabulary acquisition (Ashraf et al., 2014). Furthermore, Aghlara and Tamjid (2011) found out in their study that children learning vocabulary by playing digital games are more motivated than children who are taught vocabulary through traditional methods. They also believe that there is a relationship between language learning in early ages and digital games as they say that children are able to understand language with digital games easily (Aghlara and Tamjid, 2011). These authors also investigated the role of computer games in second language acquisition and learning and maintain that games create an environment that is mainly learner-centred and digital games have positive effect on the learning process (Aghlara and Tamjid, 2011). Last but not least, Agudo et al. (2007) see advantages of adaptive computer games as they may be adjusted to a particular student´s progress and add that playful elements are used as a source of motivation.

On the other hand, there are some negative impacts, too. For example, de Haan, Reed, and Kuwada (2010) point out that while language students watch a video with subtitles, they are only required to attend to, while players of video games must perform additional tasks in their second language input, which may interfere with learning in either a positive or negative way. They also mention the fact that not all video games are useful for language learning, and emphasize that pre-teaching vocabulary using drills and dictionary work might also be effective (de Haan et al., 2010). The role of the learner's attention is also vital as the player's attention is divided between playing the game and learning, which results in less convincing results of players in comparison with those who watch them play games (e.g., deHaan, 2011). Also de Haan et al. (2010) showed that if some students play video games, whereas others only watch them, the latter group of students can recall significantly more vocabulary. Moreover, both players and watchers tend to forget significant amounts of vocabulary over the course of their study (deHaan et al., 2010). Last but not least, Aghlara and Tamjid (2011) claim that teachers should not apply digital games for their own sake. As they put it, teachers ought to take into account that students come from different backgrounds and have various needs and expectations (Aghlara and Tamjid, 2011). Therefore, it is easy to understand why deHaan et al. (2010) warn teachers not to blindly accept these games as valuable only because they involve the language and students enjoy them. deHaan (2011) also maintains that language teachers and institutions must know more about games to use the media effectively.

Ang and Zaphiris (2008) provide an overview of game-based language learning. They maintain that computer-aided language learning technologies will continue to be developed and that they might help generate motivation and pleasure for learners (Ang and Zaphiris, 2008). Currently, computer games are full of learning materials for the learner to "discover". In future, however, they may be designed as virtual learning environment in which learners may be able to congregate and engage in communication, thus learning from each other in a social context (Ang and Zaphiris, 2008).

The purpose of this review study is to explore the efficacy of computer games on language learning and list its benefits and limitations for foreign language learning.

METHODS

The methodology of this study is based on the study by Moher et al. (2009). The main method included a systematic review whose goal was to identify the research studies on the basis of the key words in four databases Web of Science, ScienceDirect, Scopus, and Springer. This review was performed in the period from 2010 to October 2016 for the following key words: *foreign language learning* AND *computer games*, *foreign language learning* AND *videogames*, *foreign language learning* AND *gaming*. Most of the studies were found in ScienceDirect – 10,527 studies. In the Web of Science 222 studies were detected, in Scopus 90 studies and in MEDLINE only 3 studies were identified. Thus, altogether 10,842 publications were detected in the databases. The titles of all studies as well as their duplicity were then checked in order to discover whether they focus on the research topic. 128 studies remained for further analysis. After that, the author checked the content of the

abstracts whether the study examined the research topic. 44 studies/articles were selected for the full-text analysis, out of which the findings of 31 research studies were then used in the manuscript for the comparison of the findings in the part of Discussion, as well as in the Introductory part to discuss the topic, and only six studies could have been then used for the detailed analysis of the research topic (Fig. 1). In addition, most of the studies focused on the use of computer games in learning in general (e.g. Rondon et al., 2013). Therefore they were not included into the in-depth analysis, as well as the studies which were just short observations such as Bado and Franklin (2014) or Guerrero (2011), and did not use any vocabulary knowledge test.

The study was included if it matched the corresponding period, i.e., from 2010 up to October 2016; if it included young healthy adults; if the intervention involved the use of a computer game or a videogame; if it focused on the learning of foreign language; and if the study was written in English. The selection period starts with the year of 2010 since several reviews and studies (e.g., Peterson, 2010; Turgut and Irgin, 2009) were published on this topic before this period.

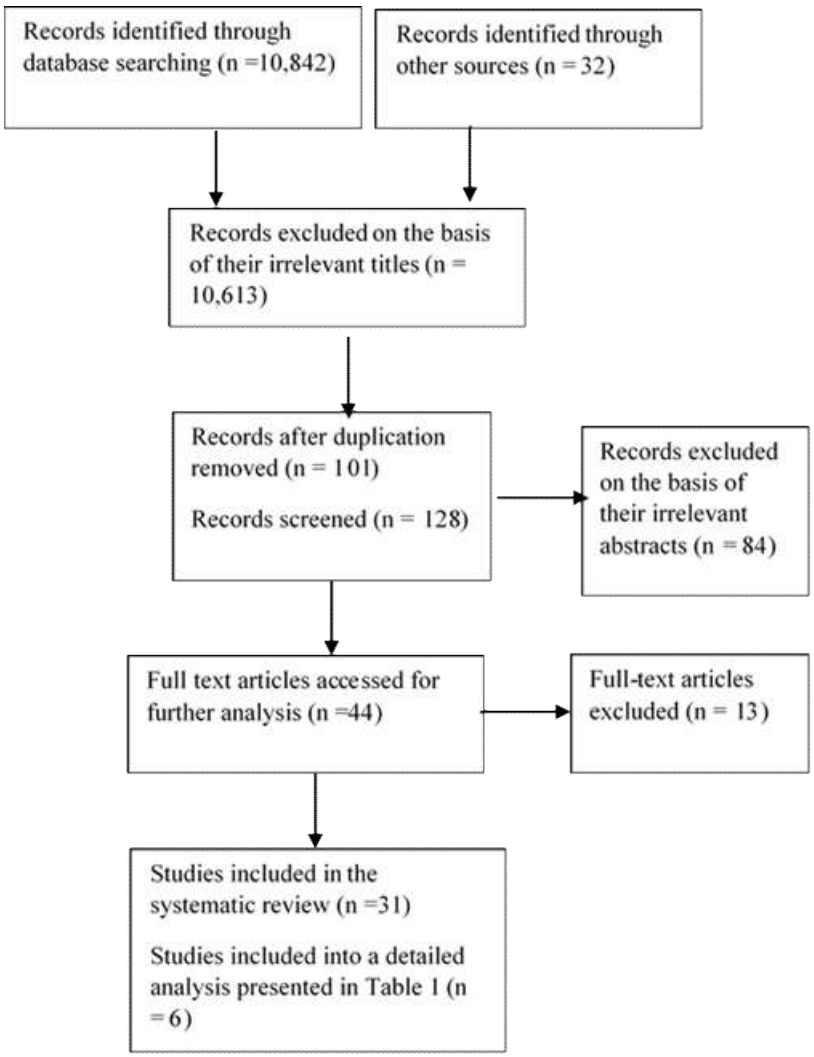

Fig. 1. Results of the selection procedure

FINDINGS

Altogether six studies were identified for the in-depth analysis. Three studies originated in Iran, two in the USA and one was a joint cooperation of the authors from the USA and Japan. The age of the subjects ranged between 6 and 40 years, however, most of them were university students. The longest intervention period lasted 15 weeks, while the shortest was just four hours. In five studies there were both experimental/intervention group and control group. One study did not have any control group. The studies mainly concentrated on vocabulary acquisition. That is why the main outcome assessment was the vocabulary (recall) test. Table 1 below then

provides an overview of the main findings from the studies on videogames and computer games used in foreign language learning, specifically in learning English as a foreign language (EFL). The studies are presented in the alphabetical order of the first author.

Table 1. Overview of the findings from the studies on videogames and computer games used in foreign language learning

Study	**Subjects**	**Age mean/ range**	**Dose of intervention**	**Experimental group intervention**	**Control group intervention**	**Main outcome assessments**	**Findings**
Aghara and Tamjed (2011) Iran	40	6-7 years	45 days; three times 90 min sessions per week	English vocabulary taught with the help of digital computer game SHAIEx.	English vocabulary taught in a traditional way.	SPSS statistical software version 16; vocabulary recall test.	The results reveal that digital games have a positive effect on learning process since the mean score of vocabulary test in the experimental group was significantly higher.
Ashraf et al., 2014, Iran	24	16-22	2 sessions of 2 hours for 15 weeks	Participants played an online game.	Controls were using pen and paper technique.	Written vocabulary recall test.	The results show that the experimental group outperformed the control group ($t = 2.40$) and thus, that playing online games enhances vocabulary acquisition in language learning.

deHaan et al., 2011, Japan, USA	80	18-24 years	5 times for 20 minutes	Subjects played the English-language music videogame.	Subjects watched the game.	Written vocabulary recall test; Cognitive Load Subjective Experience Questionnaire, subjective reports.	The results show that the videogame interactivity hinders the language acquisition process.
Lim and Holt, 2011, USA	27	24-40 years	5 days for 2.5 hours	13 subjects trained via custom-designed videogame.	14 subjects received no training.	Category Learning test, Cue Weighting test	The results indicate that videogame training improves non-native speech categorization.
Shokri and Abdolmanafi - Rokni, 2014, Iran	40	14-16 years	8 session of 45 min per 1 month	Subjects played original computer game and simultaneously taught by the teacher.	Participants only played the game.	Likert scale questionnaire, vocabulary test	The findings reveal that the experimental group significantly outperformed the control group.
Smith et al., 2013, USA	57	18-21 years	2 sessions of 2 hours	Reading + follow-up computer game.	No control group.	Vocabulary knowledge scale test	The results indicate that inference-based computer games result in better learning of new vocabulary than with traditional hardcopy lists of new words.

Source: Authors' own processing

DISCUSSION

The results from the six studies (Aghara, Tamjed, 2011; Ashraf et al., 2014; Lim, Holt, 2011; Shokri, Abdolmanafi - Rokni, 2014; Smith et al., 2013) described in Table 1 reveal that computer games, especially the educational ones, are effective in the vocabulary acquisition in foreign language learning. Bado and Franklin

(2014) in their study report that besides the improvement of the EFL vocabulary and knowledge, educational videogames also enhance the development of cooperation, scaffolding, and motivation.

Only one study (deHaan et al., 2011) described in Table 1 exhibited a negative effect of the videogame on the vocabulary acquisition. In this study, 80 randomly-selected Japanese university undergraduates were paired based on similar English language and game proficiencies. One subject played an English-language music video game for 20 minutes while the paired subject watched the game simultaneously on another monitor. The follow-up tests revealed that both the players and the watchers of the video game recalled vocabulary from the game, but the players recalled significantly less vocabulary than the watchers. The authors argue that these results might be caused by the extraneous cognitive load induced by the interactivity of the game. In addition, the players perceived the game and its language to be significantly more difficult than the watchers did. The players also reported difficulty simultaneously attending to gameplay and vocabulary. The fact that high interactivity of games may provide less support for vocabulary learning has been recently confirmed by Yudintseva (2015).

Nevertheless, there are certain problems with using computer games in language classrooms. As it has already been mentioned, there are not many investigations of game play and game culture and the same applies to evaluations of using these activities in language classrooms (deHaan, 2011). Moreover, as Ashraf et al. (2014) maintain, teachers cannot bring games into the class without having thoroughly planned how to use them. Aghlara and Tamjid (2011) warn teachers not to apply digital games for their own sake as they teach students from different backgrounds with various needs and expectations. de Haan et al. (2010) add that not all video games are useful for language learning, and they also strongly recommend traditional techniques like pre-teaching vocabulary using drills and dictionary work. Even though playing video games may be a pleasant way to learn vocabulary, it is not the best one to retain vocabulary (e.g. deHaan, 2011; de Haan et al., 2010). Moreover, deHaan (2011) emphasizes that effective game-based second language teaching and learning is more likely to occur if practical conclusions can be drawn from empirical evidence and adds that language teachers and institutions must know more about computer games to use them effectively.

In addition, the findings also showed that the studies analyzed in Table 1 were short-term and small-scale. Therefore their efficacy is slightly questionable. Other research studies also claim that the test conducted shortly after the interventions generate short-term effects in terms of students' short-term knowledge retention (Guerrero, 2011).

Table 2 below summarizes the main benefits and limitations of the computer games for foreign language learning.

Table 2. Main benefits and limitations of the computer games for foreign language learning

Benefits	**Limitations**
• exposure to the target language; • increased engagement; • improvement of language skills, structures and vocabulary in particular; • computer-aided language learning technologies will continue to be developed and may enhance learners' involvement in communication.	• high interactivity may hinder the vocabulary acquisition and learning; • low efficacy of studies; • a lack of studies on this topic; • not all games are useful for language learning; • a lack of knowledge about computer games among language teachers and institutions hinders their proper use.

Source: Authors' own processing

Further research in the area of the use of computer games in classrooms should concentrate on the other aspects (e.g., the development of productive language skills such as speaking and writing, as well as pedagogical methods and techniques) than just the vocabulary acquisition in foreign language learning. In addition, this research should include longitudinal randomized controlled studies.

The limitations of this review study consist in the lack of available research studies on the research issue and different methodologies of the included publications. This might result in the overestimated effects of the findings, which may cause an adverse impact on the validity of these reviewed studies (Melby-Lervag, Hulme, 2013; 2016).

CONCLUSION

The use of computer games seems to be an inherent attribute of present foreign language learning. It obviously generates many benefits such as exposure to the target language, increased engagement, or enhancement of learners' involvement in communication. On the contrary, there are certain limitations such as the fact that high interactivity may hinder the vocabulary acquisition and learning, not all games are useful for language learning, or a lack of knowledge about computer games among language teachers and institutions hinders their proper use. Therefore to confirm the efficacy of the use of computer games for foreign language learning, more longitudinal randomized control studies with larger subject samples are needed in this field.

DISCLOSURE STATEMENT

The author has no conflicts of interest to declare.

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E-story and Writing Skill among Second Language Learners

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ABSTRACT
The study focused on the use of e-story and writing skill among the second language Korean learners. The objectives of the study were to identify and discuss the students' writing in the second language by using e-story. The samples of the study involved all 21 participants from two classes of Malay language at one of the universities in South Korea. The participants were taught in the Malay language as the second language for two hours a week in fourteen weeks. The participants were to rewrite the e-story learnt. The result of the study revealed that majority of the participants managed to rewrite the e-story. The participants also seemed to be interested in the e-story since it is different than the normal classroom. Also, the results showed that e-story manage to enhance study learning in the second language. It is hoped that further study will focus on other e-story from the Malay folklore to enhance second language learners in learning.

Keywords: e-story, second language learning, motivation, computer

INTRODUCTION
Learning a second language in the university will be a challenging task for most of the students. However, learning a second language can be tougher when the mode of instruction is in the Malay and English. This means that the students will have to learn the English language as well as the other second language. Students in Korea will have to face this fact where they must have the knowledge of the English language in order to understand the other language. The students are sometimes having trouble to memorize words or even sentence structure for both languages. Moreover, the students have already learnt their mother tongue since schooling years and they already understood the grammatical rules of the language. However, learning two new languages will create confusion of the grammatical rules and therefore, various methods have been introduced in order to enhance the process of learning the second or third language (Normaliza Abd Rahim, 2014). The various methods involve the usage of materials using the computer, mobile phone, or any related internet and social network and others (Normaliza Abd Rahim, Affendi, & Pawi (2017). Normaliza Abd Rahim's (2014) study reveals that using the technology will enhance the process of language learning in the classroom.

A study done by Stewart and Gachago (2016) focuses on collaborative digital storytelling project titled "Being Human Today." It is a multimodal curricular initiative that was implemented simultaneously in both a South African and an American university classroom in 2015. This study facilitates dialogue and the sharing of digital stories by means of a closed Facebook group where instructors are able to investigate students' critical awareness and social consciousness regarding notions of "self" and "other" across continents. The result of the study shows that personal stories are shared in the space for critique and a raise awareness of how students are impacted by global hegemonic discourses. This study is parallel to the study by Bestgen and Granger (2014) where writing will develop phraseological competence in second language English writing. Writing in the second language will also help in the process of learning the vocabulary and sentence structure (Borich, 2012) of the target language. Borich (2012) also claims that storytelling is one of the approaches in learning a second language therefore, educators will have to ensure that the task given to learners will involve in reading and remembering the stories that the learners have read. Another study on stories using the mobile devices shows that learning a second language can be interesting and learners will look forward to the next class (Cavus & Ibrahim, 2016). Cavus and Ibrahim (2016) study is similar to the study by Dai & Ding (2010) where learning in the second language involves memorizing words and sentences. Dai and Ding (2010) study looks at the effectiveness of text memorization in English as a foreign language learning of Chinese students. The result of

Dai and Ding's (2010) study shows that the students involve memorize most of the vocabulary words in order to read or write in the target language.

On the other hand, Hoang and Boers (2016) study looks at re-telling a story in a second language. The study focuses on adult learners input text for multiword expression. The result of the study shows that adult learners are able to retell the story in the second language by giving multiword expression in delivering the story. The result of the study by Hoang and Boers (2016) is similar to the study by Eyckmans, Boers, and Lindstromberg (2016) where learning a second language needs the understanding of vocabulary in the target language. Subsequently, Eyckmans, Boers, and Lindstromberg (2016) and Peters (2016) add that the processing strategies of learning the second language were used in order for the learners to deliberate the lexical phrases. Another study by Glover, Hepplestone, Parking, Rodger, and Irwin (2016) looks at the pedagogical implication in order to enhance the learning process on teaching practice. The study focuses on educators in preparing materials for second language learners in the classroom. However, Laufer and Waldman (2011) study also looks at material prepared for classroom environment. The study looks at verb-noun collocations in second language writing. On the other hand, Qiao, Shen, and Forster (2012) study focuses on relative clause processing in Mandarin where the language is learnt as a second language. The result of the study shows that the maze task is appropriate and interesting for learning among learners of second language. Other studies on maze task in the second language include studies by Enkin (2012), Normaliza Abd Rahim (2013a), Normaliza Abd Rahim (2013b) and Ekin and Forster (2014), where the results show that learners show interest in learning.

Learning a second language can also be measured through implicit and explicit knowledge (Rebuschat, 2013). Sykes and Reinhardt (2013) agree with Rebuschat (2013) and add that second language can also be learnt by using digital games. Rebuschat's (2013) study is similar to the study done by Tokowicz and MacWhinney (2005) where there are implicit and explicit measures of sensitivity to violations in second language grammar. The result shows that second language learners will have to understand the meaning of each word and relate it to context. Studies related to using the stories and vocabulary have been studied widely throughout the world. For example, Webb and Chang (2012) study investigates vocabulary learning through assisted and unassisted repeated reading. The study has made second language learners feel motivated in learning the second language. Also, the study by Webb and Chang (2012) is similar to the study by Wright (2000) where variety in teaching and learning will create better environment. Wright (2000) study looks at stories in language teaching. The result of the study shows that learners are interested to listen to stories and the story enhances learners learning the second language.

The current study focused on the use of e-story and writing skill among the second language Korean learners. The objectives of the study were to identify and discuss the students' writing in the second language by using e-story.

METHODOLOGY

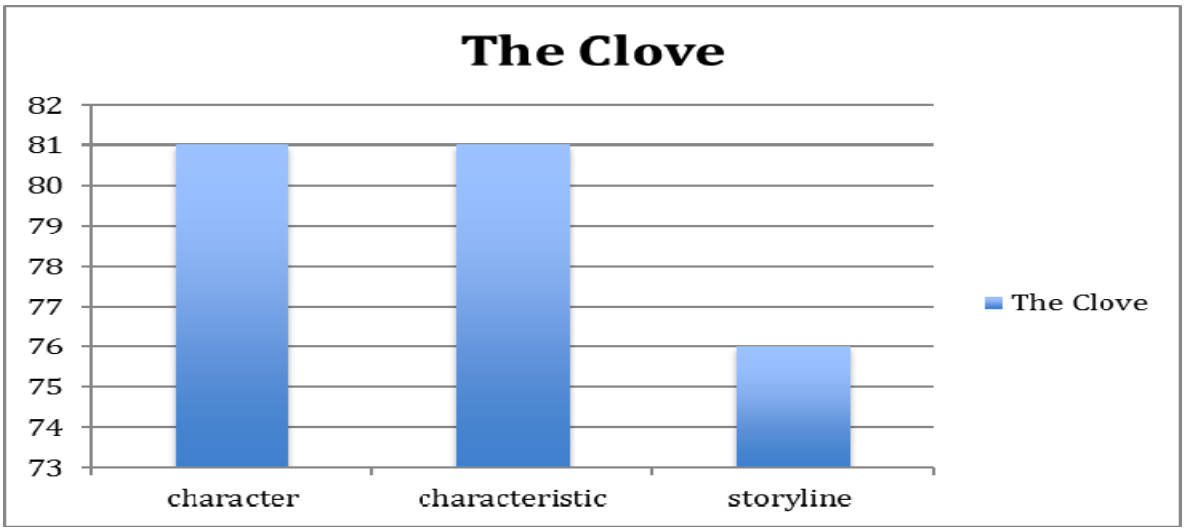
The research design of the study was a qualitative study. The samples of the study involved all 21 male and female participants age from 20 to 25 years old from two classes of Malay language at Hankuk University of Foreign Studies, South Korea. The participants were taught e-story entitled 'The Clove' in Malay for two hours a week in fourteen weeks. This study limited on the use of one e-story entitled The Clove. This is due to fact that the participants have to face the confusion and difficulty of learning the second language. Therefore, this study focused on the e-story in order to have the impact towards learning the second language. The teaching involved the identification of character, characteristics, storyline which include the vocabulary, sentence structure and spelling. In week 15, the participants were asked to write the story on 'The Clove' by using the correct vocabulary, sentence structure and spelling in the Malay language. Also, the participants were explained about character, characteristics and the storyline of e-stories in Malay language. The participants' writings were marked according to the marking scheme as in the 'character, characteristics and the storyline' and also the 'vocabulary, sentence structure and spelling'. The Clove is taken from *Pekaka Bercerita Siri 1* written by Normaliza Abd Rahim (2016) and copyrighted by Dewan Bahasa dan Pustaka. This data are analyzed by using Brown and Yule's (1983) discourse analysis theory. According to Brown and Yule (1983), there are four approaches in spoken and written discourse; reference, presupposition, implicature and inference. This study focused on presupposition of the discourse analysis theory since the rewrite of the story involves their perception and opinion of the story that they have learnt. Presupposition a thing tacitly assumed beforehand at the beginning of a line of argument or course of action.

Synopsis of the clove

The e-story entitled The Clove is taken from the Malay folklore. It has been used among storytellers in Malaysia. Also, the story is listed in the text book by Puteh and Said (2005) entitled *366 Himpunan Cerita Rakyat.*

Long time ago, there lived a king in a big country. He is the ruler of the country. The king thought that there was a disease spreading where all of them have bad breath. The villagers did not open their mouth to talk. Even the king showed hand signals to deliver any messages. The king was worried. He asked the villagers to find medicine for the disease. However, the villagers failed. The king also failed to help the villagers in the country. One day, the princess was playing with the assistance. They were giggling and laughing but they closed their mouth with a piece of cloth. They did not want anyone to smell their bad breath. Suddenly, a small bird flew and stopped on a branch of a tree. The bird was chirping and tried to attract the princess attention. The princess saw the bird. She went to the bird. The bird was pecking on a flower. The princess did not understand but she tried to take the flower from the bird. The bird was trying to tell the princess to eat the clove. The princess put the flower in her mouth. She was so surprised. Her breath smells so nice. She thanked the bird. She ran to his father, the king. She gave the flowers to the king. The king ate the clove. He was happy with the smell. The king instructed the villagers to plant the trees. Soon, there will be no bad breath among them. The king was happy.

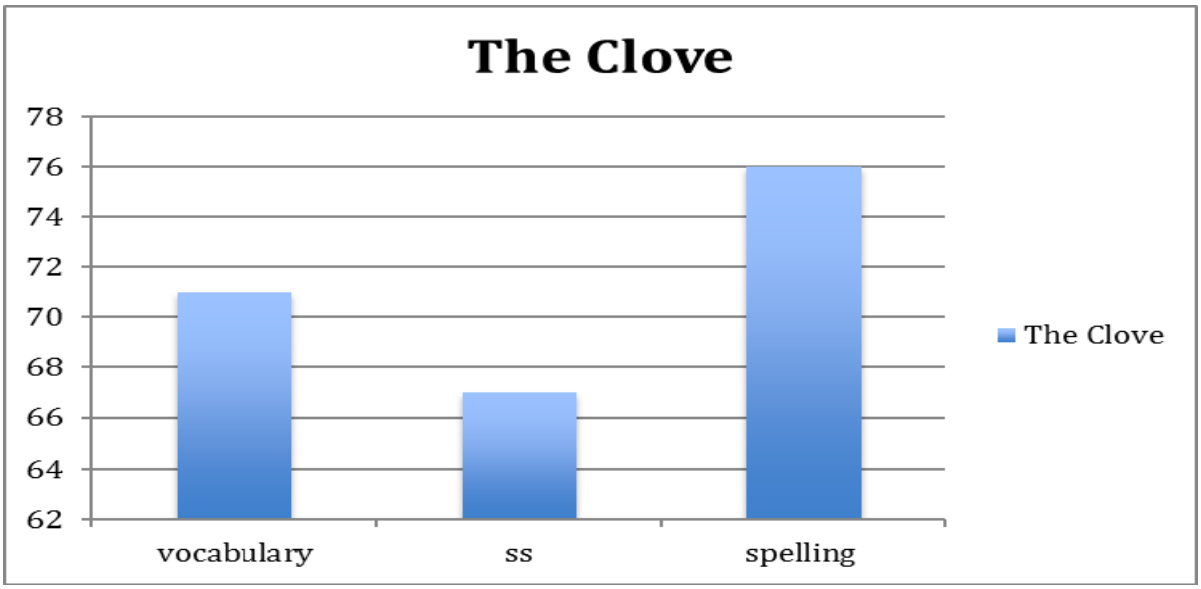
RESULTS AND DISCUSSION



Graph 1: Character, characteristics and storyline in the Clove

Graph 1 above shows the percentage of character, characteristics and storyline in the e-story The Clove. It can be seen that 81% of the participants (17 participants) manage to identify the characters in the e-story while the other 20% of the participants (4 participants) are confused on the name of the characters. This shows that the majority of the participants understood the characters in the e-story. The characters stated are the king, princess, bird, clove and villagers.

On the other hand, 81% of the participants (17 participants) manage to explain about the characteristics of the characters in the e-story. It can be seen that the participants manage to explain and discuss about the characterization of all the characters. The participants state; 'The King is the ruler of the country' (Malay: *Raja merupakan ketua dalam negara itu*), 'The King tried his best to find solution for the problem' (Malay: *Raja cuba untuk menyelesaikan masalah*), 'The princess helped to find the solution by telling the king about the clove' (Malay: *Puteri raja cuba mencari penyelesaian dengan memberitahu raja tentang cengkih*), and 'The bird has helped the princess by giving the clove to her (Malay: *Burung itu telah menolong puteri raja dengan memberikan cengkih*)'. The examples also show that majority of the participants manage to understand the characteristics of the characters. However, 76% of the participants (16 participants) exhibit that they understand the storyline while the other 24% of the participants (5 participants) do not answer the questions correctly as they only write four to five sentences. Consequently, majority of the participants (16 participants) manage to write the whole story successfully. The participants' writings are from the beginning of the story until the end. The story also includes the story about the villagers who do not talk or open their mouth. Also, about the princess who is playing with the assistance without opening their mouth. The story given by the participants also includes the princess closes her mouth with a piece of cloth when she laughs. The examples of the story above show the details by majority of the participants and this shows that they understand the e-story. Cavus and Ibrahim (2016) study has similar findings with this study where students will focus on the story. On the other hand, the findings of this study on the process of understanding of the story helps to enhance second language learning is parallel to the study of Bestgen and Granger (2014).



Graph 2: Vocabulary, sentence structure and spelling in the Clove

Graph 2 above shows the vocabulary, sentence structure and spelling use among the participants in the e-story The Clove. It can be seen that 71% of the participants (15 participants) show more than fifteen vocabulary from the e-stories. This shows that the participants understand the meaning of the vocabulary. Examples of vocabulary include, 'worry (Malay: *risau*), think (Malay: *fikir*), work hard (Malay: *usaha*), success (Malay: *berjaya*), listen (Malay: *dengar*), patuk (Malay: *peck*), look (Malay: *lihat*), inform (Malay: *beritahu*) and others. Although the words look simple, thus learning the second language is confusing when the participants have to translate the words to Korean and then to the Malay language. On the other hand, 67% of the participants (14 participants) manage to use the correct sentence structure when writing the storyline. The participants manage to write in simple sentences in order to avoid mistakes. The sentences like, 'The King tries to help the villagers (Malay: *Raja cuba membantu rakyat*),' 'The villagers do not talk to each other (Malay: *Orang kampong tidak bercakap di antara satu sama lain*),' 'The princess plays with the assistance (Malay: *Puteri raja bermain dengan pembantu*)' and others. This shows that the participants manage to write the story successfully without having major mistakes in the sentence structure. The results support the findings of Tokowicz and MacWhinney (2005) where the right usage of grammar will enhance students' writing. Consequently, it can be seen that 76% of the participants (16 participants) manage to spell most of the words in the writing correctly. It seems that the participants are confident with the sound of the words and manage to spell the words. For instance, the words, 'walk (Malay: *jalan*), sad (Malay: *sedih*), gather (Malay: *kumpul*), singing (Melay: *menyanyi*), fly (Malay: *terbang*), branches (Malay: *ranting*), clove (Malay: *cengkih*) and others. Also, the participants manage to use the correct prefix, affix and suffix in the Malay language. The words such as 'walking (Malay: *berjalan*), playing (Malay: *bermain*), thinking (Malay: *berfikir*), successfully (Malay: *berjaya*), using (Malay: *menggunakan*) and others. Here, it can be seen that majority of the participants (76%) even manage to spell the words with the correct prefix, affix and suffix in the Malay language. The results of this study are parallel to the studies of Noraien Mansor & Normaliza Abd Rahim (2017) and Webb and Chang (2012) where the usage of the right vocabulary plays an important role in writing.

The results above show that majority of the participants manage to understand the e-story. This might be the fact that the participants have watched the story several times. The participants also add that they even discuss with their peers about the story and this way they manage to understand the story more. The results reveal that majority of the participants understand the character, characteristics and storylines in the e-story The Clove. In fact, the result of the study also reveals that majority of the participants have used the correct vocabulary, sentence structure and spelling in the e-story The Clove. This shows that the e-story manages to attract the participants' attention when watching the story online. Also, this shows that e-story in the second language will enhance the participants learning in the classroom. The e-story has helps the participants to learn in different environment compared to the normal classroom. The results of the study are parallel to the study of Cavus and Ibrahim (2016), Hoang and Boers (2016), and Normaliza Abd Rahim (2014) where e-story will enhance students learning in the second language.

CONCLUSION

This study implicates educators when preparing materials for the students in the classroom. Educators will have to ensure that using online materials which involve the computer will help to enhance students learning. Nowadays, learners prefer to use the computer in learning since learning will take place individually and sometimes in pairs. Most of the time, students will be using the computer for social network so therefore, educators will take the opportunity by considering the likes of the students and relate it with learning. This way, learners will be interested in learning the second language. On the other hand, this study also implicates learners in dealing with learning by using the computer in the classroom or even outside the classroom. Learners will feel that the difference in learning the second language will make them more motivated to learn the language. This way, learners will participate in the learning process at any time of the day. It is hoped that further study will focus on other e-story related to Malay folklore to enhance second language learners in learning.

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ICT Integration in Turkey: Evaluation of English Language E-Content of the FATİH Project

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ABSTRACT
A nationwide technology integration movement, FATİH Project, was initiated by Ministry of National Education. FATİH Project whose main objective is to provide equal opportunities to the learners during compulsory education is made up of many components: Hardware supply, procurement of software and e-content, infrastructure set up, and teacher training. The research to date has tended to focus on hardware and equipment supplied rather than e-content and software. The present study examines the crucial role of English language e-content in the context of macro technology integration project. Document analysis was used to describe the main characteristics of the e-content prepared for upper secondary schools English language courses. In addition, semi-structured interviews were employed to investigate the perceptions of the shareholders about the impact of the e-content on teaching English and to gain a detailed understanding of the e-content. The findings indicated that the nature of English language e-content on EBA is not manageable, flexible, and interactive. The study suggests that a rich and efficient online language learning repository should be provided to the language learners and teachers.

Keywords: ICT integration, E-content, English language teaching, FATİH Project

INTRODUCTION
Use of technology for instructional purposes comprises not only hardware installation and infrastructure but also procurement of pedagogical content for online use. Such a task may become a challenging one provided that it is a nationwide technology integration project. In Turkey, a macro level technology integration project in education, "Movement of Enhancing Opportunities and Improving Technology" (Turkish acronym: FATİH), was launched in 2011 by the Ministry of National Education (MoNE) in cooperation with the Ministry of Transport, Maritime Affairs and Communications to be completed in five years. The project primarily intends to provide equal opportunities to all of the learners in compulsory education by providing specific hardware, software, and educational e-content for classrooms and learners' individual use. To this end, with an approximate 2.5 million-dollar budget, the project aimed to bring about a radical transformation in state upper secondary, lower secondary, and primary schools respectively.

Contrary to the technology myths which anticipate technology as self-sufficient (Blake, 2008), instructional content is one of the indispensable dimensions of any educational technology integration project that trigger transformation (Brickner, 1995; Ertmer, 1999; Olsen, 1980). In the first phase, procurement of equipment and software and hardware installation in upper secondary level was initiated in the FATIH project. According to the data in Strategic Report of the Ministry of National Education (MoNE, 2015a), 84,921 classrooms in 3,657 schools were equipped with the interactive whiteboards (IWBs), multifunctional printers, document cameras, and Internet network. In addition, learners in those schools were distributed 737,800 tablets within the same phase of the project (MoNE, 2015b). Along with the hardware in various forms and purposes, the project provided English language teachers with instructional e-content, yet it seems we have little or no knowledge about whether the e-content is in line with the national English language curriculum and syllabi and to what extent the e-content of the project is exploited by the teachers or learners in and outside the classroom.

Educational e-content of the project is published on Education Information Network (Eğitim Bilişim Ağı [EBA], 2017), the official online social website with 2 million registered users. The e-content on the website is prepared

by both the experts commissioned by the Ministry and the individual teachers on a voluntary basis. The Activity Report of the MoNE in 2014 revealed that 7,761 videos, 55,116 educational visuals, 1,674 e-books, 1,396 e-journal, 4,386 audios, 1,600 document and 84 e-content websites were published on EBA (MoNE, 2015a), which cover all of the courses. As for English language learning, the case is not a promising one; there were only 74 videos, 126 visuals, 23 e-books, 270 audios, and 12 documents among all on EBA within the same period.

Although e-content is of utmost importance to technology integration to the knowledge of the researchers, there is a gap in the literature in terms of the quality and applicability the e-content of the FATIH Project (FP) for English language teaching. Considering that technology stands at a critical point in English language teaching and learning specifically in the expanding-circle countries like Turkey, the e-content and accompanying software is the measure of the extent to which the FP exerted an impact on teachers and learners of English. This measure of success is dependent upon whether the project provided authentic materials, various learning and teaching materials via technology, online or virtual venues for genuine interaction with the speakers of English across the world and chances to get in touch with different cultures. Within this frame, the present study is motivated to identify the influence of high-budgeted FP in terms of English language learning e-content so that we can elicit insights into how a macro project is to be structured with regard to selecting and providing e-content. The e-content of the project were described in terms of its main characteristics and its compatibility with the national English curriculum, the syllabi, and the core materials provided for English courses of upper level secondary state schools. The study also examines the perceptions of the academicians and the authorities about the e-content of the project to better understand the data as well as to provide a grounded and a deeper discussion on the nature of the e-content. The following questions were framed to conduct the present study: (1) What are the major characteristics of the English content in the FATIH Project? (2) Is the English content of the FATIH Project in line with the national curriculum? (3) Is the English content of the FATIH Project complementary to other materials offered by the MoNE to state schools? (4) What are the perceptions of stakeholder academicians and decision-making authorities of the FATIH Project?

METHODOLOGY

This qualitative research study described the characteristics of the educational e-content of the FATİH Project and examined the perceptions of the academicians and authorities about the electronic content of the project offered for English language. Among three techniques – observation, interview, document analysis – used in qualitative research design (Fraenkel, Wallen, & Hyun, 2012), the present study adopted document analysis and interview. Document analysis was used to describe the main characteristics of the e-content prepared for upper secondary school English language courses. In addition, interviews were employed to examine the perceptions of the academicians and authorities about available e-content, the process of e-content preparation and future plans.

Data Collection and Analysis

Semi-structured interviews were carried out to investigate the perceptions of the shareholders about the impact of the FP e-content on teaching and learning English. The interview questions were constructed by the researchers. The questions were originally written in English, and then translated into Turkish. After the completion of back translation, the interview was piloted with a small group of English teachers. A blinded expert consensus was used to check the clarity and relevance of the interview questions. Some of the interviews with academicians and the stakeholders were audio-recorded; some were recorded by note taking. In the analysis of the interviews, the data were coded in three phases – code, theme, and category – via content analysis (Fraenkel et al., 2012). Themes were created and the excerpts were replaced under the themes. The general themes were then constructed, and converted into main themes. The codes and emerging themes were analyzed by an interrater to avoid any idiosyncratic interpretations. The participants were 2 academicians and 7 authorities of the MoNE and Scientific and Technological Research Council of Turkey (TUBITAK). The academicians were from English language teaching and educational technologies departments; the authorities were the ones who work for the educational content department of the MoNE and TUBITAK. The interviews were held between December, 2015 and January, 2016. The interviews lasted for 10 to 43 minutes.

Document analysis was employed for data collection to identify the characteristics of the visual, written, and audio materials (Ary, Jacobs, & Sorensen, 2010; Fraenkel et al., 2012) offered within the FP for English language learning and teaching. Initially, English e-content of the project, national curriculum and course books were analyzed separately, and then they were compared to find the possible consistencies or discrepancies among them. Lastly, the data yielded from the comparison process were utilized to analyze the official English course books produced by the MoNE to observe whether the e-content of the FP were consistent with the course books with regard to curricular objectives and syllabus requirements. The analysis was done via two checklists based on the comparison of the national English curriculum and course programs.

The project was initiated in 2011 and the latest English language teaching curriculum was also published in the same year. Nevertheless, the syllabi did not prescribe or offer any technology-integrated activities. It should be noted that the new English syllabi (MoNE, 2014), which is to be used in 2015-2016 educational year, presents technology-integrated activities. Because the present study took place in 2014-2015 educational year, current curriculum, syllabi, and course books were utilized in the data collection and analysis process. The project was aimed to provide hardware and software to the upper secondary, lower secondary, and primary schools respectively. As the first phase of the FP, upper secondary school was the only phase which was completed, so the study focused on the e-content prepared for this level of schooling. The inclusion criteria for the electronic materials offered by the FP were initially determined, as follows;

All of the materials included in the e-content of the FP must be;

- published on EBA website.
- published by "EBA".
- published on the website until 01.09.2015.
- prepared for English courses only.
- prepared for upper level secondary school (Although the first phase of the project covers the upper secondary schools, the educational e-content on EBA consists of e-content from different levels).
- given as open access,

In addition, the course books used in English courses as core materials are examined under their own category. As for the exclusion criteria for the electronic materials, it was decided that materials prepared for the upcoming years or published after the September 2015 as well as the user-generated materials were not included within the data collection phase of the present study.

According to the criteria above, the corpus of the study was constructed and categorized in terms of their kinds, such as videos, visuals, e-books, e-journals, audios, documents and e-content websites published on the EBA. Table 1 below presents the total number of the materials and the selected corpus for this study.

Table 1: Corpus selected for the present study

	Videos	Visual	E-Books	E-journals	Audios	Documents	E-content Websites
Total number on EBA	7,761	55,116	1,674	1,396	4,386	1,600	84
Number for ELT on EBA	74	126	23	-	270	-	12
Corpus of the study	43	-	16	-	All YYC* tracks	-	7

*Yes You Can Course book

While there are models (Cunningsworth, 1995; Tomlinson, 1998) that analyze the materials before, while, and after use, there are also other material analysis models (see McDonough, Shaw, & Masuhara, 2013) that analyze the materials in terms of organization and content. The present study described the while-use analysis, i.e. analysis of the currently used materials. The first step of the analysis was to set the criteria and create checklists. One of the checklists was prepared to describe the characteristics of e-content; the other checklist gave the operational definition of each term. Afterwards, the compatibility of course books and e-content with the criteria set by the checklists was examined. While creating the criteria and the checklists, both the literature (Byrd, 2001; Cunningsworth, 1995; Ersöz, 1990; Nunan, 1996; Özkan, 2004; Richards, 2005; Tomlinson, 2008; Ur, 1996) and the national curriculum were referred to secure the content validity of the instruments. In addition, the construct validity of the instruments was determined through literature review and expert judgment.

FINDINGS

RQ1: Major characteristics of English e-content of FATIH Project

On EBA, learning materials are classified as e-book, e-journal, e-document, video, audio, visual and offered websites. In accordance with the inclusion/exclusion criteria, e-books, videos, audios, and offered websites prepared for English course of upper secondary schools were analyzed (see Table 2).

Table 2: Included e-content of the FP

EDUCATIONAL E-CONTENT ANALYZED IN THIS STUDY	Course Book Series (Core materials)	"Yes You Can" Series by MoNE
		English A1.2 by Yıldırım Publishing
		İngilizce A1.2 by Evrensel Publishing
		Icebreaker A1.1 by Harf Publishing
	Audiovisuals	Videos on EBA (9th, 10th, and 12th grade)
		Audios of "Yes You Can" on EBA (from A1.1 to B2.3)
	Web Portals	British Council
		That Quiz
		English Central
		English Listening
		Look Forward
		Planet ELT Open to Life A1
		Lingus (English Break A1, A2, B1; Bliss A1.1, A1.2, A2.1, B2.1; Chat Book, and English Challenge)

The materials on the website are not interactive except for some web portals purchased and provided to use within the FATİH Project. Methodologically, the materials mostly don't promote communication; rather they present grammatical structures through translations in various restricted-use activities. The content on EBA was found to be unattractive in various studies from different fields (Altın, 2014; Ateş, Çerçi, & Derman, 2015). Online versions of the e-books are about 100 MB in size and thus, the bulky nature of the online materials makes it difficult to download (Kaysı & Aydın, 2014).

Two types of videos are presented on EBA; one is long (17-20 mins) and in lecture format, the other is shorter (1.5-5 mins) and presents daily interactions. There is not an even distribution in quantity of the videos according to the grades; while there are 23 videos for the 9th grade, there is no video for the 11th grade. Moreover, advised structural leveling is not followed in the videos. That is, a grammatical structure which is advised to be introduced in the 11th grade can be found in the 9th grade videos.

Those e-content materials are analyzed in terms of their compatibility with the national curriculum, the syllabi, the themes, structures, the functions, and methodology. Firstly, all e-books were found to be directly referring to the national English curriculum and the syllabi. The workbooks of these course books were categorized as complementary materials. Audio materials on EBA are the audio tracks of "Yes You Can" series. Although not all the tracks are uploaded by EBA and completed by the other users, they are categorized as the complementary materials. The number of the videos included in the study is 43, which have no systematic order or direct reference to the national curriculum and the syllabi.

The analysis of the national curriculum and the syllabi revealed that the language proficiency levels prescribed by these documents across the grades were consistently presented in the official English course books offered by the MoNE. Similarly, three English course books prepared by private publishing houses and approved by the MoNE for classroom-use were found compatible with the national English curriculum and syllabi in terms of language proficiency levels. However, both syllabi and official course books did not offer any videos to be utilized for instructional purposes in English courses.

Among seven portals offered by the MoNE on EBA, three of the portals direct users to course books. The rest are online content providers – British Council, English Listening, English Central, and That Quiz. None of the materials on any of these websites has a direct reference to the national curriculum and the syllabi. Even though they don't refer to the curriculum and the syllabi, they all have parallel content with the syllabi and the core materials, except for one website (That Quiz) and a course book on one of the websites (English Challenge).

Secondly, English e-content of the FP was examined whether it is compatible with the themes. The thematic structure of the materials should be designed according to the "themes and suggested content" proposed in the national curriculum. The videos were found to have both consistencies and discrepancies which make them supplementary materials. It was found that although the course books prepared by both national initiatives and private publishers were in line with the unit themes prescribed by the English syllabi, none of the materials

provided in the e-content appears to have a consistency with the themes that utilized for the contextualization of the language skills across the English syllabi.

In the offered websites, there were three examples of thematic similarity. The website "English Listening" and "Look Forward" course book showed thematic similarity with the syllabi. Among the course books published on Lingus website, "Bliss" series showed similarity with the syllabi, the other books seemed to have no consistency at all. Lastly one book entitled "English Challenge" was found to have a complete match with the new curriculum prepared for 2015-2016 educational year although it had no common points with the curriculum before this time period.

Thirdly, the structural and functional content of the materials was analyzed. The structural content of the materials were created according to the "Language Content" proposed by the MoNE in the national curriculum. The core materials, which are the course books, accompanying materials and offered websites were prepared in line with the language content of the national curriculum in terms of language functions and forms.

Lastly, methodology of the e-content was analyzed. That is, "the selection of learning tasks and activities" (Nunan, 1996, p. 5) in each of the materials was examined to find out whether they were consistent with the national curriculum, the syllabi, and the core materials. However, the videos and the websites, namely "That Quiz", "English Central", and "English Listening" were found to be inconsistent methodologically with the national curriculum, the syllabi and the core materials. The course books on the offered websites, the videos and the audios can facilitate instruction in the classroom either by complementing or supplementing the core materials. The other websites can also be used as supplementary materials according to the needs of the students. The only website which had nothing to do with the syllabi and the core materials was "That Quiz". It can be categorized as neither a complementary nor a supplementary material.

RQ2: English e-content of FATIH Project: Compatibility with the national curriculum

The course books in the e-book category were found to be completely in tune with the English syllabi. Some of them were directly prepared by the MoNE, and the rest were prepared by some publishing houses and approved by the MoNE. The books prepared or assigned by the MoNE as the course books have direct reference to the national English curriculum and thus the syllabi. In e-book category, there are electronic versions of these course books, their workbooks and teacher's books.

The audio materials are complementary materials to the core materials "Yes You Can" course book; that is, they can be classified as the primary materials for adhering to the dynamics of the national curriculum. The audio tracks of the texts of "Yes You Can" series from A1.1 to B2.3 were published on the audio category of EBA. They consistently match with the syllabi.

In the video category on EBA, there were 74 videos uploaded by EBA and the users. Because of the inclusion/exclusion criteria, 43 out of 74 were included in the study. Those were uploaded by EBA for English courses of upper level secondary school until 01.09.2015. Owing to the fact that eleventh grade had no videos, ninth, tenth and twelfth grades were examined. They did not have a direct reference to any English syllabi, but they showed thematic, structural, and functional match to some extent.

The last part of the educational e-content on English language learning is the offered websites on EBA. Seven websites were included in the study at the end. Three of them were course book websites and the other four were readymade websites. The websites had 11 course books in total. Only one of them – Look Forward – referred to the national curriculum; one of them (English Challenge) was completely different from the 2011 national curriculum and the syllabi for being prepared totally in line with the new curriculum (2014) which is used in 2015-2016 educational year. The other 9 course books, though they didn't have direct reference, were in line with the national curriculum and the syllabi. Rest of the offered websites on EBA was "British Council, English Central, English Listening", and "That Quiz". Except for "That Quiz", all had consistencies with the national curriculum and the syllabi. However, none had reference to either the national curriculum or the syllabi. On the one hand, it can be conceived that the English language learning e-content hasn't quite discarded the national curriculum. On the other hand, it can be seen that the English language learning e-content does not offer a complete match with the national curriculum.

RQ3: English e-content of FATIH Project: Compatibility with the core materials

The core materials ("Yes You Can" series and the English course books by Yıldırım, Harf, and Evrensel publishing houses) and the complementary materials (audio tracks, workbooks, and teacher's books) displayed a total match in all criteria. Videos failed to match directly with the syllabi and English language teaching

methodology prescribed by the national curriculum, yet they were in line with the syllabi structurally and thematically. Thematic content of the videos had various discrepancies form the themes and suggested content on the syllabi. Almost half of the themes on the videos were consistent with the syllabi while the other half were inconsistent. However, supporting some of the themes is enough to categorize those videos as supplementary materials, and they are accepted to supplement the core materials.

Among the books on offered websites, "Look Forward" was found to be compatible with all of the criteria. All three units of the book served to support the core materials. While "English Break" series on Lingus was functionally, structurally, and methodologically in line with the curriculum, "Bliss series on Lingus" was compatible with the syllabi in terms of themes, methodology, structures, and functions. "English Challenge" was a complete match with the 2014 curriculum (MoNE, 2014) and "Chat Book" matched methodologically, structurally, and functionally with the syllabi. All the books, except from "English Challenge", can be used as supplementary materials in the English courses.

Except for "That Quiz", the websites (by British Council, English Central, and English Listening) were consistent with the criteria to some extent. "English Central" structurally and "English Listening" thematically supplement the core materials. "British Council" fulfills structure, function, and methodology criteria. Three out of four websites can be categorized as supplementary materials.

Consequently, it can be argued that EBA provides only supplementary materials as 10 course books and three websites. They do not refer to the national curriculum or the syllabi, but they display compatibility with some of the criteria set on the checklist utilized in the present study. Supporting the core materials in one category was accepted enough to be named as supplementary material. These 10 course books and 3 websites support the core materials at least one category. Only one website among all the materials on EBA is in the status of being neither complementary nor supplementary for not supporting the core materials in none of the categories (That Quiz).

RQ4: The perceptions of academicians and authorities

For the objectives of the project, the participants unanimously stated that the project was based on a solid and feasible outcome; providing equal opportunities for the learners from different socioeconomic background. However, the academicians were more cautious about the outcomes, stating that the outcomes must be measured carefully: "*It is an important project in providing equal opportunities in Turkey and sustaining the retention of the learning activities … But it can be discussed to what extent the aims set in the beginning were reached, how they are reached, where it came in terms of quality* (2nd Academician).

The theme identified for the fourth research question addresses the perceptions of the authorities and the academicians about *e-content*, the preparation of e-content, software, and ICT materials, the assistance provided in using and developing content, and the future plans related to the e-content and software.

All of the participants reported that the e-content and various related online materials published on EBA (official site of the Ministry) are not sufficient in quantity and quality to support thousands of teachers and millions of English students in state schools. "*I am aware of e-content, … It is a good try, what I can tell about the quality of e-content is that's a good try but…they need to be adapted and content needs to be more easily accessible*" (2nd Academician Interview).

EBA platform was in service before the FP and e-content were developed for various courses for 8 years. Those online materials are currently being developing by around 60 teachers. In addition, different governmental bodies provided teams for content development. "*Along with that, there are academicians, teachers, illustrators, a group coordinator, a technical coordinator, and a content developer. The groups consist of six people…. This is the group for all fields*" (7th Authority Interview). These groups are responsible for developing the content for the courses taught in the schools. The authorities expect the groups to prepare online materials in line with the themes and objectives depicted in the national curriculum. It was stated by the participants that those groups were not offered any criteria related to content but to genre, which is more about how the materials look instead of what they include pedagogically. Around 1000 teachers have been trained in summer, 2015 on e-content development and it is aimed to double this number in the future. Underlying intention of the shareholders is to make the teachers potential content developers.

According to the recently signed protocols between shareholders, the e-content preparation phase which is made up of four steps (needs analysis, content preparation, content evaluation, and content delivery) is carried out by a content development team. Contrary to the current format of the e-content on EBA whereby each one is made up of more than one outcome, new format is planned to be small pieces for each outcome. The small pieces are

planned to be 20-40 seconds of videos. Although Ateş et al. (2015) suggest more inclusive content on EBA, shareholders claimed that small pieces of learning objects may facilitate learning.

The current content on EBA was thus described as insufficient by the academicians and the content coordinators advocated this argument. "*Actually, e-content somehow was tried but I cannot see some evidence of being in line with the national curricula, the syllabi, and the effective language teaching principles*" *(2nd Authority Interview).* The project was believed to fall short in complying with the national English curriculum, and this idea was articulated repeatedly by all of the participants.

Two shareholders brought up totally different perspectives into the use of online materials. While one side advocated abolishing hardcopy books in the near future and make complete use of e-contents, the other side warned about the extent to which the e-content fulfill the requirements of a course. Besides the perplexity of the contradiction in the perceptions of the both sides, the content development department did not guarantee developing satisfying amount of small pieces independent from course books in the near future.

Because synchronizing software is not available, the tablets cannot be integrated into the instruction, which seems to be a common problem articulated by the authorities. While the present study was carried out, the shareholders implied the launch of two systems; learning management system (LMS) and content management system (CMS). The former, while being a standard LMS, aims to turn EBA into a more social platform. The latter will be a platform for the teachers to create and share the content through. Both being closed systems allow only the teachers and the learners to access the systems.

DISCUSSION

There is a paucity of studies on the e-content of the FATİH Project from the points of view of shareholders, such as authorities and academicians, an issue that has been addressed in the present study. The findings indicated that the contents of the FP are the most noteworthy one according to the academicians. They appreciate the efforts of the MoNE, but raised concerns about the quality and amount of the e-content based on strong EFL methodologies. The studies on the contents of the FP (see Ateş et al., 2015) indicated that the materials were insufficient. Among the barriers to technology integration is lack of software/online learning materials (Buabeng-Andoh, 2012; Ertmer, 2005; Goktas, Yildirim, & Yildirim, 2009), and the project creates barrier to itself by neglecting the procurement of software/e-content.

The findings of the present study revealed that e-content of the project display compatibility with the national curriculum, the syllabi, and the core materials to some extent. The compatibilities were found mostly to be with themes and structures. However, in methodological terms, not only the core materials developed by the MoNE but the e-content on EBA had very limited consistency with the national curriculum. The findings raise concerns about the quality of the e-content on EBA, particularly in not being attractive and interactive (Chapelle, 2010; Murray & Barnes, 1998). The content should be robust and be in line with the effective teaching principles in terms of organization and language content. The contents were found to mismatch with the worldwide standards for online learning materials, SCORM, whereby learning materials were expected to be accessible, portable, reusable, durable, and interoperable. Not only the content but the network through which the content provided should be robust (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010; Murray & Barnes, 1998). However, the materials on EBA did not hold most of the standards above; neither was the website user-friendly (Kaysı & Aydın, 2014).

The main affordances of the CALL material are interactivity and flexibility of using it anytime, anywhere, anyway. However, the materials on EBA offer almost no interactivity, which does not promote interaction and opportunities to output (Chapelle, 2010; Murray & Barnes, 1998; Tomlinson, 2012). The findings indicated that the available learning materials may not be manageable for learners for being large and not-interactive pieces. Although the materials are planned to be smaller pieces, the present pictured cannot be delineated as offering manageable input (Murray & Barnes, 1998; Tomlinson, 2012). Lastly, the audio and video materials on website were found not to be mostly comprised of materials produced by native speakers. It is quite significant for language learning materials to be in line with the principles of second language acquisition (SLA) theory. However, the input on EBA is quite far from being rich, interactive, and manageable (Tomlinson, 2012). They cannot be depicted as promoting affective and cognitive engagement for noticing (Tomlinson, 2012). It can be understood that the materials are in line with neither SLA principles nor the national curriculum and the syllabi to a significant extent.

In the scope of the project, procurement of the hardware and equipment was almost exclusively the only focus of the shareholders. Online learning materials, which are one of the main pillars of technology integration, have

been neglected until now. However, what should be kept in mind is that "ICT should be integrated into language teaching, not bolted on, which implies that any software has to complement other activities in the classroom". The present study revealed that the project mainly interested in the bolting ICT on language teaching, rather more efforts should be put in integrating it whereby e-content development is the prerequisite.

IMPLICATIONS AND SUGGESTIONS

Central to the entire technology integration process is the procurement of e-content that is in line with SLA theory, especially in the expanding-circle countries like Turkey. The findings revealed that in general the match between the materials on EBA and SLA theory is weak. These findings suggested several courses of action for better English language learning via technology. There is a definite need for English language e-content that is manageable, flexible, and interactive. Moreover, the e-content should be in line with SLA theory (i.e. promoting interaction, purposeful communication, and focus on form and meaning). This study suggests that online language learning repository which is rich in efficient language learning materials should be provided to the English language learners and teachers. New pieces designed by TUBITAK, and initiation of LMS and CMS are expected to facilitate learning and teaching English. Greater efforts are needed to ensure the quality of the e-content on EBA. A reasonable approach to tackle the issue could be to include academia into the e-content development process more.

It is, to the researchers' knowledge, the first study to investigate English language e-content on EBA. The contribution of the present study has been to offer insight into the nature of e-content and its compatibility with national English curriculum and syllabi. The present study is limited to e-content prepared for upper secondary students. A full discussion of English language e-content on EBA lies beyond the scope of the present study. More research is required to determine the efficiency of the English language e-content published on EBA.

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APPENDIX

Interview Questions for Academicians and Authorities

1. What do you think about the FP?
2. What do you think about the tools and applications peculiar to the FP?
3. Are you aware of educational e-content of FP?
4. What do you think about educational e-content of the FP provided for English course?
5. What are your advices on the e-content of the FP?

Managing Digital Learning Environments: Student Teachers' Perception on the Social Networking Services Use in Writing Courses in Teacher Education

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ABSTRACT
Limited studies have been conducted to examine how effective and what impacts dealing with students' learning experiences as well as the problems faced by the students. This study focused on English student teachers' experiences on the advantages and problems faced in using Social Networking Services (SNS) in English as Foreign Language (EFL) writing courses which is a part of larger research involving the use of SNS in two state universities in Jambi. This research was conducted in ten classes of two Indonesian universities for one year. This qualitative research involved a total of 6 focus group discussions with 60 students. Prior to focus group discussion, demographic questionnaires were distributed to know general information of all participants in relation to the use of SNS. A thematic analysis revealed general background of the participants in relation to the use of SNS, advantages of SNS use in writing courses, problems faced of the SNS use. The findings contribute to current understanding about how English student teachers experience using SNS. Based on the findings, this research offers policy recommendation to expand the use of SNS in EFL courses.

Keywords: social networking services, academic writing, advantages, problems, Indonesia

INTRODUCTION

Social Networking Service (SNS) has been very popular during the past ten years and plays a significant role in people's daily life. By definition, SNS can be widely interpreted as internet or mobile applications designed to facilitate communication, collaboration, and content sharing (Boyd and Ellison, 2007). Murray and Waller (2007) stated people working in internet technology developed the idea on how people know and interact with each other through SNS which facilitates them the ability to share, respond, comment, and discuss which makes the world more connected. Eventually, it helps millions of people share interests on many disciplines, and make possible to the registrants to share statuses, files, photos, videos, to create blogs, to send messages, and to conduct conversations. In higher education context, the emergence and popularity of SNS has made many lecturer researchers conduct research and publish their articles in that area. The implementation has brought some learning advantages such as contribute to higher score in some direct instances, reduce anxiety levels, increase the efficiency and mastery of task, and improve social interactions (Melor, 2007; Brown, 2010; Pursel & Xie, 2014; Kabilan, Norlida, & Abidin, 2010; Hamid, Kurnia, Waycott, & Chang, 2011 & 2015; Lowedahl, 2011).

Noting the use of SNS in higher education, some applied linguists and foreign language pedagogy educators in universities (e.g. Thorne & Black, 2007; Blattner & Fiori, 2009; McBride, 2009; Stevenson & Liu, 2010; Lee, 2011) have also explored the use of SNS in their teaching and realized the great potential of SNS for foreign language pedagogy because SNS use is currently an authentic and daily literacy practice, it is useful to be implemented in English as a foreign language (EFL) teaching. In more particular issue and subject, SNS has been implemented as a medium in writing classrooms by scholars for recent few years (Warnock, 2009; Balci, 2010; Lee, 2011; Habibi, 2015) for example Warnock (2009) mentioned that number one reason to teach writing online is that the environment would be clearly textual. Students who are in a guided environment of learning express their ideas in writing to a varied audience. SNS allow students to write to their peers, teacher or lecturers, and even other audience in ways which will facilitate learning opportunities for everyone involved. In addition to that use, writing teachers or lecturers will possess a unique opportunity because online-based writings allow them and their students to interact in ways beyond content delivery. They make students create a community through the means of electronic.

Informed by these insights, we initiated a long-term, instructional research project to investigate the SNS use in EFL writing courses in two universities (University of Jambi and Islamic State University of Jambi). Further, this article which is part of the research focuses on the advantages and problems of the SNS use in EFL writing courses seen from student teacher experience. The kinds of SNS used in this research were WhatsApp, Facebook, and Telegram which were utilized to be media for EFL writing courses. The SNS were implemented in ten writing classrooms (5 EFL writing courses in Jambi University and 5 EFL writing courses in Islamic State University of Jambi). The levels of writing courses are paragraph writing (second semester) and essay writing (third semester). This research took one year time to conduct from May 2016 to May 2017. To attain the purposes, the guiding research questions for this study were: 1) what are the advantages of the SNS use perceived by the students in writing courses in two Indonesian public universities? 2) what problems emerged?

LITERATURE REVIEW

Social networking service in education

In the literature, the terms of social media and social networking services (SNS) are often used interchangeably. Lowedahl (2011) described social media as web environments where content is aggregated, performed, and distributed. Further, Social technologies can be utilized to support teaching and learning through SNS educational activities in education. Social networking service used by world citizens which are available for free, are popular nowadays (Brown, 2010; Hamid, Kurnia, Waycott, & Chang, 2015). Social technologies are able to make flexible supporting in the process of teaching and learning and to ease of academic communication, to provide the sharing of ideas and re-utilizing of study content, and commentaries. They also provide links to support resources of relevant information controlled by the users in terms of teaching and learning, students and teaching staff (Brown, 2010). Those factors have made teachers increasingly utilize them in the process of teaching and learning.

Some instances of SNS educational activities are content sharing, interacting, and collaborating (Boyd & Ellison, 2007; Pursel & Xie, 2014; Kabilan, Norlida, & Abidin, 2010). Students in the process are able to publish their work publicly for others to watch, listen, and download. For instance, multimedia files can be shared on file sharing services such as Flickr, YouTube or Slideshare, and other social bookmarking services which allow them to bookmark certain web services (Lockyer & Patterson, 2008). Social technologies also support interactions by engaging students to actively participate in a talk. They can fill in comments and inquiry for more detailed information, add friends and initiate communication by messaging (McLoughlin & Lee, 2007). In Wikipedia's (2017) lists, there are many kinds of SNS including Facebook (1871 million users), WhatsApp (1000), Facebook Massenger (1000), QQ (877), Wechat (846), Q zone (632), Instagram (600), Tumblr (500), Twitter (317), Baidu Tieba (300), Snapchapt (300), Skype (300), Sina Weibo (297), Viber (249), Line (217), Vinterest (150), YY (122), Linked in (106), Telegram (100), BBM (100) and etc.

Social networking services can be great supplemental learning tools in various subjects in higher education due to its popularity among college students. In a recent investigation by Smith and Caruso (2010), for example 96% of the 36,950 undergraduates surveyed access SNS. Recent research has also shown that college students not only have memberships with social networking accounts but are accessing these accounts often

Social networking service in foreign language pedagogy

In foreign language pedagogy, theories of social networking have historically had some focuses on description and evaluation; stage one of technology implementation. For example, Stevenson and Liu (2010) held usability evaluation on SNS built for foreign language learning, *Pa- labea*, *LiveMocha*, and *Babbel*. Their results show that the students were less attracted to the features of the SNS such as messaging, friending, publicly posting, on

line interaction than the traditional instructional elements of teaching such as lecturing, direct instruction, grades-based, seatwork and teachers-centered teaching. This is not coming for a surprise because it shows that a user's SNS network develops firstly around their existing face-to-face networks and followed with the expansion of individuals with the use of SNS (boyd & Ellison, 2007). The potential for SNS in foreign language pedagogy may therefore lie in first leveraging face to face class or learner affinity groups into digitally mediated users.

There are many studies conducted in promoting the use of SNS in foreign language pedagogy (Blattner & Fiori, 2009; McBride, 2009). For instance, Blattner and Fiori (2009) underlined the future potential for classroom community establishing through the most used social media, Facebook as one of social network services. They report on the opportunity for the expansion of socio-pragmatic awareness by getting their students to understand SNS practices established around linguistic identity, for instance, quizzes "you know you speak Swiss French when …" that include the pronunciation of shibboleths and local accents. Another research reports the foreign language learning potential for SNS as environments in which to learn pragmatics, establish relationships, experiment with multiple identities, and practice writings" (McBride, 2009). She highlights the future use of SNS in developing pragmatic competences because their use needs netiquette and critical self-awareness. She supports projects that involve optional identity and group profiles, as well as media participatory activities. Yet, she informs that SNS use in a foreign language pedagogy classroom could exist as a popularity contest, causing estrangement and changing formation of groups and requiring participants to friend each other may have backfire, being classmates may or may not be sufficient grounds for students to be in friendships.

EFL writing using SNS

Specifically, there are also some studies discussed the SNS use in writing courses (Balci, 2010; Lee, 2011; Warnock, 2009; Habibi, 2015). For instance, Warnock (2009) pointed out that the main reason teaching writing with online application is that the situation can be purely textual. Students are in an interesting learning environment expressing themselves to some variation of audience with their writing. Social networking services give students an opportunity in order to write to their teacher and to other students as well as to other people from outside the classroom in ways that will trigger a process of teaching and learning where everyone is actively involved. Further, teachers who teach writing would have times and opportunities to teach writing beyond the traditional ways with the use of SNS since the activity allow all parties to interact beyond content delivery. There would be a certain community with these applications which allow students to interact.

For students who have limited time and option to study, these social networking services allow them to establish professionally and socially the connections which create values in educational systems (Warnock, 2009). One example of the use SNS in teaching writing is the use of Facebook which is proven to affects learners' motivation and strengthens students' ability to practice in a social condition with the networking practices (Habibi, 2015). What is more, Lee (2011) informed that SNS also improve the interaction level of web-based interaction all parties involved in the teaching and learning process. Besides, they help the teachers to interact, communicate, and connect to their students outside of the classroom and discuss the assignment, activities and other useful activities.

The advantages of using SNS in education for language learning

When we examine advantages deriving from the use of social networks as an educational tool, interactivity and participation provided by such environments should be also mentioned. Advantages possibly deriving from use of social networks as an education tool (Balci, 2010; Mills, 2011; Lee, 2011, Stevenson & Liu, 2010). For example, Balci (2010) informed that there are some advantages of SNS use: 1) Independence from time and location, 2) Improvement in quality, success, and efficiency of education by use of SNS for education, 3) Ability to learn in more systematic manner and in shorter time. 4) Individualization of learning, 5) Ability to have instant feedback. 6) Offering the student ability to repeat course content as much as desired, 7) Ease of displaying the content, 8) Allowing to the design of visual and auditory learning environments, 9) Archiving course content and synchronized class (virtual class) applications, 10) Tendency towards more voluntary behaviors on the side of students for improving research, knowledge, and skills in comparison to conventional programs, 11) Offering possibility to evaluate performance of students, 12) Minimizing risk of error in measuring evaluation results, and 13) Improving skills of students and teachers to reach, evaluate, use, and efficiently cite the knowledge.

For language learning itself, some studies have found association between SNS use and improvement in new literacies and language skills in language class (e.g., Lee, 2011; Mills, 2011), and others have focused on non-standard uses of language in online interactions (e.g., Chen, 2013; Lee, 2011). Stevenson and Liu (2010), Mills (2011), and Lee (2011) reported that users of SNS in language learning achieve the following advantages: 1) perceived progress in vocabulary or vocabulary acquisition, 2) increase confidence in using the target language,

3) fostered an interactive community for communication, interaction, and discussions, 4) L2 learners' participation on SNS appeared to have a positive impact on their oral proficiency, and 6) syntactical complexity or grammatical improvement.

Problems in SNS application

There are some studies discussing the weaknesses or problems in the use of SNS in higher education (Schroeder, Minocha, & Schneider, 2010; Hamid, Kurnia, & Walcot, & Chang, 2011; Lee, 2011). Hamid, Kurnia, Waycott, and Chang (2011) reported some concerns raised by the students to the limitations of SNS use. These concerns include time management issues, lack of ICT skills faced by some students, and limited technical infrastructure in some higher learning institutions. In addition, they stated that students' woks are likely be more visible to others when using social technologies in higher education which can be motivating, but also present challenges, such as the fear from the students that other students will copy their work and the need for lecturers to educate the students for being careful when presenting their work in an online environment.

On the other hand, a study by some researchers demonstrate that students' grades can be affected negatively by using social networking tools and visiting lots of sites or applications. A questionnaire was conducted in this study to verify this fact, which shows that 63% of students get high grades because they spend less time using the SNS. Thus, spending more time on using SNS appears to result in a lowering of student grades. In addition, there are still a few learners are not using the SNS, such as e-learning, in proper ways, which has also resulted in failing to achieve success (Lee, 2011)

RESEARCH METHODS

This is a qualitative case study involving 60 EFL student teachers who were from two Indonesian state universities, University A and University B. The research needs one year to get finished, from May 2016 to May 2017. The research is a part of a joint research project conducted by lecturers from the two universities in order to promote the use of SNS in Jambi's colleges or universities. This happened as we were discussing the reality of the SNS use in higher education around the world that has become a global phenomenon. It is valuable to take a broad view and consider the views of SNS users in education. On the other hand, based on our previous preliminary data, there are few lecturers in Jambi utilizing the use of SNS in their teaching.

We discussed and agreed to use SNS in our teaching, writing courses which involved ten classes with 324 students (5 EFL writing courses in University A and 5 EFL writing courses in University B). We chose paragraph writing which is a course taught for the second-semester students and essay writing for the third-semester students. However, we excluded academic writing courses (semester four) since the course tends to focus on the advanced writing skills and the lengthy writing that the students should fulfill in forms of academic writing proposals. To make sure the research process would run well, we asked all of the students in those classes to provide their smartphones with WhatsApp, Telegram, and Facebook,.

In this research, we utilized WhatsApp group, Telegram channel, and Facebook group the SNS supplementary applications or media in teaching writing. WhatsApp group was used as a medium for the students to report their daily assignment where they were allowed to discuss their counterparts' writings and in certain times, they were assigned to evaluate, revise, and give scores. On the same time, we utilized Telegram channel to accommodate one-way instruction from us to the students. Facebook group was used to share the students' writings in a bigger group for all of the students from the two universities.

For the sampling technique, we applied purposive one by choosing six students from each class to be the participant. To represent all level of competence, the six participants were chosen based on their final writing scores, two highest achievers, two middle achievers, and two lowest achievers. We applied focus group discussions as the technique of data collection. Focus group is a widely used technique in research to obtain data on attitudes, feelings, experiences, and reactions in a way that would not be achievable with other techniques e.g. questionnaires, one to one interviews, and observations. The situation of focus group discussions allows its members to participate, react, and establish responses of other members or think with a synergy in a group setting' (Klein, Tellefsen, & Herskovitz, 2007).

Before conducting focus group discussions, we distributed a demographic questionnaire to all participants/ students because we wanted to know their background information in relation to the use of social networking services not only in classrooms but also outside the classrooms. It aimed at providing data which support the main data. Beside the general profile of the participant, we also listed some questions in relation to the use of SNS namely the familiarity of SNS kinds, the frequency, and the purposes of SNS use which we divided into two categories (Social tool and learning tool).

A total of six focus group discussions were held when the courses were completed and the samples were determined. Four researchers, two from Jambi University and two from Islamic State University of Jambi were in charge to get the data from all group discussions. The discussions were held in between 90 to 120 minutes long as on 20-25 May 2017. All participants were asked to give their opinions on the topic given in relation to the advantages of SNS use in writing courses. The discussions were videotaped using smartphone cameras to ease the process of data analysis and delivered in Bahasa Jambi to obtain in-depth understanding of both the question and the responses. In the focus discussions, the participants were asked to freely inform their opinions on the advantages of SNS use in their writing course. We set all group discussion protocols and submitted some questions. We focused on three main topics: their personal and educational use of the SNS; the activities and experience of SNS use in the writing courses (specifically focusing on the interactions) and the outcomes which include the advantages of the SNS use.

The focus group discussions were held at each university; Jambi University and Islamic State University of Jambi. Every student in each focus group completed a form of permission to participate in this research. For anonymity and ethical purposes, the participants were identified using their focus group's number and anonymous names. Mack, Woodsong, Macqueen, Guest, & Namey, (2005) explained that the dignity of all participants in research must be appreciated and it encompasses that people in research will not be used simply as an object to get research objectives. The demographic information of the research participants in the focus groups is pictured in Table 1.

Table 1: The distribution of participants and focus group discussion

Location	Discussion	No. of participants/ Gender	Codes
University A	G 1	5 males and 5 females	G1Anton, G1Andy, G1Ali, G1Budi, G1Bara (Males) G1Ani, G1Amber, G1Aina, G1Bella, G1Bebi, (Females)
	G2	4 males and 6 females	G2Charlie, G2Cole, G2Dani, G2Dion (Males) G2Christy, G2Cella, G2Chelsea, G2Dara, G2Dewi, G2Dessy (Females)
	G 3	6 males and 4 females	G3Emil, G3Eko, G3Enzo, G3Farid, G3Fadh, G3Fathir (Males) G3Elsa, G3Ella, G3Fahira, G3Flora (Females)
University B	G4	4 males and 6 females	G4Gilang, G4Greg, G4Habib, G4Hussein (Males) G4Gina, G4Gladis, G4Giska, G4Hilfa, G4Haye, G4Hesty (Females)
	G5	3 males and 7 females	G5Indra, G5Ikhsan, G5Jack (Males) G5Ines, G5Inayah, G5Ivo, G5Isti, G5June, G5Jenny, G5Julia (Females)
	G6	4 males and 6 females	G6Kamil, G6Kiko, G6Lilo, G6Louis, (Males) G6Kinan, G6Kikan, G6Kleo, G6Lili, G6Lolita, G6Lisa (Females)

We used both numbers and percentages analyzing the demographic questionnaires to observe the frequency distribution of each part. Information on the use of SNS was analyzed using a compiled mean to capture the general information of all population. The mean was chosen because participants' answers were worth in the form of different compiling, and this procedure is available as the most reliable method in appropriately understanding and presenting the data. Fink (2013) stated that descriptive statistics produce simple summaries about the population examined and the responses to most of the questions.

Analysis across and between the data went on until no more thematic patterns were recognized. Even though the participants were from different classes and with different lecturers, the data were used in equal manners without analyzing and focusing particular dissimilarities on how SNS were utilized by various groups. The analysis of the research is an attempt to meet the purpose in describing results regarding participants' experiences in using SNS in English writing courses. All data transcripts were computerized, printed, read and re-read, translated, coded, divided into themes and some themes and presented. Notes were obtained in some borderlines to pinpoint prospective themes. The data were then collated, reviewed, and examined for connections and redundancies. The data were analyzed by manual coding thematically (Boyatzis, 1998; Creswell, 2007; Kvale, 1996). Finally, we broadened, contrasted and changed the themes concurrently with other transcript analysis.

In dealing with the trustworthiness of our study (Lincoln & Guba 1985, p. 300 as cited in Mukminin, 2012a, 2012b), we conducted focus group discussions which last approximately 90 to 120 minutes. For verifying the accuracy of the data, findings, and interpretations (Creswell, 2007;Johnson & Christensen, 2008; Mukminin & McMahon, 2013) the data analyses were reviewed by all researchers and participants as part of member checking In relation to this paper purposes, the researchers focused on identifying main themes that appeared when participants discussed the advantages and problems on the use of SNS in writing courses. The findings of all analysis are presented below.

FINDINGS

The findings of this research are divided into three themes (1. general background of the participants in relation to the use of SNS, 2. advantages of SNS use in writing courses, and 3. problems faced on the SNS use). Theme one has two sub-themes which are a. participants profile and b. the use of SNS. In addition, theme two includes a. offering possibility of peer review, b. independence from time and location, c. perceived progress in vocabulary, and d. grammatical improvement. The last theme, problems faced on the SNS use, there are three sub-themes namely connection, costly to use, and inexperienced in using SNS

Table 2: Themes and sub-themes

Themes	Sub-themes
1. General background of the participants in relation to the use of SNS	a. Participants profile b. The use of SNS
2. Advantages of SNS use in writing courses	a. Offering possibility of peer review b. Independence from time and location c. Perceived progress in vocabulary d. Grammatical improvement
3. Problems faced on the SNS use	a. Connection b. Costly to use c. Inexperienced in using

General background of the participants in relation to the use of SNS

In this part, we describe the findings of the demographic questionnaires we distributed which include the general profile of the participant. The use of SNS namely the familiarity of SNS kinds and the purposes of SNS use which we divided into two categories (social tool and learning tool). General Profile of the Participants

Participants' profile

Participants in this research are 60 EFL student teachers who were from two Indonesian state universities, University A and University B. Sixty percent of those participants were women while forty percent were males with ages ranging from 17 to 22. Most of the participants had smartphones since four to six years ago. They use their smartphone for SNS use from one hour to seven hours a day. The detail explanation of the participants' profile can be seen in Table 3.

Tabel 3: Gender, age, length of smartphone use, frequency using sns

Variable	Value	Percentage (%)
Gender	Female	60
	Male	40
Age	17-19	51,66
	19-20	41,66
	+20	6.66
Length of smartphone use	1-3 years	20
	4-6 years	66.66
	+6 years	13.33
Frequency using SNS	1-3 hours	5
	4-6 hours	63.33
	+6 hours	31.66

The familiarity with SNS

The participants were asked to indicate whether they were (1) unfamiliar, (2) familiar, or (3) very familiar with SNS. Table 4 presents the summary of the responses.

Table 4: SNS kinds used by participant (Mean)

SNS	Mean	SNS	Mean
Facebook	2.95	Instagram	2.87
WhatsApp	2.87	Tumblr	1.20
Facebook Massenger	2.70	Twitter	2.23
QQ	1	Baidu Tieba	1
Wechat	1.47	Snapchapt	1.45
Q zone	1	Skype	2.45
YY	1	Telegram	2.21
BBM	2.70	Line	2.45

Facebook is the most familiar SNS among the participants (mean 2.95) followed by WhatsApp and Instagram (2.87). Other SNS such as Facebook Messanger (2.70) Line (2.45), Telegram (2.45), and Blackberry Massanger (2.70), Twitter (2.23), and Skype (2.45) are also popular SNS. On the hand, they are not really familiar with Wechat (1.47). Snapchat (1.45), QQ (1), Baidu Tieba (1), YY (1), and Q zone (1).

Advantages of SNS use in writing courses

Some advantages found through the focus group discussions are offering possibility of peer review, independence from time and location, perceived progress in vocabulary, and grammatical improvement.

Offering possibility of peer review

The first advantage highlighted by the participants when their lecturers used SNS in writing courses is offering the possibility of peer review. The term "peer review" refers to students sharing information with each other to support learning activities. Therefore, this theme includes all comments students made about sharing information with their peers to support each other's learning. The analysis found that students shared knowledge with each other when social technologies were used.

Peer review is one of learning processes which requires the students to give some comments, suggestions, and corrections freely to their friends' paragraphs. There are no clear criteria for doing peer review which mean that the students may give any comments, suggestions, and corrections if they found any mistakes such as in grammatical errors, vocabularies, ideas, and even contents of the writing. Through SNS, the assignments are not only can be seen, read, and corrected by the lecturers but also by all the members of the classroom. In that case, all students are having same chances to give responses to their friends' writing. Through this way, the participants realized that the corrections, suggestions, and comments from their friends and lecturers give some contributions to improve the quality of their writing. The students realized that through SNS, they can see their previous paragraphs in the previous assignment that they made with all the correction given by their friends and lecturers. As the result in the next assignments, they may give some attentions to those mistakes and would not do the same mistakes anymore.

> "Yes in my opinion my writing is getting better because from SNS we can get knowledge and corrections from my friends as well as the lecturer so I can be more careful to write my next assignment and not make any more mistakes." (G2Christy)

> "In my opinion my writings are getting better because through SNS everyone can see our writing and if for example we do some mistakes in our writing the lecturer and my friends can give some corrections." (G3Enzo)

Almost all participants argued that peer reviews given by their friends to their writings give them some advantages and contribution to the improvement of the quality of their writing such as in grammatical errors, vocabularies improvement, and content development. Fifty out of sixty participants agreed that peer reviews have important aspects to the improvement of their writing. They all believed that they have different ability in terms of vocabulary, grammar, and ideas in writing. Through SNS used in their writing courses, they can share their ideas to write.

> "Of course the role of my friends are really important because we have different ability there are friends who have more vocabularies, there are friends who have good ability in grammar, so when we write and do a mistake, they can give some corrections like grammar that they know like for example they said that this is best for this situation and not for this situation, indirectly they teach us and sharing actually." (G1Bara)

In addition, G1Budi stated that through this way [using SNS], his writing is getting better. He believed that he got new knowledge from the comments, suggestions, and corrections from all of his friends as well as lecturer.

For her, those comments are something that has to be a reminder for her to write better than before and not doing the same mistakes anymore.

> "Yes in my opinion, my paragraph is getting better because can get new knowledge from all the corrections from my friends and lecturer and from that mistakes make me more careful in writing my paragraph so I do not do the same mistakes so like reminder for me to be more careful like that." (G1Budi)

In situations such as the above where students' writings are viewed in the public space, other people can also read the output. The participants' attempted to produce their best work so that their output would be positively judged and assessed. This situation also resulted in students becoming more aware and more critical of their writings. Another participant, G5Jack, stated that the comments and suggestions that are given by his friends contributing so much to the improvement of his paragraph. According to his opinions, he believed that his grammar understanding is more increasing and better. He realized that his paragraphs are getting better when his lecturer uses SNS. He argued that it is because all of his friends and lecturer can see his paragraphs, so they may know the mistakes that he made and they are all free to give comments and suggestions to his paragraphs. Besides grammar, he also believed that his friends also give him some ideas to write better in the next assignments because he realized that sometimes his ideas are not interesting and his friends with pleasure always give him suggestions.

> "Comments and suggestions from my friends of course really important first of all from the ideas. Perhaps our ideas less interesting so friends may give some suggestions about the idea that this should be like this. Then, from the grammar which is one of them when I do a mistake of to write "I" and it should be written always with capital letter so the comments and suggestions are really beneficial." (G5Jack)

Although almost all the participants agreed that peer reviews give a huge contribution to the improvement of their paragraph writing which mostly in term of grammar and vocabularies, one of the participants stated that not all of his friends' comments and suggestions are good. G6Lisa realized that even though the purpose of the comments and suggestions from their friends are to make paragraphs getting better, however, sometimes the comments and suggestions that are given not always right. Sometimes, according to her opinions, some friends give wrong comments and suggestions. She believed that the paragraphs are already written properly, however some friends still give some corrections. In this case, the corrections of the lecturer are really important to have the real corrections from the professional. That is why she believed that the lecturer always gives the real corrections in the end of the sessions of peer review to make everything clear and right.

> "The advantages of the comments and suggestions depend on friends who give the corrections sometimes there are some of my friends still comment even though the paragraph has already written properly but maybe according to their perceptions that are still wrong but actually it is already good according to my lecturer when the lecturer give the real comments." (G6Lisa)

Independence from time and location

The next advantage that the participants stated from the discussions was the independence from time and location. All participants believed that using SNS makes them easier to submit their assignment. The participants felt free to do the assignments everywhere and whenever they had spare time. They were not asked to do and submit the assignments directly in the university. One of the participants, G2Dewi, stated that she preferred doing the assignments outside the classrooms.

> "We should not write it on paper but I prefer to write it in social networking service because we can send our assignments everywhere." (G2Dewi)

In addition, her friend, G1Aina, strengthened the opinion by stating that she is very glad of using WhatsApp and Facebook in her writing class. Through the use of the SNS, she is able to do the assignment everywhere such as at home, restaurant, and hang out places. She said,

> "That is easier to use because we can send our assignments everywhere at home or wherever we are on that time and we should not go directly to our campus." (G1Aina)

Another participant believed that through SNS, she enjoyed learning more because she felt that using SNS is a fresh and new thing. She emphasized that these days, university students embrace the use of technology including SNS in learning activities. For her, it makes her easy doing her homework or assignment because she was always with her Smartphone. As a result, it can increase the effectiveness of the learning process.

> "In my opinion, the use of SNS is very effective because it can save my time doing my homework. You know, I can do my assignment everywhere and every time. Besides, it is very fun to learn in such a way." (G4Gladis)

Perceived progress in vocabulary

Some of the focus group discussion members talked about the improvement of vocabulary used in their writing classes. One of the participants, G2Charlie, realized that when using SNS her vocabulary becomes more enriched. He opined that each student had different knowledge in terms of vocabularies. Through SNS that is used by her lecturer to collect the assignments, he could see her friends' paragraphs as well as their vocabularies and make his vocabularies richer than before. It is important because she convinced that when someone has a lot of vocabularies, their paragraphs are getting more interesting to read.

> "I feel that my vocabulary are more enriched because when I read my friends' vocabularies, I indirectly add my list[vocabularies]. Another advantage that I think it is important for our English." (G2Charlie)

Other participants, G5Indra and G6Kikan, thought that all the students had different abilities such as in grammatical understanding, and vocabularies abilities. Through the use of SNS, the students have the chance to use it as a media to share their knowledge and information since SNS help the participants give comments, suggestions, and corrections on their friends' writing. They stated,

> "There are friends who have good ability in grammar, so when we wrote our writing incorrectly in terms of grammar of sentence structure, they who have good English grammar had some corrections. With the guidance of our lecturers, we can surely get more benefits grammatically." (G5Indra)

> "SNS can be a tool for us to pay attention more on the glossary or vocabulary of the sentence. I frequently gave suggestion to my friends about their vocabularies. Before delivering corrections or some additions, I checked first in Google or other resources to make sure that the corrections or additions have been appropriately discussed." (G6Kikan)

Grammatical improvement

Another advantage claimed by the participants for language learning when using SNS in their writing classes as supplemental learning tools is grammatical improvement. All the participants ascertained that their writings were getting better in regard to grammar because they were allowed to have correction for the grammatical aspects. Ani had an idea on this matter in group 1,

> "The most significant improvement that I feel from the peer review is in grammar. My friends gave positive grammatical so that we can discuss the mistakes and honestly it makes me remember many things [grammar]. It is really helpful, though." (G1Ani)

Using SNS, all participants in WhatsApp group and Facebook could give comment and revise their peers' writings in terms of sentence structures or grammar. They could improve their understanding about English grammar and the guidance of the lecturers, the participants discussed and remembered more things through the discussions. Two of the participants said,

> "I used to give comments on my friends' writings. When there was something that in my opinion were wrong in terms of grammatical, I always tried to told them. It was because the lecturers suggested that we should be active in the discussion in the group WhatsApp or Facebook." (G3Flora)

> "The discussion of the grammar for the writing that we had is very important for us to have. It is very good since we can have the discussion everywhere and every time. It is so much helpful that we did not only learn it in the class but also outside the classroom." (G1Bella)

Furthermore, since they learn together, one of the participants confirmed that they have different ability and skills in English since they come from different high school with different experienced of learning English. By using SNS, she believed that it is a good media to share the knowledge that the students have. Writing classes may create discussions among the students. One of the participants had his saying,

> "There are friends who have good ability in grammar, so when we write and do a mistake, they can give some corrections that they already knew already and indirectly they teach us and share what they already got from their previous knowledge." (G3Farid)

Problems faced on the SNS use

Regardless all of those merits that may be derived from the use of social networking service as educational tool, some researchers concern about some problems of using social networking service in educational environment. Hamid, Kurnia, Waycott, and Chang (2011) reported some concerns raised by the students to the problems of SNS use. These concerns include: 1. time management issues, 2. lack of ICT skills faced by some students, and 3. limited technical infrastructure in some higher learning institutions. Through the findings of this research, the researcher found that there are three main problems in the integration of SNS as supplemental learning tools in EFL writings. Those three main problems are internet connection, costly to use, and inexperienced in using SNS.

Internet connection

SNS are very attractive tools for undergraduate students due to its popularity because SNS present opportunities to the independence from time and place. However, using social networking service means that we need the internet connection, and this is where the problem arises. All the participants agreed that they have the same problems which are the connection to connect them to SNS. All the participants stated that it is sometimes difficult to have the connection in both Jambi University and Islamic State University of Jambi. One of Jambi University students said

> "Hmm… the problem is the connection in our university, Jambi University but in other places is ok. It is difficult to have the signal in this faculty for friends who use 3 [one of low cost internet providers' names]. However, we have other options [changing internet operators]." (G4Bebi)

Having the same problem with G4Bebi who is Jambi University student, G5Ikhsan and G6Lilo from Islamic State University of Jambi also stated that one of the problems faced in using SNS as in EFL writing is the internet connection.

> "I sometimes find it difficult to have the internet access,. The instability of Wi-Fi connection in our building and for some providers that are not reachable here in our faculty is the problem. However, we have good access when we did our assignment in the city [Jambi city]." (G4Lilo)

> "The signal is sometimes bad and low and it is the only problem that I have." (G5Ikhsan)

From the data, all the participants were having problems with the connection in the two state universities. All discussions in the two state universities show that connection of the internet was always the issue and it also relates to the other problem which is about the cost of the internet.

Costly to Use

Another problem found in this research is that the participants are required to prepare a good operator in order to make them able to write and send their assignments everywhere. Since the data show that many of the students tend to buy the cheapest ones namely 3 and XL (both are low cost operators with low connection). As a result, they have to buy more expensive internet access card. One of the participants from Jambi University expressed their feelings in the discussion,

> "In relation to the connection, I had to buy a Telkomsel card since this card is the best [for the connection]. Although, it is slightly more expensive than my previous internet card, I have to buy it." (G3Elsa)

Having the same opinion with Elsa from Jambi University, Louis from Group 6 also mentioned the same thing about the internet card that he used during the course. In addition, he informed us the price difference percentages of the operator.

> "Previously, I bought and used 3 as the internet operator but now I am using Telkomsel for the writing course which is 25 % more expensive than 3. It is costly but worked, I think." (G6Louis)

Students in Jambi University and State Islamic University of Jambi tend to buy low cost internet cards to provide their needs of internet. However, in the EFL writing courses in which the lecturers assign them to use SNS in their writing activities, the students had to buy other internet cards which have better services for the internet connection.

Inexperienced in Using SNS

Some of the students have no experience using some applications which were required in the writing courses. Some of them have not tried Telegram and have less experience in using some features of WhatsApp and

Facebook. They confessed that they just used the services for basic use for examples to send messages, make a phone or video calls, and share pictures or videos. Some of them did not know how to use some other features like to make italic words, bold words, and forward messages in WhatsApp application. The fact that there are many features that can be utilized is one of encountered limitations in this finding. Two of the participants from both universities revealed,

> "Frankly say, I did not have Telegram and I had to download the application first and thanks to our lecturers for having introduced it to us. I just knew that Telegram can provide 5000 members for its group. The one way communication is also good to have simple instruction for our lecturers." (G2Dessy)

> "I just used my smartphone for 1 year and I was amazed by how our lecturer gave us time to do some activities using our smartphone. Yes, there are some applications and features that I am accustomed to using but there are greater positive effects that I think very useful." (G4Fadh)

The basic features of the SNS use have represented the needed activities. However, should the participants of the research utilize some additional features, it will be more enriched and simpler. Another statement of one participant in the discussion,

> "I could the activities with basic feature that we had in our writing course. It turned out that some of my friends were more advanced using their applications and I could learn from them. Such a good way to learn using WhatsApp or Facebook and that was my first time knowing Telegram, a great application." (G5Ines)

DISCUSSION

Findings from this research are in line with previous studies on the frequent use of social networking services by undergraduate students, as well as those investigating the potential advantages and problems of using social networking service in educational environment. All participants in this research reported that they had so many accounts in some social networking services which support the previous findings of Smith and Caruso (2010), who reported that 96% of undergraduate surveyed across disciplines had an account with at least one social networking service. In addition, all the participants reported that they had some SNS accounts long before their lecturer used them in writing courses.

It is a usual thing for a media to have its own advantages and problems. It also applies to SNS used in writing courses in this research. According to Balci (2010), there are 13 possible advantages derived from the use of social networks as an education tool, stated as follows: 1) Independence from time and location, 2) Improvement in quality, success, and efficiency of education by use of SNS for education, 3) Ability to learn in more systematic manner and in shorter time, 4) Individualization of learning. 5) Ability to have instant feedback. 6) Offering the student ability to repeat course content as much as desired, 7) Ease of displaying the content, 8) Allowing to the design of visual and auditory learning environments. 9) Archiving course content and synchronized class (virtual class) applications. 10) Tendency towards more voluntary behaviors on the side of students for improving research, knowledge, and skills in comparison to conventional programs, 11) Offering possibility to evaluate performance of students, 12) Minimizing risk of error in measuring evaluation results, and 13) Improving skills of students and teachers to reach, evaluate, use, and efficiently cite the knowledge. Besides those advantages, there are some specifically advantages for language learning when the lecturer uses social networking service as an educational environment. There are at least six advantages that deriving from use of social networking service as a supplemental language learning tool, as stated by Stevenson and Liu (2010), Mills (2011), and Lee (2011) reported that users of SNS in language learning achieve the following advantages: 1) perceived progress in vocabulary or vocabulary acquisition, 2) increased confidence in using the target language, 3) fostered an interactive community for communication, interaction, and discussions, 4) L2 learners' participation on SNSs appeared to have a positive impact on their oral proficiency, and 6) syntactical complexity or grammatical improvement. Based on the group discussions, the findings show that some of those advantages which stated by Balci (2010), Stevenson and Liu (2010), Mills (2011), and Lee (2011) informed by the participants in the group discussions. There are 4 advantages (offering possibility of peer review, independence from time and location, perceived progress in vocabulary, and grammatical improvement) which exist based on the data from the participants when their lecturer using SNS in their writing courses. The results of the focus group discussions were described descriptively to explain the data.

Another finding in this research shows that the participants believe that SNS can be used not only as communication tool, but also as learning media in some subjects in higher education specifically in English Education Study Program since it is believed that social networks improve communication skills, enhance

participation and social commitment, reinforce peer support, and ensure realization of education based on collaboration. Moreover, social networking services can be easily and inexpensively used without a substantial support from universities so that they can be integrated into educational process of students (Blattner & Fiori, 2009; McBride, 2009; Warnock, 2009, Melor 2007). Although the majority of findings were positive, some students still find some problems in using SNS in EFL academic writing. Two out of three of problems which stated by Hamid, Kurnia, Waycott, and Chang (2011) are in line with the findings of this research. Those two emerging problems are the connection which shows the limitation of technical infrastructure, inexperienced which shows lack of ICT skills of the students in using SNS. Therefore, it is possible that inexperienced with the educational application of this newer technology contributed to the students' negative perceptions. And, with continued use of SNS as part of social networking service in educational environment in higher education such perception could be reduced. The findings of this research also found another limitation which not mentioned by Hamid, Kurnia, Waycott, and Chang (2011) which is costly to use. All the participants are demanded prepare a good operator in order to connect them to the internet to access the application. However, all the participants agreed that those problems are solvable. Furthermore, the findings presented here suggest that students recognize and value the learning advantages of using SNS.

CONCLUSIONS

The findings of this research show that all participants are familiar with many kinds of social networking services since all of them are free to use. Further, those social networking services are used actively by them. This finding shows that those social networking services potentially provide great advantages as a supplemental learning tool for the students in higher education. The familiarity of SNS used by the students could also help them feel more comfortable and motivated since SNS provide the users a communication environment which is not limited with space and time because they are online tools that generate interaction by allowing new opportunities for more information, interest, and data sharing.

This research focuses to discuss about English students' perceptions of using social networking services which in this case represented by WhatsApp which is used as a supplemental learning tool in paragraph writing class in higher education. In response to the research question, the findings offer a detailed explanation of how students view their interactions when using WhatsApp in higher education in paragraph writing class. Through the finding of this research, all the participants agreed that SNS are great communication media as well as a supplemental learning tool in paragraph writing class. What participants liked the most about using SNS as supplemental learning tools in writing classes is that they are free to do the assignments wherever and whenever they want. Also, through the social networking service, all the participants have an opportunity to give and get some corrections and comments not only from the lecturers but also from their friends as a way to improve their writing skill in terms of grammar, the content of the paragraph and vocabularies. Although SNS give many advantages for the participants, it still has some problems on its implementation as a supplemental learning tool in paragraph writing class. The first as well as to be the main limitation found is on the connection to connect them to SNS since it is difficult to get signals or connection for some internet providers. The second limitation is when the participants run out of the quota for connecting them to social networking service and the inexperienced of using WhatsApp. However, those problems are not huge problems for the participants since the participants believed that the problems are solvable.

POLICY IMPLICATIONS

The findings in this research also show that all participants are very familiar with the use of social networking service and use it often. This situation should be a great chance for the lecturers to use SNS their teaching media since there are so many kinds of SNS that are available and free to use. As the data above show that all the participants agreed that social networking service which is used by the lecturer as a supplemental learning tool in paragraph writing class get positive welcome from the participants. However, it should be noted that not all classes can use SNS in their teaching and learning activities, should there be limited a limited educational value. Hence, Hamid, Kurnia, Waycott, & Chang, (2015) stated that the integration of technologies should be done by the lecturers in their teaching only if and when they see educational value in doing it. Therefore, before SNS is adopted in higher education, a thorough evaluation need to be conducted to assess its appropriateness for teaching and learning.

Almost all the participants argued and gave their suggestions that many classes except speaking and listening class can potentially give many advantages when using SNS as supplemental learning tools namely in the class of grammar, reading, writing and other classes. Finally, the findings of this research would be able to help the educational actors such as lecturers to make decisions on whether to use and implement SNS as learning media for language learning purposes. While for further research, this research can be a guidance to know and evaluate the perceptions of students towards the use of SNS in education.

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Prospective EFL Teachers' Emotional Intelligence and Tablet Computer Use and Literacy

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ABSTRACT
The aim of this study was to investigate whether there is a relationship between tablet computer use and literacy, and emotional intelligence of prospective English language teachers. The study used a survey approach. In the study, 'Prospective Teachers Tablet Computer Use and Literacy Scale' and an adapted and translated version into Turkish of 'Emotional Intelligence Scale' were used as two data collection tools. The participants of the study consisted of randomly selected 149 females and 64 males; in total, 213 prospective teachers of English from the English Language Teaching Departments of Sakarya and Gazi Universities in the 2016-2017 academic year were involved. The study revealed the fact that, variables such as gender, age, status of having a tablet PC have statically significant effect on tablet PC use and literacy skills of prospective teachers of English. On the other hand, it was found that there was no statistically significant difference in emotional intelligence levels of participants in terms of gender, age, status of owning a tablet PC and duration of tablet PC use. When the correlation between the scales was evaluated, a negative relation was determined among tablet PC use and literacy skills and emotional intelligence.

Keywords: emotional intelligence, tablet computer use, technology literacy, digital natives, EFL, prospective teachers

INTRODUCTION
Individual differences shape our preferences both in our personal and professional life. Another significant phenomenon of our tendencies is the technology pertaining into our lives day by day. Intelligence, specifically, emotional intelligence (EI) which is an individual difference and tested via psychometric measures, can presumably affect or predict our job-related choices in terms of technology.

The notion of intelligence involves understanding and forming higher-level abstract concepts. The observations made on how the intelligence is formed show that some people are better at making connections, reasoning deductively and inductively and at understanding the meaning of ideas, etc. better than others. Locke (2005, p. 425) indicated that "Those who are better able to grasp higher-level concepts are better able to handle complex tasks and jobs". Some people can be said to possess a higher capacity for carrying out complex information processing about emotion-related incentives and benefit from this information in thinking and behavior. Mayer, Salovey, Caruso (2008, p. 503) called this type of ability "emotional intelligence".

In the past decade, the notion of emotional intelligence has been seen as a new design for explaining that difference in behaviors was not associated with conventional limits of general academic intelligence. Landy (2005, p. 411) pointed out that "Historically, conceptually, psychometrically, and scientifically, there are many and substantial questions surrounding the possible value of the construct of emotional intelligence, particularly with respect to work-related behavior". Kafetsios and Zampetakis (2008, p. 713) noted that "At a theoretical level Emotional Intelligence (EI) reflects the extent to which a person attends to, processes, and acts upon information of an emotional nature intra-personally and inter-personally".

According to Nelis, Quoidbach, Mikolajczak and Hansenne (2009, p. 36), "The construct of emotional intelligence (EI) refers to the individual differences in the perception, processing, regulation, and utilization of emotional information". According to Brackett and Salovey (2006, p. 34), emotional intelligence from this tradition refers to "an individual's capacity to reason about emotions and to process emotional information in order to enhance cognitive processes". In other words, EI is held to explain how emotions advance life goals (Bastian et al., 2005).Therefore, higher emotional intelligence would be related to better mental health, under certain circumstances higher emotional intelligence may have maladaptive consequences (Schutte et al., 2007). According to Lopes et al. (2006), emotional intelligence may also contribute to work performance by enabling

people to regulate their emotions so as to cope effectively with stress, perform well under pressure, and adjust to organizational change.

Emotional intelligence is a more fixated notion. While dealing with emotions which are related to social relationships; it is also significant to bear in mind that they are related to other aspects of life. We all need to set goals, focus on future endeavors and cope with negative emotions before they cause further problems. The concept of emotional intelligence isolates a specific set of skills embedded within the abilities that are broadly encompassed by the notion of social intelligence (Grewal & Salovey, 2005).

Developments in the information and communication technology have caused dramatic changes in societies since traditional instruction is unable to meet the needs in overcoming the obstacles in the teaching process, using information and communication technology seems to be the best approach. The learners of the last decade can be named as digital natives who are born in and with technology. Computer assisted education has been gaining acceptance as one of the technology used effectively in education systems and tablet PC's have an important situation in this approach (Kamacı & Durukan, 2012). Specifically, in foreign language teaching, the significance of blending technological tools and applications with education is becoming more and more indispensable. The tablet computer allows those children who are digital natives to create original works as a means of personal expression. Potentially the tablet will allow opportunities for children to collaborate with peers using digital media and transform their current knowledge to learning a new technology (Couse & Chen, 2010)

Just like those of any kind of change and development, there are and may be unexpected consequences of technological improvements, as well. Nevertheless, the benefits of tablet computer are proven in various studies in different areas by certain researchers, such as enhancing and improving students' problem solving abilities (Ellington, Wilson, & Nugent, 2011; Gök, 2012;), and student performance (Enriquez, 2010; Pryor, & Bauer, 2008). Some other studies also point out the contribution of tablet computers to interaction (Koile & Singer, 2006) and communication, (Galligan, Hobohm, & Loch, 2012; Jones & Sinclair, 2011; Sneller, 2007) and communication and information skills (Marzuki, Mustaffa, & Saad, 2015). Karunaratne (2000) described the literacy term basically as an individual ability enabling survival in the society one is in, thus, any literate person is expected to be able to read and write to a certain extent in addition to the ability to solve basic arithmetic operations. According to Blackall (2005) 21st century literacy can be described as the overlap of verbal, visual and numerical literacy, skills and talents. Therefore, technological literacy looks crucial to sustain life in the 21st century for teachers who play significant roles in the field of education. Wang (2003) defined technology literacy to have the appropriate skills, information and behavior to use, apply, design and change the technology. Individuals who can make conscious decisions about technology can be described as technology literate (Hergüner, 2016).

It is widely known that people with high emotional intelligence have higher rational thinking and decision making processes. This situation provides people with some advantages not only in their daily life, but also in business and education life. Thus, there has been a significant increase in the number of the studies conducted on the factors affecting emotional intelligence. On the other hand, it has been seen that the studies on the relationship of technological developments and emotional intelligence, some of which are conducted by Al-faouri (2011), Han and Johnson (2012), and Hamisi, Babaie, Hosseini, and Babaie (2013), are limited.

In the current study, the aim was to examine the relationship of the tablet computer use and literacy, and emotional intelligence among prospective English language teachers. The followings are the sub research questions of the study: (1) What are the levels of participants in Tablet PC use and literacy, and Emotional Intelligence and its sub-dimensions as well? (2) Are there any gender differences in terms of tablet PC use and literacy, and Emotional Intelligence for the participants? (3) Are there any differences in terms of age in tablet PC use and literacy, and Emotional Intelligence for the participants? (4) Do the participants differ according to the status of possessing a Tablet PC? (5) Do the participants possessing a Tablet PC differ in the level of tablet PC use and literacy, and emotional intelligence in terms of duration (year) to use a Tablet PC? (6) Is there a relationship between the levels of Tablet PC Use and Literacy, and Emotional Intelligence and its sub-dimensions?

METHOD

Research design and participants

In this study, Survey Model which is one of the most frequently used descriptive models in educational sciences, was applied. As it is known, under the basis of studies with the descriptive survey method lays the search of the features of certain demographical attributes that major sample groups have on the effects of variables subject to

the study. It was aimed to investigate the effect of tablet computer use and literacy on emotional intelligence of prospective English teachers.

The participants of the study were randomly selected 149 female and 64 male student teachers of English at Sakarya University and Gazi University in 2016-2017 academic years. Demographic information about the participants is given in Table 1.

Table 1: Frequency and percentage values on demographical features of research group

Variables	Sub-Variables	f	%
Gender	Female	149	70,0
	Male	64	30,0
Age groups	18-19 age	90	42,3
	20-21 age	79	37,1
	21+ age	44	20,7
Have a tablet PC?	Yes	75	35,2
	No	138	64,8
If has a tablet PC, how long has it been used?	1-2 year	29	41,4
	3-4 year	25	35,7
	5-6 year	16	22,9

Data collection procedure and tools

The data of age, gender, the state of having a tablet PC and period of using a tablet PC were obtained by using the personal information form developed by the researcher herself.

Prospective teachers' tablet computer use and literacy scale

In the determination of prospective teachers' views "Prospective Teachers' Tablet Computer Use and Literacy Scale" developed by Kıyıcı, Kırksekiz, Kiper, and Isbulan (2014) was used. This scale is a one-dimensional one and it measures participants' Tablet PC use and literacy levels through 73 items. It is a 5 Likert type scale (1) strongly disagree (2) disagree (3) neutral (4) agree (5) strongly agree. The scale was distributed to the prospective teachers as hardcopies. They are applied and collected at the same time. Firstly, arithmetic average and standard deviation were calculated to define tablet PC use and literacy level. Standard deviation value was found from the average. Values under the average indicate low level of tablet PC use and literacy. Standard deviation value is added to the average. The participants whose values are higher than this result have higher level of Tablet PC use and literacy. The participants having average value between high and low level, has medium- level of tablet PC use and literacy.

Emotional intelligence scale

In the determination of prospective teachers' emotional intelligence levels, 'Emotional Intelligence Scale' developed by Schutte and others (1998) was used. Emotional Intelligence Scale modified by Austin and others (2004) and translated and adapted in to Turkish by Tok, Moralı, and Tatar (2005) consists of 41 items in total of which include 20 positive and 21 negative items. Emotional Intelligence Scale modified by Austin, Saklofske, Huang and McKenney (2004) was formed by converting some positive items of Schutte's Emotional Intelligence Scale into negative and adding new items aiming 'Utilization of Emotions' that formerly found lower-reliability level than other items. The scale is 5-point Likert type scale with (1) strongly disagree (2) disagree (3) neutral (4) agree (5) strongly agree. The scale consists of three factors; Optimism/Mood Regulation, Utilization of Emotions and Appraisal and Expression of Emotions. The scale measures these three-factors and general emotional intelligence in total.

Data analysis procedures

In the data analysis, SPSS 22.0 package program was used. A reliability analysis preceded the data analysis to see whether the data was reliable or not. At the end of this analysis, Cronbach's Alpha internal consistency coefficient was .959for Prospective Teachers' Tablet Computer Use and Literacy Scale. Also, it was .748 for the whole Emotional Intelligence Scale while it was .745 for the sub-dimension of Optimism/Mood Regulation; .794 for the sub-dimension of Utilization of Emotions and .654 for the sub-dimension of Expression of Emotions. The data obtained by both scales were examined by One Sample Kolmogorov-Smirnov test in terms of normal-distribution and was resulted in abnormal- distribution. Due to these reasons, non-parametric analyze methods were used to analyze the data of both scales. Mann Whitney U test was used to compare participants' scale scores according to gender and status of possessing a tablet PC. Kruskal Wallis H test was used to compare participants' scale scores according to age groups and duration of using a tablet PC. When a significant difference occurred, Mann Whitney U test was used as post hoc test to find the groups having difference. Spearman Correlation

Analysis was used to investigate the relation between tablet PC use and literacy level, and emotional intelligence level. At the end of the analysis performed, significance level was measured $p<0.05$.

FINDINGS

Table 2: Definitive statistics in levels of Tablet PC use and literacy, and emotional intelligence of participants

Scales	N	The lowest	The highest	X	Ss
Tablet PC use and literacy	213	1	5	3.68	.515
Emotional Intelligence Total Score	213	39	141	117.15	8.977
Optimism (EI)	213	17	81	64.43	7.770
Utilization of Emotions (EI)	213	6	24	14.47	3.482
Appraisal and Expression of Emotions (EI)	213	16	54	38.25	6.335

When Table 2 is examined, it can be understood that the average scores of tablet PC use and literacy, and optimism are over medium-level, scores of Utilization of Emotions and Appraisal and Expression of Emotions are under medium-level, scores of Emotional Intelligence Total Score is in medium-level.

Table 3. Comparison of pablet PC use and literacy, and emotional intelligence of participants according to gender

	Gender	N	X	Ss	Rank Ave.	Rank Total	U	P
Tablet PC Use and literacy	Female	149	3.62	.524	100.37	14954.5	3779.5	.017
	Male	64	3.80	.474	122.45	7836.5		
Emotional Intelligence Total Score	Female	149	117.13	9.822	107.92	16080.0	4631.0	.739
	Male	64	117.20	6.674	104.86	6711.0		
Optimism	Female	149	65.05	8.016	113.77	16951.5	3759.5	.014
	Male	64	63.00	7.015	91.24	5839.5		
Utilization of Emotions	Female	149	13.97	3.348	98.51	14677.5	3502.5	.002
	Male	64	15.64	3.534	126.77	8113.5		
Expression of Emotions	Female	149	38.11	6.288	106.22	15827.5	4652.5	.779
	Male	64	38.56	6.483	108.80	6963.5		

In Table 3, it is seen that male participants show statistically more significant difference based on tablet PC use and literacy level compared to female participants ($p<0.05$), of female participants more significant difference based on optimism ($p<0.05$), of male participants more significant difference based on utilization of emotions ($p<0.05$), levels of emotional intelligence and expression of emotions show no significant difference statistically for both male and female participants.

Table 4. Comparison of tablet PC use and literacy, and emotional intelligence according to age groups of participants

	Age Groups	N	X	Ss	Rank Ave.	X^2	P
Tablet PC Use and literacy	18-19 age	90	3.60	.545	97.36	9.610	.008
	20-21 age	79	3.67	.450	104.08		
	21+ age	44	3.85	.529	131.98		
Emotional Intelligence Total Score	18-19 age	90	117.54	11.161	113.96	3.050	.218
	20-21 age	79	116.53	7.243	97.65		
	21+ age	44	117.45	6.571	109.57		
Optimism	18-19 age	90	65.12	8.370	113.68	2.478	.290
	20-21 age	79	63.72	7.350	98.79		

Utilization of Emotions	21+ age	44	64.30	7.258	108.08		
	18-19 age	90	14.38	3.514	106.89		
	20-21 age	79	14.11	3.620	98.47	4.357	.113
	21+ age	44	15.30	3.085	122.55		
Expression of Emotions	18-19 age	90	38.04	6.675	105.67		
	20-21 age	79	38.70	6.007	110.31	.391	.822
	21+ age	44	37.86	6.290	103.78		

When Table 4 is examined it is clear that tablet PC use and literacy level show statistically significant difference according to age groups of participants ($p<0.05$). This difference derives from 21+ age group participants having higher level of tablet PC use and literacy compared to both 18-19 and 20-21 age groups. Differences are shown between Emotional Intelligence levels and optimism, Utilization and Expression of Emotions according to age groups but they are not statistically significant differences. ($p>0.05$).

Table5. Comparison of tablet PC use and literacy, and emotional intelligence according to status of possessing a tablet pc of participants

	Has tablet?	**N**	**X**	**Ss**	**Rank Ave.**	**Rank Total**	**U**	**P**
Tablet PC Use and literacy	Yes	75	3.78	.508	121.07	9080.5	4119.5	.014
	No	138	3.62	.512	99.35	13710.5		
Emotional Intelligence Total Score	Yes	75	116.47	7.899	98.56	7392.0	4542.0	.140
	No	138	117.52	9.518	111.59	15399.0		
Optimism	Yes	75	65.03	7.438	111.92	8394.0	4806.0	.390
	No	138	64.11	7.952	104.33	14397.0		
Utilization of Emotions	Yes	75	14.04	3.024	101.51	7613.0	4763.0	.335
	No	138	14.70	3.697	109.99	15178.0		
Expression of Emotions	Yes	75	37.40	5.927	98.87	7415.5	4565.5	.155
	No	138	38.71	6.520	111.42	15375.5		

In Table 5 above, tablet PC use and literacy level show statistically significant difference according to status of possessing a Tablet PC of participants ($p<0.05$). Participants possessing a Tablet PC have higher level of Tablet PC use and literacy compared to other participants), levels of emotional intelligence and optimism, utilization and expression of emotions show no significant difference statistically according to the status of possessing a Tablet PC ($p>0.05$).

Table 6. Comparison of Tablet PC use and literacy, and emotional intelligence according to duration (year) to use a tablet pc by participants possessing a tablet PC

	Duration	**N**	**X**	**Ss**	**Rank Ave.**	X^2	**P**
Tablet PC Use and literacy	1-2 year	29	3.66	.521	30.55		
	3-4 year	25	3.79	.511	36.44	3.942	.139
	5-6 year	16	3.95	.486	43.0		
Emotional Intelligence Total Score	1-2 year	29	115.45	7.619	33.83		
	3-4 year	25	115.56	8.713	34.02	1.436	.488
	5-6 year	16	117.75	6.298	33.83		
Optimism	1-2 year	29	63.59	7.781	32.41		
	3-4 year	25	65.20	6.868	36.82	1.259	.533
	5-6 year	16	65.88	7.702	39.03		
Utilization of Emotions	1-2 year	29	13.79	3.133	34.79		
	3-4 year	25	14.04	3.323	35.60	.086	.958
	5-6 year	16	14.06	2.435	36.63		
Expression of Emotions	1-2 year	29	38.07	5.757	38.21		
	3-4 year	25	36.32	6.026	31.48	1.568	.457
	5-6 year	16	37.81	5.456	36.88		

Table 6 illustrates that tablet PC use and literacy level, emotional intelligence and optimism, utilization and expression of emotions show statistically no significant difference according to duration (year) to use a Tablet PC by participants possessing a Tablet PC ($p>0.05$).

Table 7. The relationship between Tablet PC Use and Literacy Level, and Emotional Intelligence and its sub-dimensions

		Emotional Intelligence Total Score	Optimism	Utilization of Emotions	Expression of Emotions
Tablet PC Use and literacy	r	-.102	.296**	-.053	-.352**
	p	.140	.000	.443	.000
	N	213	213	213	213

Table 7 shows that while there is a linear and significant relation between the level of tablet PC use and literacy level and optimism (r=.296; p<0.05), it is reverse and there is a significant relationship between the level of tablet PC use and literacy level and expression of emotions (r=-.352; p<0.05). Not only level of tablet PC use and literacy level and emotional intelligence (r=-.102; p>0.05) but also utilization and expression of emotions (r=-.053; p>0.05) have a reverse and insignificant relationship.

DISCUSSION

The findings of this study that the levels of tablet PC use showed statistically significant differences according to gender; male participants had higher level of Tablet PC use compared to female participants. The fact that male students had higher interest and tendency to technology than female students might lie behind this result. In the literature, it was also found out that male pre-service teachers had higher attitude towards using technology such as computer and Internet compared to female pre-service teachers in similar studies (Köse, Savran-Gencer, & Gezer, 2007). In the study, the level of tablet PC use shows statistically significant difference according to age groups in that 21+age groups showed a higher level of tablet PC use compared to the 18-19 and 20-21years of age groups. Related studies argue that the use of tablet PC among university students considerably common (Robinson & Burk, 2013). On the other hand, it is also seen that studies on the level of tablet PC use among university students according to age groups are quite limited. In this content, there is a considerable need for the studies about the relationship between frequency of tablet PC use and age groups among university students.

In the study, participants possessing a tablet PC had higher, significant level of literacy compared to the participants not possessing a tablet PC. On the basis of this result, tablet PC's improver and facilitator function of using tablet PC relies on. Findings of studies in literature show that tablet PC use facilitates the literacy skills. In a study on research assistants, it was aimed to investigate their views about tablet PC use. At the end of the study, improving and facilitating tools according to research assistants' views were evaluated (Kamacı & Durukan, 2012). In another study on university students it was found that Tablet PC is beneficial in terms of using especially e-reading websites (Aydemir, Küçük, & Karaman, 2012).

According to the data obtained from the study, it was found that level of emotional intelligence according to gender of participants show no statistically significant difference. On the other hand, sub-division scores in optimism of female participants, utilization of emotions of male participants have higher significant level compared to the participants of opposite gender. The result may derive from female and male participants having different psychological and emotional characters. In a similar study, organized by Eraslan (2015), scores gathered from sub-division of emotional intelligence of male and female participants show statistically significant difference. In the same study, scores of emotional intelligence sub-divisions: emotion management, self-motivation and empathy are higher for female participants compared to male participants. The study also showed that emotional characters of female participants provide female participants higher level of emotional intelligence. Similar studies in the literature show that gender has an important role on emotional intelligence (Ikız & Gormez, 2010; Ismen, 2001; Sevindik et al., 2012).

Additionally, it was found that the level of emotional intelligence according to age groups of participants show no statistically significant difference. Participants in common age groups and common emotion patterns can be taught as the reason. In terms of tablet PC use, there is no statistically significant difference among levels of emotional intelligence according to the status of possessing a tablet PC. Similarly, duration to use a tablet PC is not an important definer in emotional intelligence and literacy habits. On the basis of this result, low frequency of tablet PC use (35,2%), and prospective teachers possessing a tablet PC make students perceive aims of tablet PC use in a different way can be mentioned.

In the study, it was found that there is a linear and significant relation between the level of Tablet PC use and literacy level and optimism, also a reverse and significant relation between level of Tablet PC use and literacy level and expression of emotions. Furthermore, tablet PC use and literacy level and both utilization and expression of emotions has a reverse and insignificant relation. According to the data obtained, tablet PC use and

literacy of prospective teachers has a negative effect on emotional intelligence. This may derive from the fact that participant teachers who use tablet PC are of low level in use for literacy, education or personal development. Furthermore, the fact that tablet computers provide speed and collaboration in educational areas both as learning and teaching tools does not unfortunately compensate the fact that technology deprives us of the real life communication and hinders passing emotions to the other people properly and understanding their feelings, as well. Hamissi et al. (2013) also found that students with high EI score are less internet addicted. Probably, that's why there is a negative correlation between the use and the literacy of tablet computers and the emotional intelligence levels of prospective teachers of English. As a result, variables such as gender, age, status of having a tablet PC has statically significant effect on tablet PC use and literacy skills of pre-service teachers of English. On the contrary it was found that gender, age, status of possessing a tablet PC, duration of tablet PC use has no statistically significant difference on emotional intelligence levels. When the correlation between scales was evaluated, a negative relation tablet PC use and literacy skills and emotional intelligence was reached.

CONCLUSION AND SUGGESTIONS

Technology, which is undeniably a fast multifunctional facilitator in the field of learning and teaching as content, activity, material and test provider with its products such as tablet PCs –the main component of this study- is in close relationship with psychological constructs such as Emotional Intelligence – the other main component of the study. Any kind of a development and change in the field of technology affect the educational processes in every aspect. The core of education, the human being, as a psycho- social entity is affected by all these developments and changes regardless of the locations.

The concluding remarks of the study can be stated as follows. The reason why prospective male teacher were more inclined to use a tablet computer could be the number of the daily and professional tasks they had to carry out via the internet. The reason why the older the prospective teachers candidates were the more literate they were could be because they possessed a tablet PC of their own. Those who possessed a tablet PC had naturally more time to spend on it, which provides them with the opportunities of developing their tablet PC literacy. The reason why females had higher scores in optimism while males had higher scores in the utilization of emotions could be the fact that females and males had distinct psychological and emotional features which caused them to be more proficient than each other in different settings requiring them to cope with and manage certain emotion oriented tasks. The reason why the higher level of tablet PC use had a negative effect on the emotional intelligence of prospective teachers in terms of expressing their emotions could be due to the fact that technology hinders individuals' real life communication skills despite the numerous advantages it offers.

In this sense, the efficient and adequate use of technology and its products stands out to regulate and enhance the educational processes properly. Moderately limited and controlled use of tablet PCs can be suggested in order to promote the real life communication facilities in the educational environment. Surely, technology is the fastest and the easiest way of bringing real life contexts into language classes. However, prospective teachers should not be trained as technology addicts who cannot achieve educational goals in the classroom or cannot communicate with their students effectively without relying on the use of technology. All in all, the limited number of studies in the related field and the need for more scientific evidence about the relationship between the psychological factors and the use of technological tools such as tablet PCs necessitate further studies in this field of English language education. Considering the findings in the present study and the lack of related studies in the literature, the further studies are seen as necessary in this field. For instance, the same subject can be conducted on prospective teachers and working teachers comparatively as well as other studies comparing prospective teachers at different teaching departments of universities.

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The Dynamics of Mobile Learning Utilization in Vocational Education: Frame Model Perspective Review

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ABSTRACT
This study aimed to describe the dynamics of content aspects, user aspects and social aspects of mobile learning utilization (m-learning) in vocational education from the FRAME Model perspective review. This study was quantitative descriptive research. The population in this study was teachers and students of state vocational school and private school in Makassar, Indonesia. Samples of the study were 103 teachers and 320 students, determined by a proportional random sampling technique. Data collection techniques were questionnaires. Data analysis uses descriptive analysis techniques. The results showed that the available content on the internet and accessed by teachers were relevant to the major, whereas students stated them relevantly less to their majors, so the value and substance of the utilization of m-learning content were still less relevant. The user aspect showed that teachers and students utilized mobile devices for vocational learning purposes, so the value and substance of m-learning could be still maintained. The social aspect showed that teachers and students expressed socio-cultural support influenced the utilization of m-learning, so that the value and substance of m-learning in vocational education could be continually maintained. So the value and substance of m-learning in these three aspects could be maintained and improved, this study showed alternative model of utilization and development of m-learning that were appropriate for vocational education.

Keywords: m-learning utilization dynamics, FRAME model, vocational education

INTRODUCTION
This study was a larger part of doctorate study entitled the dynamics of m-learning utilization on vocational education in Makassar, Indonesia. It focused on the understanding of content aspects, user aspects, social aspects of m-learning utilization, it generated the prototype content of m-learning properly, and found the factors that influenced the acceptance of m-learning (Mahande, 2017). However, this paper was limited to the discussion of m-learning utilization aspects on vocational education.

Vocational education has an important role in the development of human resources (HR) and technology facing global competitiveness. Vocational education is secondary education that prepares learners to work in particular fields (the National Education System Act No. 20/2003 subsection 15). This statement emphasized the vital role of vocational education on preparing students who had quality through knowledge combination, attitudes, and skills based on technological developments so they could compete and enter the labor market.

The preparation of human resources and technology has implications on the characteristics or principles of vocational education, namely, should be responsive and anticipatory towards technological progress (Djojonegoro & Slamet, 1998; Sudira, 2012). Current technological development states that the modernization of vocational education through learning that emphasizes on the shared skills aspects of technological innovation in order to prepare students' competencies is absolutely necessary. Modernization of learning according to Wilson that the integration of ICT learning in vocational education will dominate in the 21st century (Zarini, Wilson, Mar, & Varis, 2009). This lesson emphasizes on the concept of technology that requires media literacy based-ICT, self-study, collaboration, and understanding about technology in general which will be very important to increase competence in vocational education.

Considering the importance of ICT utilization in vocational learning process, several studies to step further on optimizing the utilization of ICT in the effort of transforming conventional learning into digital form, both content and the system is still developing, thus rising to the idea of *e-learning*. The presence of *e-learning* is a must in the field of education today, especially with the benefit of time flexibility and place in the teaching learning process, access to learning resources are varied and fun. But in the middle of the benefits, e-learning is still underutilized because of the awareness and ability of human resources, the availability of infrastructure, especially inland areas, application systems that require cost, and time development. The lack of *e-learning* utilization begins to be overcome by the widespread use of mobile devices among teachers and students in the field of education. Mobile devices will fill the weaknesses to strengthen *e-learning* position with all its advantages, namely smaller size, lighter, easier to carry, cheaper price, easier operational level, and more flexible information access (Mahande, 2017).

The development and ownership of *mobile* devices in accordance with research conducted by the Association of Indonesian Internet Service Providers (APJII) in 2000 internet users in 42 cities in Indonesia showed that 85% of Indonesian internet users were more often connected via smartphones (Marius & Anggoro, 2015). This is due to the increasing number of *smartphones* with affordable prices in the market and also the economical cost of access (Marius & Anggoro, 2015). Accordingly, APJII identifies internet usage through *mobile phone / smartphones* 85%, laptop / netbook 32%, PC / computer 14.0%, and tablet 13% (Marius & Anggoro, 2015).

The data indicated that the majority of internet users through *mobile* devices, such as *smart phones*, would cause tremendous traffic density in accessing information over the internet (teledensity). Gikas (2011) estimates that *mobile* computing services, such as smartphones, will be the main connection to the internet by 2020. This means that the use of *mobile* devices in accessing information from the Internet has become a major choice and will continue to evolve, which must be utilized to support *e-learning*.

The increasing use of mobile devices in the learning process leads to a new terms in learning technology that will play an important role in supporting e-learning, namely *mobile learning* or *m-learning*. *M-learning* is the development of *e-learning* and becomes a new technological trend in the field of modern education and learning. It is reinforced by Reis, Escudeiro, and Escudeiro (2012) that *m-learning* is a type of *e-learning*, a method for distance education using computer and internet technology, that offers learning through *mobile* devices, such as cell phones, *smartphones*, PDAs And tablets. The utilization of *m-learning* in vocational education can provide benefits, namely: (1) learning can occur anywhere and anytime, (2) access to fast and broad learning information, (3) two-way interaction and content collaboration, (4) Learning variation that allows students to gain knowledge at their own pace, (5) motivation with multimedia resources (Campanella, 2012; Sarrab, Al-Shih, & Rehman, 2013; Gikas & Grant, 2013)

The potential value of the utilization of *m-learning* in vocational education matches to the Sharples statement (Fazlina, Manap, & Rias, 2013) that *m-learning* complements formal learning practices in the classroom with non-formal learning situations in the outside of classroom. Furthermore, Ally and Prieto-Blázquez (2014) emphasizes that *m-learning* enables the transfer of working knowledge through the interaction of collaboration among workers in the working world to students in school. vice versa, from the school to the working world, students can access relevant information and resources to *up-to-date* education and vocational training from the web, as well as being able to communicate with teachers and working world instructors in the expertise areas. This statement means that the utilization of *m-learning* in vocational education will support the interaction of collaboration and the relevance of competence in working world.

The high number of *mobile* device users to access the internet and to the benefits of *m-learning* in education, it is not often synchronous between theoretical and fair complex implementations today. As an information material, the profile of internet users in Indonesia in 2014 showed that the penetration of internet users in Makassar (South Sulawesi) reached 3.7 million people (44%) (Marius & Anggoro, 2015). while the device to access the internet mostly use Smartphones (78%) (Marius & Anggoro, 2015). The data provides information that internet access through smartphones in Makassar is very high, but has not yet been followed or utilized for *m-learning*.

Ironically, the results an initial survey conducted by researchers at vocational school (SMK) in Makassar showed that most of vocational school stake holders had already had mobile devices, such as cell phones, *smartphones*, and *tablets*. However, the ownership of these devices is more utilized to send and receive messages. Access to information through mobile devices is still less related to vocational learning. Although some headmasters, teachers, and students actually realized the use of *mobile* devices should be directed to learning especially to support ICT-based learning and to access school e-learning. But it is different from some older and retired

teachers, their willing nesses and technical abilities to utilize mobile devices for learning have decreased (Mahande, 2017).

Moreover, the initial survey also provided information that *m-learning* at vocational school (SMK) in Makassar was still experiencing difficulties in the readiness of use, teacher skills, technical skills, guidance of *m-learning* implementation, and the absence of rules that encourage *m-learning* in learning in vocational education. Specifically, general information obtained that vocational school stake holders want the existence of *m-learning* content related to relevant learning strategies to vocational school (Mahande, 2017). In different contexts, Darmawan (2014) also said that government policies were expected to support the development of teaching materials and the access to *m-learning* among education office, the schools, the LPTK universities. This issue emphasizes the need for in-depth study, especially the readiness of the school's stake holders, the accessible and appropriate content for learning, and the formal rules that underlie or support *m- learning*.

Furthermore, the results of the initial survey at vocational school (SMK) in Makassar provided information that the *m-learning* limitation caused by the lack of awareness of school stake holders, especially teachers (Mahande, 2017). This limitation was not necessarily generalized. It could also be influenced by some factors. Pollara (2011) stated with a different subject, that teachers are still worried if the *m-learning* device will only interfere the learning process. Teachers assumed that *m-learning* would only be used by learners to socialize unrelated to learning. On the other hand, learners stated that *mobile* devices could be used for various learning activities in education. Particularly, learners' believes that the formal use of m-learning, both in and outside the classroom could be useful. This fact was a gap that required further investigation of teacher and student readiness in more limited context at vocational school (SMK) in Makassar.

In relation to the results of the field survey, Peters (2007) stated that the minimum use of *m-learning* was caused to teachers' ability, slow changes in educational institutions, and learning designs that have not yet been suitable for education. Furthermore, Pachler, Bachmair, and Cook (2009) suggested that the other challenges of utilizing *m-learning* are physical and social factors, such as potential disturbances or negative behaviors, physical health problems, and data privacy issues. In addition, *mobile* devices may also influence usability and may distract children from the true learning objectives. This challenge also seems to provide information on the importance of the study to find out the readiness of the users, the accessible content and appropriate for *m-learning*, and the learning interaction that should be done through mobile devices.

The minimum use of *m-learning* in learning is in line with Ibrahim and Walid (2014) study which concluded that, although *m-learning* could be theoretically trusted as an important aspect of the learning process, however the results showed that the percentage of respondents who accepted or believed *m-learning* was smaller (17.46%) than who rejected *mobile learning* (22.6%). Furthermore, Yusri and Goodwin (2013) stated the need to have further investigation of the use of *mobile* devices, in particular the readiness to use *m-learning*. This confirms that the need for in-depth analysis of the aspects that affect on it, why *m-learning* is less acceptable even though theoretically has many advantages.

The accumulation of these problems implied the need for an in-depth study of the development, changes, and shifts in vocational education into dynamic and adaptive based on existing information technology trends. These were to see the theoretical and problematic reviews, that there were gaps among theoretical expectations with the realization of *m-learning* utilization in vocational education in Makassar, Indonesia. It raised several issues that became topics in the dynamics of the *m-learning* utilization. The dynamics was such as the readiness of learning content, user attitude, and social interaction in learning. The problems could be grouped into three main aspects that aligned with the Framework for the Rational Analysis of Mobile Education (FRAME) model theory, namely of content aspects, user aspects, and social aspects (Koole, 2009). FRAME model in this research was used as a reference to know and to describe the utilization of *m-learning* in vocational education.

Based on field and literature studies from some of the following experts who have conducted *m-learning* studies with different aspects and focuses, such: Jabbour et al. (2014) on the impact of *m-learning* based on students' attitudes, student achievement, and educational process at higher education. Cheung (2013) on the intentions of *m-learning* by using some aspects of the Frame Model (*learner aspect, online interaction, device features, dependencies & sharing, reference groups, storage and weight*) in Polytechnic. Porumb, Tardini, Bergamin, & Picco-Schwendener (2013) on the design and development of an application used the *framework* of the FRAME model. Shariffudin, Julia-Guan, Dayang, Mislan, & Lee (2012) on the developing survey items depended on the literature and content that was validated according to the learning style of *Myer-Briggs Type Indicator* (MBTI) and FRAME model as the basic framework of *m-learning* understanding in higher education. These studies were related to the FRAME model, but it was limited to the effects of *m-learning*, usage intentions, application

development and the development of survey items in higher education. The results of the relevant research studies showed that there was no study that deepens the aspects of *m-learning* utilization on FRAME model in vocational education especially in Indonesia.
Based on the description previously mentioned, it is considered to conduct a study of dynamics of *m-learning* utilization at vocational education from FRAME model perspective review were investigated by addressing the following research questions: How to describe the dynamics of content aspects, user aspects, and social aspects of m-learning utilization in vocational education?

THEORETICAL FRAMEWORK

FRAME model is useful as a reference for the development of future mobile devices, the development of learning materials, and the design of teaching and learning strategies for education (Koole, 2009). FRAME model in this research is used as a reference to know and describe the utilization of *m-learning* in vocational education.

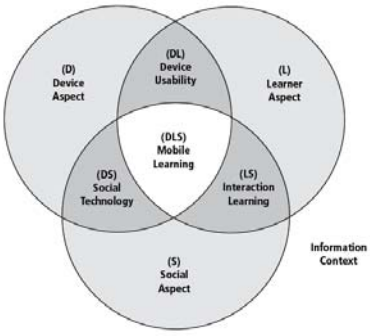

Figure 1. The FRAME Model

The theoretical framework shown in Figure 1 illustrates three circles represent another aspect of the device that was translated in this study, namely, it was related to the content aspect. The learner aspect was translated as the user aspect and the social aspect.

The content aspect described learning content or any content that was normally accessed by teachers and students through their *m-learning*. The *m-learning* content for learning became very important to fit the learning objectives in SMK. Wuebben (2011) asserted that it was important to understand the specific purpose and function of content type generated. The purpose of all content was essentially interesting and useful if used by individuals. The user aspect described how students utilized *m-learning* for learning purposes in vocational high school (SMK). The users' aspects focused on students' cognitive abilities and prior knowledge, characteristics and habits of learners with *m-learning* (Kenny, Van Neste-Kenny, Park, Burton, & Meiers, 2009). These aspects explained how learners used what had already known, accessed, identified, stored, and transferred information. The social aspects described how the ethics and behavior of students in utilizing *m-learning*. Moreover, how communication, collaboration, interaction were done by students through *m-learning*. The social aspect referred to the social interaction (Koole, 2009) and collaboration, access to information, and contextual learning (Kenny et al., 2009; Kearney, Schuck, Burden, & Aubusson, 2012). Social interaction and collaboration were essential for learning from sociocultural perspective, especially for individuals that involved in the discussion (Vygotsky in (Kearney et al., 2012). The importance of interaction and collaboration in this aspect, so that students, teachers, and instructors were expected to follow collaboration rules in communicating, exchanging information, acquiring or building knowledge, and maintaining learning culture practices.

RESEARCH METHOD

This study used quantitative descriptive research, with the consideration that this study will attempt to describe events or events that have occurred in the present in the form of meaningful numbers. This research was conducted at state vocational school and private vocational school in Makassar, Indonesia. The stake holders of this study were teachers and students of state vocational school and private vocational school in Makassar, consisted of 155 teachers and 5,274 students. The primary sample was 110 teachers and 355 students (Isaac & Michael, 1981) determined by the proportional random sampling technique. Questionnaire verification was done by examining the completeness of the questionnaires in pairs, so there were 103 teacher (approximately 17 each school) and 320 student (approximately 53 each school) questionnaires filled correctly and completely and deserved to be analyzed further. Data collection techniques in this study used questionnaires. Research instruments were prepared based on the FRAME model criteria (Koole, 2009), which contained statements/questions related to content aspects, user aspects, and social aspects. The instrument consisted of 40

items of statements/questions, used 1-4 scale assessment (very low=1, low=2, high=3, and very high=4). Instrument's validity in this study included the content validity. The content validity of the instrument was done through *expert judgment* by involving fourth experts, from various fields of expertise related to this research: (1) educational technology, (2) vocational learning, (3) informatics engineering, and (4) human computer interaction, ICT in education, user experience. Reliability calculation in this study used the cronbach's alpha (α) ≥ 0.70 (Hair, Black, Babin, Anderson, & Tatham, 2006). Data analysis techniques used in this study was descriptive analysis. Descriptive analysis would present the percentage, bar chart and pie. Descriptive analysis was done by using *IBM SPSS statistic software 20*. The categorization assessment of each aspect referred to the Mardapi (2008).

FINDINGS

The purposes of this study were to describe the dynamics of content aspects, user aspects, and social aspects of *m-learning* utilization in vocational education with FRAME model perspective review. The study focused on describing aspects of content, user aspects and social aspects of *m-learning* utilization of teacher perceptions and student perceptions of vocational schools in Makassar, Indonesia.

The description of *m-learning* data utilization by teacher

The description of *m-learning* data utilization by teacher from FRAME Model perspective covers three main aspects, namely content aspect, user aspect, and social aspect.

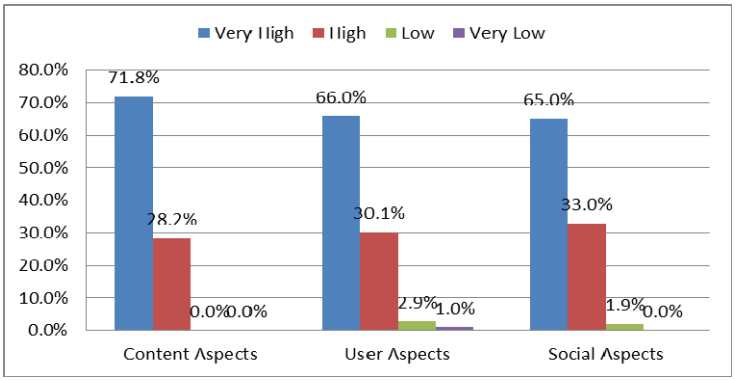

Figure 2. The distribution of frequency in the aspects of teachers m-learning utilization

Figure 2 shows that the average of content aspect in theory was 35 and empirical average was 45.90. Content aspect data show that the empirical average value was greater than the mean of the theory. This means, in general the *m-learning* content utilization by teachers is in very high category. The average aspect of users in theory was 30 and empirical average was 38.82. In general, teacher responses regarding to the use of *mobile* devices for vocational learning were included in the high category, however, there were still low and very low percentages that require further attention. The average of social aspect in theory was 35 and empirical average was 45,45. In general, the teachers' responses to the social aspects of *m-learning* utilization were included in the high category. However, there was still a relatively low percentage, which requires further attention. Furthermore, from the descriptive analysis results are known to achieve three aspects of *m-learning* utilization in vocational education (ML-VE) by the teachers, by comparing the total score, it empirically achieved the highest total score in the theory. The results of the descriptive analysis of three aspects are visually presented in the FRAME model, Figure 3.

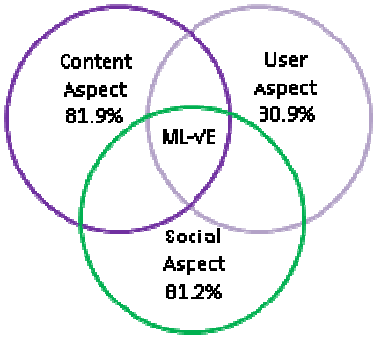

Figure 3. The percentage of score aspects of teachers' m-learning utilization

The aspects of content from teachers perceptions

Figure 3 shows that 81.9% of teachers had utilized the available content from various internet sites accessed through mobile devices. The results strengthened that in accessing the *m-learning* content which was available on the internet, teachers expected to state their frequencies in accessing media-based content, text-based content, and image-based content that were relevant to learning and vocational training purposes. As stated by Quinn (2011) that content was often accessed through mobile devices as media-based content, both dynamic content: audio/video, as well as static ones: graphs, photos, and text that had information for learning. In addition, teachers also strongly expected to the importance of properly sorted content, the availability of communication facilities on content such as discussion forums. Nevertheless, teachers stated if the content was available and accessed which had no navigation and communication facilities that teachers could use sync for *video conference*. Furthermore, content accessed on the internet by teachers had not shown any consideration of the attractiveness of the display.

The aspects of users based on teachers perceptions

Figure 3 shows that 80.9% teachers had taken benefits of their *mobile* devices for vocational learning purposes. The results supported that the utilization of *m-learning* from user aspect could be seen from the higher utilization of *mobile* devices for the purposes of vocational learning. *Mobile* devices were used to access and to find interactive relevant information (pictures and video learning) to the needs of learning and vocational training. As stated by Motta, Cattaneo, & Gurtner (2013) that mobile devices serve to capture workplace conditions at work, develop learning activities based on workplace conditions, then the knowledge that has been described during the learning phase at schools is validated at work The use of *mobile* devices facilitates the acquisition of information and the development of relevant knowledge based on the needs of employment. In this regard, the use of mobile *devices* for learning in SMK required the support from surrounding environment such as leaders of institutions, teachers, friends, and families.

However, teachers did not believe that the use of mobile devices for learning would reduce cognitive burden. This could be caused by two things: *first*, the teachers' *mobile* devices had not been used as places for file storages. *Second*, *m-learning* content contributed to provide contextual access as a cognitive addition or adding memory (Quinn, 2011). In addition to cognitive burden, teachers were also less confident if the use of *mobile* devices was to gain comfort learning. This was followed by the lower utilization of mobile devices to view tutorial videos or simulation of learning theory with practice. The lower utilization of mobile devices to access *m-learning* content from employment sites from different parts of the world. The uses of *mobile* devices for learning by teachers were the dynamics of *m-learning* utilization from user aspect. However, the teacher clearly stated the importance of *mobile* devices for vocational learning in the development era, change, shift of conventional learning toward technology-based learning in vocational education at SMK.

Social aspect based on teachers perceptions

Figure 3 shows that 81.2% teachers had taken benefits of their *mobile* devices to communicate, collaborate, interact, and build learning communities that were appropriate to vocational learning. The results of the study indicated that the ethics of *m-learning* utilization became very important for teachers. This is in line with Kraut (2013) states the importance of promoting the use of *mobile* devices for safe, responsible, and ethical technology learning. More broadly, Pheeraphan (2013) stated the importance of developing a critical and ethical understanding of the use of information technology. This means that, the importance of ethics in the utilization of m-learning had been understood by teachers and indirectly promoted safe and responsible utilization. On the other hand, teachers advocated the provision of media space for the development of work-based communities. In

addition, the features or applications of mobile devices based on social media today should be directed to develop the community through related groups or forums to learning and vocational training. Moreover, teachers had utilized *mobile* devices to interact with the instructor's work, communicate and collaborate on vocational learning. According to Vygotsky that interaction and collaboration were essential for learning from a sociocultural perspective especially for individuals involve in learning discussions (Kearney et al., 2012). This was very possible with the availability of various applications in *mobile* devices, such as: text messaging, *e-mail* or *audio conferencing*, which could be used to interact and to collaborate to share information and knowledge (Boyinbode, Ng'ambi, & Bagula, 2013).

Nevertheless, for the purposes of revealing the competencies gained in SMK, teachers were still lack on *mobile* devices utilization to communicate and to collaborate with work instructors. Interaction through m-learning to facilitate the need for knowledge information that was done by teachers was also low. This was followed by the lower utilization of *mobile* devices to collaborate with friends (teachers) on learning.

The description of *m-learning* data utilization by student

The description of *m-learning* data utilization by student from FRAME Model perspective covers three main aspects, namely content aspect, user aspect, and social aspect.

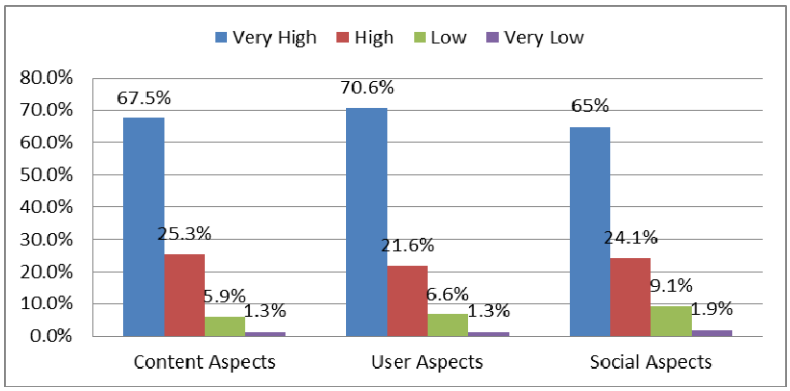

Figure 4. The frequency of distribution aspects of students m-learning utilization

Figure 4 shows that the average content aspect was 35 and empirical average was 44.30. This data indicated that the empirical average value was greater than the mean of theory. This data indicated that in general the students' responses regarding to the use of *mobile* devices to access vocational learning content are included in the high category. However, there were still very low and very low percentages that require further attention. The average of user aspect was 30 and empirical average was 44.23. In general, students' responses to the use of *mobile* devices for vocational learning were included in very high categories. However, there were still low and very low percentages that require further attention. The average of social aspect was 35 and the empirical rate was 44.23. In general, the students' responses to the social aspects of the utilization of *m-learning* were included in the high category. However, there was still a relatively low percentage that needs further attention. Furthermore, from the descriptive analysis, it is known that the achievement of the three aspects of *m-learning* in vocational education (ML-VE) by students, through comparing the total score empirically achieved with the highest total score in the theory. The results of the descriptive analysis of the three aspects are visually presented in the FRAME model figure 5.

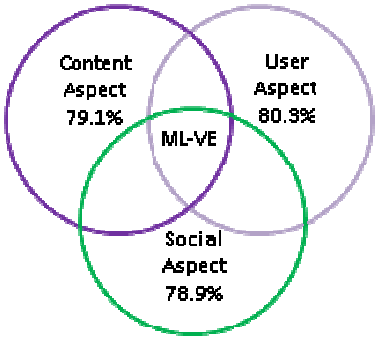

Figure 5. The percentage of aspect scale of m-learning utilization by students

The aspects of content according to students' perceptions
Figure 5 shows that 79.1% students had utilized the available content from various Internet sites accessed through mobile devices. Study results indicated that the students felt it is important to utilize *mobile* devices to access and download *m-learning* content based on media, content that provided multimedia facilities interactively, text-based content which was suitable for vocational learning purposes. This statement was as important as the previous teachers' statements. The level of interest was also in relation to the developing of virtual learning that is available today. In addition, virtual learning is able to simulate practical learning (Jin, 2009). Youtube is a multimedia facility commonly used by students and could be an example media for obtaining interactive virtual content in both media-based content and text.

In general, the result of study indicated the low utilization of *m-learning* content by students. Cheon, Lee, Crooks, & Song (2012) recommended the strategic efforts, included by considering the degree of readiness of students from three perspectives, namely: (1) the positive attitude of students, (2) content, and (3) comfort level. Due to the low utilization of content by students, these three viewpoints became important to be reviewed, especially on the accessed content. Although, the use of content was considered lower. Content according to students that the *m-learning* content seen on the internet was less considered attractively, had not provided navigation, communication facilities that could be used in sync such as video conferencing. The use of cameras or video from mobile devices had not been utilized to obtain content from multiple locations.

The aspects of users based on student perceptions
Figure 5 shows that 80.3% students had taken benefits of their *mobile* devices for vocational learning purposes. The results of analysis indicated the higher utilization of *mobile* devices for vocational learning purposes (user aspect, beyond the two aspects: content and social aspects), as study from Martono & Nurhayati (2014) showed that 95% users enjoy the use of *m-learning* applications and only 5% did not enjoy *m-learning* applications. Furthermore, the research results stated that students generally utilized their mobile devices to access and obtain relevant knowledge information toward learning and vocational training. The acquisition of information emphasized to more interactive learning information. This is in line with Koole (2009) that an effective *m-learning* process will enable students to be able to collect and to select information in relevant context and required information. This is in line with the statement of Shariffudin et al. (2012) that *m-learning* helps students to assess and to select relevant information based on the objectives within the *m-learning* environment.

Nevertheless, students used less *mobile* devices to access content from vocational employment websites and to view tutorial videos or to simulate theoretical learning with practice. Furthermore, as well as teachers, students also did not believe if the use of *m-learning* would be able to reduce cognitive burden. Unlike the teachers, students were less likely to require people in the surrounding environment and to encourage them utilizing *mobile* devices for learning. In *mobile* device utilization, students needed the freedom as they desired. This was consistent with Cheung statement (2013) that the use of *mobile* devices for learning was largely determined by the students' willingness and positive attitude. On the one hand, it had a positive impact because it involved the students' awareness, desire and technical abilities, but on the other hand, the lack of environmental support could cause negative impact, namely; the use of *mobile* device became uncontrolled, and it's utilization was out of the essence of vocational learning. This was a challenge for the world of vocational education to formulate more specific rules for m-*learning*.

Social aspect based on students perception
Figure 5 shows that 78.9% students had taken benefits of their mobile devices to communicate, collaborate, interact, and build learning communities that were appropriate to vocational learning. The results stated that social-cultural support was an important factor in influencing the development, change, shift of learning toward the utilization of m-learning on vocational education in SMK. This was just as important as the ethics of using *mobile* devices. In addition, students also expressed their unity in communicating and collaborating with friends on vocational learning. Due to socio-cultural and ethical support, students also expressed the need to provide media space or forums for the development of work-based communities. Nevertheless, the uses of *mobile* devices to collaborate and to communicate with workplace structures as an effort to evaluate the competencies acquired in SMK were still lack of implementation. These were followed by the lower utilization of *mobile* devices for learning interaction and collaboration with teachers on vocational learning. Students also less utilized their owned *mobile* devices to interact with work instructors in the workplace. Though this was very important, because an effective *m-learning* would emphasize the improvement of knowledge where students could interact with teachers and work instructors on subject matter from different environments virtually (Koole, 2009). Therefore, the use of *mobile* devices to facilitate interaction and collaboration among students with teachers and work instructors needed to be improved.

DISCUSSION

The dynamics of *m-learning* utilization in vocational education with FRAME Model perspective review

The aspects of utilization made by teachers based on the three aspects, it was more emphasis on aspects of content (81.9%), while students emphasized the user aspect (80.3%). The dynamics of the content aspect explained that in general the development and changes in learning content accessed on the internet through *mobile* devices were relevant to the majors on vocational education in SMK. The dynamics of user aspect explained that mobile devices had been utilized for vocational learning in the development era, change, technology-based learning on vocational education in SMK. In addition to those two aspects, it turned out, that the social aspects of both teachers (81.2%) and students (78.9%) also gave responses on the importance of social aspects in the utilization of *m-learning*. The dynamics of social aspect explained that socio-cultural support would affect the development, change, shift of learning towards the utilization of *m-learning* on vocational education in SMK. Socio-cultural support became very important, so the development of *mobile* devices increasingly utilized for learning purposes, not vice versa less let alone not at all.

These three aspects of utilization emphasized the importance of content, user intention, and socio-cultural support to realize *m-learning* utilization along with the development of *mobile* devices today. Content would lead to the acquisition of learning information that was meaningful, objective, and interesting to learners. Related to content, Al-Zoubi, Jeschke, & Pfeiffer (2010) stated the lack of content is as a major factor that slows down the progress of *m-learning*. Therefore, vocational education institutions needed to provide and developed appropriate and *up-to-date* content based on to their developments and needs. User's intentions would lead to awareness and desire in utilizing *mobile* devices for learning. Socio-cultural support would provide rules in the form of policies, and facilities that would encourage *m-learning* implementation in vocational education.

The three aspects of the FRAME model were very important to be considered, in order to realize the utilization of *m-learning* as a new generation of *e-learning*; it was also the implementation of ICT-based learning for the future. The description of dynamics aspect that occurred, provided a developed model based on FRAME model with the highest level of importance and utilization of *m-learning* on vocational education in Makassar, both from teacher perception and student perception. The utilization model in Figure 6 was the recommended model towards better *m-learning* utilization and in accordance with vocational learning and training, especially in Makassar, Indonesia.

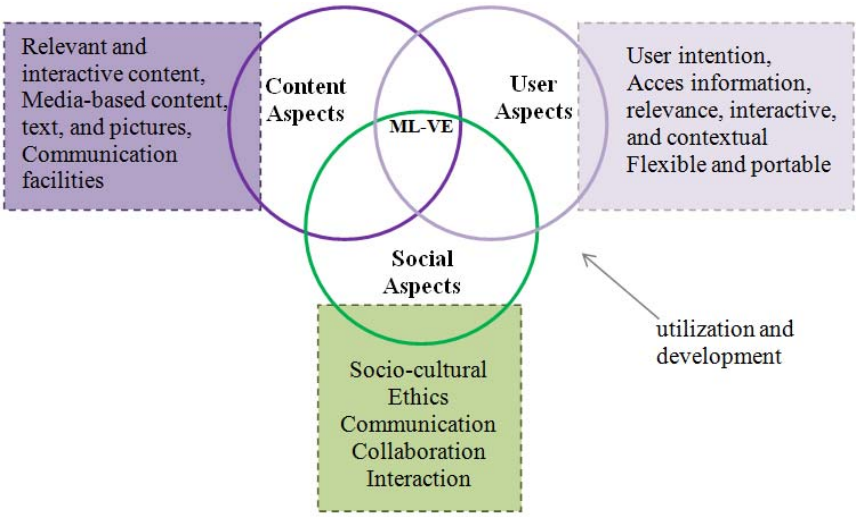

Figure 6. Model of m-learning utilization in vocational education

Figure 6 shows the model of *m-learning* utilization in vocational education (Mahande, 2017). The utilization and development of *m-learning* would be concentrated on the user's aspect with the *mobile* devices, the learning content, and the social aspects.

On the content aspect: relevant and interactive content, media-based content, text, and images were the most expected content even it used to be accessed by teachers and students. In addition, content that provided synchronous communication facilities, such as *video conference* was needed. Thus, *m-learning* in the future needed to improve and to consider the content aspect, especially the interactive multimedia-based content in the utilization or development of *m-learning* content in the future.

On the user aspect: Strong intention or self-will would promote good utilization and based on its purpose. Intention was influenced by various factors of usability, ease of use, social environment, and supporting facilities. Related to the intention, importance and highly *mobile* devices utilization related to the acquisition of relevant, interactive, contextual or environmental information where *m-learning* was utilized, in terms of flexibility and portability. Thus, user intentions prior to utilization or development became important to be traced through theories of technology acceptance. Similarly with content, providing an understanding of *mobile* devices utilization in accessing and classifying relevant and interactive information were very important to do. In addition, utilizing all the advantages of flexibility and portability were for learning purposes. It needed further attention in order to utilize and to develop future *m-learning*.

On the social aspect: socio-cultural support such as schools, leaders, teachers, friends, and families influenced the realization of *m-learning* utilization that had been better and had aim. In addition, the utilization ethics should receive attention, especially in using, accessing information, and communicating, collaborating, and interacting among teachers, students and instructors in the workplace. Thus, socio-cultural support, ethics of utilizing *m-learning* in communication, collaborating, and interacting became very important in the utilization and development of future *m-learning*.

CONCLUSION AND IMPLICATIONS FOR FUTURE RESEARCH

The content aspect which was available on the internet and accessed by teachers were relevant to their majors, whereas students expressed less relevance to their majors, so the value and substance of utilizing *m-learning* content was still less relevant. *The user aspect* showed that teachers and students utilized *mobile* devices for vocational learning purposes, so the value and substance of learning could be still maintained. *The social m-learning aspect* showed that socio-cultural support was important in influencing *m-learning* utilization for teachers and students, so that the value and substance of m-learning in vocational education could be maintained.

This study provides implications for the need for increasing socio-cultural support towards the utilization of *m-learning*, especially in obtaining information on knowledge and skills through communication and collaboration with work instructors, as an effort to increase the relevance of competencies between schools and the working world. Optimizing the utilization of *m-learning* is required toward appropriate content for vocational learning.

Therefore, it is hoped that further study can use the result model and or fill the gap of each aspect of the FRAME model to illustrate the utilization and development of *m-learning* applications and content in future. The limitations of this study were the less specific review of research results with vocational education and the sample of the study came only from six vocational schools with a limited number of study respondents, so the findings of this study were still general at vocational education in Makassar, Indonesia.

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The Early Literacy at Preschool Education: The Book or the E-Book?

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ABSTRACT
Educational technology is commonly used. The use of technology at preschool education has an important role with a lot of effective methods so that children can learn. Preschool teachers use the technology to support children's development. Early literacy skills have gained more importance especially in the recent years. As a result, the use of technology has been necessary to develop early literacy skills. Based on dialog, interactive book reading is an important activity to give children the opportunity for them todevelop their early literacy skills. It was found in the previous studies, that the literacy skills of the children; for whom readingbooks based on dialogue by teachers or families, were at a better level. In this study, the previous studies related to E-book interactive book reading are gathered and it aims to introduce based on dialogue E-book to families and teachers and makes some proposals to support the early literacy skills through based on dialogue E-book. Besides, by studying the related literature, developing early skills to reading E-book or reading book were compared and the results were argued.

Keywords: Techonolgy, Preschool Education, Early Litearcy, E-Book at Preschool Educations.

INTRODUCTION
Early childhood period has a critical importance for the development of emergent literacy skills. Emergent literacy skills have a significant impact on the child's literacy performance in primary school years as well as overall academic success. Thus, emergent literacy should be adopted by preschool teachers, and should be included frequently in in-class activities. In addition to this, the families should be informed about this topic and encouraged to demonstrate and support their children's emergent literacy activities at home. Also, studies that will increase attention, interest, and motivation should not be ignored. Emergent literacy practices appropriate to children's age and developmental attention levels should be included in the program (Yalçıntaş-Sezgin & Ulus, 2017).

One of the most important contributions to educational research in recent years is the link between reading studies with early childhood education. Until 25 years ago, reading and writing education was not accepted or even should not be accepted. However, studies on emergent literacy emphasize the importance of early years, especially preschool period, for the development of future literacy fundamentals. Although there is a widespread understanding of the importance of early reading learning experiences in children, contradictory opinions exist about reading studies in preschool period. The lack of understanding of the concept of early reading is one of the reasons for these contradictory views. Technically, literacy means reading and writing correctly. But emergent literacy, reading and writing skills, is a continuing process until the beginning of the basic education that begins to develop from the moment the child is born. Moreover, skills that are assumed to be developmental determinants or pioneer of reading and writing is also defined as knowledge and behavior (Yalçıntaş-Sezgin & Ulus, 2017).

THE DEVELOPMENT OF COMPUTER TECHNOLOGY AND THE USE OF E-BOOKS
In the preschool period it is important that the adult and the child has reading and writing activities together which supports significantly the early literacy skills of the child and it should be thought that reading book is one of the most important activities (Sénéchal & LeFevre, 2002). However most of the children nowadays are exposed intensely to digital social media by variousof technological tools (Hisrich & Blanchard, 2009). As a result of exposure of technology the children have a lot of opportunities to observe and explore it and play with it. The children are most commonly exposed to electronic books which are E-books (Ihmeideh, 2014). With the help of E-book, the fun story reading activity with adults are able to be done individually. Studies show that this is a considerable activity for the early literacy of young children to evolve/develop. In the following parts this is explained in detail.

Computer technology is promising to support the early literacy skills of children in a creative and innovative way not only for normal-developing children, but also for the children with learning impairment risks. Before computer

technology the first early literacy skills develop during experience of reading done by adult and the child together (Bus, van Ijzendoorn, & Pellegrini, 1995).

WHAT IS E-BOOK?

E-book is a text that is transformed from words, pictures and shapes that are in computer file format to digital form (Rao, 2003, p. 86). What differs E-book from traditional book are the sound/audio, (e.g. music or verbalism/expression/audio etc…) visuality (e.g. movement etc…) and etc. Besides in the E-book there are features that children can enjoy, like a motion picture with the text, shapes, audio expression (listening the story) and listening the text…

Another explanation is so; E-book is a form of interactive story(expression) that has multimedia effects for children between 3-8 years old and it is named as 'a living book, talking book or CD-ROM stories' and includes a written text, mouth reading, mouth talking, music, noise effects and motion pictures, shapes. This interactivity enables children to carefully follow the written text, sentence and paragraphs that is vocalized and so they understand the insider of the text. In this way they interact with the book, understand the words and the letters, enrich their vocabulary, improve their reading comprehension skills and increase their motivation to read (Segers & Verhoeven, 2002; Glasgow,1996-1997; Matthew, 1996; Reinking, 1997; Smith, 2001).

There is a new, thriving fashion in the recent years that to have the digital versions of books in the classes of young children (Unsworth, 2006). The International Reading Association (2009) emphasizes the importance of merging the technologies including digital books like E-book with current programs. Because when the literature is examined it is come through that the E-book supports and helps to improve reading and comprehension skills (De Jong & Bus, 2004; Gong & Levy, 2009; Maynard & McKnight, 2001; Moody, 2010; Verhallen & Bus,2010; Zucker, Moody, & McKenna, 2009). At the same time E-book is used effectively for the children with reading difficulties and for the children who are at the initial phase of reading (Zucker et al., 2009). According to Moody (2010) digital reading materials increase children to be included in the stories apart from supporting early literacy and Moody also suggests that this is quite important in the early childhood.

Because of many unique features, E-books provide a lot of opportunities. For instance; pictures, motion shapes and figures and pictures help children to understand the definitions and concepts of words. The letters in alphabet stressed and pointed out and this supports phonological awareness (Doty, Popplewell, & Byers, 2001; Moody, 2010; Wood, Pillinger, & Jackson, 2010).

READING AN E-BOOK OR A TRADITIONAL BOOK?

When the literature is examined there are a lot of researches about reading an E-book or a traditional book. First of all it would be beneficial to point out the differences between an E-book and a printed out book. The difference is; E-book includes motion pictures, verbalism/expression and different audio. Mentionedadvanced features of E-book result in high reading and writing improvement and less success differences (Ihmeideh, 2014). Printed books are important for the improvement of children's reading and writing skills, however they lack some of the features E-book has.

Both in school and at home reading and writing skills are assisted/supported extensively with technological tools. Likewise, a well designed E-book comparing to traditional books help children better to improve their phonological decoding skills, vocabulary and to understand the meaning of words (Verhallen, Bus, &de Jong, 2006; Segers, Verhoeven, 2003). Increasing the utilization of E-books more than traditional books help children to experience a qualitative privilege of reading.

Today young children read the written-printed books with the adults, at the same time they can read the E-books individually without the help of adults. E-books are becoming more and more common. While reading an E-book, motivation and enjoyment of kids are higher at reading and listening (Greenlee-Moore & Smith, 1996).

E-books have a lot of advantages for children. When children read or listen E-books, they get to choose the story they like, they can listen the story and they can interactively join the story events (Takacs, Swart, Bus, 2015). E-books include motion pictures, wireless access area, sounds and activities. They also include written texts that change their color itself following the oral story for children to follow up easier (De Jong & Bus, 2002).

E-books provide children a personalized reading support. Children can read individually and they can take up on themselves the learning (Matthew, 1996). E-books have the potential to encourage and support children with features that traditional books do not have (Huffstetter, King, Onwuegbuzie, Schneider & Powell-Smith, 2010; Bus, Takacs & Kegel, 2014). Having the pictures and the content with motion make the E-books more fun. Unlike in traditional books children can set the speed of reading themselves. However, a disadvantage of E-books for children is that without having a skilled reader with them, they will have difficulties to understand unfamiliar words (McKenna, 1998). In

literature it is showed that having an adult with child during reading is beneficial. Yet children aren't exposed to books that help to improve their early literacy skills. However, family child dialogue is equally important (Mol, Bus, de Jong & Smeets, 2008). During reading a book the participation of adults is encouraged. For instance; with specific questions about the story and with the explanation, language development is supported (Mol, Bus, de Jong & Smeets, 2008). However, a good designed E-book has a feature; the child can click on the unknown/unfamiliar word and listen it over and over. If the E-book has the dictionary feature, child can click on it and learn the meaning of the word. In this way a disadvantage of E-book can be eliminated. E-book can be used individually by the kids and also with the company of adults.

E-books can also be helpful to children who are unwilling and unresponsive to read (Maynard, 2010; Maynard & McKnight, 2001).

Reading stories are thought to be an important activity to support early literacy of children (Bus, Van IJzendoorn, & Pellegrini, 1995). However, even if there is an extensive evidence on the positive relationship between reading a book and the speaking language of children, there is only a few evidence about the positive relationship between reading a story and the early writing skills. (Bus et al., 1995; Sénéchal, 2006; Korat, Klein, & Drori-Segal, 2007).

A lot of researches on adult-child book reading claim that this activity to support children's speaking language has contribution (De Temple & Snow, 2003). Just a few researches state that these activities has contribution on early literacy skills (e.g. naming the letter, reading a word, writing a word …) (De Temple & Snow, 1996; Leseman & de Jong, 1998). These three meta-analysis work show that reading a book activity contributes 8% children to speak and write (Bus, van IJzendoorn, & Pellegrini, 1995; Mol, Bus, de Jong, & Smeets, 2008; Scarborough & Dobrich, 1994). One of the comments about this topic is that neither the families nor the teachers generally stress out the writing (Dickinson & Tabors, 1991). For that reason, children can not focus on the writing, while they are looking at the book (Evans & Saint-Aubin, 2005). Researches show that the families and the teachers talk rarely about the writings during the reading activities (Muter, Hulme, Snowling, & Taylor, 1997; Piasta, Justice, McGinty, & Kaderavek, 2012). Whereas in E-book, in various screen parts there are embedded tools. These tools are planned to provide extra information about characters. E-books also have some features that are optional like repeating the text, copying a sound, changing the screen or enabling to enter a game and some other activities to help you to understand the story. By clicking on the shining word in the text, you receive the explanation of the word. The created dynamic images apart from the written text help to pass forward the inside of the story in a detailed way and children understand easily what story tells (Korat, 2010).

Person who tells the story can help children to understand the writings by stressing out the written words, sentences and paragraphs. For example; children can click on the unknown/unfamiliar word and listen it again. These E-books not only help children to learn new words, but also to help them to read the words (Korat, 2010).

In the research they did, Korat and Drori stated that preschool children who are up to 4 years old are subjected to E-books and the result was beneficial. When these children were subjected to pre-test, they recognize the word and their phonologic awareness were lower than 5-6 years old preschool children. However, with the help of developed E-book they showed the same development in reading and writing with 5-6 years old children.

A good developed E-book has strong potential for young children to improve their reading and writing skills and they can start with E-books from the age of 4 years old (Korat & Drori, 2016).

A research about the efficiency and the worth of E-books to improve reading and writing, for instance, for preschool childrenand for children who just start school show that for children to recognize the words with the help of E-books is promising (Miller, Blackstock, & Miller, 1994; De Jong & Bus, 2002; Lewin, 2000). It is also found that the E-books support the improvement of phonological awareness of children (Chera & Wood, 2003; Wise Olson, Annsett, Andrews, et .al 1989). Cheer and Wood, carried out the reading activity with E-book for 4 weeks with preschool children who are 3-6 years old and found out that their phonological awareness were more improved than the children from the control group. Besides, their verbal skills got better after using electronic story book (Lewin, 2000; Segers & Verhoven, 2002). E-books in headstart kindergartens show that reading and writing skills of children were improved (Talley, 1994).

Korat (2010) studied in a research the language and reading/writing skills of Israeli children after reading electronic story books. The E-book research were applied to preschool children. To compare the first grade children were taken in the research. In every ages children were randomly separated to two groups; 5 times E-book read intervention group and a control group that goes school regularly. The evaluation of reading the word is done as pretest and final test. In final test they evaluate if the children can understand and explain the story. Children who read E-book showed a promising improvement in understanding and reading the word comparing to control group. Preschool children in same

way showed better improvement in reading more words than first grade intervention group. Apart from that, preschool children showed a good improvement in understanding the story (Koran & Shamir, 2007) concluded similar results. E-book was found as an effective tool to understand the story.

The families should be educated about the usage of E-book and its different mechanism to have a successful interaction with their children. Peneu et al. (2009) found in the researches that, the families who support E-book usage claim that the phonologic awareness, recognition of letters, language, reading comprehension, and creating words and early literacy etc. such skills of their children are improved. Likewise, Shamir and Korat (2006) applied the study of story books in CD-ROOMS to children of low economic level and middle economic level families. In pre- and final-tests, comprehension & recognition of the word and phonologic awareness were tested. To conclude, both in low economic level and middle economic level children show improvement after this educational E-book application. Apart from that children of low economic level showed even better improvement than in middle economic level. E-book can overcome the learning barriers of low economic level children (Shamir&Korat, 2006). Even if the features of E-book result in less family interaction, they can minimize the success differences. E-books motivate the children to read. Because the E-book is multi-dimensioned featured and that is why it can help children who are behind their compeers/fellows overcome learning barriers (Shamir & Korat, 2006).

CONCLUSION AND DISCUSSION

In this research/paper, reading an E-book and reading a book in the early ages of children is compared by examining the literature. It is concluded that children who read stories in E-books or children who read individually improve their reading and writing skills better than the children of other control groups. Especially, writing awareness, recognition of the word, reading the word and vocabulary showed improvements. (Shamir, & Korat,2007; Korat & Shamir, 2007; Verhallen, Bus, &de Jong, 2006; Segers, Verhoeven, 2003; Korat, 2010, Korat & Drori, 2016).

Apart from that the E-book supports the early literacy in young children, it also motivates children to read books, helps their concentration because they have to listen during the story read in a period of time and helps to understand the story. Children at these ages like to read books with the adults or listen however they also like to observe the book individually. E-book gives children the opportunity to be independent.

New developed features of E-books offer better qualities in motion, sound, brightness and vividness. All of these new improvements enable children to listen and watch the stories without getting bored. In most of the traditional books there aren't motion pictures and drawings. Young children like to look at motion pictures. That is why these features of E-book help children to spend more time with E-books. Improvement of early literacy skills in young children required motivation and interest and it is supported with E-books.

Digital tools (e.e computer disk) make it easier the use of E-books, however with the improvement of technology the touchscreen tablet apps (downloadable software programs designed for mobile devices e.g., literacy, gaming, and e-book apps; Neumann, 2014) are used by families, teachers and children. And young children can also use them individually (Thank, 2011). Bloodgoog (1999) states that some 3-4 years old children who have small muscle capabilities have the ability to write their names and alphabet. That is why touchscreen can be an alternative tool to children who are at the different stage of writing skills. Because in the stories children draw from up on the letters inside the words. This let the children to experience drawing. This important experience is not present.

To summarize the advantages of E-books; with E-books children learn the new words that are stressed out when the sound in E-book reads the story. There are games and pictures that help children to understand the story (Segal-Drori, Korat, & Klein, 2013; Shamir, Korat & Fellah, 2012). When compared to classical printed books, kids can spend more time with their families. People with growth retardation can also favor from E-books. (Moody, Justice& Cabell, 2010; Shamir, Korat & Fellah, 2012; Parish-Morris, Mahajan, Hirsh-Pasek, Michnick Golinkoff & Fuller Collins, 2013). The Children can read the E-book over and over. Reading the same story over and over increase their reading skills. Children by themselves can enjoy reading the E-book alone (Salmon, 2014). This can liberate children and gets children more keen on reading. E-books are useful and accessible (Salmon, 2014). Families and teachers can download to their computers, laptops and iPads. This easy access gets families choose the reading activity without distinction of place (e.g. metro, auto-bus etc.). Children learn better when they read with adults (Drori, Korat, & Klein, 2013; Moody, Justice& Cabell, 2010). That is why the adults are required to increase the reading activities with E-books rather than classical books.

E-book stories should have more advanced features and their numbers should be increased in every language and families at home, teachers at school should benefit from E-books to support children's early literacy skills. The children can do the reading activities with E-books alone as well as with their parents. Because young children may require the guidance of adults. Various and advanced features of E-books should be introduced to parents and E-book's frequency should be increased. Pre-school teachers should also benefit from the attractive and impressivefeatures of E-books.

They can benefit from the E-books in such a way that the reading activity could be done with E-books so that it becomes more fun. Especially E-books can be made use of supporting the early literacy skills of children with special needs such as developmental retardation and difficulty in reading.

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The Effectiveness of the Smart Board-Based Small-Group Graduated Guidance Instruction on Digital Gaming and Observational Learning Skills of Children with Autism Spectrum Disorder

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ABSTRACT
The objective of this study was to teach digital gaming skills to children with autism spectrum disorder (ASD) using a SMART board with a graduated guidance teaching method in a small-group instructional format, to determine the participants' levels of learning by observation, and to determine the views of their families on the conducted instruction. For this purpose, a multiple probe design across behaviors was used and replicated across four students who received training at a university practice unit and were diagnosed with ASD. In addition to the effectiveness data collected to determine the effects of the utilized instructional package on the levels of digital gaming and observational learning of the participants with ASD, reliability and social validity data were also collected. The effectiveness data analyzed with graphical analysis. Findings demonstrate that small-group instruction with graduated guidance was effective in teaching digital gaming skills to children with ASD. It was also observed that the children acquired a high level of accuracy at non-directly targeted gaming skills via observational learning.

Keywords: autism spectrum disorder, small-group instructional format, graduated guidance, SMART board, digital gaming, observational learning

INTRODUCTION
Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder considered among the categories of special education. Communication problems have a special significance among those observed in ASD because many of the challenges experienced by individuals with autism arise from the lack of communication with others. Acquiring communication skills plays a crucial role in achieving information, establishing relationships, and choosing and facilitating independent living (Boutot & Myles, 2011). Therefore, it is necessary to use systematic, effective, and scientifically based practices in teaching communication skills to children with autism (National Research Council, 2001; Webber & Scheuermann, 2008; Wong, Odom, Hume, Cox, Fettig, Kucharczyk & Schultz, 2015).

Playing games that start during the early periods in life is a skill with significant contributions to the mental, social, emotional, and language development of individuals (Lifter, Mason, & Barton, 2011). Studies conducted in the field on gaming skills have demonstrated that children with developmental disabilities, including children with ASD, had lower gaming skills based on both quantity and quality when compared to their typically developing peers (Cumine, Dunlop, & Stevenson, 2009; Lifter, Mason & Barton, 2011; Wolfberg & Schuler, 1993). Due to these inadequacies/limitations observed in gaming skills, children with ASD, are often excluded by other people in the social environment, and this negative experience leads to these children feeling lonelier in their social environment (Wolfberg & Schuler, 1993). Children with ASD need systematic instructional practices to achieve both observational learning and gaming skills, while typically developing children learn gaming skills by observing the individuals or events around them (Hobson, Lee, & Hobson, 2009).

The approach that is often recommended in the education of children with ASD is the use of as many visual, auditory, and tactile stimuli as possible. Studies conducted in the field of ASD reveal that using tools that engage more than one sense allow children with ASD to learn more easily and faster (Sehaba, Estraillier, & Lambert, 2005). Digital games that contain multi-sensory stimuli and that can be played on various electronic devices in the virtual environment are those that provide opportunities to play both as an individual and with

small-group interaction. Instructing children with ASD through the visual, auditory, and tactile stimuli that digital games offer allows them to acquire targeted gaming skills in less time and in a more permanent manner (Moore & Taylor, 2000).

Bandura argue that many of the behaviors performed by individuals are learned through modeling by observing other people in the same environment (Bandura, 1977). Similar to their typically developing peers, individuals with ASD can acquire a variety of information and skills through learning. A review of the relevant literature revealed that all studies that aimed to teach children with ASD new skills via observational learning were conducted in small-group instructional formats and that these individuals were taught several different skills in academic, social, gaming, communication, and daily living areas (Brown & Whiten, 2000; Colozzi, Ward, & Crotty, 2008; DeQuinzio & Taylor, 2015; Garfinkle & Schwartz, 2002; Griffen, Wolery, & Schuster, 1992; Ingersoll & Schreibman, 2006; Leaf et al., 2012; Ledford, Gast, Lustre, & Ayres, 2008; Ledford, Wolery, & Ahearn, 2015; Mechling & Gast, 2008; Özen, Batu, & Birkan, 2012; Tekin-İftar & Birkan, 2010). According to social learning theory, in order for learning to take place, instruction is required to be conducted in an interactive environment where the child can observe the target behavior. This interactive environment could include two to a few individuals. Such environments are called small-group settings.

Small-group instructional organization is a group setup aimed at instructing the same skills or a combination of different skills to at least two students with the same or different learning and performance characteristics (Brown, Holvoet, Guess, & Mulligan, 1980; Collins, Gast, Ault, & Wolery, 1991; Gürsel, Tekin-İftar, & Bozkurt, 2004). The use of small-group organization is often a strategy to meet the educational needs of children with disabilities (McDonnell, Johnson, Polychronis, Riesen, Kercher, & Jameson, 2006). Studies conducted in the field demonstrated that small-group organization facilitates individuals with disabilities to acquire several skills in academics, communication, social life, and motor development (Aldemir & Gursel, 2014; Browder, Hines, McCarthy, & Fees, 1984; Fickel, Schuster, & Collins, 1998; Camps, Dugan, Leonard, & Daoust, 1994; Orelove, 1982; Schepis, Reid, & Fitzgerald, 1987; Wilson, Cuvo, & Davis, 1986).

Electronic devices used in the instruction of digital gaming could be listed as mobile phones, desktop, laptop and tablet computers, and SMART boards. One of these devices, SMART boards, are electronic devices suitable for use by small groups within the classroom (Campbell &Mechling, 2009). For the purposes of the present study, digital gaming skills were instructed using a SMART board. A SMART board is an interactive technological product by which a user can conduct operations by touching the screen with his fingers or by using electronic pens specially designed for the SMART board (Argott, 2012). Despite the widespread use of SMART boards in general education environments, they have been slowly introduced to special education settings (Coyle, 2013). A review of the related literature demonstrated that individuals with ASD could acquire various skills such as digital game playing, picture-word matching, completing an activity, and reading letters and words using intelligent SMART boards (Argott, 2012; Campbell & Mechling, 2009; Coyle, 2013; Handler, 2011; Mechling, Gast, & Krupa, 2007; Mechling, Gast, & Thompson, 2008).

It is known that the use of technological tools in the instruction of children with ASD has been increasing every day. Although it is also known that children with ASD have a high interest in these tools, it is important to present the tools in the most appropriate way to avoid the possibility of a negative experience. Graduated guidance instruction is an instructional approach in which response prompts, one of the errorless teaching methods, are presented (Duker, Didden, & Sigafoos, 2004; Wolery, Ault, & Doyle, 1992). In graduated guidance instruction, the teacher first provides the controlling prompt and allows the learner to react independently by gradually removing the controlling prompt in the subsequent instruction sessions. A review of related literature showed that children with disabilities have been instructed in both single-step and response chain skills such as daily life, gaming, and chart following using graduated guidance instruction (Bryan & Gast, 2000; Denny et al., 2000; Marchand-Martella & Martella, 2001; MacDuff, Krantz, & McClannahan, 1993; Woods & Poulson, 2006).

A literature review also demonstrated that instructional packages (e.g., SMART board-systematic instruction or small-group organization/systematic instruction) in which two different instructional strategies are used in conjunction are commonly used in instructing gaming skills to children with ASD (Argott, 2012; Campbell, & Mechling, 2009; Coyle, 2013; Garfinkle & Schwartz, 2002; Handler, 2011; Ledford, Gast, Lustre, & Ayres, 2008; Ledford & Wolery, 2015; McDonnell, Johnson, Polychronis, Riesen, Kercher, & Jameson,2006; Mechling, Gast, & Krupa, 2007) while there is a limited number of studies in which more than two instructional strategies were used together. It seems that the use of combined instructional strategies makes it possible to effectively and efficiently acquire multiple skills with complex chaining. Thus, the use of coherent and well-

planned instructional strategies packages would increase the effectiveness and productivity of the instruction presented, and, therefore, it would facilitate the job of practitioners.

Children with ASD often receive their education in inclusive settings which are environments that provide opportunities for children to learn several social, academic, language, and communicative skills through observation. Unlike their typically developing peers, for children with ASD to acquire various skills via observational learning, they need support. In the present study, it was considered that the use of technology-based applications and graduated guidance instruction in a small-group instructional format for the acquisition of digital gaming skills by individuals with ASD, would help particularly pre-school children with ASD to acquire digital game skills through observational learning and to transfer the observational learning process to future inclusive settings. To this end, the following research questions were addressed in this study: (a) Is graduated guidance instruction presented with a SMART board within a small-group format effective in teaching digital gaming skills to children with ASD? (b) Does graduated guidance instruction presented with a SMART board within a small-group format have an effect on the learning of digital gaming skills by children with ASD only through observing their peers play, without direct instruction? (c) Is graduated guidance instruction presented with a SMART board within a small-group format effective in the maintenance of acquired digital game playing skills by children with ASD? (d) Does graduated guidance instruction presented with a SMART board within a small-group format have an effect on the generalization of digital gaming skills of children with ASD to different situations? (e) What are the views of the families of the participating children with ASD on the target skills and the instructional process?

METHODS

Participants

The participant groups in this study included the subjects, the researcher, the assistant teacher, the observer. The subjects of the study included four 47-67-month-old boys diagnosed with ASD. Written permission has been taken from the parents of the children before starting study. Demographic information about the participating children is presented in Table 1. The participating children were expected to have certain prerequisite characteristics. The following are the prerequisite criteria that the children with ASD had to meet prior to participating in the study and how the participants were assessed: (a) ASD diagnosis: hospital reports provided by the families of the children and obtained from a general hospital were examined; (b) determination of ASD characteristics as a result of GOBDO-2-TV (Gilliam Autism Rating Scale, Second Edition, Turkish Version (Diken, Ardıç, Diken, & Gilliam, 2012) application; (c) lack of a prior instructional experience on digital gaming and observational learning skills that were planned for instruction in the study (it was determined by asking family and teachers); (d) recognition and fulfillment of directives that include at least two words (presented directives that include at least two words and whether it has been done or not has been examined). Following the determination that the participating children met these prerequisite criteria, the process of planning the small-group instruction was initiated.

Table 1: Characteristics of the subjects

Code Name	Age	GOBDO-2-TV Score	Communication Skills Performance	Educational Status
Can	56 months	88	Use of a few single words and gestures	University unit inclusive preschool
Berk	47 months	102	Use of two-word sentences and gestures	University unit individual training in rehabilitation
Alp	49 months	71	Use of two-word sentences and gestures	University unit inclusive preschool
Efe	67 months	78	Use of two-three-word sentences	University unit inclusive preschool

The application planning process, the planning was conducted so that each of the four participating children should win three digital games determined for each, as well as observing the three games played by their peers in their learning pairs. In other words, within the small groups of four, there were two separate observational learning pairs. Children with similar developmental and behavioral characteristics were selected to form these observational learning pairs. Two participating children (Can and Berk) could not state their desires verbally. In addition, the academic performance levels of these two were similar. The academic performance and ability to verbally express their wishes were also similar for the remaining two participants (Alp and Efe). Another

reference used in the determination of observational learning pairs was the similarity of GOBDO-2-TV autistic disability index scores of the participating children. Can and Berk's autism disability index scores (88 and 102) and Alp and Efe's autistic disability index scores (71 and 78) were similar.

The researcher who conducted the study is a graduate of an undergraduate program for teaching individuals with intellectual disabilities. The researcher taught in the university unit the children attended. The study involved a small-group instructional format. Thus, an assistant teacher was included among the research staff. The assistant teacher was a senior student in the undergraduate program for teaching individuals with intellectual disabilities and, at the same time, participated as an intern in the class where the study was conducted.

Settings

The baseline probe, instruction, and maintenance sessions were conducted in a university unit. The class in which the implementation was conducted was 6 x 5 m. In the classroom, there was a cabinet for materials, a wall panel, a SMART board, and chairs for children. Generalization sessions were conducted in a different classroom in the unit.

Materials

The materials used in baseline, instruction, maintenance, and generalization phases were SMART boards, tripods, tablet computers, digital cameras, data entry forms, pens, and the target digital games that were pre-installed on the SMART boards (see Table 2). Digital games targeted for instruction were downloaded for free from the Google PlayStore via the Bluestacks interface program on the SMART board. At the beginning of the study the researcher established skill analysis steps for the predetermined digital gaming skills. The skill analyzes were then presented to three field experts for review and expert opinion. Modifications were made in line with the experts' recommendations and skills analyses were prepared for data recording. In the process of collecting social validity data, a social validity questionnaire that included semi-structured questions developed by the researcher, a voice recorder, and pens were used.

Table 2: Digital games targeted for instruction

Children	Games		
	1st Game	2nd Game	3rd Game
Can	Car Wash	Educational Game Set (Jigsaw)	Animal Maze
Berk	Game Kids Free	Educational Game Set (Picture puzzle)	Educational Game Set (Shadow Jigsaw)
Alp	Supermarket Boy Shopping	Amazing Santa	Early Learning (Color Matching)
Efe	Cleanup Game All Selfie	Animals – Joining the Dots	Early Learning (Figure Matching)

Dependent and independent variables

The study included two dependent variables. The first dependent variable was the learning level of digital gaming skills by the participants with ASD as performed on the SMART board and the other was the level of learning through observation of the gaming skills instruction to the pairs. For this purpose, observational learning pre-test probe sessions and observational learning posttest probe sessions were conducted to observe how well the participants learned the games without receiving instruction for each game. The independent variable was the researcher-presented graduated guidance instruction using the SMART board in a small-group format.

The researcher arranged preparatory sessions before the instructional application began. The purpose of these sessions was to check whether there were any compatibility problems among the children in the small group and whether they experienced problems with the utilized technological devices. Preparatory sessions for the application were terminated after the decision was made that there was no need for any change/adaptation in the process and the application process was initiated.

Research model

In the present study, a multiple probe design across behaviors model was used and replicated across participants to evaluate the effectiveness of SMART board-based graduated guidance instruction on the digital gaming skills of children with ASD. Multiple probe models aim to assess the effectiveness of an instructional or behavior modification program in more than one case. In these models, there is no need to continuously collect baseline data and they are suitable for all behaviors, with or without feedback (Kennedy 2005). In this study,

experimental control was established by the difference between response levels for the instructed and uninstructed games in collective probing sessions and observation of this difference in other games.

Experimental process

The study included baseline, instructional, collective probing, observational learning, maintenance, and generalization sessions. It took four months to complete the study. Instructional sessions were conducted in small-group format and all other sessions were conducted with one-on-one instruction. The researcher determined that children should have 100% correct responses in three consecutive sessions. After the performance criterion was met for all skills, maintenance data were collected. Levels of learning the digital games that had not been directly instructed were determined with observational learning sessions.

Full probe sessions

The full probe sessions were conducted simultaneously and one-on-one with all participants. In these sessions, the single opportunity method, one of the types of skill analysis, was used.

Intermittent probe sessions

Intermittent probe sessions were conducted to demonstrate the performance levels of participants with ASD on the target digital gaming skills. Intermittent probe sessions were conducted individually with the participants following two instructional sessions. Procedures followed in intermittent probe sessions was the same as procedures conducted in full probe sessions.

Instructional sessions

Before the instructional sessions, the researcher prepared the chairs for the participating children by placing them in front of the SMART board and turned the SMART board on. The children's attention was drawn to the instruction (e.g., "Everyone should be seated now. Are you ready to study?"). Children were reinforced by the practitioner when they expressed their readiness with verbal expressions and/or gestures (e.g., "Great, then let's begin!"). The practitioner then offered a special attentional cue to the child and his partner who were the subject of that particular session (e.g., "We are starting to work with Can today. Everyone should watch it carefully, but Berk should watch especially closely!").

The researcher then pointed to the digital game on the SMART board desktop and instructed the focus child to "play" on the SMART board. The basic strategy used in graduated guidance instruction is to fade the controlling prompt. In the present study, the process of fading the prompt was conducted as a physical-sign-verbal prompt hierarchy. When the child provided the accurate response, the process of fading the prompt was immediately initiated and a sign prompt with a lower level control was utilized. In the later stages of the skill, the prompt fading process was initiated based on the child's performance. This process was repeated when the child provided an incorrect response or gave no response. During the instructional sessions, every correct response the subject would independently perform in the skill analysis was reinforced immediately. During instruction, the researcher provided the child with the opportunity to observe his peer while the peer played a digital game on the SMART board. If the researcher noticed the child's attention wandering in a direction different than the peer playing the digital game on the SMART board, the researcher immediately directed his attention to the game on the SMART board, instructing him to "follow his friend. Furthermore, a "group criterion" was established for this study (Collins et al., 1991) since the children participating in the instructional process had the same type of disability, games with similar difficulty levels were targeted for instruction, and an observational learning process was used in the game skills instruction.

Observational learning sessions

The data collection process for winning the pair's target games via observational learning was conducted using an observational learning pre-test posttest process. Pre-test probing sessions were conducted just before the instruction of digital games. Posttest sessions were conducted after all the participants met the performance criteria for their target skills. Observational learning pre-test and posttest sessions were conducted in a manner similar to the collective probe sessions.

Maintenance data collection sessions

Maintenance data collection sessions were conducted to determine levels of retention of digital gaming skills that children learned as a result of the instructional process and the digital gaming skills they acquired by observing and learning through the target behaviors of their peers. Three separate maintenance sessions were conducted in the first, third, and fifth weeks, starting 1 week after the instructional sessions ended. Maintenance sessions were conducted using procedures similar to those used in the probe sessions and assessed two different types of skills: target game-playing skills and game-playing skills acquired through observational learning.

Generalization sessions

The study's generalization sessions involved different individuals, different settings, and different tools and equipment. Generalization pre-test sessions were conducted before the instructional sessions and posttest sessions were held after all instructional sessions were completed. In the generalization across different individuals sessions, the participants played the games with a different practitioner, in the different setting generalization sessions, they played the games on the SMART board in a different classroom, and in the case of generalizing across materials sessions, the participants played digital games on a tablet computer, and all these processes were analyzed. In all generalization sessions, procedures similar to those used in probe sessions were followed.

Reliability

Two types of reliability data were collected in the study. These were (a) inter-observer reliability data and (b) treatment integrity data. Reliability data (i.e., inter-observer reliability and treatment integrity) were collected for at least 30% of all sessions in each phase of the study. The analyses of the obtained inter-observer reliability data were conducted with the inter-observer reliability calculation formula, "Agreement / Agreement + Disagreement X 100" (Gast, Llyod, & Ledford, 2014). Inter-observer reliability was calculated at 100% for all sessions in the study.

Treatment integrity

Analysis of the treatment integrity data obtained in the study was performed using the "observed practitioner behavior / planned practitioner behavior x 100" treatment integrity calculation formula (Gast et al., 2014). The lowest application reliability coefficient obtained was 98.55 (*range*: 83.33% - 100%).

Social validity

The study's social validity data were collected from Can's and Berk's fathers and Alp's and Efe's mothers of the participating children through individual interviews. Interviews lasted an average of 15 minutes for each parent. The "Social Validity Interview Questionnaire" developed by the researchers was used in the process of collecting social validity data, to determine the views of the parents on the functionality of the instruction process and targeted digital game playing and observational learning skills. Interview questions were posed to the parents by the researcher. As the parents answered the questions, the researcher did not provide any guidance. The obtained audio recordings were transcribed, categorized, and analyzed by the researchers.

FINDINGS

Effectiveness and efficiency findings

Findings on the effectiveness of SMART board-based small-group graduated guidance instruction on the digital gaming skills of children with ASD are presented in Figures 1, 2, 3, and 4. Can satisfactorily met the performance criterion for all three target games as a result of a total of 16 instructional sessions. He learned the first target game with a mean 73% (*range*=29% -100%) correct responding in seven sessions, the second game with a mean 88% correct responding (*range*=60% -100%) in five sessions, and the third target game with a mean 90% correct responding (*range*=60% -100%) in four sessions. As a result of a

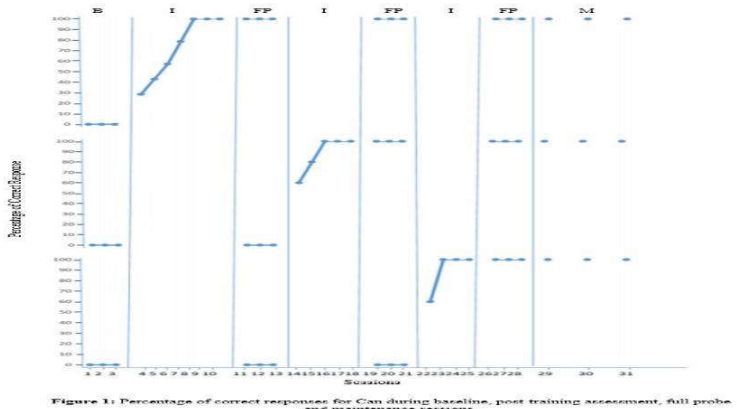

Figure 1: Percentage of correct responses for Can during baseline, post training assessment, full probe and maintenance sessions.

total of 16 intervention sessions conducted with Berk, he satisfactorily met the performancecriterion in all three games. Berk learned the first target game with a mean 55% correct responding (*range*=13% -87%) in seven sessions, the second game with a mean 84% correct responding (*range*=40% -100%) in five sessions, and the third game with a mean 79% correct responding (*range*=33% -100%) in four sessions. As a result of a total of 16 instructional sessions conducted with Alp, he also satisfactorily met the performance criterion in all three games.

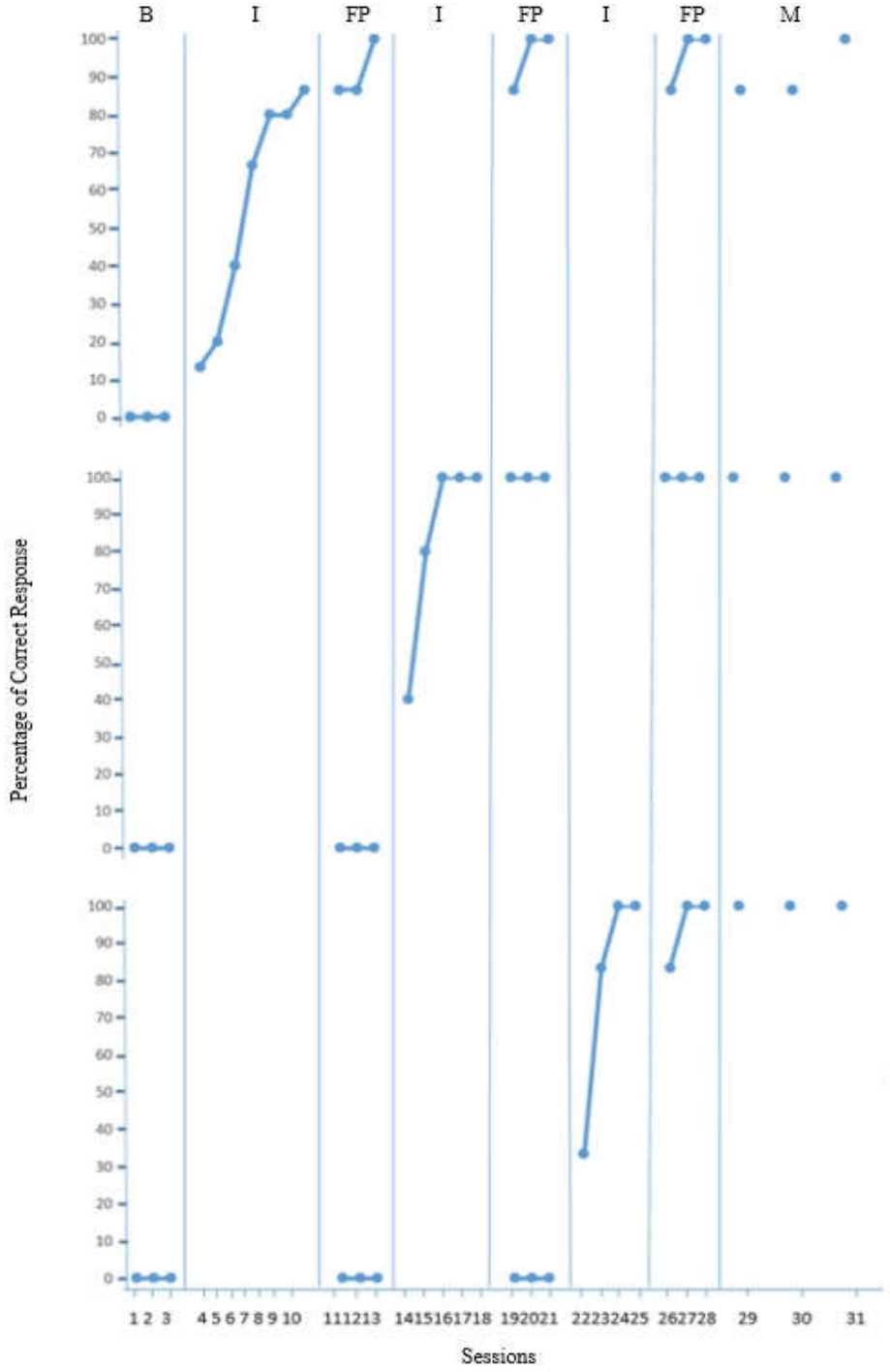

Figure 2: Percentage of correct responses for Berk during baseline, post-training assessment, full probe and maintenance sessions.

Alp learned the first target game with a mean 83% correct responding (*range*=29% - 100%) in seven sessions, the second target game with a mean 95% correct responding (*range*=75% -100%) in five sessions, and the third game with a mean 94% correct responding (*range*=77% -100%) in four sessions.

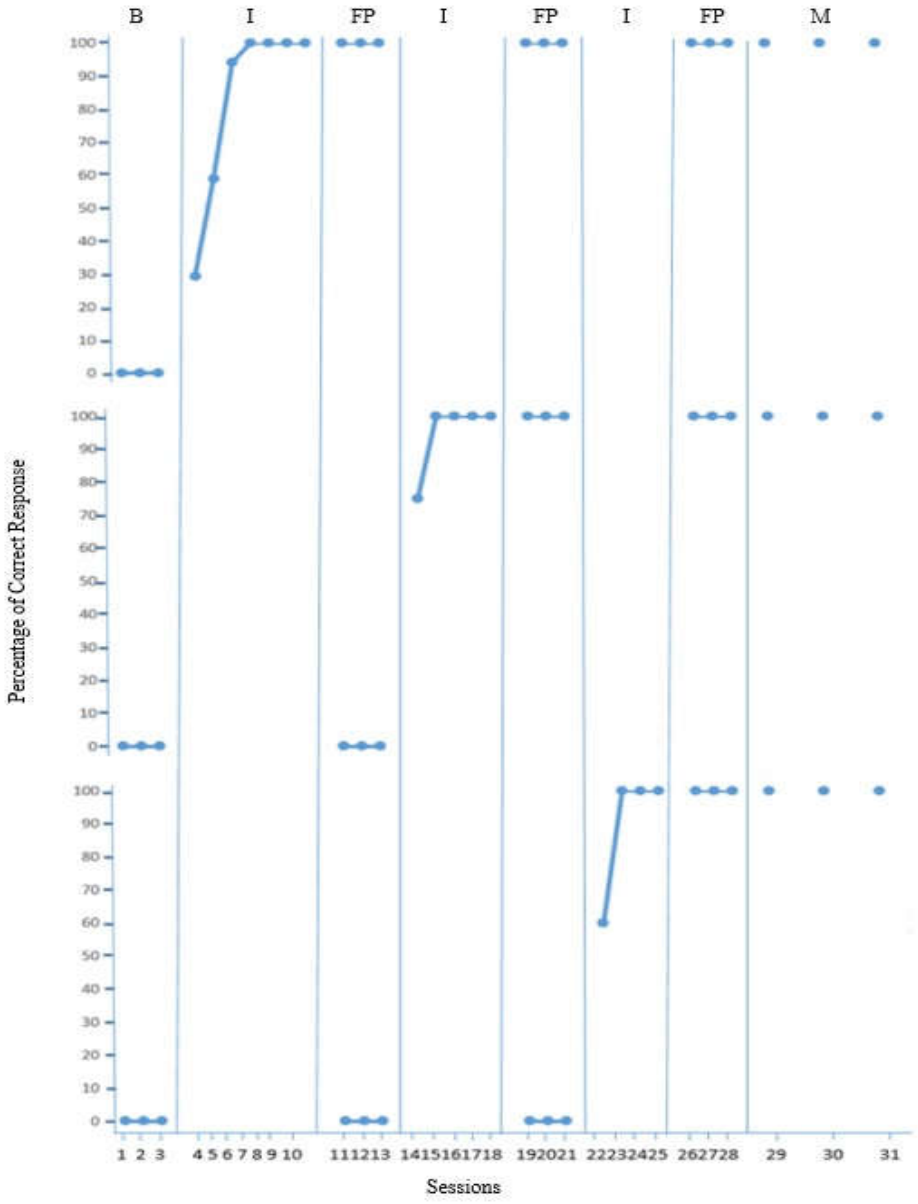

Figure 3: Percentage of correct responses for Alp during baseline, post-training assessment, full probe and maintenance sessions.

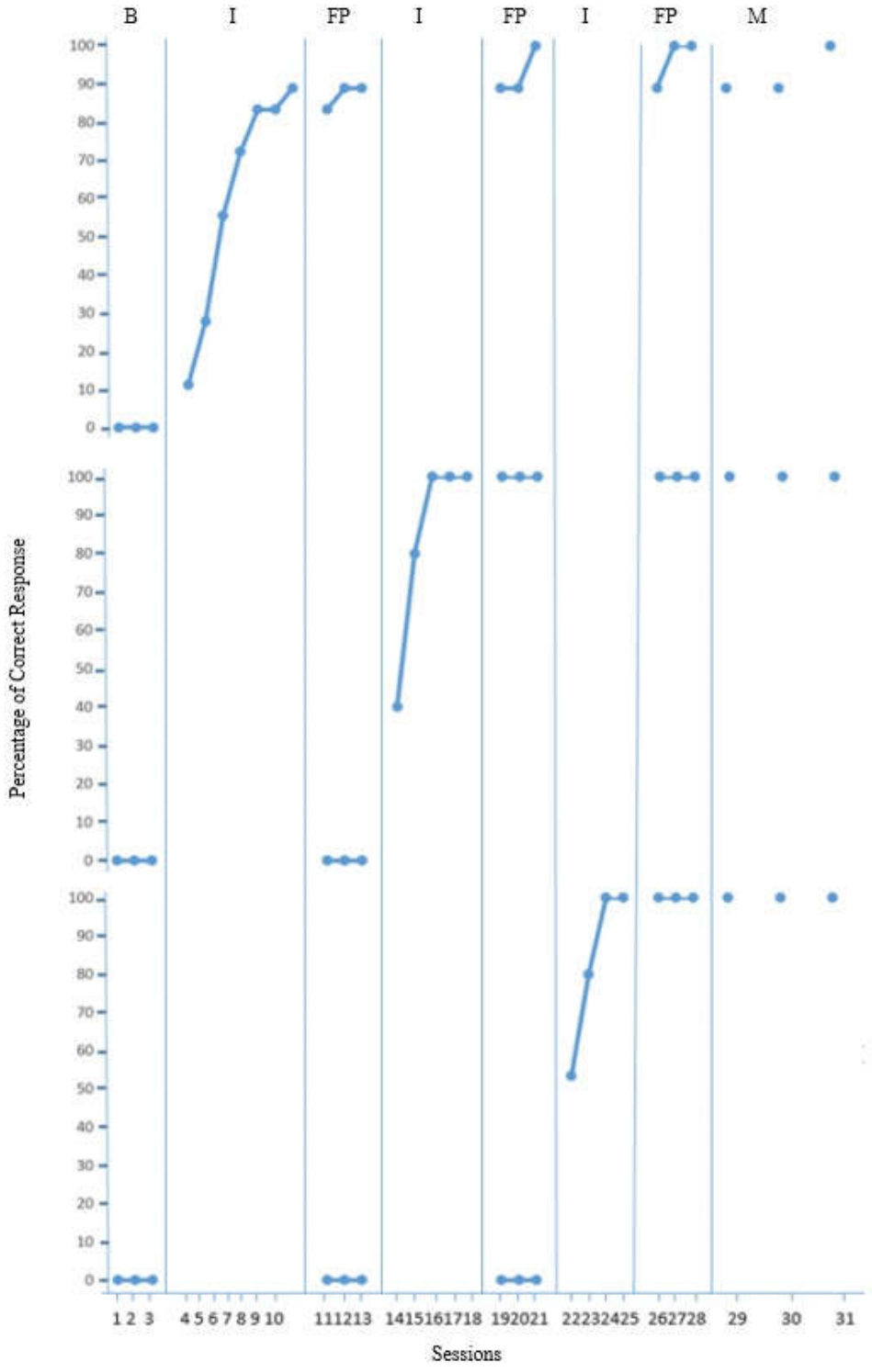

Figure 4: Percentage of correct responses for Efe during baseline, post-training assessment, full probe and maintenance sessions.

Efe satisfactorily met the performance criterion in all three target games as a result of a total of 16 sessions. He learned the first game with a mean 60% correct responding (*range*=11% -89%) in seven sessions, the second target game with a mean 84% correct responding (*range*=40% -100%) in five sessions, and the third target game with a mean 94% correct responding (*range*=77% -100%) in four sessions.

Generalization findings

In the present study, data were collected on the generalization of gaming skills determined for each child with ASD to different individuals, different settings, and different materials. All children with ASD met the generalization criteria in the posttest sessions. Generalization data for different individuals are presented in Figure 5, while generalization data for different settings are shown in Figure 6, and generalization data for different materials are shown in Figure 7.

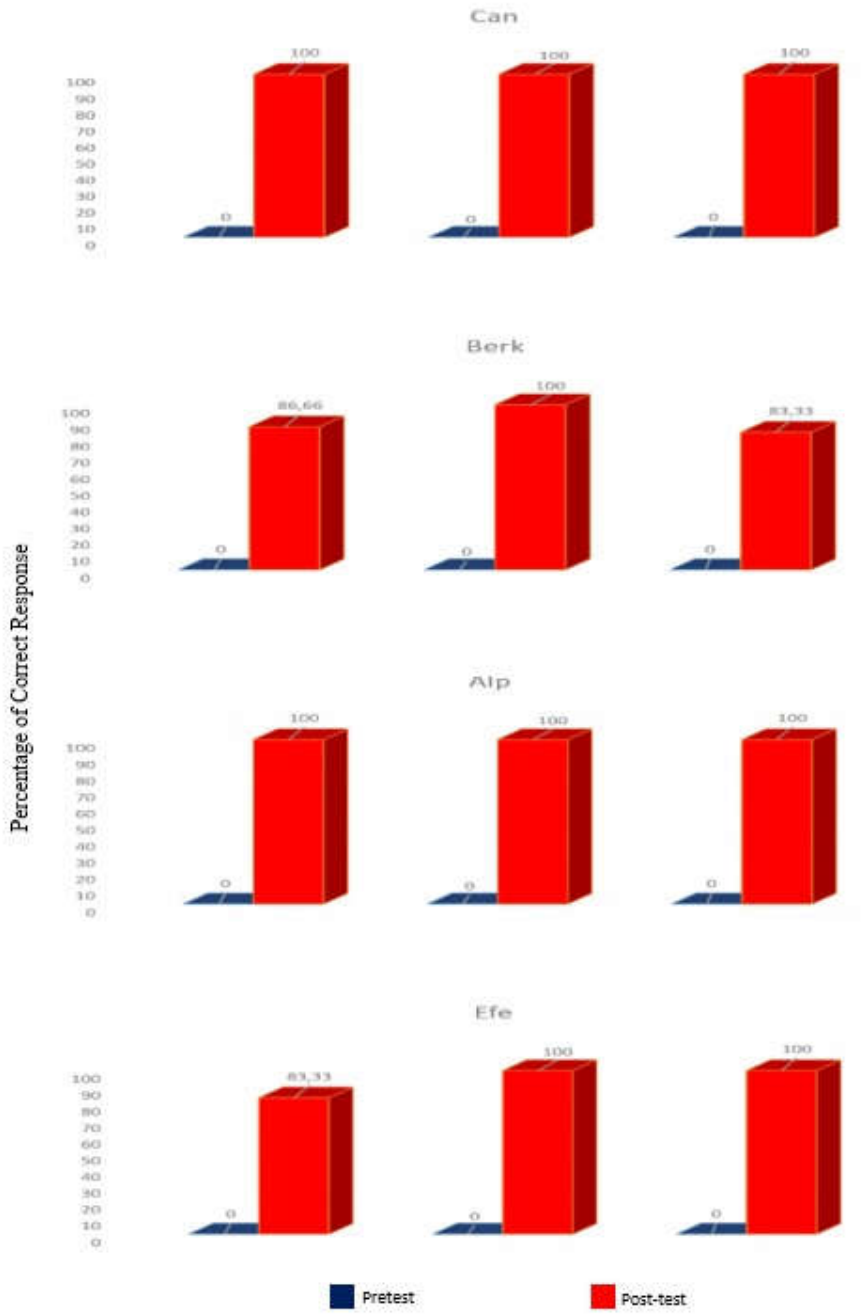

Figure 5: Can, Berk, Alp and Efe's responses to digital gaming skills. Different person generalization pre-test and post-test data.

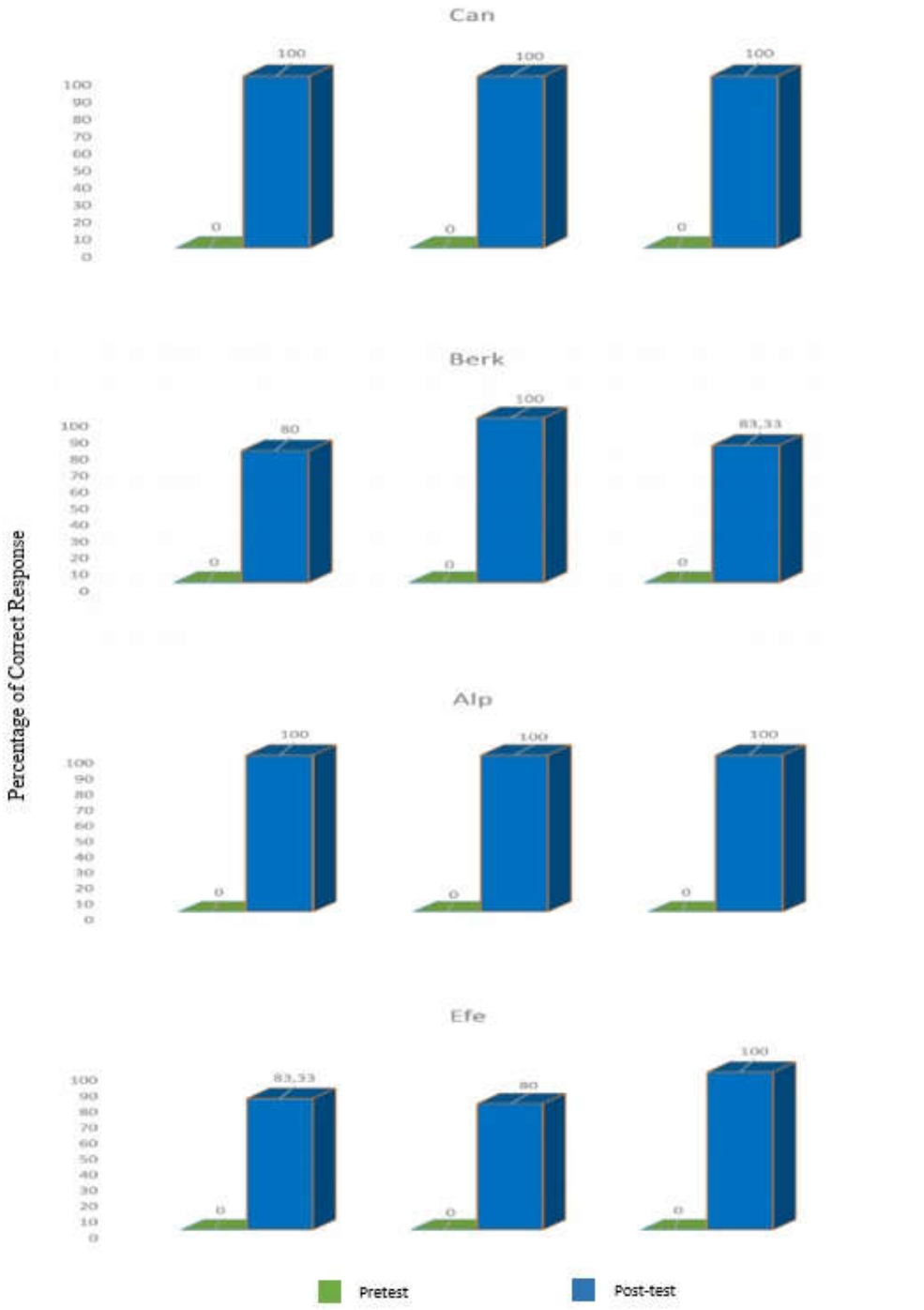

Figure 6: Can, Berk, Alp and Efe's responses to digital gaming skills. Different setting generalization pre-test and post-test data.

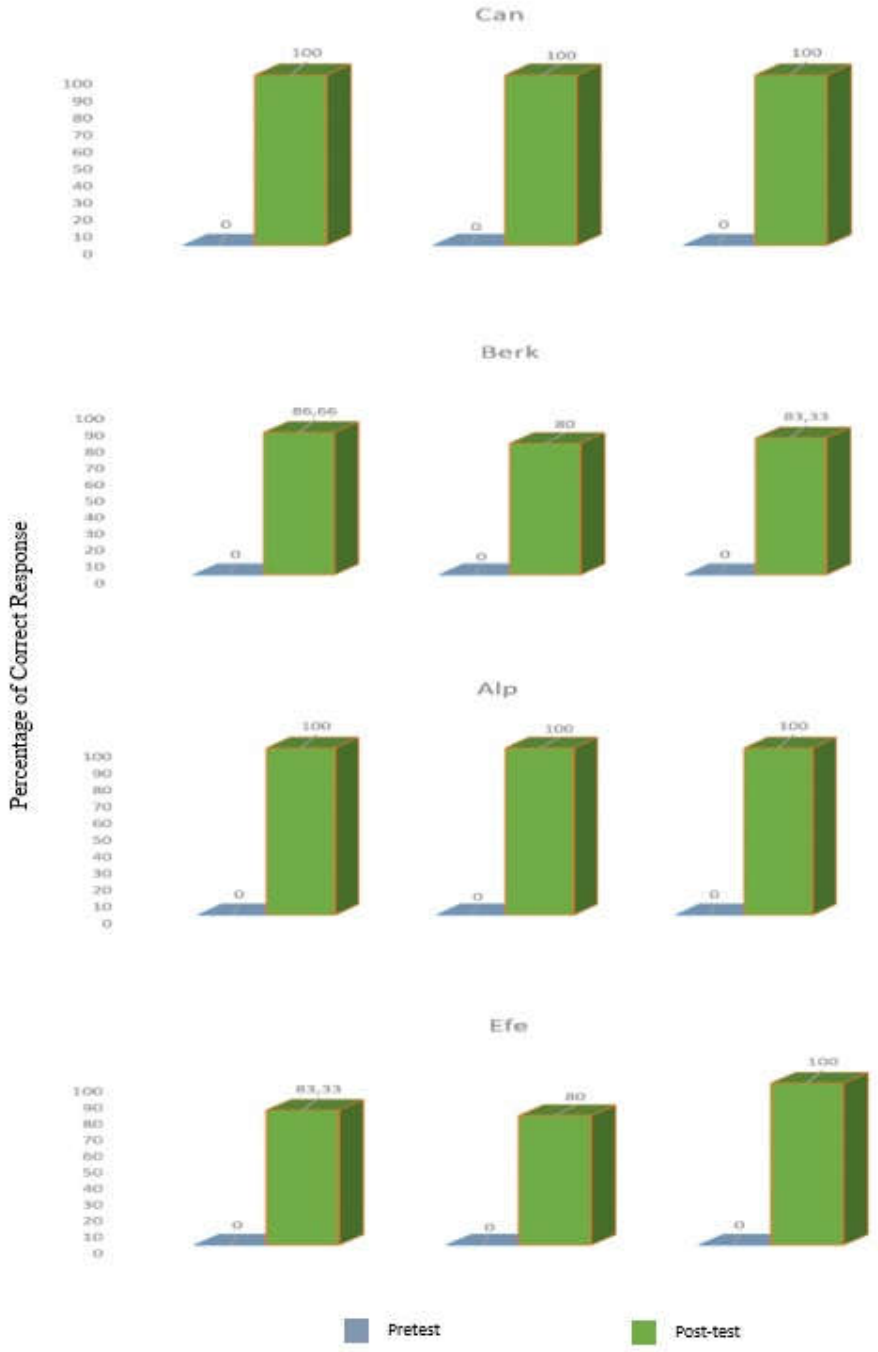

Figure 7: Can, Berk, Alp and Efe's responses to digital gaming skills. Different material generalization pre-test and post-test data.

Observational learning data

The participants' levels of learning their peers' target games via observational learning was measured with pre-test and posttest assessments. Observational learning pre-test and posttest sessions were conducted before each full probe session. Pretest and posttest observational learning data are shown in Figure 8.

Observational learning data for Can on his peer's first target game demonstrate a 0% correct performance level in the pre-test probe session and he won 100% of his peer's games in the observational learning posttest session. Can performed at 0% on his peer's second game in the pre-test probe session and 100% in the posttest session, showing that he learned his peer's game through observational learning. Can's 0% performance on his peer's

third game in the pre-test probe session and 100% performance level in the posttest probe session demonstrates that he learned his peer's game through observational learning.

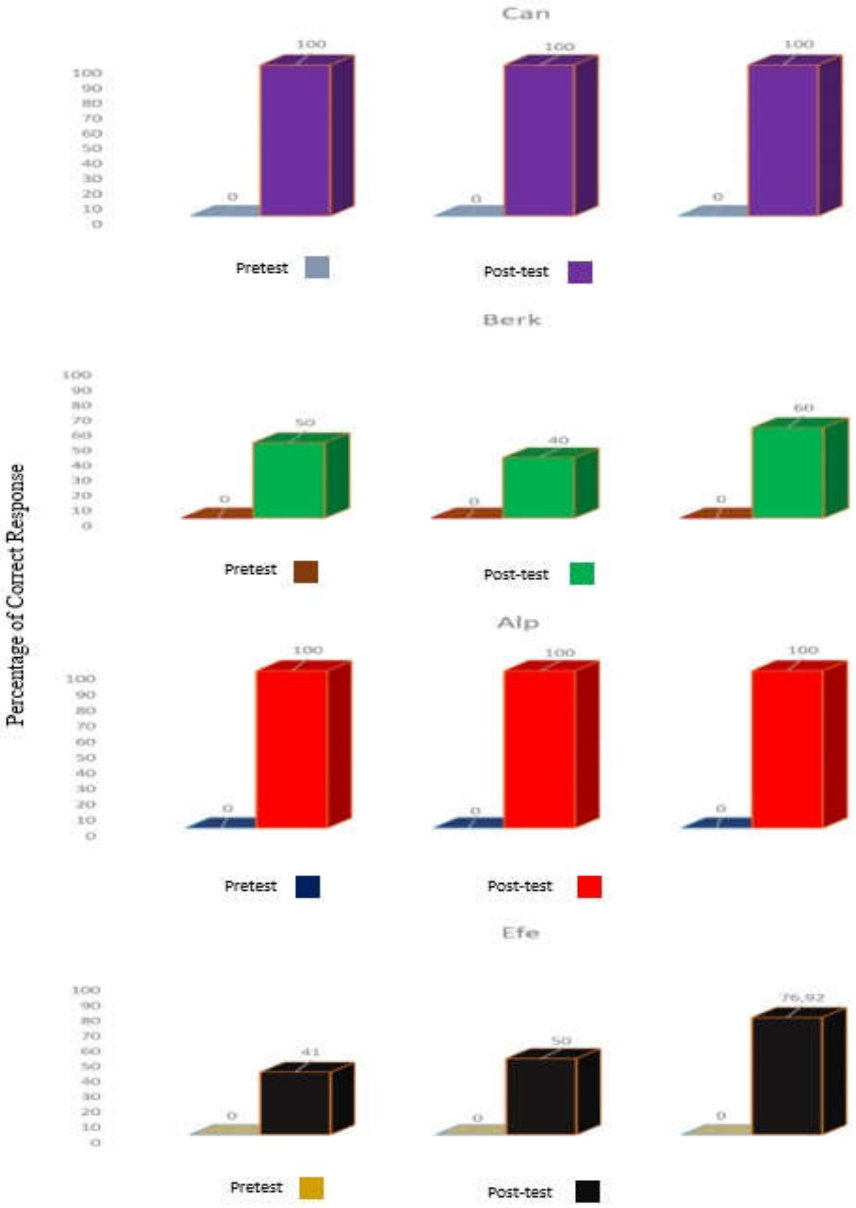

Figure 8: Can, Berk, Alp and Efe's observational learning pre-test and post-test data.

Observational learning data for Berk on his peer's first target game demonstrate that he performed at 0% correct responding in the pre-test probe session and won 50% of his peer's games in the observational learning posttest session. Berk performed at 0% on his peer's second game in the pre-test probe session and at 40% in the posttest session, thus learning his peer's game through observational learning. Berk performed at 0% on his peer's third game in the pre-test probe session and at 60% in the posttest probe session, thus learning his peer's game through observational learning.

Observational learning data for Alp on his peer's first target game demonstrate that he performed at 0% in the pre-test probe session and won 100% of his peer's target games in the observational learning posttest session. Alp performed at 0% on his peer's second game in the pre-test probe session and at 100% in the posttest session, thus learning his peer's target game through observational learning. Alp's performance on his peer's third game

was at 0% in the pre-test probe session and 100% in the posttest probe session, indicating that he learned his peer's target game through observational learning.

Observational learning data for Efe on his peer's first target game show that he performed at 0% in the pre-test probe session and won 41% of his peer's games in the observational learning posttest session. Efe performed at 0% on his peer's second game in the pre-test probe session and at 50% in the posttest session, thus learning his peer's game through observational learning. Efe's performance on his peer's third target game was at 0% in the pre-test probe session and at 77% in the posttest probe session, showing that he learned his peer's target game through observational learning.

Social validity findings

Social validity data were collected with face-to-face, semi-structured interviews with the participants' parents on the learning of digital gaming skills by children with ASD. All questions in the social validity interviews were transcribed and the findings demonstrate that the parents' views were generally positive. All parents stated that they were pleased with the intervention (i.e., SMART board-based small-group graduated guidance instruction) for their children's acquisition of digital game-playing skills. Can's father said that: "*I look at these kinds of studies positively. I care about my child plays games with his friends. It was nice to take advantage of this service that the technology brought".* All parents also stated that they considered their children's acquisition of other nontargeted games (i.e., those instructed to their children's peers) through observational learning important for their children. Alp's mother said in the interview: "*Alp learned from other friends' game through observational learning. So I think that observational learning is an effective method"*. When parents were asked what they thought about the fact that the study was conducted in the children's natural settings, namely, the classes they attended every day, and about how this study was conducted, all parents stated that it was important for their children to play games with their friends and to communicate with them. Berk's father said that: *"It is extremely important for my child to play and communicate with his group mates. I think that it is important for the children to work in their own classroom in terms of common achievements".* When they were asked whether they thought digital gaming skills would be a positive contribution to the daily lives and other developmental areas for their children, the parents replied that they saw their children with ASD as locked in their own worlds, but they considered the fact that their children observed their peers, desired to achieve the game-playing outcomes they observed, and followed the necessary steps to complete the games as worthy achievements. Finally, when asked for their views on possible failures in the study, the parents replied that they had no concerns about this study.

DISCUSSION

The goal of the present study was to investigate the effects of using a SMART board to deliver small-group graduated guidance instruction to teach children with ASD digital gaming skills and to measure the extent to which these children acquired through observational learning the non-targeted digital games taught to their peers, retention of these skills after the instruction and the display of these skills under different conditions (i.e., different individuals, settings, and materials). Furthermore, the participants' parents' views on their satisfaction with the study results and overall satisfaction with the study process were determined through the conducted social validity interviews.

Study findings demonstrated that all children achieved their targeted digital gaming skills, retained the acquired skills after the instruction was over for 5 weeks, and exhibited these skills under different conditions (i.e., different individuals, settings, and materials). When the level of children's learning of their peers' digital games through observational learning was examined, it was determined that Can and Alp won 100% of the games they learned through observational learning, while Berk won a mean 50%, and Efe won a mean 56%. The results of the social validity interviews conducted at the end of the study demonstrated that the parents of the participants were satisfied with the study's procedures and outcomes. In this section, the prominent aspects of the findings of the study are discussed.

The findings reported in the literature on the effectiveness of SMART board-based small-group graduated guidance instruction demonstrate results similar to those of the present study (Au, Leaf, Leaf, Taubman, McEachin, & Tsiju, 2016; Colozzi, Ward, & Crotty, 2008; Coyle, 2013; Leaf et al., 2012). It was observed that the pre-instructional performances of all participating children on the digital games differed significantly with their post instructional performances. At the end of the instruction, the children reached a level where they could independently demonstrate their target digital gaming skills thus showing that the intervention was an effective application for teaching digital gaming skills to children with ASD who participated in the study (Au et al., 2016; Argott, 2012; Campbell & Mechling, 2009; Coyle, 2013). In addition, when children's performance in acquiring their peers' target digital games was examined, it was observed that two children acquired all steps of

their peers' digital games, while the other two performed at a mean 50% accuracy level. The low levels of acquiring digital gaming skills through observational learning for these two children might be due to various factors. The first could be the fact that the children never received instruction on observational learning skills prior to or during the study. In the process, in order to focus their attention on the games of their learning peers, the directive to watch was issued only before the instructional sessions and when it was observed that their focus was not on their peers. Another cause of poor performance may be a significant characteristic of children with ASD: antipathy toward the behavior of others and poor or lacking imitation skills. When GOBDO-2-TV scores of both children with low achievement levels of digital gaming through observational learning were examined, it was determined that they scored three points on each item related to social interaction on the scale, namely Item 32, "does not imitate other people during gaming or learning activities when asked or required" and Item 33: "acts cold, uninterested, shy, and introverted in a group," different from the other two children in the study.

Observational learning is considered as an important skill in educational, economic, and social aspects. Children with autism need intensive, one-on-one training (Smith, 2001). This education is important and useful for children with ASD. However, this intensive and individual training is very costly and not easy to find in general educational settings. Therefore, the creation of observational learning opportunities in systematically organized small-group setting is of great importance for children (Taylor & DeQuinzio, 2012; Townley et al., 2015).

Findings on retention of the skills by the participating children demonstrate that the children could retain digital gaming skills in maintenance sessions conducted after 1, 3, and 5 weeks after the instructional sessions ended. This suggests that SMART board-based small-group graduated guidance instruction was effective in the retention of the acquired digital gaming skills by the participants with ASD after a certain period of time (Au et al., 2016; Argott, 2012; Campbell & Mechling, 2009; Coyle, 2013). The study's generalization findings demonstrate that children could display the acquired digital gaming skills under different conditions (i.e., different individuals, settings, and materials). When the acquisition, retention, and generalization findings obtained in the study were examined, it was observed that SMART board-based small-group graduated guidance instruction was effective on the acquisition, maintenance and generalization of digital gaming skills of children with ASD, similar to the findings in the literature (Colozzi, Ward, & Crotty, 2008; Coyle, 2013; Leaf et al., 2012).

Other points that should be mentioned are the characteristics of the children participating in the study, the setting in which the study was conducted, and the methods utilized for the intervnetion. Although the fact that these children with ASD had inadequate imitation and intra-group interaction skills which would seem to be a limitation in terms of the application of the method utilized in the study, the interest of these individuals for technological devices played an important role in their selection as participants in the study. In fact, it was observed that the children demonstrated higher levels of interest and motivation when they used the SMART board during the instruction compared to their attention and motivation levels during group activities conducted at their desks. Similar cases have been observed in different studies in the literature (Argott, 2012; Coyle, 2013; Handler, 2011). Thus, in the present study, where technological devices were used intensively, the identification of children with ASD as participants played a facilitating role in the implementation of the study. Furthermore, when Alp's and Can's performance data for target skills acquisition are examined, it is interesting to note that data levels and tendencies increased in the second and third games after the initial instructional session and the criteria were met in a short period of time for both games. Findings of several other studies support graduated guidance instruction as an effective teaching strategy. However, it could be argued that the reason behind the situation observed in the present study was the fact that the participating children learned how to use the SMART board and digital gaming faster when compared to the first games. Another reason could be the fact that their familiarity with the SMART board increased over time and both the SMART board and the games functioned as positive reinforcement. Also, the children's learning rate could have been affected by the fact that there were fewer steps in the second and third games than there were in the first game.

The setting in which the study was conducted was the classroom where the researcher was the classroom teacher and the participating students regularly attended. It was observed that there were several advantages of using this setting in the study process. The most important of these was the fact that the over-commitment of the children with ASD to their routines had to be tested. Implementing the research project in a classroom where children are typically educated with familiar friends and teachers may significantly facilitate adaptability to the research protocol. Furthermore, conducting the study at intervals between daily routine activities saved the researcher a considerable amount of time and effort. Another advantage of the setting used in the study process was that the researcher practiced in a familiar classroom during the planning and implementation stages of the intervention. By working in a classroom where the researcher was familiar with the routines, teaching students whom the researcher had known for a semester and whose individual differences the researcher recognized, and

conducting the study at intervals determined by the researcher, it was possible to have more control over the study and to conduct the study more effectively.

In the present study, the graduated guidance instructional method was used in a small-group setting. The use of small-group instruction, which is one of the elements of this method, enabled the children to win their peers' digital games via observational learning and to acquire within-group skills (e.g., making lines and raising hands to come to the SMART board) in the process. Another advantage of teaching within a small group was the fact that the sessions were easily planned and implemented since all instructional sessions were conducted with four children. One of the elements of the intervention was the use of the SMART board. The use of SMART board in the implementation process of this study emerged as a positive factor because these children with ASD had more information about technological devices. In the process, it was observed that children paid attention to follow group rules until they came to the SMART board to play, and they paid full attention to the SMART board activities. This demonstrates that the SMART board was an important facilitating factor for the methodology of the present study. In the implementation process, the near-errorless instructional method of graduated guidance instruction was preferred. Graduated guidance instruction is a near-errorless instructional method proved to be effective in the instruction of several response chain skills, such as digital gaming skills (Wolery, Ault, & Doyle, 1992). The use of graduated guidance instruction in this study, by providing support to children in the amount and type they needed, was considered to be effective in creating the steps that could be performed independently and providing positive reinforcement, and it was effective in preventing prompt dependency.

When the study is examined in terms of social validity, the results of the individual social validity interviews conducted with the parents of the study participants were consistent with the findings of similar research (Argott, 2012; Özen, Batu, & Birkan, 2012). Current findings demonstrate that this study which examined the intervention's effectiveness on levels of digital gaming through direct instruction and through observational learning of children with ASD was socially valid. The most positive aspects of the present study according to the children's parents were the children's ability to learn to play their peers' games through observational learning, to wait for their turns in their group, to take turns by raising their hands, and to transfer the digital games they learned to their daily lives. In general, all parents expressed the opinion that they saw no adverse aspect related to the study, while two parents talked about the possibility that the use of digital devices such as SMART boards by children with ASD may lead to obsession, and thus, the children should be allowed to use these devices for a limited amount of time and under supervision.

LIMITATIONS AND FUTURE DIRECTIONS

There are some limitations of the present study that need to be discussed. These are the fact that no generalization data were obtained in the natural setting for the skills instructed to the children. The second limitation is that social validity data were not collected by social comparison. The third limitation was experienced especially in the technological dimension. Due to the differences between the feedback provided for correct and incorrect responses within the digital games used in the study (e.g., in certain games correct actions were applauded) and due to software incompatibilities with the SMART board, problems were experienced during loading and running the applications. Despite the precautions taken to prevent technological problems, the abovementioned facts led to some disruptions in the process.

In the present study, the practitioner was the researcher himself, peers with typical development and preschool teachers, and intern students could be the practitioners. It is very important to create observational learning opportunities for children with ASD (Taylor & DeQuinzo, 2012). Practitioners should organize programs with different application conditions and processes in such a way that enables observational learning. A similar study could be conducted with large groups in addition to student pairs, or small-group arrangements involving two or more students.

In the present study, digital gaming skills were instructed. In future studies, different skills such as social interaction skills, functional academic skills, literacy skills, mathematics (e.g., four operations or problem solving) can be instructed using the SMART board. This study was conducted at the university unit where the participating children regularly attended. In the future, similar studies could be conducted in preschool and primary school inclusive classrooms (in larger groups). Different small-group instructional formats could be set up to provide opportunities for observational learning, and different specific skills could be instructed. Further studies can be planned in which children with ASD would be instructed with opportunities for observational learning.

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The Impact of Assistive Technology on Down Syndrome Students in Kingdom of Bahrain

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ABSTRACT
Assistive Technology is playing an enabler role in the life of Dawn Syndrome. Assistive Technology can allow Down Syndrome to engage in the normal life activities and be more social and independent. The Arab countries are providing vital effort on facilitating the life of Dawn Syndrome and encouraging their engagement in normal social life. However, there is a lack in utilizing Assistive Technology in supporting such segment of people in these countries. The main aim of the current research is to investigate the current situation regarding the adoption of AT in the teaching and learning processes of Down Syndrome students in inclusion schools and rehabilitation centers in Kingdom of Bahrain. In addition, the impacts of AT in enhancing the independence, performance and social interaction of Down Syndrome students were examined. To achieve these objectives, two different questionnaires were administered to a non-random sample of teachers or specialists and families of Down Syndrome at Kingdom of Bahrain. In general the results show that the adoption of AT in teaching and learning of Down Syndrome students can enable them to be more social and independent person. AT can enhance the Down Syndrome communication which in turn can improve their independence, social interaction, and performance. However, to perceived the greatest and sustainable advantage on using AT, there is still a need for enhancing the capabilities and skills of the teachers/specialists and families to be able to adopt the AT for getting the best results. The research outcomes address several recommendations to enhance the educational process for the Down Syndrome students and other disabled people in Kingdom of Bahrain. Moreover, the study has a vital contribution to the theoretical literature and knowledge by building new model for examining the impact of AT on the Down Syndrome which is rarely develop by previous literature. In addition, it has developed new measurements which can be adopted in further studies in the same field.

INTRODUCTION

Information and Communication Technology ICT and Assistive Technology (AT) is considered as an effective learning tools that can help in improving and developing social skills as well as academic achievement and enable Dawn Syndrome (DS) is increasing their abilities to cope with the rapid progression life (Ahmed, 2015;Lahm, 2002). AT offer new opportunities for everyone, but for DS these opportunities are more significant as they can use AT for their daily activities to a higher extent than other normal people (Ahamed, 2015). That's means disabled individuals are able to participate in all aspect of social life on more equal terms than ever before. AT enables DS to communicate with others, involve in the social activities and be effective part in their communities that they would be unable to do without technology (Cowan and Khan, 2005).

Despite the vital concern devoted for the DS and other disabled people in the Arab countries, there is still a lack in utilizing Information Technology (IT) for supporting such segment of people. Few number of researches have been conducted to study the role and the impact of AT on disabled people. Therefore, the current research is aimed to answer a main question of "*To what extent AT enables DS students to be independent and engage in normal life at Kingdome of Bahrain*? The main objective of the current study is set to be investigating the current situation regarding the adaption of AT in the learning process of DS students in inclusion schools and rehabilitation centers. This will be tackled from the following aspects: problems and challenges facing DS student which are caused by their special features or disabilities and to what extent this difficulties are impacting their teaching and learning process, and types of AT that are adopted by inclusion schools and rehabilitation centers for the learning and teaching processes. In addition the study will examine the impacts of AT in enhancing the independence, performance and social interaction of DS students.

The current research is considered as one of the few and significant studies in the field of AT and the learning of special needs. The study is tackled a vital issue concerning the Arab world which is the engagement of DS students in an effective learning environment and normal social life. As a social implication for the study, the findings would help in enhancing the awareness toward the special needs people and especially the DS and how they can be an active factor in the society. More attention will be paid by the decision makers and educators in the Kingdom of

Bahrain toward the effect of AT in supporting the DS students and enhancing their achievement. As such, the study will provide information on the different types of AT that can be adopted in the learning of DS and how each type can support different disabilities and challenges for DS which need to be considered by management and academic staff in the inclusion schools and rehabilitation centers. As a theoretical implication, the current study will enrich the theoretical literature on the field of AT and DS in the context of the Arab countries as well as developing new model on the impact of AT on DS performance, independence and social interaction which rarely undertaken by previous studies. Moreover, the study provides new measurements that can be further used and developed in new studies in the same field.

The current paper is articulated into seven sections including the introduction. AT impact on DS students and AT in the Arabian Gulf Countries and Kingdom of Bahrain were discussed in the next two sections. The research and hypotheses were discussed in the Section 4. Section 5 discusses the research methodology and data collection. Section 6 presents the data analysis and results of the research. The paper then concludes with Section 7.

ASSISTIVE TECHNOLOGY IMPACT ON DOWN SYNDROME STUDENTS

DS is a set of physical and mental tracks which is caused as a result of a chromosomal disorder (Al-Edwan, 2015). Normally a person has 46 chromosomes; while DS determined by 47 chromosomes (Percy and Schormans, 2006). This extra genetic material alters the course of development (Al-Edwan, 2015) and causes diverse impairments such as visual, hearing, cognitive, motor and communication (Feng et al, 2008).Therefore, individuals with DS have varying degrees of abilities, skills, behavior and physical development. However, DS learning deficits result from different learning styles rather than learning impediments (Alfaraj and Kuyini, 201). DS people have a numerous disability appear as physical and cognitive characteristics that need to be identified serious attention and helpfulness when it comes to their education or other aspects of their life (Faragher and Brown, 2005; Alfaraj and Kuyini, 2014). As a general rule, students with DS need activities that are highly structured and sequenced, small amounts of information presented at a time and a good reward system (DASWM, 2015).

AT are a powerful tools for improving the participation and engagements of disabled people in their learning process (Gierrach and Stindt, 2009; McKnight and Davies, 2013). AT is defined as the equipment, devices, services, systems, processes that aim to help the disabled persons with special educational needs to better function in daily life, attain a higher quality of life and secure their full, active and easy participation in society (Lancioni et al., 2013, Hersh and Johnson, 2008). Moreover, the International Classification of Functioning, Disability and Health (ICF) define the assistive products or technologies as any product, instrument, equipment or technology that are specially designed for improving the functionality of a person with a disability (WHO, 2014). In general, AT is used for aiding the DS students in their education, enhancing motivation and independency, and help them to be more active member in the social activities (Reed, 2007). AT might be adopted to support vision, hearing, reading or communication, as described by UNICEF (2013). Voice recognition applications, mobile devices, symbol-based interaction and virtual reality technologies are designed to assist the DS weakness to be more active in the learning process with their tutor and their classmate or peers (Winter and O'Raw, 2010; McKnight and Davies, 2013). Knowing the strength and weakness of the DS will enable the decision makers in setting plan to select the most appropriate AT to be adopted for more effective results. In addition, previous studies deduce that there is a need to identify intelligent ways to determine where, who, why and when to use AT (McKnight and Davies, 2013, Al-Ammary, 2010). However, the adoption of the Educational Technology in the classroom for the disabilities student's needs special and well skilled education teachers or specialists to refine their skills and trains them on how to interact and use the technology in the classroom. They need to work as coordinators and organizers to initiate Individualized Education Plans (IEP), which arrange a separate plan for each student by initiate schedule according to their cases to be able to consume extra time detecting the systems by themselves (Cramer et al., 2012).

Students with disabilities need specific and suitable education corresponding to their education level (Jenkinson, 1997). Teaching disabilities students in isolated classrooms enable the adoption of unifying curriculum for whole similar disabled students to support their self-assurance or confidence, as well as, make sure they will acquire appropriate privacy, safety and adequate enhancement (Jenkinson, 1997). However, such way of teaching could restrict and limit the DS capabilities acquired. Therefore, combining students with disabilities in general school currently become very popular in most countries, where this integration currently called inclusion or mainstream (Kliewer, 1998). Wang (2009), exposed that implementation of integration system may not comfortable for all students with disabilities, as consider that, students with disabilities may not be able to interact and participate with their normal peers. Thus, there is a need to integrate the usage of AT with different types of model for special education such as SETT, Education TechPoints, Human Activity Assistive Technology- HAAT, AT CoPlanner Model and others (Edyburn; 2001). Hersh and Johnson (2008) revealed that the goal of these models is to remove the existing barrier in using the AT which include tools, equipment, hardware, software, applications, etc, and make it easy for DS students to use AT anywhere and anytime. In addition, AT devices and services will allow DS

students to have a better governor over their personal lives, be able to interact with normal people and participate more in social activities either in their homes, schools, work environments, or communities (McKnight and Davies, 2013)

ASSISTIVE TECHNOLOGY IN THE ARAB GULF COUNTRIES AND KINGDOM OF BAHRAIN

Although, the Arabian Gulf countries are aware about the disabled people and their various needs and provide vital efforts in enhancing their independency and performance, they are still beyond other countries in adopting AT is supporting the disabled people either in their education or social life (MADA, 2015). In Qatar for instant, there are a variety of associations for special needs such Qatar Society for Rehabilitation and Special Needs, Al Noor Institute for the Blind-Qatar, International Mosaic Down's Syndrome Association, and Qatar Assistive Technology Center. However, Qatar Assistive Technology Center was established just in 2010 by the Qatari Supreme Council of Information and Communication Technology, with an aim to use AT in the classroom, home and surrounding environments for engaging the disabled people in the revitalization environment and enhance their social interact and performance (MADA, 2015). In UAE there are more than 30 associations to qualify disabilities people such as Al Noor Training Centre for Children with Special Need, Zayed Higher Organization, Super Kids Nursery, Little Hands Kids Club, Sharjah American International School, Abou Hanifa Basic School, Al Baraa Kindergarten etc. (UAE Down Syndrome). However, only two associations include Al Noor Training Centre for Children with Special Need and Zayed Higher Organization – ZHO are using AT for teaching people with special needs. These associations are offering multi-disciplinary program and variety of consolidating services for nurturing the skills of the disable students by improving their performance and independence and encourage the social interaction with their peers. Among the AT that adopted by ZHO are labs which are equipped with computers that introduce with text-to-speech, screen reader, screen enlargement software as well as Braille printers, sensors, adaptive mouse and keyboards..

In Kuwait there are multiple special education schools for individual with special needs such as Al-Noor School, Al-Amal School, Al-Raja Schools, Al-Wafa Schools, Rehabilitation schools, School of autistic behavior, Schools of educational workshops, etc. However, only three of these schools are using AT in the teaching processes. These centers are highly depending on AT in the learning and teaching for supporting DS and other mental impairments. They are using different devices in teaching Kindergarten, primary, intermediary and secondary stages to assist students to become more independent, enhancing their abilities and improving student's self-care skills and social interaction. In Saudi Arabia there are various associations to support DS such Saut Society, The Help Center, Down Syndrome Charitable Association “DSCA”, Al-Nahda Schools for Down Syndrome, etc. According to Ranaet al. (2011), there are 1237 institutes and programmers which have integrated the use of ICT in offering special education for people with learning disabilities. However, there is no clear information on the technologies being used by the various institutions for individuals with learning disabilities and the types of learning disabilities being dealt with (Rana et al., 2011).

Kingdom of Bahrain is providing more concern and focuses on disabled people by providing financial, psychological, and educational support. There are 1700 cases of DS and are recording 30 injured annually. Around 54 students with DS from different levels of study are registered in inclusions schools, while the others students are engaged in different rehabilitation and special needs centers supported by the Ministry of Labor and Social Developments - MLSD. There are 35 rehabilitation centers in Kingdom of Bahrain, include but not limited to Bahrain Hope Special Education Institute, Al Matrook Conductive Rehabilitation Centre and Bahrain, Hope Center for Early Care, Bahrain Down Syndrome society, Special educational services center for children "Tafaol” includes and Kayan Center for Special Education (Al-Watan, 2015). Al Matrook Conductive Rehabilitation Centre is providing AT for their students to support and expand the characteristic and physical abilities and skills. The AT provided include smart tablets, touch control panels, motor support tools, communication tablets, and others (MLSD, 2015). Recently there is an agreement between Bahrain Down Syndrome society and Special Educational Services Centre for Children (TAFA’OL), to initiate AT room in each center to use it for disabled students to promote, enhance and augment their capabilities, performance, independence and social interaction. However, criteria, policies and standards of the agreement are under study. Moreover, and as an appreciation for the importance of the DS and other disables individual in Kingdom of Bahrain, AlShaikh Nasser bin Hamad Al Khalifa – a Bahrain military office, member of Bahrain Royal Grand and president of the Bahrain Olympic Committee, announced “The Award of Nasser Bin Hamad for Disabled Persons Creativity” for promoting the capabilities and qualification of the disabled people and DS, improving their intellectual, artistic and scientific skills and expanding their innovation and creativity (MLSD, 2015). Furthermore, in 2007, the MLSD was established the disabled services centre. The centre was established particularly for employing the disabled people in the private and non-governmental sectors. It is responsible for processing the requests and applications of the disabled and their guardians and finding solutions for them in coordination with governmental and non-governmental organizations and private bodies.

RESEARCH MODEL AND HYPOTHESES

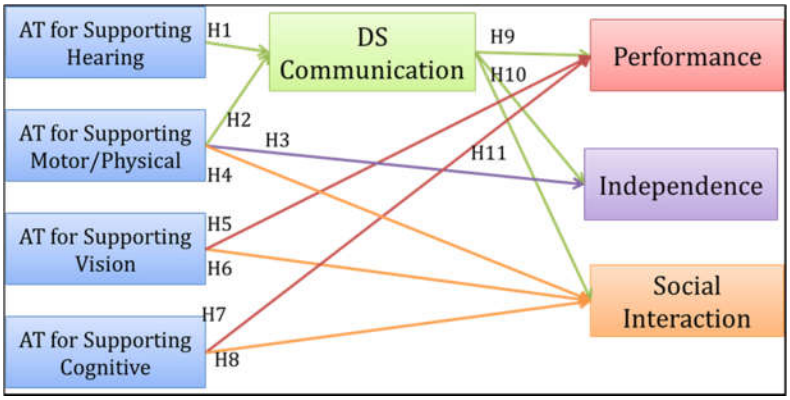

Figure 1. Research Model

The indirect impact of the AT for supporting hearing and motor/physical on performance via enhancing the DS communication:

Hearing impairments considered as main problems with DS as conductive and sensor-neural hearing loss are more common with DS than in the general population (Diefendorf, et al 1995). Such hearing loss can reinforces specific speech and language delay and difficulties in auditory processes which impact the DS communication (DSAWM, 2010). With the continuous advancement in technology, a wide range of AT devices were provided to support DS with different hearing problems, such as Personal Frequency Modulation (PFM) systems, Infrared systems, Induction loop systems, one-to-one communicators and others (Wiazowski, 2009). AT for supporting hearing impairments reduce the noise sounding and improve the speech recognition of DS which can help in improving their performance and enhancing the hearing effectiveness (Wiazowski, 2009). Such AT moreover, can enable the DS to communicate with, participate and contribute more effectively the the community, and be more independence which can maximize the DS overall quality of life (Cowan et al., 2012)). For example, voice output encourages DS with hearing impairments to start discussion and communication with other people easily from extended distances without any obstacles and complications (Doyle and Phillips, 2001). In general it can be revealed that AT for supporting hearing is the most important assistive tools to enable DS to define their strength and weakness and prompt communication, cooperating with surrounding environments and maximize their independence (Kumin, 2003; Lloyd et al., 2006, Olaosun and Ogundiran, 2013). This will decrease the needs of DS for outsider caregivers and minimize their deficiencies level. As such, DS can use such AT anywhere and anytime to communicate and interact with others through sound amplification or any other alternative ways so they can be able to participate and communicate without control with the community (Olaosun and Ogundiran, 2013, Lartz, et al. 2008, McCoy, 2013). Therefore, the following hypothesis was developed:

H1: AT for supporting Hearing has a positive impact on enhancing DS communication in the Kingdome of Bahrain.

As it was motioned above the communication skills of DS need to be enhanced and improved to be more independent. DS that lack the communication skills, scored significantly lower for expressive language, reading and writing (Buckley et al, 2006). For many DS, the inability to communicate with others can have a devastating effect on social personal skills (Deutschsmith, 2006). DS student's need more time, practice, consistency and reinforcement to be able to communicate and enhance their social interaction (Erdem, 2017) as effective communication skills and socially appropriate behavior are interrelated (Erdem, 2017). Improving DS communication skills provides a gateway to their independence, dignity and self-esteem, and allows them to move around their environment, communicate with others and take part in developing appropriate activities (Cowan and Khan, 2005). Communication has a tremendous impact on the development of students with DS as it affects their ability to become contributing members in classroom and community. Enhancing communication of DS students will enhance their speech and language expression and provide plenty of opportunities for social activities (Jon et al, 1999). It has been revealed that AT that support people with hearing impairment can enable DS to communicate with others and exploring more different environments which has high potential in increasing and improving independence and confidence (Azenkot et al, 2011). Moreover, it may allow disabled people to be able to perform activities of daily living easily (Baker, 2003). Therefore, the following hypotheses were developed:

H9: Enhancing the communication of DS students has a positive impact on improving DS performance in the Kingdome of Bahrain.
H10: Enhancing the communication of DS students has a positive impact on enhancing DS independence in the Kingdome of Bahrain.
H11: Enhancing the communication of DS students has positive impact on enhancing the DS social interaction in the Kingdome of Bahrain.

Many DS have physical mobility, stability, motor coordination and range of motion challenges. Such disabilities need to be supported to enable DS movement and communication and ensure that this segment of people can be more independent and take part in their daily and routine activities (Mulligan, 2003). The delay in physical and motor skills could affect the physical education and sports activities. It may affect the DS's physical abilities in school, and has an impact on classroom activities, for example, drawing and coloring and handwriting development. Hence, the use of the AT that support motor/physical disabilities, such as special keyboard and mouse can help in developing the motor/physical skills of the DS so they can practice at home and school which can enhance their independence (Cook, 2011, Cowan et al., 2012). By adopting AT for support DS motor disabilities, DS will be able to manage the tasks independently, and build learning self-help skills (Cook, 2011; Kling, A., et. al., 2010). AT devices such light pointer, eye gaze direction, or head/mouth stick, can be used to leverage and encourage DS communication skills, and improve their performances and body functions to participate more effectively in their environment (Cook, 2011). Several other AT are available to assist DS in completing their social work including audio books for those who can't physically handle books. Moreover, keyboard adopters such as key guars can help DS to make selection more easily and prevent mistyping from tremors or less of control, while switches make it more possible for DS to access a computer keyboard using mouth, head or foot, and voice recognition software for students who can't type. This could reduce the need for informal caregivers where it takes the pressure off and can prevent burnout. Moreover, AT for supporting mobility such as wheelchair, scooters, walkers, canes and orthotic devices, prosthetic limbs, functional electrical stimulation, and wearable exoskeletons can expand DS performance and enhance their mobility and movement (Cowan, et al., 2012). Adopting AT to help DS with physical or motor disabilities may not be simple as it is very important to select the suitable AT devices that suit the DS level of disability, surrounding environment and other health problems (Mulligan, 2003). Previous studies have shown that AT for supporting motor/physical, when are appropriate to the user and the user's environment, have a significant impact on increasing the level of communication, independence and social interaction (Cowan and Khan, 2005). Therefore, the above mentioned discussion reveal strongly on the positive effect of the AT support for motor on enhancing the communication, independence and social interaction of the DS and simplifying their movement and overall life. Therefore, the following hypotheses were developed:

H2: AT for supporting motor/physical has positive impact on enhancing DS communication in the Kingdome of Bahrain.
H3: AT for supporting motor/physical has positive impact on enhancing DS independence in the Kingdome of Bahrain.
H4: AT for supporting motor/physical has positive impact on enhancing DS social interaction in the Kingdome of Bahrain.

The direct impact of AT for supporting vision on performance and social interaction of students with DS:
AT is designed to support people with diverse disabilities such vision or memory (Cognitive), by assisting them to do what they normally cannot do with an expected level. AT that support vision increase and sustain the capabilities of a student's performance, independence, and social interaction (Parette et al., 2007). Previous studies revealed that people with vision disabilities or blind are taking advantage from using AT it enhances their performance in learning and overall life (Bouck et al. 2011; Bowers et al. 2001; Ferrell 2006; Lovie-Kitchin et al. 2001; Spindler 2006). Developments in AT support vision result in a better achievement and high quality life for students with visual impairments, especially in educational processes as it enrich their performance and academic achievement (Koweru, 2015). For example, Talking Tactile Tablet devices which are supporting multi-sensory impairment can result in a positive impact on the performance of students suffering from visual impairment as these tools enable them to become more contributors and effective in the classroom (Cooper, 2015). According to the American Foundation for the Blind (2014), students with visual impairments faced obstacles in completing learning requirements, but AT can facilitate their ways to complete their assignments, coursework, task, etc. Hence it will support the performance of the students by enhancing their efficiency accomplish their tasks easily and within minimum time (Kareri et al., 2014). Furthermore, AT that support vision is supporting not only the students with visual impairments, but also enhance teacher skills for teaching students carefully, expand awareness, and enhance the performance of disabilities students to get superior consequences (Kareri et al., 2014).

On the other hand, the AT inspire disabilities, and enable people with vision impairment to express and interact easily with others without any obstacles by promoting their social skills, encouraging interaction with other peers and enriches the quality of the life of such people (Bird, 2000, Ee and Cohen, 2010). Additionally, Berry and Nees (2013) stat that AT such as Text-to-speech and auditory are contributing and assisting people with different disabilities, especially visual impairments. The advantages of such AT are removing the barriers and obstacles during interaction with others (Berry and Nees, 2013). Beside, people with visual disabilities are using AT for aligning their personal management skills to support the modification and adjustments in their capabilities to facilitate their interaction and reaction with others (Wiazowski, 2009). For example, Auditory Scanning devices facilitating understanding and interaction for people with vision impairment's. Currently, instructors used Neoteric AT and technical supports throughout teaching students with visual impairments, for providing professional and qualified support; to make them able to define their achievement and points of improvements in learning processes, where successfully provide modifications in their behaviors to promote interaction with other peers (Koweru, 2015). Therefore, the following hypotheses are developed:

H5: AT for supporting vision has a positive impact on enhancing DS performance in the Kingdome of Bahrain.
H6: AT for supporting vision has a positive impact on enhancing DS social interaction in the Kingdome of Bahrain.

The direct impact of AT for supporting cognitive on performance and social interaction of DS students
Evolving with technology, permits individuals with different impairments to ensure encouragements, ease of use, upgrade social image, commitments and satisfaction, and enhance social interaction with their normal peers (Carter et al., 2009; Edrisinha, et al., 2011; Lancioni et al., 2011). Social interaction will result in recognition, accepting and positive influences in managing disabled people lives and reducing reliance on caregivers (Felce and Perry, 1995; McDougall et al,. 2010). According to Scherer et al. (2005), the main purpose of AT for supporting cognitive impairment is nurturing the DS performance on functional accomplishments, which assist them in minimizing needs to caregivers, and drive them to become more interactive in social life. AT can support people with cognitive impairment in expanding their quality of life and improve performance of sequential behavior (Neill et al., 2010). Wilson and Evans (1996) agreed that AT for supporting cognitive impairments such as virtual keyboards reorganizing letter digraph frequency augment remembrance, where it not only expands the performance of cognitive impairments, but also encourages them to be more corroborative through educational courses as it minimizing error occurrence.

On the other hand, the majority of the AT for supporting cognitive impairment has a significant role in enhancing the social interaction for people with cognitive impairment (Dawe, 2006). Teacher/specialists and family suggested that, the main role of AT has a positive impact on DS students with cognitive disabilities, as they enhancing and increasing their social interaction with other (Dawe, 2006). Students with cognitive disabilities are advised to use smart interface that recommends communication options and encourage interaction and conversation with partners and peers. For example, AT such as "persuasive" cellular phone that called the KIT phone (keep-in touch) can be used to reminds the people with cognitive to call other people in their contact list who they haven't been in touch with recently which enhance the relationship development and social engagement (Golder, 2004). Therefore, the following hypotheses are proposed:

H7: AT for supporting cognitive has a positive impact on enhancing DS performance in the Kingdome of Bahrain.
H8: AT for supporting cognitive has a positive impact on enhancing DS social interaction in the Kingdome of Bahrain.

RESEARCH METHODOLOGY AND DATA COLLECTION

A self-administrated questionnaire was adopted in order to elucidate the impact of adopting AT to assist the DS in the class room and enhance their performance, engagement and interaction in the inclusion schools and rehabilitation centers in the Kingdom of Bahrain. The population of the current study was identified to be all those who are working with DS students such as teachers from inclusion schools, expertise and specialist from rehabilitation centers and family members. All the experts or specialists in all rehabilitation centers which shown in the Table (1) were selected. On the hand, all teachers assigned to teach in an inclusion class were selected from the inclusion schools shown in Table (1). Moreover, 400 randomly family were selected from a total of 1700 families that have DS. Therefore, the sample size was calculated to be 700 inclusion teachers, experts, and specialists and parents. Only 550 legible, correct and completed questionnaires were returned with a response rate of 71.4% which considered as high rate especially with the DSs' families. The returned questionnaires consisted of 300 for teachers/specialist and 250 for families of DS students in the Kingdome of Bahrain. Due to the lack of well established scales developed to measure research model constructs such as AT for supporting vision

impairment, AT for supporting hearing impairment, AT for supporting motor, AT for supporting cognitive and mental impairment, the measurement scales were developed by the authors. However, the measurement of communication was developed based on the measurement of Easlin and LaRose (2002) and Kaya and Weber (2003). Social interaction was developed based on the measurement of Mahadavinejad et al. (2014), while independence scales were adopted from Persel (2012).

Table 1: List of schools and rehabilitation centers in the Kingdom of Bahrain

Rehabilitation centers	Inclusion schools
Bahrain Hope Special Education Institute	IbnTufail primary school (Boys)
Bahrain Hope Center for Early Care	AlKhamis primary school (Boys)
Al-Wafa Autism Center	AlYarmook primary school (Boys)
Bahrain Down Syndrome Society	Al-Oruba primary school (Girls)
Special educational service center for children " Tafaol"	Arad primary school (Girls)
Kayan Center for Special Education	Al-Hidd secondary school (Girls)
NBB Rehabilitation Home For Disabled Children	Uthman bin Affan Intermediary school (Boys)
Salwa Club for disabled (Bin Khuldoon)	Alfarabi Intermediary School (Boys)
Salwa Club for disabled (Hamad Town)	UmaimabintAlNuman secondary school (Girls)
Academic and Vocational Rehabilitation Center	Isa town intermediary school (Boys)
	Alwadi primary school (Boy)
	Ghazi AlQusaibi secondary school (Girls)
	Imam al-Tabari Primary School (Boys)
	Al-Esteqlal secondary school (Girls)

DATA ANALYSIS AND RESULTS

Demography

The current section will present information on the demographics of the participants both teachers, experts, specialist and the families of the DS. Such information can provide explanation and indications on the results of the research model analysis. The results in Table (2) show that most of the participants are special and general educational teachers (34.8% and 18.6%, respectively). However, social worker and supervisor from the rehabilitation centers represent just (12.4 %). The inclusion teachers also represent few of the participants (8.1%). Moreover results in Table (2) show that most of the participants are young (40 or less, 73.9%) female (60.9%), and are holding bachelor (65.8%) and that is why they have few years of experiences (five or less, 66.1%). Table (3) presents demographic information on the families of DS students. The results show that most of the member of the families are young females (<=40 years old) (67.9% and 69.1% respectively). However, they are less educated as they are holding diploma or less (60.3%).

Table 2: Teachers demographic information

Gender		Education level	
Female	60.90%	Secondary	11.20%
Male	39.10%	Diploma	11.80%
Age		Bachelor	65.80%
20-30 years	36.60%	Master	9.30%
31-40 years	37.30%		
41-50 years	21.70%	Doctoral or more	1.90%
More than 50 years	4.30%		
Education Role			
Senior Head of education		6.20%	
Social supervisor		5.60%	
General education teacher		18.60%	
Special education teacher		34.80%	
The Social worker		6.80%	
Inclusion teacher		8.10%	

Table 3: Families demographic information

Gender		Education level	
Female	69.10%	Less than secondary	16.00%
Male	30.90%	Secondary	28.40%
Age		Diploma	25.90%
20-30 years	42.00%	Bachelor	23.50%
31-40 years	25.90%	Master	2.50%
41-50 years	28.40%	Doctoral or more	3.70%
More than 50 years	3.70%		
Related to the Down Syndrome			
Mother	57.10%		
Father	48%		
Brother/Sister	55.60%		
Other	31.6		

Current situation regarding the adoption of AT for teaching DS students in Kingdom of Bahrain

The following section presents information on the current situation regarding the adoption of AT in teaching DS in the school or rehabilitation centers in term of the skilled teacher's gains, types of AT adopted, challenges and problem faced by family and teachers. The demographics information show that most of the participants include teachers, experts and supervisor were young that's why results in Table (4) have few years of experience in teaching the DS students (five or less years of experiences) (67.1%) and have adopt AT in teaching few courses (5 courses or less) (82.0%). However, the results show that they have no experience in using AT as they never evolve in any workshop (42.9%) or attended just 5 courses or less (39.8%).

Table 4: Experience of teacher/specialist in using AT in Kingdom of Bahrain

Experience in Teaching DS students		No. of courses in which AT was adopted		No. of Workshops or training on AT	
Less than one year	28.6 %	None	38.5 %	None	42.9 %
1-5 years	38.5 %	1 -5 courses	43.5 %	1 -5 courses	39.8 %
6-10 years	13.0 %	6-10 courses	8.7%	6-10 courses	9.3 %
More than 10 years	19.9 %	More than 10	9.3%	More than 10	8.1 %

The families were asked to specified the best way for teaching their DS students were they revealed that the best way is to include their DS students in special school or centers (23.6%) not inclusion schools. However, they don't mind to adopt the AT either in special class or in inclusion class (32.9%, 31.1%, respectively)

Table 5: Family perception on the best ways for teaching DS students

Teaching DS in inclusion school	Teaching DS in special school	Adopting AT to teaching DS in inclusion class	Adopting AT to teaching DS in special class
12.40%	23.60%	31.10%	32.90%

Table 6: Types of disabilities that DS are suffering from

Types of disabilities that DS are suffering from	
Infantile paralysis	3%
Cognitive disability	58%
Communication impairment	37%
Motor/physical impairment	10%
learning difficulties	52%
Schizophrenia psychotic	10%
Vision impairment	19%

Development delay	36%
Traumatic brain injury	6%
Hearing impairment	12%
Speech/language	80%

Results on the different disabilities that DS students usually suffered from are presented in Table (6). Results show that DS mostly suffered from speech/language (80%), cognitive disabilities (58%) and learning difficulties (52%). Problems faced with DS students either in the home or in class room are demonstrated Figure (2). As shown in the table, teachers are mostly facing problems such as speech and communication (50.9%) and lack of focusing and understanding (58.4%). However, families are facing problems with speech and language (76.5%) and reading and writing (50.6%).

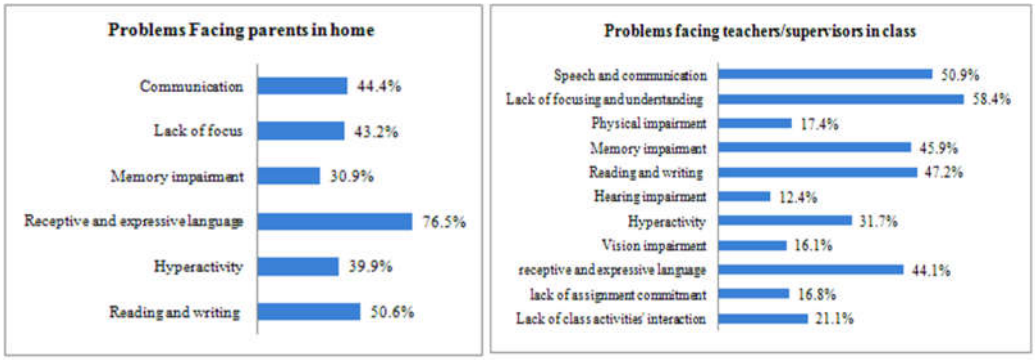

Figure 2: Problems faced by teachers and families with DS students

Although AT has many effects on supporting the learning and teaching of DS students, there are many challenges and barriers that may facing both teachers and family in adopting such technology. Therefore, teacher and families were asked to identify the most barriers they perceived in adopting AT and results are presented in Table (7). The results illustrate that both teachers and families are facing two main barriers: selecting and choosing the suitable AT (41.6% and 59.3% respectively) and the high cost of the AT (46.9%, 43.2%, respectively), as well as the lack of training provided on AT (31.7%) and lack of sufficient skills and experience to adopt AT(32.9%).

Table 7: Barriers for adopting AT for supporting DS students

Barriers are facing while adopting DS students BY:	Teacher, experts and specialists	Family
Difficult to encourage DS to adopt AT	27.7%	4.9%
Adopt the suitable AT	41.6%	59.3%
Complexity of AT (not easy to use)	15.5%	4.9%
Lack of sufficient skills and experience to adopt AT	32.9%	25.9%
Adopt poor and cheep AT	13.0%	7.4%
lack of training provided on AT	31.7%	27.2%
High cost of AT	46.0%	43.2%
Availability of AT	21.1%	6.2%
Perceived benefit of AT	30.3%	24.6%

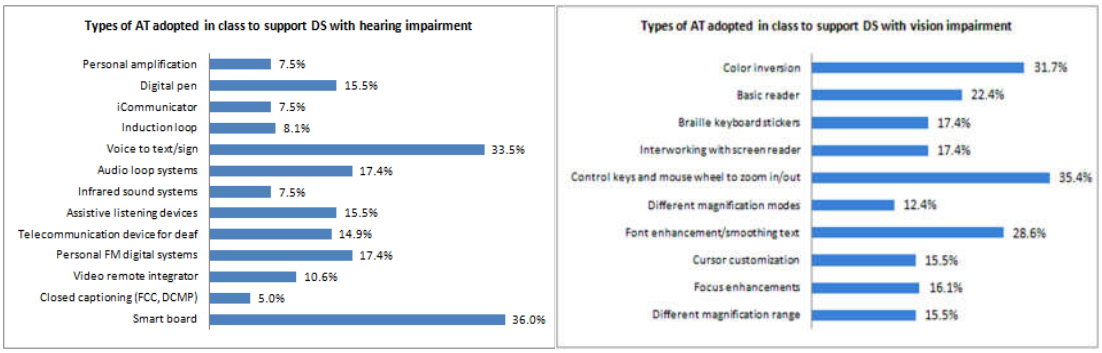

Figure 3: AT adopted for supporting DS with vision and hearing impairments

Finally, the different types that have been adopted in class to support the different impairments include the vision, hearing, motor and cognitive were identified as shown in Figure (3) and Figure (4). Regarding to the types of AT adopted to support the vision and hearing , the results revealed that control keys and mouse wheel to zoom in/out (35.5%) and smart board (36.0%) were identified to by the main adopted AT to support vision and hearing impairment, respectively. On the other hand the results in Figure (4) show that electronic notebook (50.3%) and graphic organizers (34.2%) are the main AT adopted for supporting the cognitive impairment. However, touch screens (56.5%) and trackball for easer mouse manipulation (28.0%) are very important AT that has been adopted to support the motor impairment.

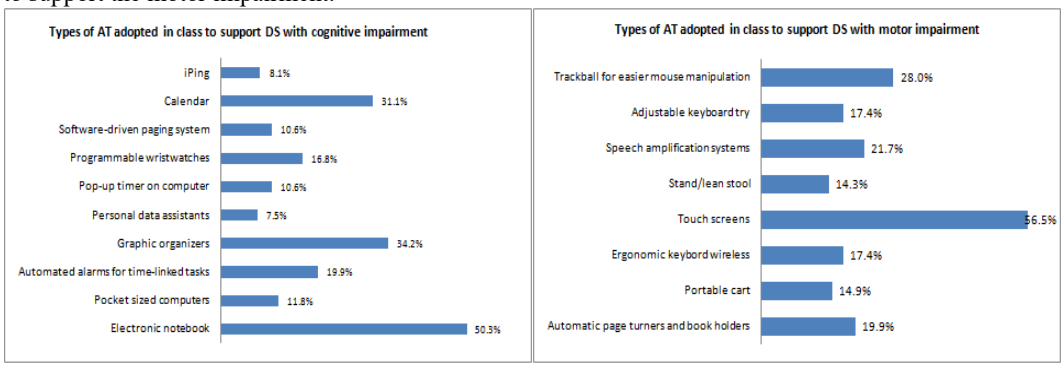

Figure 4: AT adopted for supporting DS with cognitive and motor impairments in class room

Assessing model measurements

PLS path analysis was done using SmartPLS-3 to test the research model. Goodness-of fit indexes of latent variables are shown in Table (8) and Table (9), which indicates that the model has good fitness. All the value of AVE are mostly greater or equal to 0.5 and all values of composite reliability are greater than 0.8, while all value of Cronbach's Alpha are greater than 0.7.

Table 8: AVE, composite reliability and Cronbach's Alpha

Construct	AVE	Composite Reliability	Cronbach's Alpha
AT for Supporting Cognitive	0.658	0.92	0.896
AT for Supporting Hearing	0.69	0.899	0.85
AT for Supporting Motor/Physical	0.685	0.897	0.846
AT for Supporting Vision	0.654	0.883	0.823
DS Communication	0.658	0.906	0.87
Independence	0.79	0.919	0.867
Performance	0.698	0.92	0.891
Social Interaction	0.724	0.929	0.905

Table 9: Factor loading of the items.

Construct	Items	Factor Loading	Construct	Items	Factor Loading
AT for Supporting Cognitive	CS.1 CS.2	0.806 0.804	AT for Supporting	VS.1 VS.2	0.821 0.852

	CS.3 CS.4 CS.5 CS.6	0.788 0.849 0.819 0.8	Vision	VS.3 VS.4	0.761 0.797
AT for Supporting Hearing	HS.1 HS.2 HS.3 HS.4	0.843 0.849 0.861 0.767	DS Communication	CMS.1 CMS.2 CMS.3 CMS.4 CMS.5	0.782 0.821 0.83 0.819 0.801
AT for Supporting Motor/Physical	MS.1 MS.2 MS.3 MS.4	0.809 0.858 0.84 0.803			

Research hypotheses testing

The causal relationships in the proposal research model were tested. Consistent with Chin (1998), bootstrapping was applied to produce standard error and t-statistics. This permits the measurement of the statistical significance of the path coefficients. The statistical objective of PLS is to show high path coefficient - R and significant t-statistics, thus rejecting the null hypothesis of no effect. The t-statistics need to be significant to support the hypothesized paths. R indicates the explanatory power of the latent endogenous variables.

Properties of the causal paths, including standardized path coefficients, t-statistics and explanation of variance for each equation in the hypothesized model are presented in Table (10) and Table (11). As expected, the results reveal that adopting AT to support some impairments of the DS have some impact on enhancing their communication, independency, performance and their social interaction. AT has vital role in enhancing the communication of the DS students as it can be enhance directly or act as intermediate in enhancing the engagement of DS in the learning process as the normal students. As such, the results indicate that by enabling the communication of the DS students, they can be more independent, reach better achievement and performance, and interact more in the social life. Thus, H9, H10, and H11 were accepted ((r=0.694, T= 9.038), (r=0.575, T= 8.301), (r=0.566, T= 5.748), respectively). Moreover, H1 and H2 were accepted ((r=0.343, T= 4.469) and (r=0.571, T= 8.89), respectively), thus enabling the communication of the DS can act as an intermediate factor for the impact of the AT for supporting hearing and motor on the performance. While, AT for supporting motor of the DS has a direct impact on the independence (r=0.287, T= 4.21) it has only indirect impact on enhancing the social interaction of the DS but not direct impact (r=0.116, T= 1.66). Thus, H3 was accepted and H4 was not accepted.

On the other hand, the AT for supporting the DS with vision impairment has shown insignificant effect on enhancing the performance and the social interaction of this segment of students. Hence, H5 and H6 are rejected (r=0.102, T= 1.548 and r=0.074, T= 1.188). Finally while, AT support for the cognitive of the DS shown a weak impact on the social interaction of DS students (r=0.184, T= 2.149), they has shown insignificant impact on enhancing the performance of the DS students (r=0.121, T= 1.873) as shown in Table (10).

Table 10. Path analysis

Path	Coefficients (β)	T-Test	P-Values	Hypothesis statues
H1: AT for Supporting Hearing -> Communication	0.343	4.469	0	Accepted
H2: AT for Supporting Motor/Physical -> Communication	0.571	8.888	0	Accepted
H3: AT for Supporting Motor/Physical -> Independence	0.287	4.21	0	Accepted
H4: AT for Supporting Motor/Physical -> Social Interaction	0.116	1.66	0.098	Rejected
H5: AT for Supporting Vision -> Performance	0.102	1.548	0.063	Rejected
H6: AT for Supporting Vision -> Social Interaction	0.074	1.188	0.235	Rejected
H7: AT for Supporting Cognitive -> Performance	0.121	1.873	0.062	Rejected
H8: AT for Supporting Cognitive -> Social Interaction	0.184	2.149	0.032	Accepted
H9: Communication -> Performance	0.694	9.038	0	Accepted
H10: Communication -> Independence	0.575	8.301	0	Accepted
H11: Communication -> Social Interaction	0.566	5.748	0	Accepted

On the other hand, the results has shown that AT for supporting the motor and hearing impairments of the DS explained 63% of the variance in enabling the communication skills of DS; which in turn, explained 74% of the variance of the performance while AT for support for both cognitive and vision have no impact on that variances. Conversely, AT for supporting motor and enabling DS communication are explaining 66% of the variances on enhancing the independency of the DS, while AT for supporting the cognitive of the DS and the enabling of their communication are explaining 75% of enhancing the social interaction of the DS as shown in Table (11).

Table 11: R Square of the items

	R Square
DS Communication	0.628
Independence	0.661
Performance	0.740
Social Interaction	0.746

DISCUSSION AND CONCLUSIONS

With the increasing number of DS in Kingdom of Bahrain, there is a need to exploit the opportunities provided by the rapid succession in the innovative ICT and AT to make life easier for these segments of people and enables them to communicate and participate in the community and provided them with the best way of learning. Although Kingdom of Bahrain are providing vital efforts for enhancing the development of people with special needs and DS and involve them more as contributable persons in the community, they still not reaching a mature level in adopting AT in the teaching and learning processes of DS in the inclusion schools or rehabilitation/special centers. It have revealed that lack of ICT accessibility, lack of resources and lack of skills are the major challenges that hinder the use of technology in the learning institutions. This implies that even if there are schools make available for supporting the educational needs of children with DS, they may not be adequately equipped with modern technologies for supporting their learning. In the Kingdom of Bahrain the inclusion of DS and other students with minor disabilities and special needs in the standard learning and teaching process started just on 2001 as an ad hoc process but reached more structured and more manageable process on 2011. The results of the current study reflect the current situation of the adoption of AT in inclusion schools or rehabilitation/special centers. The findings demonstrated that there are a reasonable numbers of specialists and teachers for teaching DS either in the inclusion schools or in the rehabilitation centers with specialists, supervisors or special education teachers in rehabilitation centers represents (34.8%) while specialist teachers in the inclusion schools represents just (8.1%). Thus, there is still a shortage in the specialist teachers in the inclusion schools that can help in teaching DS students. Moreover, the majority of the teacher/specialists who are taking care about DS students are females. Actually, female with their natural skills and characteristics as they are full of tenderness and passion can be more suitable for dealing with DS students and thus, can contribute, collaborate and embraced the DS students either in the classroom or home.

Regarding the capabilities of the teachers and specialists, the findings reveal that there is a need for building and enhancing the capacity in this field. The finding revealed that most of the teachers/specialists are young with high level of education as they hold at least bachelor or higher degree but with few years of experience; no more than 5 years. However, it is not essential for those who want to teach DS students to be graduated with psychology or special education. They can be graduated with any specialization such as science, art or any other field of study. Graduated with special education, psychology will obtain importance skills and knowledge needed for such occupation to be able to understand DS capabilities and needs. Moreover, the majority of teachers/specialist have applied the AT in maximum five courses without attending workshops interrelated to the adoption of AT. Thus they has a little knowledge about AT and are not prepared well for adopting AT in classrooms as most of the teachers/specialists confirmed that they are "somehow prepared". Few workshops were provided for the teacher/specials to prepare them to deal with this segment of students and how it can be adopted in teaching DS students. Increasing knowledge and experience of the professionals in using AT will lead to an increase in education opportunities for DS (Erdem, 2017). Government should pay more attention in building the capacity and skills of specialists and teachers in using new technology.

Parent of DS students think that the best ways to improve the learning quality of their DS students is through adapting AT in inclusion schools but not in rehabilitation or special centers. DS can be improved and do well if they involve in school with normal students. Keep DS students in special environment with special students will restrict their ability for improvement. In a press conference conducted on 2010, decision makers from Ministry of Education-MOE in Kingdom of Bahrain have discussed the possibilities of the inclusion of the DS in kindergartener level in the normal kindergartens and the need for enhancing the learning of these people (Alwasat, 2010). Moreover, parents of the DS have confirmed in many events conducted by the Bahrain Down Syndrome Society in Kingdom of Bahrain that they want their DS to be taught and qualified in inclusion school not in special

center or an isolation environment (Alwast, 2003). They demonstrate that teaching DS in inclusion school will offer the opportunity for the DS individual to share and participate in the general life and community (Alwast, 2003). When the inclusion class implemented effectively it will offer academic and social benefits for DS students. Many parents of children with DS revealed that the inclusion experience have many benefits, including higher self-esteem, improved speech and communication, friendship development, independence in daily life activities, high educational accomplishment, and social interactions (DSAWM, 2010).

Teaching DS is not easy as it necessitate the understanding of these people and identify their weakness, strength and problems to be able to deal with them in a proper way and adopt the most suitable AT that may support their impairments. In addition, there are many problems are facing DS students either because of their nature and special characteristics or in adopting the AT in their teaching and learning processes. There are many problems that may be faced by DS in classroom or family at home. However, these problems may not be the same as DS may be impacted by the environment surrounding them. As such, the finding of the study show that the main problems faced by teachers/specialists in classroom are the “lack of focusing and understanding”, “difficulties in speech and language”, and “communication with others”, while at home, family are facing problems such "receptive and expressive language", “reading and writing” and “lack of focus” . Concerning the problems that are facing teachers/specialists and family in adopting AT in teaching DS, the findings disclosed that the main challenges and barriers that are faced by teacher/specialists in adopting AT are “high cost of AT devices” and “adopt the suitable AT” in the suitable situation. Both teacher/specialists reveal that they are striving to acquire AT to improve and expand the capabilities of DS students but due to the high cost of the AT sometime it become impossible. Hence, the both government and private sectors need to support the family, schools and rehabilitation centers with an adequate financial support. Actually, digital empowerment in Kingdom of Bahrain is the main concern of the MOE as a high budget was set to enhance the digitization. As the AT is a way for DS students’ empowerment and will enhance the student digital empowerment it needs to be the focus of the MOE in the Kingdom of Bahrain. Moreover, they need to help in determining the specific types of AT needed by each DS students according to their case either in the inclusion school or rehabilitation center by enhancing the research and academic studies in this field. There is a need to develop an appropriate assessment tools to help decision makers in evaluating and selecting the most suitable AT for improving the academic and social life of the DS students (Erdem, 2017).

By identifying the problems and the characteristics and needs of the DS students, it will be easy to identify the most appropriate AT in improving their learning. However, with the problems faced in adoption AT in Kingdom of Bahrain, mostly inappropriate AT was adopted. The findings show that a low level technologies, cheap and very simple that does not need experience or skills AT was adopted. As such "control keys and mouse wheel to zoom in/out” are adopted to support DS with vision impairment because of its ease/effortless and low cost. However, “different magnification modes” is not adopted because of its complexity and the teacher/specialists do not have the enough experience to adopt such tools. For supporting DS with hearing impairments , “smart-board and voice to text/sign” are the most adopted AT in inclusion schools and rehabilitation as they are flexible and easy to use for both teachers/specialists and students. Whereas, "closed captioning (FCC, DCMP) which may have better effect was not adopted because it need special skills and experiences. On the other hand, “electronic notebook” adopted for supporting DS students with cognitive impairments, while PDA and iPing are not adopted. Finally, findings elucidate that “touch screen” which is commonly used for DS students with motor impairments was adopted because it is easy to use and not required a lot of training.

Although several studies have confirmed that AT has a positive effect on supporting DS, there are few studies that attempted to examine that effect empirically. Therefore, the impact of AT on the DS students was examined and assessed by developing a theoretical model based on the available literature in the related field. The model has a main hypothesis indicate that adopting AT in teaching DS students can enhance their performance, social interaction and independence. AT can support different disabilities and characteristics of the DS and hence, the research model has identified the effect of each type of AT on the aforementioned effects. In general it can be concluded that the adoption AT in teaching and learning of DS students can enable them to be more social and independent person. AT for supporting hearing and motor have an effective impact in enhancing the communication of DS students which in turns effect their independence, social interaction and social interaction directly. While AT for supporting motor has indirect effect on independence, social interaction and social interaction via enhancing the communication of the DS students, they have direct effect on enhancing their independence but not their social interaction. AT for supporting cognitive of DS has shown to have a strong impact on enhancing the social interaction of DS but not their performance. However, the finding indicated that AT for supporting vision has no impact on enhancing the performance or the social interaction. These results are against what have been revealed and approved by previous literatures. Therefore, more investigation needs to be conducted to examine the indirect effect of the AT for supporting vision impairments of DS or adopting larger sample of size to get more reflective results. Overall, the importance of enhancing the communication of the DS

was the main findings of the model analysis. In many respects, the improvement of the communication of DS can motivate DS people especially those with speech and language disabilities, to involve in competition with others by attending workshops encourage participation with others (McCoy, 2013). In addition, it provides a gateway to the independence, dignity and self-esteem, and allows children to move around their environment, communicate with others and take part in appropriate activities that they would be unable to do without technology (Cowan and Khan, 2005).

The main aim of the current research was to investigate the current situation regarding the adoption of AT in teaching and learning DS students in inclusion schools and rehabilitation centers. In addition, the impacts of AT in enhancing the independence, performance and social interaction of DS students were examined. The study demonstrate that AT are playing a vital role in supporting the learning of DS and enabling them to be an active member by enhancing their communication, performance, social interaction and independence. Kingdom of Bahrain provides more effort and focus on the DS and established a long term strategic plan for having such segment of people as a normal person that can live like others and act normally in the general life.. They provide different inclusion programs for the disables and special needs. They started by providing these programs in eight primary schools in 2001-2002 and recently they have such program in 54 schools in different level. They also provide a special curriculum for the DS and special assessments. The MOE started with an academic inclusion (mainstreaming) and shifted to the social inclusion (normalization) (Alwasat, 2003). Moreover, there are many AT were provided for supporting motor, vision and hearing imperilments of DS such as buss with elevator to simplify the movement of the DS and support the motor and assign their classes in the ground floor with special and well equipped bathroom. Moreover, they provide Dell touch computer, pronto, CCTVE, CCTV, Digital amplifiers and others. On the other hand, some professional certificate such as the agriculture program are providing for DS to enhance some of their skills and improve their social interaction. They are also assigning specific scholarships for DS that have finished the secondary school (Alayam, 2015).

However, to exploit the opportunities provided by AT, consideration should be pay to many aspects such as the capacity building of the teachers/specialist, types of AT to be adopted, the environment where to adopt the AT and the DS themselves. Government' strategic plan should consider building capacity on AT and emergent technology to have sufficient specialists to satisfy the needs of the disabled segments in the country. More attention should be paid for building capacity and skills for using AT by teachers/specialist at inclusion school and rehabilitation centers via involving them in more workshop and courses. They can be involved in direct and indirect training as a way for building capacity and skills. A direct training can be conducted through the involvement of specials, developers, special educators, teachers and volunteers in different workshops and courses. While indirect training can be achieved through the communications with house holders and disabled parents. Moreover, indirect way of enhancing knowledge and experiences of AT for supporting DS can be done through implementation of special e-learning networks for teachers in inclusion schools to exchanges lessons courses and information among themselves or network let say "Bahrain DS", include all societies that are concern about the DS in Bahrain, experts. Such online networks will support DS students and their parents and family so that they can inquire about certain services, suitable support and guidance for DS. Moreover, school that are successful is integrating students with DS must have an effective leadership to deal with student's individual needs and commitment to provide a broad and balanced range of curriculums for all students (Krahn et al., 2015). Therefore, MOE should pay more attention in building well established academic leadership. On the other hand, decision makers need also to enhance the financial support for the special needs centers and inclusion schools that can help them in establishing a well qualified environment for providing more effective services for this segment of people. Social community and business sectors should support inclusion schools and rehabilitation centers financially to be able to provide and improve the current AT.As such Tamkeen and Economic Development Bank - EDB can offer free workshop through a memorandum of understanding with MOE, while banking sectors and other financial institution in the country can help in supporting schools and rehabilitation centers with the appropriate AT.

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The Predictive Level of Social Media Addiction for Life Satisfaction: A Study on University Students*

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ABSTRACT
Social media addiction is considered as a sort of Internet addiction. Individuals who spend too much time on social media have a desire to be notified of anything immediately, which can cause virtual tolerance, virtual communication and virtual problems. Behaviours that force the person into these actions can be explained as social media addiction. This study aims to determine the relationship between social media addiction and life satisfaction among university students as well as the effect of social media addiction on predicting life satisfaction. The participants are composed of 612 (380 female, 232 male) university students. Social Media Addiction Scale-Adult Form (Şahin and Yağcı, 2017) and Life Satisfaction Scale (Diener, Emmons, Larsen and Griffin, 1985; Köker, 1991) were used in the data collection process. Pearson product-moment correlation coefficient and regression methods were used to analyse the data. The results indicated that there is a negative relationship and moderate correlation between life satisfaction and social media addiction. There is also a significant relationship, according to the regression analysis, between life satisfaction and social media addiction levels.

Keywords: Social media addiction, life satisfaction, university student.

INTRODUCTION

Internet is such technology that makes it possible for people to get all sorts of information in a snap and to communicate with other people at a fast pace. With this feature, internet has been a tool of communication penetrating every sphere of human life. Internet in today's world is a popular tool used by not only adults and teenagers but also children and seen as a free time activity in a multitude of countries across the globe.

According to the Internet World Stats (2017), the number of Internet users worldwide has reached to four billion. The proportion of Internet and social media usage (e.g. Facebook) to population is 27,7 and 11,7 % in Africa; 45,2 and 13,4 % in Asia; 77,4 and 39,9 % in Europe; 59,6 and 55,8 % in Latin America; 56,7 and 30,3 % in the Middle East; 88,1 and 62,1 % in North America; 68,1 and 51,7 % in Australia. In Turkey, according to the same survey, the proportion of Internet users is 59,6 % and that of social media (Facebook) is 53,2 %. The rate of increase over the last 15 years is 93,4 %. According to the Turkish Statistical Institute (TUIK, 2016), the proportion of individuals using the Internet in Turkey is 61.2%. As for the purposes of Internet usage in Turkey, 82.4% of individuals who use the Internet in the first three months of 2016 have shared their social networking profiles/photos, messages and content. This ratio is higher among adolescents and students when compared to the other age groups (TUIK, 2016).

Social media is one of the most important means of communication today. The frequency of social media usage has increased in parallel with the increase in frequency of Internet usage (Tektaş, 2014). Over the last few years, social media use has become an increasingly popular free time activity in a multitude of countries across the world (Kuss & Griffiths, 2011). Poeple visit social media sites to engage in many different types of entertainment and social activity, including games, time-wasting, socialising, posting photos, and communicating (Allen, Ryan, Gray, Mclnerney, & Waters, 2014). Excessive (Ceyhan, Ceyhan and Gürcan, 2007) or problematic use (Young, 1988; Davis, 2001) of the Internet or being online for 8,5 to 21,5 hours in a week (Yang and Tung, 2007) is defined as addiction.

Addiction is generally evaluated in terms of using substances like alcohol, drug, and tobacco. Recently, it is argued that such behaviours as gambling, eating, and sleeping cause addiction, too. As Fidan (2016) points out,

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addiction comprises technological devices and applications like computer, Internet, online games, mobile phone, etc. Internet addiction is accepted among the most common types of technological addiction today (Young, 1988; Şahin, 2011). Internet addiction (Young, 2004), online addiction (Tüzer, 2011), game addiction (Fisher, 1994; Horzum, 2011), social network addiction (Griffiths, 2012), cybersex addiction (Schwartz & Southern, 2000), mobile phone addiction (Bianchi & Phillips, 2005; Fidan, 2016), Facebook addiction (Andreassen, Torsheim, Brunborg & Pallesen, 2012), Twitter addiction (Said, Al-Rashid & Abdullah, 2014), and social media addiction (Andreassen, Torsheim, Brunborg and Pallesen, 2012; Şahin ve Yağcı, 2017) have been investigated in the context of behavioural addiction and are gaining importance in tandem with the developing technology.

Social media addiction is regarded as a kind of Internet addiction (Kuss and Griffiths, 2012). Being hooked on social media, wanting to be always online on social media, being directed with uncontrolled motivations and being affected negatively in other spheres of life due to this situation are regarded as the symptoms of social media addiction (Andreassen and Pallesen, 2014).

There are an increasing number of researches in the literature on the relationship between social media usage and human psychology (Pempek Yermolayeva and Calvert, 2009; Correa, Hinsley and de Zúñiga, 2010; Salehan and Negahban, 2013; Lepp, Barkley and Karpinski, 2014). Some indicate that social media use make people happy (Eren, Çelik and Aktürk, 2014). Others usually consider life satisfaction as personal contentment (Diener, Emmons, Larsen, & Griffin, 1985). Ellison et al. (2007) argue that mostly individuals with low levels of life satisfaction seek to join in social media in order to improve their psychological well-being.

The main argument about how life satisfaction leads to problematic Internet or social media use is that people prefer to spend more time on the Internet so as to avoid the feeling of dissatisfaction and to seek psychological satisfaction (Demir, Peker Özköklü and Aygün Tuğrul, 2015). Spending more time on the Internet to keep away from life dissatisfaction is seen as a significant factor increasing the possibility of problematic Internet use. Accordingly, Internet turns into a pretext to evade the sources of dissatisfaction and leads to problematic use (Çelik and Odacı, 2013; Esen, 2010).

Based on the reasons above, this study aims to determine the levels of life satisfaction and social media use among university students and put forth the relationship between their levels of life satisfaction and behaviours of social media use.

Objective of the Study

This study aims in general to analyse the relationship between social media addiction and life satisfaction as well as the effects of social media addiction on life satisfaction. The answers are sought for the following questions:

1. Is there a significant relationship between university students' social media addiction (virtual tolerance and virtual communication) and their life satisfaction?
2. Does university students' social media addiction significantly predict their life satisfaction?

METHOD

Study Model

This is a descriptive study based on a survey model. As it is known, survey models aim to reflect an existing situation as they are (Karasar, 2016). This study aims to examine the relationship between social media addiction and life satisfaction among the students of Faculty of Education.

Study Group

The participants included 612 students (380 female, 232 male) from different grade levels in the Ahi Evran University Faculty of Education. Distribution of the participants per grade level is as follows: 31,9 % of the participants (195 students) are first graders, 19,4% (119 students) second graders, 30,9 % (189 students) third graders and 17,8 % (109 students) fourth graders. The average age of the respondents is 20,34±1,10.

Data Collecting Instruments

The data were collected via "Demographical Information Form", "Social Media Addiction Scale: Adult Form" and "Life Satisfaction Scale". Psychometric properties of those measuring tools are specified below.

Demographical Information Form: Needed information about the participants' demographical characteristics such as grade level, gender, and department was obtained through a personal information form.

Social Media Addiction Scale - Adult Form: The SMAS-AF developed by Şahin and Yağcı (2017) is a five-point Likert type scale including 20 items that can be gathered under two factors (virtual tolerance and virtual

communication). Confirmatory factor analysis showed that the two-factor model fitted the data (χ2=7051,32; sd=190, p=0,00; RMSA=,059; SRMR=,060; NFI=,59; CFI=,96; GFI=,90; AGFI=,88). Internal consistency coefficients of the subdimensions were ,92 for virtual tolerance and ,91 for virtual communication. Coefficient of total internal consistency was ,94. Test-retest reliability coefficients were found as ,93 for the scale in total; ,91 for virtual tolerance and ,90 for virtual communication. The analysis proved that SMAS-AF is a valid and reliable scale that can be used to determine social media addiction among adults.

Life Satisfaction Scale: Life satisfaction was measured using the Turkish version of the Life Satisfaction Scale (Diener Emmons, Larsen and Griffin, 1985; Köker, 1991). This is a five-item, self-reported, seven-point Likert-type measurement scale (1=strongly disagree to 7=strongly agree). Higher scores indicated higher levels of psychological well-being. The scale measures overall life satisfaction and is suitable for use with individuals of all ages from adolescent to adult. The scale was translated to Turkish using the Face Validity technique developed by Köker (1991). The correlation between the scores of each item and the total scores of the scale were satisfactory. The test-retest reliability value of the scale was .86, the internal consistency coefficient was .80, and the test-retest reliability coefficient was .85.

Data Analysis

The students were divided into groups, and the scales were implemented in the classroom. The participants were fully informed of the purposes of the study before the scales were administered. Pearson product-moment correlation coefficient and regression methods were used to analyse the data. SPSS 22 was used while analysing the data.

RESULTS

This section includes the results of the analysis carried out to determine whether social media addiction and life satisfaction levels of students participating the research vary or not in accordance with the independent variables.

Findings related to students' social media addiction and life satisfaction levels are specified in Table 1.

Table 1: Students' social media addiction and life satisfaction levels

Variable	N	M	SD	Level
Virtual tolerance	612	24,72	9,26	Low
Virtual communication	612	17,20	7,01	Low
Social media addiction (Total)	612	41,92	15,03	Low
Life satisfaction	612	23,47	6,95	moderate

Table 1 shows that students' life satisfaction level is moderate, while their level of social media addiction and the relevant subdimensions is low. The relationship between students' life satisfaction and social media addiction and subdimensions was calculated via Pearson correlation technique and the results are presented in Table 2.

Table 2: Correlation between students' life satisfaction and social media addiction levels

Variable	VT	VC	SMA	LS
Virtual tolerance (VT)	1,00			
Virtual communication (VC)	,70*	1,00		
Social media addiction (SMA)	,94*	,90*		
Life satisfaction (LS)	-,27*	-,32*	-,31*	1,00

N=612, *p<0.01

As seen in Table 2, there is a significant negative correlation between students' life satisfaction and social media addiction (r=-,31; p<.01) as well as their average scores of virtual tolerance (r=-,27; p<.01) and virtual communication (r=-,32; p<.01). This significant negative correlation between the scores means that the score the students get on a dimension decreases when their score on another dimension increases. We also studied whether the subdimensions of social media addiction predict life satisfaction.

Table 3: Multiple regression analysis of social media addiction in terms of life satisfaction

Variable	B	Std. Error	β	t	p	Partial R	Part r
Constant	29,469	,790		37,296	,000		
Virtual tolerance	-,067	,040	-,089	-1,657	,098	-,067	-,064
Virtual communication	-,252	,053	-,255	-4,743	,000	-,189	-,182

R=,323 R^2=.105 $F_{(2,-609)}$=35,540 p=.000

The results of multiple regression analysis on how social media addiction and its subdimensions predict life satisfaction are seen in Table 3. Accordingly, there is a low-level, negative and significant relationship between social media addiction and life satisfaction (R=.323, R2=.105, p<.01). Two subdimensions of social media addiction account for only 10 % of the total variance. T-test results regarding the significance of regression coefficients indicate that only virtual communication is a significant predictor of life satisfaction, whereas virtual tolerance, the other variable, is not effective to a considerable extent.

DISCUSSION AND CONCLUSION

Internet as a mass communication tool is increasingly impacting and penetrating every sphere of human life, which gave rise to the emergence of sites of social networks called social media. This study examined the relationship between social media addiction and life satisfaction among university students.

The results indicated that the students' level of social media addiction is low while their level of life satisfaction is moderate. A significant negative correlation was observed between the students' life satisfaction and social media addiction and their average scores on virtual tolerance and virtual communication defined here as the subdimensions social media addiction. Social media addiction and its subdimensions show a high-level positive intercorrelation. The mentioned subdimensions are significantly coherent with each other. The more the participants are addicted to social media, the less they are satisfied with life.

As the regression analysis showed, social media addiction is an important predictor of life satisfaction, albeit affecting it negatively. According to the t-test results regarding the significance of standardized regression coefficients, virtual communication as a subdimension of social media addiction is an important predictor of life satisfaction (p<.01). However, virtual tolerance does not appear to be a significant predictor of life satisfaction (p>.01).

There are several studies supporting this result in the relevant literature. Balcı and Koçak (2017), Satıcı and Uysal (2015), and Spraggins (2009), for example, assert a positive relationship between social media use and life satisfaction. However, there are some studies not supporting the results of this study. Doğan (2016), Oh, Ozkaya and LaRose (2014), Mahan Iii, Seo, Jordan and Funk (2014), Ong and Lin (2015) argue that social media usage positively predicts life satisfaction.

In today's world, technology is progressing at an unbelievable speed and continually connects people of every age and type. This is the case for teenagers in particular. Considering the countries that are going through a process of change and development, e.g. Turkey, it is observed that technological processes and SNS are on the increase and becoming more of an issue (Doğan, 2016). From this point of view, social media use has a considerable place in students' life and negatively affects their life satisfaction.

In conclusion, there is a low-level, negative and noticeable relationship between social media addiction and life satisfaction. Social media addiction is an important variable in predicting life satisfaction. Social media addiction affects life satisfaction of university students in a negative way to a significant extent.

The number of studies examining the effects of social media on people in both Turkey and abroad is limited. We think it is worthwhile to carry out similar studies using different samples and variables.

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The Use of Social Networks as a Communication Tool between Teachers and Students: A Literature Review

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ABSTRACT
Social networks have drastically changed communication between people, constituting a means of everyday use by which information is created and shared in a simple, instantaneous way with the rest of the world. Although social networks were not initially created for academic purposes, they are gradually being used as a means of communication between teachers and students, making them an extremely important element in the teaching-learning process by offering new possibilities for communication and interaction as well as creating new learning spaces. The purpose of this study is to analyze the use of social networks as a communication tool between teachers and students through a thorough bibliographical review. To do this, a systematic review of scientific documents containing data on teacher-student communication through social networks was carried out, resulting in a total of 96 documents published between 2006 and 2016 indexed in different internationally consulted databases. From the analyzed documents were extracted the educational levels in which research on teacher-student communication in social networks were carried out; the most addressed social networks in the study of teacher-student interaction through social networks; the research areas that have been developed and the main results.

INTRODUCTION

Social networks have changed the way people communicate, the interaction they have and the ability to create and share information with the rest of the world, becoming a daily occurrence (Gómez, Roses, & Farias, 2012). Social networks foster the maintenance, development and creation of interpersonal relationships based on the elaboration of a personal profile in which accessible information is published and shared by all who are present on the social network (Kwon & Yixing, 2010). Social networks have gradually emerged as a new avenue of communication between teachers and students, mainly in higher education, becoming an important communicative tool (Akcaoglu & Bowman, 2016; Albayrak & Yildirim, 2015; Chromey, Duchsherer, Pruett, & Vareberg, 2016), generating diverse questions about teacher-student communication through social networks and their impact on the teaching-learning process (Hershkovitz & Forkosh-Baruch, 2013).

The use of social networks provides the opportunity for teachers and students to be in continuous contact transcending the conventional classroom and creating new teaching and learning spaces (Ean & Lee, 2016; Hamid, Waycott, Kurnia, & Chang, 2015). However, this new reality has generated debates as to whether teachers and students should interact in this way, leading some authorities to restrict or even prohibit such communication (Asterhan & Rosenberg, 2015). Supporters of the teacher-student interaction through social networks present arguments in favor, such as teachers´ and students´ freedom of expression, the inevitability of the phenomenon and the pedagogical potential of social networks (Greenhow, Robelia, & Hughes, 2009). As the number of teachers with social network profiles increases, the possibilities for teacher-student interaction increase. Therefore, if teachers wish to take advantage of the educational opportunities of social networks, both teachers and students should interact on them (Teclehaimanot & Hickman, 2011).

The main purpose of the present study is to analyze the use of social networks as a communication tool between teachers and students through a systematic literary review. In particular, this study intends to answer the following questions: (1) What are the educational levels that are being addressed in research related to teacher-

student communication on social networks? (2) Which is the most commonly used social network as a communication tool between teachers and students? (3) What are the research areas that are being developed regarding teacher-student interaction through social networks and the main results of the studies under analysis?

METHODOLOGY

They were analyzed 96 published documents on teacher-student communication through social networks. These documents were found in international scientific databases such as Web of Science, Scopus, PsycINFO and ERIC and come from around the world. As standard criterion, it was established that all scientific documents that provide data on teacher-student communication through social networks would be analyzed, in order for all studies under analysis to be comprised of articles from scientific journals subject to peer review, doctoral theses, dissertations, conference communications and book chapters. The search criterion of the documents consisted of the detection in the title or abstract of the documents of the following keywords, some of them extracted from the ERIC and UNESCO thesaurus: "Teacher-Student Communication and Social Networking", "Teacher-Student Interaction and Social Networking", "Teacher-Student Relationship and Social Networking", "Teacher-Student Communication and Facebook", "Teacher-Student Interaction and Facebook", "Teacher-Student Relationship and Twitter", "Teacher-Student Communication and Twitter", "Teacher-Student Interaction and Twitter" and "Teacher-Student Relationship and Twitter". Similarly, new searches were carried out using other keywords such as "Teacher-Student Friending", "Teacher Credibility", "Instructor Credibility", "Teacher Self-Disclosure" and "Student Self-Disclosure" in combination with the above mentioned keywords. From the total of the found documents, it was considered that 96 documents strictly met the criterion, the rest were excluded from the bibliographic review. The documents that were selected for the analysis cover the period between 2006 and 2016, both inclusive, since research focused on teacher-student communication through social networks has been carried out since 2006 and no studies have been found prior to this date.

The selected documents were analyzed using a coding table in which they were categorized by certain features such as the educational levels that were addressed in the study of teacher-student communication on social networks, the most analyzed social networks in teacher-student interaction and the main results obtained by the studies under analysis. In order to create the categories, researchers followed an inductive process based on the exhaustive analysis of the content in the selected documents.

RESULTS

In relation to the educational levels in which research on teacher-student communication on social networks are being developed (see Annex 1); the results show that 77 studies have focused on higher education, 12 in secondary education and 4 in elementary education. There are 3 studies that have not specified the educational level in which the studies were carried out (Table 1).

Table 1: Addressed educational levels in teacher-student communication on social networks

Educational level	Number of studies	Percentage
Higher Education	77	80.2%
Secondary Education	12	12.5%
Elementary Education	4	4.16%
Not specified	3	3.12%

With regard to the most prevalent social networks through research in the analysis of teacher-student interaction (see Annex 2), the results show that 65 studies have focused on Facebook, 8 on Twitter, 1 on Facebook and Twitter, 1 on MySpace and 1 on YouTube. There are 20 studies that have not specified the social network in which the analysis of teacher-student communication was carried out (Table 2).

Table 2: Analyzed social networks in relation to teacher-student communication

Social Networks	Number of studies	Percentage
Facebook	65	67.70%
Twitter	8	8.33%
Facebook & Twitter	1	1.04%
MySpace	1	1.04%
YouTube	1	1.04%
Not specified	20	20.83%

In accordance with the research areas being developed in relation to teacher-student communication on social networks, five categories have been identified through an inductive process: teacher-student interaction through social networks; impact of teacher-student communication through social networks on the teaching-learning process; content published by teachers and students on their online profiles; students´ perceptions of teacher

credibility according to the content of the instructor´s online profile; friendship requests between professors and students and the privacy of teachers´ and students´ online profiles. Furthermore, in the category "teacher-student interaction through social networks", four sub-categories have been identified: frequency, reasons and opinions about teacher-student communication through social networks as well as most commonly used social networks by teachers and students for interacting with each other. In the category "content published by teachers and students on their profiles" two sub-categories have been identified: exposure to the content of teachers´ and students´ online profiles and inappropriate content of teachers´ and students´ profiles. Table 3 shows the distribution of the documents under analysis in their respective categories. It should be noted that there are several studies that are in more than one category since they have addressed more than one aspect of teacher-student interaction on social networks (see Annex 3).

Table 3: Analyzed studies distributed in the different identified categories

Categories	Sub-categories	Number of studies
Teacher-student interaction through social networks	Frequency of the interaction	13
	Reasons of the interaction	19
	Opinions about the interaction	11
	Most used social networks	6
Impact of teacher-student communication through social networks on the teaching-learning process		51
Content published by teachers and students on their online profiles	Exposure to the content	12
	Inappropriate content	2
Students´ perceptions of teacher credibility according to the content of the instructor´s online profile		8
Friendship requests between teachers and students		21
The privacy of teachers´ and students´ online profiles		8

Below, the main results of the documents under analysis are presented according to their respective categories.

Teacher-student interaction on social networks

Frequency of teacher-student interaction on social networks

Students are willing to use social networks as a means of communication with their teachers (Hamid et al., 2015), using them between 56% and 75% of the cases depending on the study (Ophir, Rosenberg, Asterhan, & Schwarz, 2016; Sendurur, Sendurur, & Yilmaz, 2015). Draskovic, Caic and Kustrak (2013) found that students were motivated by interacting with their teachers through social networks, whereas teachers showed concern and skepticism toward the idea. Saylag (2013) notes that 72% of students agreed to contact their teachers through Facebook to get to know them better. Hurt, Moss, Bradley, Larson and Lovelace (2012) emphasize that students showed no discomfort when interacting with their teachers on Facebook and that teachers created new profiles to interact with their students which lacked personal information, displaying only a profile photo.

40% of teachers contact their students on Facebook, 16% used it in the past and 41% had never communicated with their students through Facebook (Asterhan, Rosenberg, Schwarz, & Solomon, 2013). According to Madge, Meek, Wellens, and Hooley (2009), 91% of students have never used Facebook to communicate with their teachers; 68% have not visited their professors´ Facebook profile and 41% indicate that they would not like their teachers to communicate with them via Facebook. Erjavec (2013) noted that most students did not communicate with their teachers on social networks. Hershkovitz and Forkosh-Baruch (2013) found that communication between teachers and students on Facebook was limited. For Hank, Sugimoto, Tsou and Pomerantz (2014), most teachers and students would prefer not to communicate with each other by means of Facebook. Aaen and Dalsgaard (2016) noted that 65% of students have never used social networks to interact with their teachers while only 10% of students have used social networks to communicate with their teachers. Canós-Rius and Guitert-Catases (2014) point out that 100% of teachers and students have never used Twitter to communicate with each other, while 89% of teachers and 92% of students have never used Facebook to interact with each other.

Reasons of teacher-student interaction on social networks

Teachers use Facebook as a tool for contacting their students primarily for issues related to logistics and class organization (Asterhan & Rosenberg, 2015; Asterhan et al., 2013; Fewkes & McCabe, 2012; Gettman & Cortijo, 2015; Sendurur et al., 2015). Furthermore, they point out that through Facebook they seek to strengthen and support those students who need the most assistance, as well as intervene in cases where a psychosocial problem can be detected through the student´s profile (Asterhan & Rosenberg, 2015) or to provide emotional support (Ophir et al., 2016). Students communicate with their teachers through social networks to ask them about the content of a subject, as well as schedules or dates of exercises or exams (Abu-Alruz, 2014; Draskovic et al., 2013; Gunnulfsen, 2016).

Thus, there is a consensus that teacher-student communication on social networks should be professional, mainly focused on issues related to the academic field (Ean & Lee, 2016; Chromey et al., 2016; DiVerniero & Hosek, 2011; Draskovic et al., 2013; Erjavec, 2013; Foote, 2011; Hewitt & Forte, 2006; Madge et al., 2009; Nemetz, Aiken, Cooney, & Pascal, 2012).

Opinions about the use of social networks as a communication tool between teachers and students

In relation to the acceptance of social networks as a communication tool between teachers and students, for the majority of students it is appropriate to communicate with their teachers on social networks (Baran, 2010; Fondevila et al., 2015; Sendurur et al., 2015) while a minority finds it inappropriate (Madge et al., 2009; Malesky & Peters, 2011; Miron & Ravid, 2015). In addition, there are, on the one hand, gender differences since male students find teacher-student communication on social networks more appropriate than women (Göktas, 2015; Hewitt & Forte, 2006; Teclehaimanot & Hickman, 2011) and, on the other hand, there are differences according to the academic year in question. For example, third and fourth grade students feel more comfortable and interact more with their teachers through social networks compared to first and second year students (Aydin, 2014; Göktas, 2015).

Most used social networks in teacher-student communication

The most used social networks between teachers and students are Facebook (Aaen & Dalsgaard, 2016; Fondevila et al., 2015) and WhatsApp (Canós-Rius & Guitert-Catases, 2014; Ophir et al., 2016). However, Leafman (2015) and Smith (2016) argue that students prefer e-mails to communicate with their teachers by perceiving them as more professional and formal channels of communication, while social networks are perceived as more casual, informal and more appropriate for interacting with classmates.

Impact of teacher-student communication through social networks on the teaching-learning process

In relation to the impact of teacher-student communication through social networks on the teaching-learning process, the improvement of teacher-student communication and teacher-student relationship stands out (Abella & Delgado, 2015; Albayrak & Yildirim, 2015; Amador & Amador, 2014; Hamid et al., 2015; Irwin, Ball, & Desbrow, 2012; Lee, Lee, & Kim, 2015; Rambe & Nel, 2015; Rezende da Cunha, van Kruistum, & van Oers, 2016; Sanchez, Cortijo, & Javed, 2014; Sánchez-Rodríguez, Ruiz-Palmero, & Sánchez-Rivas, 2015; Sobaih, Moustafa, Ghandforoush, & Khan, 2016; Staines & Lauchs, 2013; Wang, 2013; Yakin & Tinmaz, 2013); a deeper understanding of another individual at a personal level (Cole, Hibbert, & Kehoe, 2013; Erjavec, 2013; Kio, 2016; Schroeder et al., 2010) and the breaking of barriers between teachers and students (DeGroot, Young, & VanSlette, 2015; Rambe & Nel, 2015; Rambe & Ng'ambi, 2014). Similarly, teacher-student communication on social networks correlates positively to increased academic motivation (Aubry, 2013; Imlawi, Gregg, & Karimi, 2015; Saylag, 2013); academic performance (Bowman & Akcaoglu, 2014; Jumaat & Tasir, 2013; Junco, Elavsky, & Heiberger, 2013; Mendez et al., 2009; Sarapin & Morris, 2015); student commitment and involvement (Akcaoglu & Bowman, 2016; Annamalai, Tan, & Abdullah, 2016; Bowman & Akcaoglu, 2014; Junco et al., 2013; Imlawi et al., 2015; Meishar-Tal, Kurtz, & Pieterse, 2012; Rezende da Cunha et al., 2016; Schwarz & Caduri, 2016); a positive class environment (Asterhan & Rosenberg, 2015; Mazer, Murphy, & Simonds, 2007); student satisfaction with the teacher-student relationship (Imlawi et al., 2015); student empowerment (Saylag, 2013) and student resilience (Ophir et al., 2016).

However, Evans (2014) found that the use of Twitter as a communication tool between teachers and students did not improve the teacher-student relationship. Furthermore, the inappropriate and irresponsible use of social networks as a communication tool between teachers and students may be detrimental to the teacher-student relationship (Gettman & Cortijo, 2015; Manasijevic, Zivkovic, Arsic, & Milosevic, 2016); to the teacher´s authority and status (Asterhan & Rosenberg, 2015; Draskovic et al., 2013; Foulger, Ewbank, Kay, Osborn, & Lynn, 2009; Kyriacou & Zuin, 2015); to student motivation (Çimen & Yilmaz, 2014) as well as academic performance (Nkhoma et al., 2015).

Content published by teachers and students on their online profiles

Exposure to the content of teachers´ and students´ online profiles

In relation to the exposure to the content that teachers and students share on their profiles, the expectations of both can be affected by observing particular comments, statuses or photos, judgments being made about the other person (Chromey et al., 2016; DiVerniero & Hosek , 2011; Gettman & Cortijo, 2015; Helvie-Mason, 2011; Sleigh, Smith, & Laboe, 2013). Students claim that on their online profiles they display information that they do not want their teachers to see (Cain, Scott, & Akers, 2009; Hank et al., 2014; Hewitt & Forte, 2006) and that they are able to find out information about their teachers´ private lives that they would rather not know (DiVerniero & Hosek, 2011; Foote, 2011; Wang, Novak, Scofield-Snow, Traylor, & Zhou, 2015). Likewise, teachers are concerned about accessing a student's online profile and being exposed to information they would rather not have discovered (Asterhan et al., 2013).

Inappropriate content of teachers´ and students´ online profiles

Teachers consider it to be inappropriate for other teachers to harass or mock students, use unauthorized information, propagate false information, create fictitious profiles, share disruptive information or insult national values on social networks (Deveci & Kolburan, 2015). Thus, teachers understand the need to be as professional as possible to create appropriate learning spaces (Carter, Foulger, & Ewbank, 2008; Forte, Humphreys, & Park, 2012; Mikulec, 2012). Students ranked the following information beginning with the least appropriate all the way to the most appropriate on a teacher's online profile: comments about piercings or tattoos, photos about alcohol consumption, negative comments about other colleagues, comments of a political, racist or religious nature, announcements about class changes, information about exams and positive comments directed to students (Nemetz, 2012).

Students´ perceptions of teacher credibility according to the content of the instructor´s online profile

Instructors´ credibility may be affected by the content of their online profiles when it is inconsistent with the students' previous expectations (DeGroot et al., 2015; Imlawi, Gregg, & Karimi, 2015; Johnson, 2011; Mazer, Murphy, & Simonds, 2009). Thus, a teacher´s Facebook profile that discloses a vast amount of information is more credible than an instructor´s Facebook profile low in self-disclosure (Mazer et al., 2009) while revealing information about alcohol consumption and emotional problems concerning a personal relationship negatively influences students´ perception of teacher credibility (Wang et al., 2015). Johnson (2011) found that instructors who posted social tweets were more credible than teachers who posted scholarly tweets, although DeGroot et al. (2015) suggested that teachers´ online profiles with professional content were the most credible.

Furthermore, the mere existence of a teacher´s Facebook profile can affect their credibility (Barber & Pearce, 2008; Mazer et al., 2009), although there is no research consensus on the existence or direction of such a correlation (Hutchens & Hayes, 2012). It also seems that frequent use of social networks by students positively affects their perceptions of teachers´ credibility (DeGroot et al., 2015; Imlawi, Gregg, & Karimi, 2015; McArthur & Bostedo-Conway, 2012).

Friendship requests between professors and students

According to friendship requests between professors and students on social networks, there is rejection among teachers and students in becoming virtual friends (Bosch, 2009; Bruneel De Wit, Verhoeven, & Elen, 2013; Cain et al., 2009; Gettman & Cortijo, 2015; Gómez et al., 2012; Helvie-Mason, 2011).

Teachers prefer to ignore friendship requests from their students by considering them to be inappropriate relationships (Bosch, 2009; Hank et al., 2014; Sturgeon & Walker, 2009); although some studies note teachers´ neutrality or even receptiveness in this respect (Deveci & Kolburan, 2015; Grosseck, Bran, & Tiru, 2011; Sarapin & Morris, 2015). In terms of students, discomfort is generated in relation to teachers´ friendship requests (Karl & Peluchette, 2011; Miller & Melton, 2015).

Both teachers and students are often added as virtual friends because they have previously had some kind of contact in real life (Amador & Amador, 2014; Baran, 2010; Hershkovitz & Forkosh-Baruch, 2013). Sheldon (2015) points out that students try to add their teachers as friends on Facebook to get to know them better on a personal level. Accordingly, Hank et al. (2014) indicate that most teachers are inclined to add or accept the friendship requests of those students who have completed their university studies. To identify these causes, Akkoyunlu, Daghan and Erdem (2015) developed an instrument to analyze the reasons why teachers add their students as friends on Facebook. On the contrary, if friendship requests between teachers and students are rejected or ignored, it could negatively affect the teacher-student relationship (Atay, 2009; Dearbone, 2014; Hank et al., 2014; Plew, 2011).

The privacy of teachers´ and students´ online profiles

Students point out that social networks are platforms for private use and that their use by teachers to communicate with them is intrusive (Al-Dheleai & Tasir, 2015; Fondevila et al., 2015; Kolek & Saunders, 2008; Mazer et al., 2007; Rambe & Ng'ambi, 2014; Roblyer, McDaniel, Webb, Herman, & Witty, 2010). Similarly, different studies found that teachers restricted student access to their Facebook profiles (Erjavec, 2013; Lin, Kang, Liu, & Weiting, 2015).

CONCLUSIONS

The main objective of the present study was to analyze the use of social networks as a communication tool between teachers and students, determining the educational levels in which research on teacher-student communication on social networks are being developed; the most addressed social networks by research for the analysis of teacher-student interaction, the research areas that are being developed and exposing the main results of the studies under analysis.

With regard to the educational levels in which research on teacher-student communication on social networks are being developed, studies have mainly focused on higher education, mostly in universities. As previously mentioned, more and more university professors use social networks in their teaching practice as a means of communication with their students, so this may be the main reason why the scientific community has shown an interest in addressing teacher-student interaction on social networks in the university field.

In terms of the most addressed social networks by the research for the analysis of teacher-student interaction, studies have mainly focused on Facebook. Facebook, apart from being the most popular social network in the world, is the most used social network in the university field by both teachers and students, so it is likely that researchers have focused their interest on analyzing teacher-student communication by means of Facebook.

Considering the five identified categories and the main results of the analyzed studies, in relation to the frequency of teacher-student interaction through social networks, the use of social networks as a communication tool between teachers and students is not generalized. Therefore, the frequency with which they interact through social networks depends on each teacher and student, influenced perhaps by their perceptions of the use of social networks as a communication tool in the academic field. For this reason, teachers can use social networks as an educational platform but should not force students to use them as communication tool with teachers since each student has a certain perception about the use of social networks within the academic field, so that some students may feel uncomfortable or consider it inappropriate to communicate with their teachers through social networks.

In terms of the reasons why teachers and students communicate through social networks, both use them primarily for academic reasons. Thus, teachers should use social networks as communication tools with their students for class-related issues, such as addressing aspects related to class organization, because if teachers interact with their students on issues that are not related to the academic field, students may feel uncomfortable and the teacher-student relationship could be affected. Therefore, teacher-student interaction through social networks should be as professional as possible.

In relation to the most used social networks by teachers and students as a communication tool, they emphasize Facebook, perhaps due to its popularity among the young population and for offering a great variety of interactive tools as well as WhatsApp, for being the most used messaging service these days, being an instant communicative tool and simple to use.

According to teachers´ and students´ opinions on teacher-student communication through social networks, the acceptance of social networks as a communication tool between them are varied, depending mainly on their perceptions of the subject matter. However, there are clear differences related to gender and academic course according to the opinions of students on teacher-student communication through social networks: male students view teacher-student communication on social networks more appropriate than female students and students in higher courses see teacher-student communication on social networks more appropriate than students in lower courses. This does not mean that teachers should be careful or not interact through social networks with female students or first-year students, but teachers should always explain the reasons or purposes of communicating with their students through social networks in order to reduce the uncertainty or discomfort that some students can have when interacting with their teachers through social networks. If students know from the beginning the intentions of the teacher regarding using social networks as a communication tool, they may feel more comfortable knowing the purpose of the interaction.

With respect to the impact of teacher-student interaction through social networks on the teaching-learning process, the improvement of teacher-student communication and relationship stands out. Likewise, teacher-

student interaction through social networks generates a deeper knowledge of the other person on a personal level; helps break down barriers between teachers and students and positively correlates to increased academic motivation, academic performance, student commitment and involvement, a positive classroom environment, student satisfaction with the teacher-student relationship, student empowerment and student resilience. However, an inappropriate or irresponsible use by both teachers and students of social networks can negatively affect the teacher-student relationship, especially in terms of teacher authority and status as well as student motivation and academic performance. Therefore, in order to improve the teaching-learning processes, teachers should make a responsible use of social networks when interacting with their students and avoiding an inappropriate use of them in order to not damage the teaching-learning processes.

Regarding the exposure to the contents that both teachers and students publish and share on their online profiles, both seem to make judgments about the others according to the content of their respective online profiles. Similarly, teachers´ online profile content affects their credibility as education professionals, so teachers should be cautious about the type of information they wish to publish and share with their students because their credibility could be affected and they must always avoid inappropriate content.

In relation to friendship requests between teachers and students, both teachers and students prefer not to become friends. Possible reasons for this rejection include the desire to keep academic and social lives separate and being uncomfortable with the idea that a teacher or student has complete access to the other´s online profile. Also, teachers and students indicate that a condition to become friends is that there has to have been contact or that they have established a good relationship in real life. In the same way, teachers and students claim that they have accepted friendship requests to avoid damages in the teacher-student relationship. According to the obtained results, we recommend avoiding friendship requests between teachers and students since although there may be good intentions when adding as friends, some students may see this act as favoritism, affecting the teacher-student relationship. Therefore, we recommend that if a student wants to add a teacher as a friend or vice versa, do so once the course is finished. Likewise, if a teacher rejects a friendship request of a student, the teacher should explain to the student the reasons for rejection so that it does not negatively affect the teacher-student relationship.

Regarding the privacy of teachers´ and students´ online profiles, students warn that social networks are platforms for private use and that their use by teachers to communicate with students is a violation of privacy. In this sense, teachers must always respect the privacy of their students and avoid behaviors that could violate their privacy when interacting through social networks.

As a limitation of the study, we point out the absence of studies in other languages that we have not been able to access, so it is not possible to assume all possible data on the subject. Moreover, the use of the ERIC and UNESCO thesaurus have been a limitation of the study since many of the used keywords were not included in them, so it is necessary that the thesaurus are updated to facilitate the search of information, especially if it is an expansion topic such as teacher-student interaction through social networks.

Taking into account the identified categories and the main results of the studies under analysis, we propose, as future research, to continue analyzing teacher-student communication on social networks in other educational levels differing from higher education since the majority of studies have focused on universities; to address teacher-student interaction through other social networks other than Facebook since social networks such as Twitter, WhatsApp or YouTube have received little attention; to analyze the frequency of teacher-student interaction through social networks depending on various factors such as age, sex, academic year and areas of study to determine if there are significant differences between them; to identify motives or situations where students wish to communicate with their teachers on issues that are not within the academic field; to determine if the frequent use of social networks in daily life by teachers and students influences their opinions on the acceptance of teacher-student communication on social networks; to establish possible significant differences between students who communicate with their teachers through social networks and students who do not and their impact on the teaching-learning process; to identify what the inappropriate or irresponsible uses of social networks by teachers that can damage the teacher-student relationship are; to clearly expose what types of content in an online profile are those that grant the teacher more or less credibility and to establish the reasons why a teacher or student sends a friendship request to the other. Likewise, we propose that future research should address teacher-student communication on social networks through comparative studies between different educational levels and between public and private educational institutions.

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Annex 1: Addressed educational levels in teacher-student communication on social networks

Authors	Year	Country	Educational level
Abella & Delgado	2015	Spain	Higher Education
Abu-Alruz	2014	Jordan	Higher Education
Akcaoglu & Bowman	2016	United States	Higher Education
Al-Dheleai & Tasir,	2015	Malaysia	Higher Education
Albayrak & Yildirim	2015	Turkey	Higher Education
Amador & Amador	2014	United States	Higher Education
Atay	2009	United States	Higher Education
Aubry	2013	United States	Higher Education
Aydin	2014	Turkey	Higher Education
Baran	2010	Turkey	Higher Education
Bosch	2009	South Africa	Higher Education
Bowman & Akcaoglu	2014	United States	Higher Education
Bruneel, De Wit, Verhoeven & Elen	2013	Belgium	Higher Education
Cain, Scott & Akers	2009	United States	Higher Education
Canós-Rius & Guitert-Catases	2014	Spain	Higher Education
Chromey, Duchsherer, Pruett & Vareberg	2016	United States	Higher Education
Cole, Hibbert & Kehoe	2013	Australia	Higher Education
DeGroot, Young & VanSlette	2015	United States	Higher Education
Dearbone	2014	United States	Higher Education
Deveci & Kolburan	2015	Turkey	Higher Education
DiVerniero & Hosek	2011	United States	Higher Education
Draskovic, Caic & Kustrak	2013	Croatia	Higher Education
Ean & Lee	2016	Malaysia	Higher Education
Evans	2014	England	Higher Education
Fondevila, Mir, Crespo, Santana, Rom & Puiggròs	2015	Spain	Higher Education
Foote	2011	United States	Higher Education
Foulger, Ewbank, Kay, Osborn & Lynn	2009	United States	Higher Education
Gettman & Cortijo	2015	United States	Higher Education
Göktas	2015	Turkey	Higher Education
Gómez, Roses & Farias	2012	Spain	Higher Education
Grosseck, Bran & Tiru	2011	Romania	Higher Education
Hamid, Waycott, Kurnia & Chang	2015	Malaysia and Australia	Higher Education
Hank, Sugimoto, Tsou & Pomerantz	2014	United States	Higher Education
Helvie-Mason	2011	United States	Higher Education
Hewitt & Forte	2006	United States	Higher Education
Hurt, Moss, Bradley, Larson & Lovelace	2012	United States	Higher Education
Hutchens & Hayes	2012	United States	Higher Education
Imlawi, Gregg & Karimi	2015	Jordan and United States	Higher Education
Irwin, Ball & Desbrow	2012	Australia	Higher Education
Johnson	2011	United States	Higher Education
Jumaat & Tasir	2013	Malaysia	Higher Education
Junco, Elavsky & Heiberger	2013	United States	Higher Education
Karl & Peluchette	2011	United States and Australia	Higher Education
Kolek & Saunders	2008	United States	Higher Education
Leafman	2015	United States	Higher Education
Lin, Kang, Liu & Lin	2015	Taiwan	Higher Education
Madge, Meek, Wellens & Hooley	2009	England	Higher Education
Malesky & Peters	2012	United States	Higher Education
Manasijevic, Zivkovic, Arsic & Milosevic	2016	Serbia	Higher Education
Mazer, Murphy & Simonds	2007	United States	Higher Education
Mazer, Murphy & Simonds	2009	United States	Higher Education
Meishar-Tal, Kurtz & Pieterse	2012	Israel	Higher Education
McArthur & Bostedo-Conway	2012	United States	Higher Education
Mendez, Curry, Mwavita, Kennedy, Weinland, & Bainbridge	2009	United States	Higher Education
Miller & Melton	2015	United States	Higher Education

Nemetz	2012	United States	Higher Education
Nemetz, Aiken, Cooney & Pascal	2012	United States	Higher Education
Nkhoma et al.	2015	Vietnam and Australia	Higher Education
Plew	2011	United States	Higher Education
Rambe & Nel	2015	South Africa	Higher Education
Rambe & Ng´ambi	2014	South Africa	Higher Education
Roblyer, McDaniel, Webb, Herman & Witty	2010	United States	Higher Education
Sanchez, Cortijo & Javed	2014	Spain, US and Pakistan	Higher Education
Sánchez-Rodríguez, Ruiz-Palmero & Sánchez-Rivas	2015	Spain	Higher Education
Sarapin & Morris	2015	United States	Higher Education
Saylag	2013	Turkey	Higher Education
Schroeder, Minocha & Schneidert	2010	England and Hong Kong	Higher Education
Sheldon	2015	United States	Higher Education
Sleigh, Smith & Laboe	2013	United States	Higher Education
Smith	2016	Canada	Higher Education
Sobaih, Moustafa, Ghandforoush & Khan	2016	Egypt and United States	Higher Education
Staines & Lauchs	2013	Australia	Higher Education
Sturgeon & Walker	2009	United States	Higher Education
Teclehaimanot & Hickman	2011	United States	Higher Education
Wang	2013	Taiwan	Higher Education
Wang, Novak, Scofield-Snow, Traylor & Zhou	2015	United States	Higher Education
Yakin & Tinmaz	2013	Turkey	Higher Education
Aen & Dalsgaard	2016	Denmark	Secondary Edu
Annamalai, Tan & Abdullah	2016	Malaysia	Secondary Edu
Asterhan & Rosenberg	2015	Israel	Secondary Edu
Asterhan, Rosenberg, Schwarz & Solomon	2013	Israel	Secondary Edu
Barber & Pearce	2008	Canada	Secondary Edu
Fewkes & McCabe	2012	Canada	Secondary Edu
Gunnulfsen	2016	Norway	Secondary Edu
Hershkovitz & Forkosh-Baruch	2013	United States and Israel	Secondary Edu
Kio	2016	China	Secondary Edu
Miron & Ravid	2015	Israel	Secondary Edu
Rezende da Cunha, van Kruistum & van Oers	2016	Netherlands	Secondary Edu
Schwarz & Caduri	2016	Israel	Secondary Edu
Çimen & Yılmaz	2014	Turkey	Elementary Edu
Erjavec	2013	Slovenia	Elementary Edu
Lee, Lee & Kim	2015	Korea	Elementary Edu
Sendurur, Sendurur & Yilmaz	2015	Turkey	Elementary Edu
Akkoyunlu, Daghan & Erdem	2015	Turkey	Not specified
Kyriacou & Zuin	2015	England	Not specified
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Not specified

Annex 2: Analyzed social networks in relation to teacher-student communication

Authors	Year	Country	Social Network
Aaen & Dalsgaard	2016	Denmark	Facebook
Abu-Alruz	2014	Jordan	Facebook
Akcaoglu & Bowman	2016	United States	Facebook
Akkoyunlu, Daghan & Erdem	2015	Turkey	Facebook
Al-Dheleai & Tasir	2015	Malaysia	Facebook
Albayrak & Yildirim	2015	Turkey	Facebook
Amador & Amador	2014	United States	Facebook
Annamalai, Tan & Abdullah	2016	Malaysia	Facebook
Asterhan & Rosenberg	2015	Israel	Facebook
Asterhan, Rosenberg, Schwarz & Solomon	2013	Israel	Facebook
Atay	2009	United States	Facebook
Aubry	2013	United States	Facebook
Aydin	2014	Turkey	Facebook
Baran	2010	Turkey	Facebook
Barber & Pearce	2008	Canada	Facebook

Bosch	2009	South Africa	Facebook
Bowman & Akcaoglu	2014	United States	Facebook
Bruneel, De Wit, Verhoeven & Elen	2013	Belgium	Facebook
Cain, Scott & Akers	2009	United States	Facebook
Dearbone	2014	United States	Facebook
DiVerniero & Hosek	2011	United States	Facebook
Ean & Lee	2016	Malaysia	Facebook
Erjavec	2013	Slovenia	Facebook
Fewkes & McCabe	2012	Canada	Facebook
Fondevila, Mir, Crespo, Santana, Rom & Puiggròs	2015	Spain	Facebook
Foote	2011	United States	Facebook
Gettman & Cortijo	2015	United States	Facebook
Göktas	2015	Turkey	Facebook
Grosseck, Bran & Tiru	2011	Romania	Facebook
Gunnulfsen	2016	Norway	Facebook
Hank, Sugimoto, Tsou & Pomerantz	2014	United States	Facebook
Helvie-Mason	2011	United States	Facebook
Hershkovitz & Forkosh-Baruch	2013	United States and Israel	Facebook
Hewitt & Forte	2006	United States	Facebook
Hurt, Moss, Bradley Larson & Lovelace	2012	United States	Facebook
Hutchens & Hayes	2012	United States	Facebook
Imlawi, Gregg & Karimi	2015	Jordan and United States	Facebook
Irwin, Ball & Desbrow	2012	Australia	Facebook
Jumaat & Tasir	2013	Malaysia	Facebook
Karl & Peluchette	2011	United States and Australia	Facebook
Kio	2016	China	Facebook
Kolek & Saunders	2008	United States	Facebook
Lin, Kang, Liu & Lin	2015	Taiwan	Facebook
Madge, Meek, Wellens & Hooley	2009	England	Facebook
Manasijevic, Zivkovic, Arsic & Milosevic	2016	Serbia	Facebook
Mazer, Murphy & Simonds	2007	United States	Facebook
Mazer, Murphy & Simonds	2009	United States	Facebook
Meishar-Tal, Kurtz & Pieterse	2012	Israel	Facebook
Mendez, Curry, Mwavita, Kennedy, Weinland & Bainbridge	2009	United States	Facebook
Miron & Ravid	2015	Israel	Facebook
Nkhoma et al.	2015	Vietnam and Australia	Facebook
Plew	2011	United States	Facebook
Rambe & Ng´ambi	2014	South Africa	Facebook
Rezende da Cunha, van Kruistum & van Oers	2016	Netherlands	Facebook
Roblyer, McDaniel, Webb, Herman & Witty	2010	United States	Facebook
Sanchez, Cortijo & Javed	2014	Spain, United States and Pakistan	Facebook
Sarapin & Morris	2015	United States	Facebook
Saylag	2013	Turkey	Facebook
Sheldon	2015	United States	Facebook
Sleigh, Smith & Laboe	2013	United States	Facebook
Staines & Lauchs	2013	Australia	Facebook
Sturgeon & Walker	2009	United States	Facebook
Teclehaimanot & Hickman	2011	United States	Facebook
Wang	2013	Taiwan	Facebook
Wang, Novak, Scofield-Snow, Traylor & Zhou	2015	United States	Facebook
Abella & Delgado	2015	Spain	Twitter
Cole, Hibbert & Kehoe	2013	Australia	Twitter
DeGroot, Young & VanSlette	2015	United States	Twitter
Evans	2014	England	Twitter
Johnson	2011	United States	Twitter
Junco, Elavsky & Heiberger	2013	United States	Twitter
McArthur & Bostedo-Conway	2012	United States	Twitter
Yakin & Tinmaz	2013	Turkey	Twitter

Miller & Melton	2015	United States	Facebook and Twitter
Foulger, Ewbank, Kay, Osborn & Lynn	2009	United States	MySpace
Kyriacou & Zuin	2015	England	YouTube
Çimen & Yılmaz	2014	Turkey	Not specified
Canós-Rius & Guitert-Catases	2014	Spain	Not specified
Chromey, Duchsherer, Pruett & Vareberg	2016	United states	Not specified
Deveci & Kolburan	2015	Turkey	Not specified
Gómez, Roses & Farias	2012	Spain	Not specified
Draskovic, Caic & Kustrak	2013	Croatia	Not specified
Hamid, Waycott, Kurnia & Chang	2015	Malaysia and Australia	Not specified
Leafman	2015	United States	Not specified
Lee, Lee & Kim	2015	Korea	Not specified
Malesky & Peters	2012	United States	Not specified
Nemetz	2012	United States	Not specified
Nemetz, Aiken, Cooney & Pascal	2012	United States	Not specified
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Not specified
Rambe & Nel	2015	South Africa	Not specified
Sánchez-Rodríguez, Ruiz-Palmero & Sánchez-Rivas	2015	Spain	Not specified
Schroeder, Minocha & Schneidert	2010	England and Hong Kong	Not specified
Schwarz & Caduri	2016	Israel	Not specified
Sendurur, Sendurur, & Yilmaz	2015	Turkey	Not specified
Smith	2016	Canada	Not specified
Sobaih, Moustafa, Ghandforoush & Khan	2016	Egypt and United States	Not specified

Annex 3: Analyzed studies distributed in the different identified categories

Authors	Year	Country	Category
Aaen & Dalsgaard	2016	Denmark	Frequency of interaction
Asterhan, Rosenberg, Schwarz & Solomon	2013	Israel	Frequency of interaction
Canós-Rius & Guitert-Catases	2014	Spain	Frequency of interaction
Draskovic, Caic & Kustrak	2013	Croatia	Frequency of interaction
Erjavec	2013	Slovenia	Frequency of interaction
Hamid, Waycott, Kurnia & Chang	2015	Malaysia and Australia	Frequency of interaction
Hank, Sugimoto, Tsou & Pomerantz	2014	United States	Frequency of interaction
Hershkovitz & Forkosh-Baruch	2013	United States and Israel	Frequency of interaction
Hurt, Moss, Bradley, Larson & Lovelace	2012	United States	Frequency of interaction
Madge, Meek, Wellens & Hooley	2009	England	Frequency of interaction
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Frequency of interaction
Saylag	2013	Turkey	Frequency of interaction
Sendurur, Sendurur & Yilmaz	2015	Turkey	Frequency of interaction
Abu-Alruz	2014	Jordan	Reasons of interaction
Asterhan, Rosenberg, Schwarz & Solomon	2013	Israel	Reasons of interaction
Asterhan & Rosenberg	2015	Israel	Reasons of interaction
Chromey, Duchsherer, Pruett & Vareberg	2016	United States	Reasons of interaction
DiVerniero & Hosek	2011	United States	Reasons if interaction
Draskovic, Caic & Kustrak	2013	Croatia	Reasons of interaction
Ean & Lee	2016	Malaysia	Reasons of interaction
Erjavec	2013	Slovenia	Reasons of interaction
Fewkes & McCabe	2012	Canada	Reasons of interaction
Foote	2011	United States	Reasons of interaction
Gettman & Cortijo	2015	United States	Reasons of interaction
Gunnulfsen	2016	Norway	Reasons of interaction
Hewitt & Forte	2006	United States	Reasons of interaction
Madge, Meek, Wellens & Hooley	2009	England	Reasons of interaction
Nemetz, Aiken, Cooney & Pascal	2012	United States	Reasons of interaction
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Reasons of interaction
Sendurur, Sendurur & Yilmaz	2015	Turkey	Reasons of interaction
Aydin	2014	Turkey	Opinions about the interaction

Baran	2010	Turkey	Opinions about the interaction
Fondevila, Mir, Crespo, Santana, Rom & Puiggròs	2015	Spain	Opinions about the interaction
Göktas	2015	Turkey	Opinions about the interaction
Hewitt & Forte	2006	United States	Opinions about the interaction
Madge, Meek, Wellens & Hooley	2009	England	Opinions about the interaction
Malesky & Peters	2011	United States	Opinions about the interaction
Miron & Ravid	2015	Israel	Opinions about the interaction
Sendurur, Sendurur & Yilmaz	2015	Turkey	Opinions about the interaction
Teclehaimanot & Hickman	2011	United States	Opinions about the interaction
Aaen & Dalsgaard	2016	Denmark	Most used social network
Canós-Rius & Guitert-Catases	2014	Spain	Most used social network
Fondevila, Mir, Crespo, Santana, Rom, & Puiggròs	2015	Spain	Most used social network
Leafman	2015	United States	Most used social network
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Most used social network
Smith	2016	Canada	Most used social network
Abella & Delgado	2015	Spain	Impact of teacher-student interaction
Akcaoglu & Bowman	2016	United States	Impact of teacher-student interaction
Albayrak & Yildirim	2015	Turkey	Impact of teacher-student interaction
Amador & Amador	2014	United States	Impact of teacher-student interaction
Annamalai, Tan, & Abdullah	2016	Malaysia	Impact of teacher-student interaction
Asterhan & Rosenberg	2015	Israel	Impact of teacher-student interaction
Aubry	2013	United States	Impact of teacher-student interaction
Bowman & Akcaoglu	2014	United States	Impact of teacher-student interaction
Çimen & Yilmaz	2014	Turkey	Impact of teacher-student interaction
Cole, Hibbert & Kehoe	2013	Australia	Impact of teacher-student interaction
DeGroot, Young & VanSlette	2015	United States	Impact of teacher-student interaction
Draskovic, Caic & Kustrak	2013	Croatia	Impact of teacher-student interaction
Erjavec	2013	Slovenia	Impact of teacher-student interaction
Evans	2014	England	Impact of teacher-student interaction
Foulger, Ewbank, Kay, Osborn & Lynn	2009	United States	Impact of teacher-student interaction
Gettman & Cortijo	2015	United States	Impact of teacher-student interaction
Hamid, Waycott, Kurnia & Chang	2015	Malaysia and Australia	Impact of teacher-student interaction
Imlawi, Gregg & Karimi	2015	Jordan and United	Impact of teacher-student

		States	interaction
Irwin, Ball & Desbrow	2012	Australia	Impact of teacher-student interaction
Jumaat & Tasir	2013	Malaysia	Impact of teacher-student interaction
Junco, Elavsky & Heiberger	2013	United States	Impact of teacher-student interaction
Kio	2016	China	Impact of teacher-student interaction
Kyriacou & Zuin	2015	England	Impact of teacher-student interaction
Lee, Lee & Kim	2015	Korea	Impact of teacher-student interaction
Manasijevic, Zivkovic, Arsic & Milosevic	2016	Serbia	Impact of teacher-student interaction
Mazer, Murphy & Simonds	2007	United States	Impact of teacher-student interaction
Meishar-Tal, Kurtz & Pieterse	2012	Israel	Impact of teacher-student interaction
Mendez, Curry, Mwavita, Kennedy, Weinland & Bainbridge	2009	United States	Impact of teacher-student interaction
Nkhoma et al.	2015	Vietnam and Australia	Impact of teacher-student interaction
Ophir, Rosenberg, Asterhan & Schwarz	2016	Israel	Impact of teacher-student interaction
Rambe & Nel	2015	South Africa	Impact of teacher-student interaction
Rambe & Ng'ambi	2014	South Africa	Impact of teacher-student interaction
Rezende da Cunha, van Kruistum & van Oers	2016	Netherlands	Impact of teacher-student interaction
Sanchez, Cortijo & Javed	2014	Spain, United States and Pakistan	Impact of teacher-student interaction
Sánchez-Rodríguez, Ruiz-Palmero & Sánchez-Rivas	2015	Spain	Impact of teacher-student interaction
Sarapin & Morris	2015	United States	Impact of teacher-student interaction
Saylag	2013	Turkey	Impact of teacher-student interaction
Schroeder, A., Minocha & Schneidert	2010	England and Hong Kong	Impact of teacher-student interaction
Schwarz & Caduri	2016	Israel	Impact of teacher-student interaction
Sobaih, Moustafa, Ghandforoush & Khan	2016	Egypt and United States	Impact of teacher-student interaction
Staines & Lauchs	2013	Australia	Impact of teacher-student interaction
Wang	2013	Taiwan	Impact of teacher-student interaction
Yakin & Tinmaz	2013	Turkey	Impact of teacher-student interaction
Asterhan, Rosenberg, Schwarz & Solomon	2013	Israel	Exposure to the content
Cain, Scott & Akers	2009	United States	Exposure to the content
Chromey, Duchsherer, Pruett & Vareberg	2016	United States	Exposure to the content
DiVerniero & Hosek	2011	United States	Exposure to the content
Foote	2011	United States	Exposure to the content
Gettman & Cortijo	2015	United States	Exposure to the content
Hank, Sugimoto, Tsou & Pomerantz	2014	United States	Exposure to the content
Helvie-Mason	2011	United States	Exposure to the content
Hewitt & Forte	2006	United States	Exposure to the content

Sleigh, Smith & Laboe	2013	United States	Exposure to the content
Wang, Novak, Scofield-Snow, Traylor & Zhou	2015	United States	Exposure to the content
Deveci & Kolburan	2015	Turkey	Inappropriate content
Nemetz	2012	United States	Innapropiate content
Barber & Pearce	2008	Canada	Students´ perceptions of teacher credibility
DeGroot, Young & VanSlette	2015	United States	Students´ perceptions of teacher credibility
Hutchens & Hayes	2012	United States	Students´ perceptions of teacher credibility
Imlawi, Gregg & Karimi	2015	Jordan and United States	Students´ perceptions of teacher credibility
Johnson	2011	United States	Students´ perceptions of teacher credibility
Mazer, Murphy & Simonds	2009	United States	Students´ perceptions of teacher credibility
McArthur & Bostedo-Conway	2012	United States	Students´ perceptions of teacher credibility
Wang, Novak, Scofield-Snow, Traylor & Zhou	2015	United States	Students´ perceptions of teacher credibility
Akkoyunlu, Daghan & Erdem	2015	Turkey	Friendship requests
Amador & Amador	2014	United States	Friendship requests
Atay	2009	United States	Friendship requests
Baran	2010	Turkey	Friendship requests
Bosch	2009	South Africa	Friendship requests
Bruneel De Wit, Verhoeven & Elen	2013	Belgium	Friendship requests
Cain, Scott & Akers	2009	United States	Friendship requests
Dearbone	2014	United States	Friendship requests
Deveci & Kolburan	2015	Turkey	Friendship requests
Gettman & Cortijo	2015	United States	Friendship requests
Gómez, Roses & Farias	2012	Spain	Friendship requests
Grosseck, Bran & Tiru	2011	Romania	Friendship requests
Hank, Sugimoto, Tsou & Pomerantz	2014	United States	Friendship requests
Helvie-Mason	2011	United States	Friendship requests
Hershkovitz & Forkosh-Baruch	2013	United States and Israel	Friendship requests
Karl & Peluchette	2011	United States and Australia	Friendship requests
Miller & Melton	2015	United States	Friendship requests
Plew	2011	United States	Friendship requests
Sarapin & Morris	2015	United States	Friendship requests
Sheldon	2015	United States	Friendship requests
Sturgeon & Walker	2009	United States	Friendship requests
Al-Dheleai & Tasir	2015	Malaysia	Privacy of profiles
Erjavec	2013	Slovenia	Privacy of profiles
Fondevila, Mir, Crespo, Santana, Rom & Puiggròs	2015	Spain	Privacy of profiles
Kolek & Saunders	2008	United States	Privacy of profiles
Lin, Kang, Liu & Weiting	2015		Privacy of profiles
Mazer, Murphy & Simonds	2007	United States	Privacy of profiles
Rambe & Ng'ambi	2014	South Africa	Privacy of profiles
Roblyer, McDaniel, Webb, Herman & Witty	2010	United States	Privacy of profiles

The Written Expression Performance of Students with Hearing Loss: Results from an Implementation of the Auditory-Oral Approach

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ABSTRACT
Written expression skills play an important role in the development of the linguistic, academic and social skills of individuals from their school years onwards. The aim of this study was to evaluate the written expression performance of hearing-impaired students who receive auditory-oral education, and examine the student characteristics that affect performance. The study participants were 36 fourth, sixth, seventh and eighth grade students with hearing loss. The results of the study show that students received a mean total score of 60.59 out of 100 for written expression. Chronological age explained 26% of the variance in written expression, age at the first hearing aid fitting explained 43% and 20% was explained by the duration of preschool education. The results indicated that in addition to school education, early identification and early intervention affect the written expression performance of school-age students with hearing loss.

Keywords: hearing loss, writing skills, auditory-oral approach, balanced literacy, writing process

INTRODUCTION

Written expression involves coding thoughts, experiences and information using written symbols, in line with the purpose and the language skills of the author (Albertini, Marschark, & Kincheloe, 2015). Just as it is with listening, speaking and reading skills, the development of writing skills is directly related to the interaction between linguistic skills. Hearing loss, which causes delays in the development of listening and speaking skills, directly affects literacy skills during school years. This is because literacy skills require the use of phonological, syntactic, semantic and pragmatic skills, which start with the development of verbal language in the preschool years.

As is the case for children with normal hearing, expressing thoughts in a written format, following rules and a certain order, is a difficult task for children with hearing loss (Mascia-Reed, 2012). This is because written expression requires the simultaneous use of many skills. These include, deciding what to write about, the organization of thoughts prior to writing and selecting words that express the intended meaning, while paying attention to the relationship between letters and sounds. Written expression also requires forming sentences that follow syntax rules, making proper use of punctuation marks during writing and also reviewing and revising the text after writing. Due to the use of various skills prior to, during and after writing, the development of written expression skills is viewed as a process, and instructional practices are based on the process of writing (Dostal, Bowers, Wolbers, & Gabriel, 2015). The adoption of the writing process approach is very important for children to develop positive attitudes toward reading and writing, set reading and writing goals. This approach is also important for producing quality written work, particularly for children who struggle with or are delayed in developing their linguistic skills (Tompkins, 2014). With the adoption of the writing process approach, which is generally acknowledged to comprise prewriting, drafting, revising and editing, and publishing, children with hearing loss improve their written expression skills, similar to children with normal hearing (Girgin & Karasu, 2007; Schirmer, Bailey, & Fitzgerald, 1999; Schley & Albertini, 2005; Wolbers, 2007; Wolbers, Dostal, & Bowers, 2011; Wolbers, Dostal, Graham, Branum-Martin, Kilpatrick, & Saulsburry, 2016).

The Balanced Literacy Approach, which has its roots in the Whole Language Approach, enables the implementation of the writing process in the form of meaningful activities, as it treats linguistic skills as a whole in the acquisition and development of literacy skills (Tompkins, 2014). In the balanced literacy approach, verbal language, reading, comprehension, writing, voice skills, vocabulary, content knowledge, strategy teaching and spelling are considered together (Farris, Fuhler, & Walther, 2004). Interactive writing, structured writing, patterned writing, journal writing and shared writing activities can be implemented in a balanced literacy program. Teachers' guides published in Turkey by the Ministry of National Education (MEB) do not mention the writing process in the context of written expression activities, but learning outcomes are set within the

framework of the writing process. In addition, the section on activities mentions free writing, sensory writing, group writing, guided writing, critical writing and creative writing methods, similar to balanced literacy practices (MEB, 2015). These practices, which are included in the guides and are activity-based, include the writing process; however, in studies conducted with students with normal hearing, due to implementation problems such as prewriting activities not being possible in crowded classrooms and the failure to review written products together, it has been found that students have difficulty in selecting topics and are not willing to write (Kurudayioglu & Karadag, 2010), are unable to use language effectively (Calp, 2015) and have limited vocabularies (Cer & Agrelim, 2016).

Children with hearing loss face many difficulties in the development of written expression skills (Dostal *et al.*, 2015; Strassman & Schirmer, 2012; Wolbers, 2007). Studies show that delays in the development of verbal language and reading skills are reflected in written products, when compared with their peers with normal hearing students with hearing loss write shorter compositions, use fewer verbs and clauses, usually form sentences with simple tenses, make mistakes in spelling and syntax and have difficulty organizing and concluding their thoughts (Albertini & Schley, 2011; Gormley & Sarachan-Deily, 1987; Karasu & Girgin, 2007; Schirmer, 2000; Wolbers, 2007; Yoshinaga-Itano & Downey, 1992; 1996). To deal with these difficulties, authentic in-class activities that take the stages of the writing process into account, and strategies to be underlined according to the needs of the students should form the basis of instructional practices. For example, the development of strategies such as identifying the purpose and the topic prior to writing, ordering thoughts when preparing a draft, organizing thoughts by forming connections between events, and identifying and correcting mistakes in a text by making use of syntactic and semantic clues, affect written expression performance. It is reported that students with hearing loss perform at levels similar to their peers with normal hearing when the development of linguistic, academic and social skills is supported, an education program tailored to individual needs is followed, and strategy teaching and the writing process are included (Akay, 2011; Antia, Reed, & Kreimeyer, 2005; Geers & Hayes, 2011; Heefner & Shaw, 1996; Girgin & Karasu, 2007; Wolbers, Dostal, & Bowers, 2011).

Some studies report that the fitting of cochlear implants at an early age, which is becoming increasingly common in recent years, limits the delay that children with hearing loss experience in the development of their reading and writing skills, and also results in the improvement of literacy skills, due to the development of verbal language skills (Connor & Zwolan, 2004; Geers, 2002; Johnson & Goswami, 2010; Spencer, Tomblin, & Gantz, 1997; Tomblin, Spencer, & Gantz, 2000). Even so, in addition to general factors that affect literacy skills of children with normal hearing, such as intelligence, learning processes socioeconomic status and school education, this improvement also depends on the early fitting of the implant, together with the presence and quality of auditory-oral education prior to and after the implant (Chute & Nevins, 2003; Geers, Nicholas, & Moog, 2007; Geers & Hayes, 2011; Marschark, Rhoten, & Fabich, 2007; Paul, 2008; Pisoni, Cleary, Geers, & Tobey, 1999; Turan, 2006). The literacy approach adopted at a school, the school culture, academic quality of the practices, teacher development and ensuring family participation are the main factors in determining the overall quality of an educational environment (Mascia-Reed, 2012). Auditory-oral education, which offers important advantages in the development of literacy skills, should not be interpreted as the use of hearing aids and verbal communication in an haphazard and unplanned way in the school environment. In addition to the intensive use of activities targeting listening and speaking skills following the fitting of hearing aids at an early age, to develop academic skills auditory-oral education requires the intense and systematic implementation of education programs based on hearing and verbal language (Moog, 2002).

The evaluation of academic skills not only makes it possible to shape education programs by identifying the individual needs of students, it also allows tracking the benefit that the student gets from the current program. In the international literature, the written expression skills of children with hearing loss were first evaluated by Heider and Heider in 1940, and until the 1970s, syntax errors in sentences written by students with hearing loss, sentence length, and compliance with writing conventions were used as the criteria in evaluations (e.g. Greenberg & Withers, 1965; Heider & Heider, 1940; Myklebust, 1964; Wilbur, 1977). In subsequent studies, criteria used in the evaluation of written products began to include content and sections of a text, the organization of thoughts and the diversity of vocabulary, based on the idea that a text should be evaluated as a whole (e.g. Burman, Evans, Nunes, & Bell, 2008; Gormley & Sarachan-Deily, 1987; Heefner & Shaw, 1996; Klecan-Aker & Blondeau, 1990; Yoshinago-Itano & Synder,1985; Yoshinago-Itano & Downey,1992; 1996). In 2000s, on the other hand, studies focused on teaching methods that supported the development of written expression skills (Antia, Reed, & Kreimeyer, 2005; Cheng & Rose, 2009; Dostal *et al.*, 2015; Easterbrooks & Stoner, 2006; Lang & Albertini , 2001; Schirmer, Bailey, & Fitzgerald, 1999; Schley & Albertini, 2005; Wolbers, 2007; Wolbers, Dostal, & Bowers, 2011; Wolbers *et al.*, 2016), and examined the impact of

developments in hearing aids and cochlear implants on the written expression skills of students with hearing loss (Geers & Hayes, 2011; Nelson, 2008; Spencer, Baker, & Tomblin, 2003).

Studies conducted in Turkey evaluated the written products of students with hearing impairment in various educational environments (Efe, 2016; Erdiken, 1989; 1996; 2003; Girgin & Karasu, 2007; Karasu, 2004; Tiryaki, 2014; Tuncay,1980; Turgut, 2012), identified the shortcomings of students with hearing loss in the editing and revising stage (Karasu, 2014), and examined the effect of use of cochlear implants on written expression (Yaşamsal, 2010). In some of these studies (Efe, 2016; Girgin & Karasu, 2007; Karasu, 2004; Turgut, 2012; Yaşamsal, 2010), the written expression performance of students was evaluated using the Written Expression Skills Evaluation Form developed by Yıldızlar (1994) and adapted by Karasu (2004). The Written Expression Skills Evaluation Form, which is also used in the present study to evaluate students' written products, is an analytical evaluation form that consists of title, organization, narrative diversity and compliance with writing conventions sections, with a total score of 100. The present study, which evaluates results from an implementation of the auditory-oral approach, can contribute to the identification of needs that arise over time concerning written expression skills of students with hearing loss, and revision of education programs on this basis. This is because the academic success of an educational environment depends on conducting systematic evaluations of the applied activities and the evolving needs of the students (Mascia-Reed, 2012). The findings of the present study are expected to contribute to audiologic interventions and educational environments for students with hearing loss, by underlining the benefits that students obtain from an auditory-oral educational environment and the importance of the variables that affect written expression skills. The aim of this study is to evaluate the written expression performance of students with hearing impairment who are taught using the auditory-oral approach. To this end, answers were sought to the following questions: (a) What are the skill levels of students with hearing impairment, in terms of title, organization, narrative diversity, compliance with writing conventions and overall written expression? (b) Which student characteristics account for the written expression scores?

METHOD

This study uses the descriptive and correlational model to identify the written expression levels of students with hearing loss and to examine the student characteristics that explain written expression scores. The descriptive model serves to establish the current situation, and the correlational model is used to identify interactions between the multiple variables (Gay, Mills, & Airasian, 2012).

Participants

This study was conducted in the Education and Research Center for Hearing-Impaired Children (ICEM), established in 1979 by Anadolu University. ICEM provides preschool, elementary, and middle school education to children with hearing loss, using the auditory-oral approach. In addition to following the MEB curricula, the center runs literacy programs within the framework of the balanced literacy approach and holds group lessons and one-on-one activities based on individual needs of the students. In accordance with the MEB curriculum, independent writing activities commence in the fourth grade, and students are asked to write individual stories. Therefore, the participants in this study were 36 fourth, sixth, seventh and eighth grade students with hearing loss attending ICEM in the 2015-2016 academic year. In this academic year, there were no fifth graders with hearing loss attending ICEM. Prior to the research, written permission was obtained from the parents of students with hearing loss for participation in the research. Seven students with IQ scores lower than 85 on the Wechsler Intelligence Scale for Children-Revised (WISC-R), who had been diagnosed with a learning disability and neurological problems, were not included in the study. Descriptive statistics concerning demographic, educational and audiological characteristics of the participants in the study are reported in Table 1 in the form of categorical and continuous variables.

Table 1: Descriptive statistics of participant characteristics (n = 36) *Note.* dBHL = decibel Hearing Level

Categorical Variables	***N***	***%***
Grade		
4th Grade	12	33.3
6th Grade	2	5.6
7th Grade	14	38.9
8th Grade	8	22.2
Parental Education		
Received	19	52.8
Not Received	17	47.2
Preschool Education		
Received	26	72.2

Not Received	10	27.8	
Continuous Variables	***Mean***	***SD***	**Minimum-Maximum**
Age (months)	155.80	22.42	117-190
Hearing level [dBHL]	99.58	12.93	70-120
Age at the first hearing aid fitting (months)	16.33	9.88	5-40
Age of cochlear fitting (months)	56.85	19.50	24-120
Age of starting preschool education (months)	43	12.09	34-77
Duration of preschool education	21.52	16.08	0-36
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As Table 1 shows, 12 (33.3%) of the participants were fourth graders, 2 (5.6%) were sixth graders, 14 (38.9%) were seventh graders, and 8 (22.2%) were eighth graders. Thirty-one students had profound hearing loss (90 dBHL and above), and 5 students had severe hearing loss (70 - 89 dBHL). A total of 26 (72.2%) students received preschool education from ICEM, whereas 10 (27.8%) did not. The chronological ages of the students varied between 9 years and 9 months, and 15 years and 10 months. The age at which the first hearing aid fitting was made varied from 5 months to 3 years and 4 months. Of the students, 27 had cochlear implants, and 9 were wearing behind-the-ear hearing aids.

Data Sources

Data for the study were collected using the student information form, which contained items on student characteristics, and the scores given to the students' stories. The student information form, developed to identify characteristics that explain written expression skills, contained items on the demographic, audiological and educational characteristics of the students. Files kept at the audiology clinic and the parents were other sources of data for the student characteristics.

In order to assign written expression scores to the students, first, the written products were obtained from the students, and then these were scored using the analytical scoring method. The quality of a written product is directly related to the way in which it is obtained. Prewriting activities enable the students to share their feelings and thoughts on the subject/event, drawing on their knowledge and experiences, and to initiate, develop and conclude narratives. Prewriting activities can be performed using various materials, by sharing events on a single card or sequential cards, using newspaper stories, or by discussing scenes from a movie (Burman *et al.*, 2008; Yoshinago-Itano & Downey, 1996). In this study, the prewriting activity was carried out using five sequential picture cards depicting a dog stealing food from a bag and running away with it, children chasing the dog, getting caught up in the traffic and crowds, before the dog finally brings the food to its puppies.

Events on the sequential picture cards were shared with the students in one-on-one environments, as part of the prewriting activity. Then the stories written by the students were scored using the Written Expression Skills Evaluation Form. The Written Expression Skills Evaluation Form, based on analytical scoring, consists of four sections: title, organization, narrative diversity and compliance with writing conventions. The form has a maximum total score of 100, with a maximum of 3 points for the title, 51 points for organization, 24 points for narrative diversity, and 22 points for compliance with writing conventions. In the title section, evaluation is based on whether the writing has a title and if so, whether the title is relevant to the content. In the Written Expression Skills Evaluation Form, the section that contributes most to the total score is the organization section. This is because the organization involves the ordering of ideas in terms of the introduction, development and conclusion, recounting the main events, forming connections between the events, creating the message content, and drawing a conclusion. In the narrative diversity section, spelling and the use of words, sentence structure and vocabulary skills are evaluated. The section on compliance with writing conventions focuses on punctuation marks, capitalization, paragraphs and layout.

Procedure

To obtain the written products, prewriting activities were held between May 27 and June 5, 2015, using sequential cards in one-on-one sessions with each student, and then the students were asked to write a story about the event. To ensure the consistent performance of the prewriting activity for every student, an activity plan was developed and this plan was followed during the activities. In the prewriting activity, the students' narratives were accepted and the same questions were asked to every student concerning the events depicted on the cards. Following the prewriting activity, students were asked to write a story; no visual or verbal were clues were given during the writing stage, and no time limits were imposed. Together, the prewriting activity and the writing stage lasted for about 15-25 minutes. For reliability and validity analysis, the activities were video-recorded.

Validity and Reliability Process

In a master's thesis, Efe (2016) reports that the sequential cards used in this study to obtain written products were examined by two field experts in terms of their story grammar, component integrity, contents, age and grade suitability, and content validity as prewriting activity material. The present study uses the Written Expression Skills Evaluation Form, which has been used in previous studies conducted in Turkey and was shown by Karasu (2004) to have content validity.

In the present study, as part of the reliability analysis, treatment integrity was examined and the inter-rater reliability of the story scores was calculated. Reliability analysis was conducted by a field expert who viewed the video recordings and examined the story scores of 18 randomly selected students. Treatment integrity was found to be 100% and inter-rater reliability was found to be 99%.

Data Analysis

In line with the research questions, two principle statistics were used for the research data analysis. To determine the written expression performance of the students, descriptive analysis was made regarding the title, organization, narrative diversity and compliance with writing conventions. To identify the variables that explain the written expression scores, correlation coefficients between the student characteristics and written expression scores were calculated, and multiple linear regression was used to examine chronological age, age of first

hearing aid fitting and duration of preschool education. The strength of the relationship between a dependent variable and the dependent variables that affect variation in the dependent variable can be identified using multiple linear regression analysis (Field, 2005). In these analyses, the probability of making a type I error was set at $p \leq .05$.

RESULTS

In what follows, descriptive results and correlational results concerning written the expression scores are presented.

Descriptive results

To answer the first research question, the descriptive statistics relating to the scores of the students with hearing impairment for their written expression skills, as well as for the dimensions of the titles, organization, narrative diversity and compliance with writing conventions, are reported in Table 2.

Table 2: Descriptive statistics concerning the scores for written expression skills and its dimensions for the students with hearing impairment (n = 36)

Dimension	***Mean***	***SD***	**Minimum-Maximum**	**K***
Title	2.67	.95	0-3	3
Organization	27.39	5.60	16-39	51
Narrative diversity	17.51	3.04	9-23	24
Compliance with writing conventions	13.03	2.91	7-18	22
Total score	60.58	10.40	41-77	100

* The maximum possible score for each dimension.

As Table 2 shows, students who participated in the study received a mean total score of 60.58 out of 100 for written expression. Standard deviation of the total score for written expression was 10.40. Student scores varied between 41 and 77. Student scores on the dimensions of title, organization, narrative diversity and compliance with writing conventions have a homogeneous distribution. Descriptive statistics concerning scores for the dimensions of title, organization, narrative diversity and compliance with writing conventions, which together make up the total written expression score, are reported in Table 3.

Table 3: Descriptive statistics concerning scores for the dimensions of title, organization, narrative diversity and compliance with writing conventions

Title		**Number of Students**	**Percentage (%)**
Has title?	Yes	32	88.9
	No	4	11.1
	Total	36	100
Title related to subject?	Related	32	100
	Not related	0	0
	Total	32	100

Organization		**Mean**	**SD**	**Min. Max.**	**K***
Introduction	Has a separate paragraph	.89	.32	0-1	1
	Explains the subject or main argument	2.98	.51	2-4	5
	Presents the subject clearly	2.98	.56	2-4	5
Development	Has a paragraph that outlines the main argument	.53	.51	0-1	1
	Presence of side arguments in support of the main argument	3.28	1.14	1-5	6
	Events, feelings and thoughts are presented in a way that is logically consistent and orderly	4.72	1.00	3-7	10
	Presents the subject/main argument clearly	4.41	1.02	2-7	10

	Avoids repeating ideas	2.97	.17	2-3	3
Conclusion	Has a separate paragraph	.50	.51	0-1	1
	Reaches a conclusion	4.14	1.40	2-7	9
Narrative diversity		**Mean**	**SD**	**Min. Max.**	**K***
Spells words correctly		4.61	1.10	2-6	6
Uses words correctly and properly		5.30	.86	2-6	6
Sentence structure is correct		4.17	1.49	2-7	8
Avoids word repetition when explaining ideas		3.42	.64	2-4	4
Compliance with Writing Conventions		**Mean**	**SD**	**Min. Max.**	**K***
Paper layout		2.50	1.06	1-4	4
Legible writing		3.25	.84	1-4	4
Correct use of punctuation marks		4.08	1.71	2-8	10
Correct use of upper and lower case letters		1.78	.42	1-2	2
Paragraph order		1.41	.70	0-2	2

* The maximum possible score for each dimension.

As can be seen in Table 3, four of the students did not use a title for their writing, while 32 used a title related to the subject. Students received a mean score of 27.39 out of 51 for organization. In the introduction section of the organization, students received the same mean score out of 5 for the sub-dimensions of *explaining the subject or the main idea* (Mean=2.98, SD=.51) and *presenting the subject clearly* (Mean=2.98, SD=.56). In the development section, the students received the highest scores for *presenting events, feelings and thoughts in a logically consistent and orderly manner* (Mean=4.72, SD=1) and *presenting the subject/main idea clearly* (Mean=4.41, SD=1.02). For these sub-dimensions, which were scored out of 10, the mean scores were very close to each other. In the development section, the highest mean score was received for *avoiding the repetition of ideas* (Mean=2.97, SD=.17), scored out of 3. In the conclusion section, students received a mean score of 4.14 out of 9 for drawing a conclusion, with a standard deviation of 1.4. The maximum possible score for the narrative diversity section, which considers skills related to vocabulary and the correct use of words and sentences, is 24. The students received a mean score of 17.51 for narrative diversity. The highest mean scores in the narrative diversity section were received for *using words correctly and appropriately* (Mean=5.30, SD=.86), which was scored out of 6, and *avoiding word repetition when explaining ideas* (Mean=3.42, SD=.64), which was scored out of 4. Standard deviations for these two sub-dimensions show a homogeneous distribution of scores. The dimension of compliance with writing conventions, scored out of 22, considers punctuation, spelling and format. Students received a mean score of 13.03 for compliance with writing conventions. The mean score for the *correct use of punctuation marks* was 4.08 out of 10, with a standard deviation of 1.71. The highest mean score in the dimension of compliance with writing conventions was received for the *correct use of upper and lower case letters*, which was scored out of 2 (Mean=1.78, SD=.42). Table 4 reports the correlation between the total written expression scores of the students with hearing impairment and scores for its dimensions.

Table 4: Correlation between total written expression scores and scores for its dimensions

Variables		**2**	**3**	**4**	**5**
1	Title	.36*	.236	.434**	.477**
2	Organization		.620**	.571**	.913**
3	Narrative diversity			.605**	.818**
4	Compliance with writing conventions				.804**
5	Total				

As Table 4 shows, there are significant correlations between; on the one hand, total written expression scores of students, and on the other, scores they received for the dimensions of title, organization, narrative diversity and compliance with writing conventions.

Correlational results

The aim of the second research question was to identify the variables that explain the written expression scores of the students with hearing loss. Accordingly, to begin with the relationships the participant characteristics had with one another and with the written expression score were examined using the Pearson Moment Product Correlation, then the variables to be included in the regression equation were selected and a hierarchical multiple regression analysis was conducted. Prior to the analyses, tests were conducted to see if the assumptions of the regression analysis were met. As meeting the assumptions of the regression analysis automatically means those of the correlation analysis are met too, there was no need for a separate testing of assumptions for the correlation analysis.

Testing assumptions of the analysis

Assumptions of multiple regression analysis are normality, linearity, multicollinearity and singularity, homogeneity and independence of errors. To meet the *normality* assumption for regression, univariate and multivariate normality distributions must be tested. The p-value in the Shapiro-Wilks test was $p > .05$, and kurtosis and skewness coefficients were between -1.5 and 1.5, indicating that the univariate normality assumption was met in this study (Tabachnick & Fidell, 2013). Although it is not possible to directly examine multivariate normality, the Mahalanobis distance value can be used to identify outliers, to get an idea of normal distribution. The Mahalanobis distance value was not greater, for any of the participants, than the value (11.34) indicated in the table of critical χ^2 values, indicating that multivariate normality assumption was met (Field, 2005). *Linearity* assumption was also met as the graph of expected and observed standard errors had a linear slope (Field, 2005). *A multicollinearity* problem is seen when the correlation between variables is very high ($r >$ .90 or .80), tolerance value is lower than .20, or the VIF (Variance Inflation Factor) value is higher than 10 (Stevens, 2009). In this study, the values of the correlation matrix (see Table 5), the minimum tolerance value (.46) and the maximum VIF value (2.17) indicate the absence of a multicollinearity problem. We also took care to ensure that the singularity assumption was met, which refers to a variable not consisting of multiple underlying variables (Tabachnick & Fidell, 2013). The interaction effect of the chronological age, which was included as a control variable, with explanatory variables was $p > .05$ in all comparisons, indicating that the *homogeneity of regression slopes* was met. For the assumption of *independence of errors* to be met, Durbin-Watson values should be between 1.00 and 3.00 in all of the regression analyses. In the present study, these values (1.64-1.85) remained within the specified limits, indicating that the errors were independent.

Results of the Regression Analysis

Table 5 reports the results of the correlation analysis conducted prior to multiple regression.

Table 5: Correlations between student characteristics and written expression scores among students with hearing loss (n = 36)

Variables		2	3	4	5	6
1	chronological age (months)	-.13	-.18	.13	.42*	.51*
2	Hearing level (dBHL)		-.27	.56*	-.14	-.01
3	Age at the first hearing aid fitting			-.36*	-.67**	-.74**
4	(months)				.14	.18
5	Age of cochlear fitting (months)					.91**
	Duration of preschool education (months)					
6	Total score for written expression					

Note. dBHL = decibel Hearing Level, *$p < .05$, **$p < .01$

As Table 5 shows, the total score for written expression is significantly correlated with chronological age ($r = .51$, $p < .05$), age of first hearing aid fitting ($r = -.74$, $p < .01$), and the duration of preschool education ($r = -.91$, $p < .01$).

As a result, in addition to chronological age, which was identified as the main determinant based on correlation values and theoretical expectations, age of first hearing aid fitting and duration of preschool education were selected as the explanatory variables for written expression score in this study. To measure the degree to which these variables explain total written expression scores, two separate hierarchical multiple regression analyses were conducted. The reason for this was to be able to gauge the explanatory power of each variable independently from each other. In the first analysis, age at which the first hearing aid was worn was included in the equation, in addition to the control variable of chronological age, which is expected to be the main determinant. In the second analysis, duration of preschool education was included in the equation, with

chronological age and age at the first hearing aid fitting, as the control variables. This was done to separate, as far as possible, the individual effects of the age at the first hearing aid fitting and the duration of preschool education, which are highly correlated (.67). The detailed results of the hierarchical multiple regression analysis are presented in Table 6.

Table 6: Variables explaining total written expression scores

Explanatory Variables	β	t	R	R^2	ΔR^2
Equation I					
Chronological age	.38	3.86**	.51	.26	.26
Age at first HA fitting	-.67	-6.77**	.83	.69	.43
Equation II					
Chronological age + Age at first HA fitting	.18/-.26	2.78*/-3.29*	.83	.69	.69
Duration of preschool education	.66	7.68**	.94	.89	.20

Note. HA = Hearing Aid, *p < .05, **p < .01

The results on Table 6 show that both hierarchical multiple regression equations, which had a total written expression score as the dependent variable (age at the first hearing aid fitting was the explanatory variable in the first equation, with chronological age as the control variable; duration of preschool education was also included in the second equation, with chronological age and age at first hearing aid fitting as control variables) were statistically significant [$F_{Equation1}(1, 34) = 11.69$, $p < .05$ and $F(2, 33) = 36.49$, $p < .01$), $F_{Equation2}(3, 32) = 86.68$, $p < .01$]. In the first analysis, chronological age, which was entered into the equation first, explained 26% of the variance in total written expression score. With the subsequent inclusion of age at first hearing aid fitting in the equation, total variance explained increased to 69%. That is to say, inclusion of the age of first hearing aid fitting resulted in a significant increase of 43 percentage points in total variance explained.

In the second analysis, chronological age and age at first hearing aid fitting, entered into the equation first, explained 69% of the variance in total written expression score. With the subsequent inclusion of the duration of preschool education into the equation, total variance explained increased to 89%, a significant increase of 20 percentage points.

In sum, chronological age contributed 26%, age at first hearing aid fitting contributed 43%, and duration of preschool education contributed 20%, the three variables together explaining 89% of the variance in the written expression score.

DISCUSSION

The findings of the present study, the aim of which was to evaluate the written expression performance of students with hearing impairment who received education with the auditory-oral approach, are discussed in what follows within the framework of research questions.

What are the skill levels of students with hearing loss regarding written expression and its dimensions of title, organization, narrative diversity and compliance with writing conventions?

The 36 students with hearing impairment who participated in the study received a mean total score of 60.58 out of 100 for written expression, with a standard deviation of 10.40. Of the participants 27 had cochlear implants, and 9 wore behind-the-ear hearing aids. Although the small number of participants did not allow for a statistical comparison to be made of the written expression scores of students who had cochlear implants and hearing aids, students who had cochlear implants received a mean total score of 60.59, whereas students who wore hearing aids received a mean total score of 60.55. Compared with traditional hearing aids, cochlear implants contribute to the development of verbal language and literacy skills of children with severe and profound hearing loss (eg. Geers, 2002; Geers, 2003; Johnson & Goswami, 2010; Tomblin, Spencer & Gantz, 2000). However, for cochlear implants to improve the language skills of children with congenital hearing loss, the age of implant fitting and auditory-oral education received prior to and after the implant are very important (Geers, Nicholas & Moog, 2007; Marschark, Rhoten & Fabich, 2007; Pisoni *et al.*, 1999, Turan, 2006). Cochlear implants fitted before the age of 2, in particular, contribute to the development of verbal language skills of the child, with positive consequences for the development of literacy skills during school years (Geers, Nicholas & Moog, 2007). In this study, the mean scores of students who had cochlear implants and hearing aids were close to one another. This can be explained by the participants in this study having their implants fitted between 24 and 120 months, which is considered to be a late age for implants.

Studies conducted in Turkey with elementary school and middle school students with normal development report mean written expression scores of 57.89 (Yılmaz & Aklar, 2015), 60.82 (Ak, 2011) and 76.14 (Çelik, 2012). In the international literature, comparisons of the quality of written products of students with and without hearing loss show that 17 year old students with hearing loss are comparable to 9-10 year old students with normal hearing (Albertini & Schley, 2011; Mayer, 2010; Paul, 2008). The manner in which written products were obtained and the activities used in this process directly affect the quality of the products. The medium levels of written expression scores observed in studies conducted in Turkey, for students with normal development, can be explained by these studies obtaining written products by asking students to write about a topic of their own choice, or a given topic, without having contecteed prewriting activities beforehand. In the present study, on the other hand, written products were obtained by first sharing with the students sequential cards containing a narrative structure and events, and then asking students to write a story about the cards. This prewriting activity may have made it easier for students with hearing loss to organize their thoughts, narrate the events and write them in a certain order. In other studies conducted with children with hearing impairment, using the same evaluation form, written expression scores of students with hearing loss were found to be lower (Efe, 2016; Girgin & Karasu, 2007; Karasu, 2004; Turgut, 2012). The higher scores observed in the present study may be a result of various audiological and educational variables. Individual characteristics are important factors that affect academic achievement among children with hearing loss, as is the case among children with normal development. Among children with hearing loss, in particular, audiological and educational variables, such as age at which the first hearing aid is fitted, age of starting formal education, parent education and preschool education, play an important role in the development of language skills, and by extension, the academic skills of the students (Geers & Hayes, 2011; Girgin, 2012). The higher mean scores for written expression among students with hearing loss observed in this study, when compared with other studies conducted in Turkey, can be explained by early diagnosis and hearing aid fitting, as well as features of the educational environment. This is because the early fitting of hearing aids that are appropriate for the loss, only ensures the transmission of sounds to the individual, but does not guarantee the automatic development of the language skills of children with hearing impairment, as in their peers with normal hearing. Therefore, the parental education that immediately follows the fitting of the hearing aid, listening activities, which form the basis of verbal language skills and a balanced literacy program, are crucial (Lewis, 1998; Turan, 2006).

There is a direct relationship between the quality of the educational environment and student achievement. In cases of children with hearing loss, the most important factor that determines the quality of the educational environment is an education program tailored and implemented by taking individual needs into account (Schirmer, 2000). Studies conducted in recent years on the improvement of written expression scores of students with hearing loss usually focus on Strategic and Interactive Writing Instruction (SIWI) activities (Dostal & Wolbers, 2014; Dostal *et al.*, 2015; Wolbers, 2007; 2011; Wolbers, Dostal, & Bowers, 2012; Wolbers *et al.*, 2016). SIWI includes instructional practices based on strategic, interactive, linguistic and metalinguistic, balanced, guided to independent, visual scaffolds, and authentic principles. Authentic writing practices, based on balanced literacy, comprise purposive and meaningful writing activities placed within the educational program in a balanced way. In instructional practices, a balance should be established between the teacher acting as a model and direct strategy teaching, and language skills should be treated as a whole (Dostal *et al.*, 2015). Strategy teaching involves the demonstration of various writing strategies to students, such as title, organization of ideas and identifying spelling errors, and supporting the use of these strategies (Wolbers *et al.*, 2016) In their quasi-experimental study, Wolbers *et al.* (2016) provided 18 hours of instruction to children with hearing impairment to examine the impact of SIWI on written expression. They found that following SIWI instruction, the students' narrative and persuasive essays had improved. However, the authors noted that students with hearing loss have additional needs to improve their language skills, and their written expression experiences required development.

In the present study, a significant relationship was found between the total written expression scores of students, on the one hand and on the other, scores for title, organization, narrative diversity and compliance with writing conventions. Thirty-two (89.9%) of the 36 students were able to produce titles for their essays, and these titles were relevant to their writing content. The organization section considered content characteristics, that is to say, whether students organized their ideas, paying attention to the introduction, development and conclusion parts, explained the main idea and supported it with auxiliary ideas, presented the events in sequential order and came to a conclusion. In the present study, the students received a mean score of 27.39 out of 51 for organization, with a standard deviation of 5.60. Various studies report that students with hearing loss, similar to students with normal hearing, have difficulties in organizing their thoughts, explaining the main idea, and writing about events in a logical order (Antia, Reed, & Kreimeyer, 2005; Gormley & Sarachan-Deily, 1987; Klecan-Aker & Blondeau, 1990; Shirmer, 2000; Yoshinago-Itano & Synder, 1985; Wolbers, Dostal, & Bowers, 2011). In writing instruction, a balanced literacy approach should be adopted to establish a balance between grammar, mechanical aspects, the organization of thoughts and the meaning of sentences. The difficulties students with

hearing loss have with syntax make it harder for teachers to establish this balance, resulting in an emphasis being placed on syntax rather than content during activities (Mayer, 1999). The process approach used to improve written expression skills require the use of the main principles of the writing process (Schirmer, 2000).

In the beginning of this process, the teacher attracts the students' attention to the writing subject, and encourages them to make drafts of their essays. In the drafting stage, students are not expected to correct spelling and grammar mistakes, and their writing is not edited (Albertini, Marschark, & Kincheloe, 2015). The editing and revising stage, which follows the writing stage, is for reviewing the essay in terms of content, spelling, grammar and writing conventions. Students with hearing loss face problems with enriching the content of their writing in the editing and revising stage, have difficulty identifying and correcting their mistakes, and usually focus on the mechanics of their writing (Albertini, Marschark, & Kincheloe, 2015; Graham, MacArthur and Schwartz, 1995). Therefore, completing the editing and revising stage, together with the hearing-impaired student, in one-one-one settings where the teacher acts as a model, provides the student with an opportunity to identify and correct their mistakes, and supports students on the way to becoming independent writers (Reimer, 2001). Middle school students with hearing loss are reported to have greater benefits from the teaching of writing strategies when compared with older students (Wolbers *et al.*, 2016). Results of the present study, conducted at ICEM in the 2015-2016 academic year, show that students with hearing loss benefit from auditory-oral education based practices, group lessons that are held in line with MEB curricula but enriched on the basis of individual needs, and one-on-one activities that contribute to the development of verbal language and literacy skills.

Difficulties faced by hearing-impaired children with vocabulary and syntax can affect their story writing skills (Albertini, Marschark, & Kincheloe, 2015). Students with hearing loss perform at a lower level in terms of morphological and syntactic skills when writing, but their scores for semantic and rhetorical skills are at a comparable level with their normal-hearing peers (Wolbers, Dostal, & Bowers, 2011). The narrative diversity section considers vocabulary, word usage and compliance with syntax rules when forming sentences. In the present study, the students received a mean score of 17.51 out of 24 for narrative diversity, with a standard deviation of 3.04. Because of the delay they experience in the development of language skills, to develop their writing skills, children with hearing loss need more intensive strategy teaching compared with their normal-hearing peers (Wolbers, Dostal, & Bowers, 2011). This teaching should be supported with group literacy and content area activities, as well as one-on-one activities taking the individual needs of the students into account (Luckner & Isaacson, 1990; Karasu, 2014; Schirmer, 2000). Reading materials used in the classroom to develop grammar and vocabulary are very important for written expression skills. Awareness of story structure develops in parallel with the development of reading skills. This awareness allows students to identify and analyze elements of story structure, and use them in their own stories. For example, the skills of ordering events, forming connections between events and associating sentences and paragraphs make hearing-impaired students more fluent, critical and confident writers (Albertini, Marschark, & Kincheloe, 2015).

In addition to having content and vocabulary problems, children with hearing loss also experience difficulty in complying with writing conventions (Antia, Reed, & Kreimeyer, 2005; Giddens, 2009; Negrete, 2015). The section on compliance with writing conventions focuses on punctuation marks, capitalization, legibility and layout. In the present study, the students with hearing loss received a mean score of 13 out of 22 for compliance with writing conventions. This finding indicates that students with hearing loss need strategy instruction concerning the mechanics of writing, such as punctuation marks, use of upper and lower case letters and layout, to be held in group and one-on-one sessions. As part of the education program followed at the school, one-on-one instructional conversations are held every day on a regular basis, within the framework of the balanced literacy approach, in addition to group sessions. In addition, each student participates in two individualized reading and one-on-one writing conference sessions a week. Of the 40 hours of group lessons each week, 15 are devoted to Turkish in the elementary school, and 10 in the middle school. On the basis of these findings, it is recommended that literacy strategies should receive more emphasis in literacy and content area courses, the number of authentic writing activities should be increased, and writing conferences should involve more intensive editing and revising activities. Parental involvement in the education process and active use of reading and writing in home environments also contribute to the development of students' literacy skills (Mascia-Reed, 2012). The Program for International Student Assessment (PISA) results show that the mean score received by 15 year old students in Turkey for reading skills is lower than the OECD average (Tas, Arici, Ozarkan, & Ozgurluk, 2016). Students in Turkey face a large number of multiple choice tests starting during elementary school, and the scores for these tests form the basis for admissions. This has resulted in parents and students focusing on preparing for these tests in home environments too, and spending most of study time on solving multiple choice questions. Therefore, the active use of reading and writing by parents in daily life, informing parents about activities held at school, and supporting literacy activities at home can improve the written expression performance of students.

Which student characteristics explain written expression scores?
It was found that chronological age, age at first hearing aid fitting and duration of preschool education combined, explained as much as 89% of the variance in the written expression score. This finding can be explained by the collection of data from a single school attended by hearing-impaired students with similar audiological and education characteristics. In terms of participant characteristics, children who had hearing aids at an early age and received preschool education received higher scores for written expression. Student age explained 26% of the variance in written expression scores. In a study conducted with hearing-impaired adolescents, Musselman and Szanto (1998) failed to find a significant difference between the scores of different age groups. Yoshinaga-Itano and Downey (1996) argue that improvement in compliance with grammar rules slows down in adolescence, for hearing-impaired adolescents, as well as normal-hearing adolescents. However, in line with the findings of the present study, correct use of grammar, sentence complexity and syntax accuracy increase linearly with age during the elementary school and middle school years (Heefner & Shaw, 1996; Powers & Wilgus, 1983; Wolbers, Dostal, & Bowers, 2012; Yoshinaga-Itano, Snyder, & Mayberry, 1996).

Many factors affect the development of hearing-impaired children's language skills. These factors include the hearing level of the child, the use of a hearing aid, mode of communication, socioeconomic status of the family, the education program followed at school, and the quality of education (Karchmer & Mitchell, 2011; Marschark, Shaver, Nagle, & Newman, 2015). Antiana, Reed and Kreimeyer (2005) found that gender, grade, level of hearing loss and free lunches combined explain 18% of the variance in written expression scores. The early fitting of hearing aids and use of hearing aids prior to cochlear implant (especially in the first 6 months after birth) affect the academic achievement of children with hearing loss (Geers & Hayes, 2011; Kasai, Fukushima, Omori, Sugaya, & Ojima, 2012; Sugaya, Fukushima, Kasai, Kataoka, Maeda, Nagayasu, Toida, Ohmori, Fujiyoshi, Taguchi, Omichi, & Nishizaki, 2015). Yoshinago-Itano and Apuzzo (1998) found that hearing-impaired children who were diagnosed in the first 6 months after birth and were fitted with the correct hearing aids had better receptive and expressive language skills compared with children who were diagnosed and fitted with hearing aids between 7 and 18 months. In the present study, age at the first hearing aid fitting explained 43% of the variance in the written expression scores of elementary school and middle school students, and duration of preschool education explained 20%. The ages of the participants at first hearing aid fitting varied between 5 months after birth and 3 years and 4 months. As was previously mentioned, 18 of the participants in the present study were fitted with hearing aids in the first 12 months after birth. Hearing age, the age at which hearing aids begin to be used effectively, plays an important role in the development of literacy skills (Geers & Hayes, 2011; Girgin, 2012). Adoption of auditory-oral approaches in the education of children with hearing loss requires early identification and intervention, and an aggressive audiological program. The aggressive audiological program refers to intensive audiological and education arrangements, including the early fitting of hearing aids, early cochlear implantation, parental education and child development (Marschark & Spencer, 2009). At ICEM, from where data for the present study were collected and which is based on aggressive audiological management, early identification and intervention is performed by the audiology clinic. High-quality preschool experiences that are made possible with the early fitting of hearing aids contribute to the development of verbal language and literacy skills, and affect school achievement (Akay, 2016; Dickinson & Porche, 2011). When presented with a large number of diverse activities in the preschool period, children develop a richer vocabulary, become interested in writing, recognize story structures, are able to narrate events, are interested in the sounds that make up language, and attempt to read and write on their own (Fields, Groth, & Spangler, 2004; Reutzel & Cooter, 1996). Findings of the present study underline the importance of early identification and intervention in the education of children with hearing loss. The findings also indicate that instructional practices tailored to individual needs in the preschool period play an important role in minimizing the difficulties hearing-impaired children face in school years. However, this finding does not mean that every hearing-impaired student who benefited from early identification and intervention will perform at the same level. This is because following early identification and intervention, school education, school culture, literacy approaches, activities held and strategies, affect literacy in school years (Mascia-Reed, 2012). During the school years, strategy teaching as part of the writing process can target the areas with which the students have difficulties, such as creating content, organizing their thoughts, sentence structure, spelling and the mechanics of writing. Writing conferences held in small groups or one-on-one sessions provide important opportunities for sharing ideas and giving interactive feedback to students about their writing, and teaching strategies (Barbeiro, 2011). These opportunities may allow students to make additions to or subtractions from their essays, change the ordering of events, emphasize connections between events, draw conclusions, pay more attention to syntax and sentence structure, and check spelling and grammar, improving their skills concerning content, narrative and compliance with conventions.

CONCLUSION AND LIMITATIONS

This study, which evaluated the written expression performance of hearing-impaired children who were taught using the auditory-oral approach, was conducted with 36 hearing-impaired students attending Anadolu University's ICEM, and their written expression performance may not be representative of that of other school age children with hearing loss in Turkey. In addition, the study is limited in that sequential cards were used to obtain written products, and the written expression skills evaluation form was used to evaluate these products. Future studies can focus on the stages of the writing process, analyze practices for different types of writing, examine difficulties faced by students with hearing loss in this process, and offer solutions. In addition, the written products of students who have had cochlear implants before the age of 2 can be examined to identify the effect of cochlear implants on literacy skills.

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Three-Dimensional Interpretation of Sculptural Heritage with Digital and Tangible 3D Printed Replicas

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ABSTRACT
Spatial interpretation features as a skill to acquire in the educational curricula. The visualization and interpretation of three-dimensional objects in tactile devices and the possibility of digital manufacturing with 3D printers, offers an opportunity to include replicas of sculptures in teaching and, thus, facilitate the 3D interpretation of the sculptural heritage. In this research, an open access 3D educational resource is created for teaching in the aim of Art and drawing subjects. In Santa Cruz de Tenerife, Spain, fifteen students of *High School,* worked in a traditional 2D environment and in a 3D environment with sculptural heritage replicas in digital and tangible versions. The three-dimensional interpretation of the sculptures is evaluated with a 3D viewing test created for this experiment, to verify whether the material used does indeed facilitate the 3D interpretation. The results show a greater difference using 3D representations compared with the 2D versions in the three ambits analysed. In modularity, the percentage of correct answers in the 3D viewing test are 84% with 3D technologies, versus 40% with 2D representations, in volumetry, 90,7% versus 72%, but in orthogonal views is where the biggest difference is with a 76,7% of correct answers in the 3D viewing test using 3D technologies versus 0% using 2D versions.

Keywords: sculptural heritage, replicas, digital models, 3D printing, spatial 3D interpretation

INTRODUCTION

Different international organisations emphasise the importance of including artistic heritage in teaching environments. UNESCO, at its General Conference for Education, Science and Culture, indicated the need to increase the presence of artistic heritage in education (UNESCO, 2006). In the European setting, the Educational, Audiovisual and Culture Executive Agency (Eurydice, 2009) analysed Artistic and Cultural Education and indicated the understanding of Heritage as a common objective of artistic education. The Council of Europe, in the Framework Agreement on the value of cultural heritage for society, promoted the knowledge and comprehension of common European cultural heritage and recommended including heritage at all educational levels (Council of Europe, 2005).

Cultural heritage includes architectural, artistic, archaeological works, and groupings that have a universal value from the point of view of history, art and science. Sculptural heritage is a significant part of artistic heritage. For the teaching of sculpture, artistic drawing and volume, visits to museums and the use of replicas of sculptures and architectural elements are used. This means having large classrooms with storage space for the replicas, which may present difficulties of mobility, deterioration or breakage. On the other hand, the offer of replicas or 3D objects covers only the most requested objects, with the result that it is difficult to get reproductions of local

works of art that the student can get to know in their geographical ambit. This fact means that teaching remains, in many cases, limited to the use of bi-dimensional educational resources (images, videos, plans, sketches, etc.). The limits of access to replicas are especially clear in online education.

In order to solve these problems, the reduction in the price of digital manufacturing technologies such as 3D printers makes the inclusion of tangible learning objects more and more viable in the practice of teaching. On the other hand, the use of 3D digital models constitutes an alternative to the physical models as they are easily accessible from a Smartphone, tablet or computer, and give a three-dimensional manipulation, which is similar to that of a tangible replica (Yi-Chen, C., Hung-Lin, C. & Wei-Han, H. &. S.-C. K, 2011). It is necessary, therefore, to study the potential of replicas and 3D models for the study of forms and the representation of sculptures.

Spatial interpretation, where students need to imagine objects from different orientations, visualise three-dimensional models and make transformations between representations in two and three dimensions is present as a competence to be acquired in the curricula of university and pre-university degrees and courses. At high school levels, there are few studies which have a bearing on the spatial reasoning of the students as well as methodologies, strategies and teaching materials for its development (Morell, R. V. G., Miranda, V. G. & Alamar, M. D. V., 2010), as occurs in fields such as Engineering and Architecture university studies (Martín-Dorta, N., Saorín, J. L. & Contero, M., 2008; Saorín-Pérez, J. L., Navarro-Trujillo, R., Martín-Dorta, N., Martín-Guiterrez, J. Contero M., 2009).

In this paper, an experiment carried out in Santa Cruz de Tenerife with 11th Grade students of Drawing and Plastic Arts is described. A three-dimensional educational resource is developed which contemplates the two 3D formats simultaneously, the digital and the tangible. The experiment aims to improve the three dimensional comprehension of the Sculptural heritage of Santa Cruz de Tenerife using new 3D low cost technological resources. The participants answered a 3D viewing test designed to analyse the impact of this technology on the student's 3D interpretation. The results are compared when using traditional 2D representations and digital and tangible 3D models.

Three-dimensional objects in drawing and plastic arts

For the study of sculpture, artistic drawing and volume it is normal to use replicas of sculptures and plaster objects. A replica is a reproduction, with the greatest possible precision, of the original of an object and it may be in a different material and be on a different scale (Almagro Gorbea, 1988). One of the reasons for which a replica is made is to replace an object of great value and prevent it undergoing deterioration. Replicas are given outstanding value because they serve to transmit art to the public in general and without them only specialists or researchers would have access to protected works of art. Replicas moreover serve to understand the three-dimensional concepts associated with the analysis of form and its representation (Rodríguez-Samaniego, 2013).

In disciplines related with drawing and plastic arts, models of 3D parts are used for learning of standardised views in the subjects of technical drawing (de la Torre Cantero, J. Martin-Dorta, N., Saorin, J.L., Carbonell-Carrera, C., 2013). These physical models are used so that the students can make sketches from different points of view and improve their comprehension of the relationship between the real world (three-dimensional environments and models) and the two-dimensional representations (drawing of standardised views). They constitute a much-used educational material in technical drawing to improve spatial skills (Ben-Chaim, D., Lappan, G. & Houang, R. T., 1988).

In other disciplines unrelated with drawing and plastic arts, the use of 3D models is also frequent such as in natural science (fossils, stuffed animals, etc.), geology (minerals and rocks), topography (digital models of terrain) and architecture (models). As an alternative to tangible objects, the appearance of 3D digital technologies makes possible the design of didactic resources allowing the user to interact with 3D contents on digital devices. Foremost among these are such multi-tactile devices as the Smartphone and tablets, whose tangible interface approximates the way of interacting with the real object (Yi-Chen, et al., 2011). High-quality, three-dimensional models make it possible to widen the knowledge of sculptural and/or architectural heritage in great detail as is the case of the heritage of Oviedo cathedral as described by Ruiz, Rovés, & Voces (2015). This is a hyper-realistic 3D model which allows the user to appreciate all the details of valuable pieces which can normally only be observed through a grille or glass and can only be seen from one side, inside urns and at a certain distance for security reasons.

The use of digital three-dimensional models can solve some of the areas where real models fall short, such as breakages or loss of objects as 3D models can not only be viewed on a range of devices both offline and online but it is also possible to download them for reproduction as often as is necessary (they are replicable). They

resolve, in turn, the problems of transport, exchange and storage as they can be filed in the cloud or virtual classrooms, thus going beyond the limits of a laboratory.

In the year 2013 a pilot study was carried out on the comparison of the use of tangible and digital models. The viability of 3D models on tablets as possible substitutes for the pieces used for learning of standardised views in subjects of technical drawing was analysed. But the results were not conclusive: the evaluation of the students was very similar in both cases as there was not a significant difference between the preferences of the students for the tangible models or for the digital models (de la Torre Cantero, et al., 2013).

Legal aspects related with replicas

The intellectual ownership of a literary, artistic or scientific work belongs to the author due to the simple fact of its creation. With regard to the materials accessible through the network, they can be read, watched or heard for free if the author so decides, however, making a copy or redistributing it without authorisation is not allowed. When scanning a sculpture using any technique, whether laser or photography, you are making a copy of an object protected by Copyright. Copying and distributing a sculpture requires the permission of the person who has the rights of reproduction (Weinberg, 2013).

It is important to indicate that the laws of intellectual property vary according to the country. This research has been carried out in Spain, where, in the teaching sphere, the law of intellectual property (section 2, article 32 of the Boletín Oficial del Estado, 2006) sets down that "teachers in formal education will not require the authorisation of the author to carry out acts of reproduction, distribution and public communication of small fragments of works or of isolated works of a plastic or figurative photographic nature, excluding text books and university manuals, when such acts are carried out solely for the illustration of their educational activities in the classrooms, to the extent that they are justified by the non-commercial purpose, provided that it is a matter of works that are already in the public domain and, except in the cases in which this is impossible, the name of the author and the source is included.

NEW TRENDS FOR TEACHING 3D CONTENTS

Among the international reports on technology in education (OCDE, 2014; Instituto de Educación Internacional, 2014) there is one, which has become a point of reference: the Horizon Report (Johnson, Levine, Smith, & Smythe, 2011-2016). This report, prepared by the New Media Consortium, identifies new types of technology, which can be used in teaching, and analyses their impact on education, learning and research. Among these technologies, the applications for 3D digital modelling stand out, together with digital tablets and/or Smartphones as well as 3D printers. The report also looks at a new trend: BYOD (Bring Your Own Device), which promotes the use by students of their own devices to access innovative resources as a complement to traditional teaching in the classroom.

In the experiment carried out in this research, for the creation of the 3D material used, use is made of digital 3D modelling, tablets and/or Smartphone (the students gain access to the information using their own devices: BYOD) and 3D printers, all of which trends were highlighted in the Horizon reports. Digital tablets and Smartphones constitute a technology with great potential in the classroom: 30% of Spanish children of ten years of age have a Tablet or a Smartphone, 70% at the age of 12 and 83% at 14 (Cánovas, García-De-Pablo, Oliaga-San-Atilano, & Aboy-Ferrer, 2014). Modelling, scanning and 3D printing until about eight years ago were technologies reserved for experts in the subject and required a long and costly learning process, and an advanced technical team was also required and the price of the programmes was very high and only accessible for large centres, companies or universities (Caño, de la Cruz, & Solano, 2007). This panorama changed in 2006 with the distribution free of charge of the SketchUp programme by Google. SketchUp is a multi-platform programme (PC and Mac) with a free version, which offers the possibility of introducing the user to 3D modelling with very little background knowledge and in only a short time. This program has been used already in the teaching of subjects with 3D content offering excellent results (de la Torre Cantero, Saorín, Carbonell, de Castillo Cossío, & Contero, 2012). Blokify, Pottery and the Autodesk 123D Suite are other applications of 3D modelling with a free version which are simple to use, with which, at low cost, digital replicas of sculptures have been obtained (de la Torre-Cantero, Saorín, Meier, Melián Díaz, & Alemán, 2015).

In relation with the scanning of objects, there are peripherals of video games, which have the possibility of detecting 3D space, which has given rise to the appearance of highly accessible three-dimensional scanners although with resolutions that are not so good as professional ones. One example is the use of Microsoft's Kinect with the Skanet programme, which makes it possible to have a 3D scanner for less than 500 Euros. On the other hand, apart from the possibility that the students or teachers might create their own 3D models, there are web pages specialising in the free dissemination of three-dimensional models such as Thingiverse, 3D Warehouse or

SketchFab. These repositories have special resources with 3D models aimed at education. In order to view a 3D model it is necessary to have an application installed in the device (Smartphone or Tablet). However, in the repositories specialising in 3D objects, the viewing and direct interaction in the online environment via one's own browser, without the need to have installed any 3D viewing application is possible. The online environments specialising in 3D models for education also offer the possibility of downloading and printing the models with a 3D printer. In the ambit of Art, there are museums and institutions, which make their works available to the user via the internet for on-line 3D viewing, such as for example the Smithsonian Museum (Smithsonian, 2015) or the project for the spreading of heritage in 3D of the Virtual World Heritage Laboratory (Frischer, 2016).

Another example is the Art Project, in which Google has collaborated with seventeen museums around the world for the diffusion of a virtual version of their collections. Apart from permitting a virtual visit to the interior of a number of chosen galleries, it is possible to admire works of the most renowned artists in history. These virtual visits are made up of 360º photos of the halls in a similar format to the Google application, Street view.

In the sphere of teaching, accessibility and dissemination of digital 3D models is the same as any other digital file and can be included in specialised 3D repositories free of charge (e.g. Sketchfab or Thingiverse), in virtual classrooms, or online repositories such as Dropbox, Drive, etc. Thus, three-dimensional objects can be included easily in multi-media presentations or even in paper books by means of a link. The books, despite the multiple formats of communication that there are, continue to be a widely-used format of diffusion of knowledge in educational settings. There are at least nine different technologies, which make it possible to include three-dimensional objects in digital or paper books (Carbonell Carrera, Vlad Avarvarei, Chelariu, Draghia, & Catrinel Avarvarei, 2017)). In order to include 3D information in a book, it is possible to indicate a reference to a web page, which obliges the reader to key in the URL. Although there is the possibility of using short URLs, there are applications, which make it possible, by means of a code, to gain access to the indicated address such as for example a QR code. There are generators of QR codes that are free on the Internet, such as for example QR Creator.

3D interpretation

Given the three-dimensional nature of sculptures, their dissemination via a flat resource (2D) such as the images in a traditional catalogue means that information is lost and the comprehension of the works is limited (Chamizo, 2010; Rea-Ramirez, Clement, & Núñez-Oviedo, 2008). In the learning of materials related with concepts of a three-dimensional nature, the use of traditional teaching resources in 2D such as books, photos, plans or drawings may be complex and sometimes insufficient for spatial reasoning on the part of the student.

Three dimensional interpretation features among the skills to be acquired in the subject of Drawing and Plastic Arts and it make reference to the use of technologies for visual interpretation, such as for example the acquisition of graphic skills, the capacity to use techniques of 3D representation, the capacity to work with 2D and 3D interfaces as well as the perceptive visual capacity (Aneca, 2004). Stavridou and Kakana (2005) suggest that the more extended use of 3D models, either physical or digital, could help to a better understanding of spatial relationships and evoke the use of more advanced drawing techniques for the depiction of 3D layouts.
Numerous studies show that three dimensional interpretation can be developed using training if the appropriate materials are provided (Cohen, Hegarty, Keehner, & Montello, 2003; Potter & Van der Merwe, 2003), (Kinsey, 2003), and there is unanimity about the fact that spatial thinking can be improved by means of training (Sorby, Wysocki, & Baartmans, 20013). The use of 3D models is a proven strategy to increase the improvement of spatial reasoning (Ben-Chaim, et al., 1988). For example, in secondary education, metallic models of 3D pieces are successfully used for learning of standardised views in the subjects of Technical Drawing and Analysis of Forms and Their Representation (de la Torre Cantero et al., 2013). With these models, the students develop their sketches from different points of view and improve their understanding of the relationship between the real world (settings and three-dimensional models) and two-dimensional representations (drawing of standardised views).

In university education, an improvement in the spatial interpretation of students of Engineering has been obtained using three-dimensional models of land printed in 3D (Carbonell & Bermejo, 2016), as well as three-dimensional representations of industrial parts in digital format such as augmented reality (Saorín, de la Torre-Cantero, & Martín-Dorta, 2014). It is necessary, therefore, to study whether there is an improvement in spatial comprehension in pre-university levels, where the use of 3D replicas of sculptural works in subjects related with drawing and plastic arts is usual so as to facilitate the comprehension of 3D concepts associated with the analysis of forms and their representation (Rodríguez-Samaniego, 2013).

EDUCATIONAL 3D RESOURCE REPLICABLE FOR THE TEACHING OF THE SCULPTURAL HERITAGE

In the present research, an educational resource is rated for content related with the sculptural heritage: a catalogue of sculptures, which includes replicable three-dimensional models. The catalogue contains twenty-seven public sculptures from Santa Cruz de Tenerife from the First International Exhibition of Sculpture in the Street available at: http://goo.gl/wD3EwS. It is presented in the traditional format of a book where the sculptures are described with a specifications card (name, description, author, year, materials, dimensions and a link with additional information), one or several images of each sculpture and a schematic map of the city with its location.

The difference with regard to a conventional catalogue lies in the incorporation of two links: one to gain access to the online view of the 3D model and the other to download and print the sculpture on a 3D printer (Fig. 1). In this way, if the electronic version of the book is available, it is possible to gain access to and view the three-dimensional model with just a click. If only the paper version is available, it is possible to gain access and handle the digital model of the sculpture by means of a Smartphone or tablet using the QR code.

Figure 1: Catalogue with links and QR codes for viewing and downloading the models

In order to organise all the works printed in 3D, a packaging has in turn been created (Fig. 2). The design and the templates to make this packaging, made up of two boxes, are included in the catalogue so that any user can make his/her own box for packaging with cardboard for which he/she will only need a large sheet of cardboard (approximately 130 x 130 cm) and a normal paper printer. The design of the boxes includes identifying cards of each work with a link, which makes it possible to download and print the work again in case of loss or breakage. Replicas have been printed of all the works on a 3D printer, Makerbot Replicator 2, in white PLA filament.

Figure 2: Catalogue of sculptures and the set of 27 sculptures printed with their packaging

This educational resource, therefore, gives access to 3D files, which allow the creation of tangible replicas by means of a 3D printer of the sculptures it, contains. The teacher thus has a catalogue of sculptures in two different formats: the book format with access to digital models and the box format with the tangible models.

The steps for the creation of these replicas are described in the work of de la Torre, et al. (2015), where the entire process is detailed for generating 3D objects as well as the costs deriving from creating a replica using a 3D printer or buying in an outside printing service.

METHODOLOGY

In order to check this new 3D resource as a method to improve the 3D comprehension of sculpture heritage an experiment was design. A school that studied the sculptural heritage of Santa Cruz as part of the drawing subject was selected. This was important because we wanted to compare the traditional 2D resources with the new 3D materials described in this paper.

Participants

The experiment was carried out with fifteen volunteer (eight male and seven female) 11th grade students from the Dominicas Vistabella School in Santa Cruz de Tenerife, who were studying the subject of Drawing, and Plastic Arts. Before the experiment was carried out, the participants responded to a survey with eight questions on viewing technologies and 3D printing.

Measuring instrument

A 3D test of viewing sculptures was carried out by DEHAES, the research group into spatial abilities at the University of La Laguna. It consists of ten questions aimed at the 3D analysis of the sculptures, separated into two blocks: volumetry and modularity, as well as two exercises on standardised views (Table 1).

Phases

The experiment took place in an hour-long session in the drawing, and plastic arts classroom. It was divided into two phases:

Phase I. 2D. (25 minutes): the students were given a 3D visualisation test, in which they were asked a number of questions about the 27 publicly-displayed sculptures in Santa Cruz de Tenerife from the First International Exhibition of Sculptures in the Street. For finding the information, they had computers with an Internet connection, apart from their own Smartphones and computers, from which they could gain access to the information in text and images (photos) of the sculptures on the Internet. It was verified that the graphic information on Internet about the sculptures was only in 2D format.

Phase II. 3D. (25 minutes): the participants responded to the same 3D visualization test again but on this occasion they had the catalogue of sculptures in two formats: the book format with access to digital models and the box format with the tangible models. They made use of their Smartphones to view the sculptures from the catalogue in 3D as well as directly handling the replicas made on the 3D printer.

RESULTS

The experiment aimed to improve the three dimensional comprehension of the Sculptural heritage of Santa Cruz de Tenerife using new 3D technological resources. In the survey of viewing and 3D printing technologies, 93 % of the participants declared that they had a Smartphone and a computer for their private use and 60% already had a QR code reader installed on their Smartphone. All of the students said they would like to have educational material printed in 3D and 86 % believed that a 3D object helped them to study better. 86 % knew 3D printers but only 26 % had seen them working in person. 93 % of the participants stated that they were interested in art but only 53 % showed interest in sculptures or had noticed the urban sculptures in Santa Cruz de Tenerife. To check the reliability or the internal consistency of the questionnaire the Cronbach's alpha coefficient is calculated. The value obtained, 0,71 is acceptable according to Pallant (2007).

In table 1, it is possible to observe the number of correct responses obtained for each question in the test of 3D visualisation of the sculptures. It can be seen that in the second phase, the students were able to answer many more items by means of the observation of the 3D printed sculptures.

Table 1: Responses obtained in the 3D viewing test

3D Viewing Test

Type	Question	% Correct answers Phase I 2D	Phase II 3D
Modular questions	Of how many modules is the Labyrinth sculpture made up?	53	100
	Does the large module of the Solidarity sculpture have a hole inside? Is it rectangular or round?	40	80
	Are all the modules of the Lorea sculpture the same?	53	80

	In the Tribute to Pascal sculpture are there two modules, which are exactly the same?	0	67
	Which sculptures are made up of identical modules?	53	93
	Average results modular questions	40	84
Volumetric questions	Is the shield of the Goslar Warrior flat on its rear side?	100	100
	Is the hand in the Introversion sculpture a bas-relief?	33	100
	Is the thickness of the sculpture Hombre by María Simón the same all over the sculpture?	93	100
	In the sculpture called "Dado para 13", can you enter and leave on different sides?	87	93
	Can the sculpture Tribute to Millares be moved?	47	60
	Average results volumetric questions	72	90,7
Exercises for standardised views	Draw the top view of the sculpture "Dado para 13".	0	80
	Draw the Top view of Labyrinth sculpture.	0	73
	Average results standardised views	0	76,7

DISCUSSION

Nowadays, digital replicas of sculptures can be obtained and manipulated with free software (de la Torre, et al., 2015). The editing and digital printing technologies allow teachers to have local replicas in three dimensions for the teaching. These innovative technologies are accessible and easy to use for teachers and students and allow new teaching resources to be introduced into the teaching and learning processes in accordance with the BYOD trend emphasised by the Horizon report.

The digital versions in 3D offer the possibility of having a large number of models to which the students have access from settings of virtual teaching such as virtual classrooms, or in free repositories such as Dropbox or Google Drive, which facilitates their implementation in formal teaching. The tangible versions, printed in 3D, are an alternative to the digital ones and a single replica can be presented to the student in the two versions. For our experiment, we create, using only low cost 3D technologies, a box that includes twenty-seven replicas of public sculptures from Santa Cruz de Tenerife from the First International Exhibition of Sculpture in the Street. This resource is available, in catalogue format at: http://goo.gl/wD3EwS.

The results of the survey show a high degree of interest among the students in 3D educational materials, which they consider would help them to study better. The 3D replicas can increase the interest among students in sculptural heritage.

In relation with spatial 3D interpretation, the analysis of forms and the representation of the sculptural heritage, the student understands spatial relationships of the sculptures better with the 3D representations than with the 2D versions. The percentage of correct answers in questions related with the modularity and volumetry of the sculptures is higher using 3D (84% modularity and 90,7% volumetry) than 2D (40% modularity and 72% volumetry). The participants also obtain better results in the exercises with systems of representation (standardised views) of the sculptures with the three-dimensional versions (76,7%) than with the 2D viewings (0 %), in agreement with Stavridou & Kakana (2005), who found serious difficulties in depicting the third dimension in the absence of a model, either physical or digital

CONCLUSIONS

Using only the access to the Internet as a source of information, the students were not capable of answering two of the ten questions asked, nor could they create a bird's eye view of one of the sculptures despite the fact that they had 25 minutes to draw it. However, using 3D models, they were able to answer all the questions and activities and to do so with a higher percentage of success.

The versatility that the innovative editing and digital printing technologies offer for teaching and diffusion of the sculptural heritage make the teaching resource described in this research just one example that can be extended to other subjects which require, in the teaching and learning process, representation and interpretation in three dimensions.

The present research is focused specifically on the 3D interpretation using 3D replicas, but in disciplines related with the Art and Design, in addition to the spatial interpretation, the creative thinking process of generating new ideas and forms is also important. Therefore, as a future work, we propose a research about how the 3D technology could help to the student of Art disciplines to work more accurately and efficiently, generating solutions in a 3D environment in a creative way.

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We thank the participation of the teacher and the students from the 2nd year of the subject of drawing, design and plastic arts of the MM. Las Dominicas school for their participation in the experiment. The institution signed a document called "informed consent" on the experiment to be performed, according to the 95/46/CE European Directive and Organic Law 15/1999 of the Spanish Cabinet Office number 298.

The complete data obtained in the 3D Viewing Test are available (creative commons) in the institutional repository of the University of La Laguna, at the following link: http://riull.ull.es/xmlui/handle/915/4754. The educational resource used for the experiment, a catalogue of sculptures, which includes replicable three-dimensional models is available at: http://goo.gl/wD3EwS.

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Using Facebook for the Purpose of Students' Interaction and its Correlation with Students' Academic Performance

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ABSTRACT
Facebook has now become the most popular social networking tool among university-aged youth. Its popularity has transformed it into an acceptable platform for educational purposes. The use of Facebook is currently more suited to facilitate online interaction among learning participants. The purpose of this study is to investigate students' perception towards the use of Facebook for course-related online interaction and its effect on academic performance. The data were collected using a survey method of data collection. A quantitative data analysis process was employed using SPSS statistics software. The findings of the study revealed that students had positive views towards the use of Facebook for online interaction with peers. Additionally, the findings reveal that there is a relationship between students' perceived online interaction via Facebook and academic performance.

Keywords: Student interaction, Social Network, Facebook, academic performance.

INTRODUCTION

Facebook is just one part of web 2.0 technology. Web 2.0, or social networking tools, have changed the way people access, manage and exchange knowledge, as well as the way they connect and interact. This change has led to the emergence of different learning styles, especially among young people. On the other hand, educators believe that social networking tools offer flexible and dynamic learning opportunities that are often more appealing and engaging than traditional learning arrangements (Heid, Fischer, & Kugemann, 2009).

Facebook in higher education

Facebook is almost universally-used among higher education students. These students consider Facebook as their main social media choice and therefore spend a great part of their time in its use in their normal day (Ellefsen, L, 2015). In a study conducted in one of Malaysia's large public Universities, the researchers found that, among 105 students, only three students stated that they did not use Facebook (with only 2.8 percent) (Alhazmi, A. and Rahman, A, 2013). Moreover, in a study conducted in Universiti Teknologi Malaysia (UTM), the findings of the study showed that 97.10% of students use Facebook compared to 28.50 %use blogs and only 14.50% use Twitter alongside their use of Facebook (Aldheleai, 2010).

Students, on the other hand, spend a considerable amount of time actively on Facebook. Wiley and Sisson (2006) in their study reported that 91% of college students use Facebook. Another study showed that college students use Facebook on an average of 10 to 30 minutes daily (Ellison, Steinfield, & Lampe, 2007). Similarly, results of a study by Pempek, Yermolayeva and Calvert (2009) showed that college students spend an average of 27.93 minutes per day during weekdays and an average of 28.44 minutes per day during weekends on Facebook. However, Alhazmi, and Rahman (2013) reported that 78.9% of students spend more than one (1) hour a day on Facebook. More interesting facts were found by Junco, (2012) when the findings went beyond other studies by revealing that students spend 100 minutes every day on Facebook. The findings showed that Facebook is the place where nowadays university students are linked with their virtual world.

The EDUCAUSE Center for Applied Research (ECAR) conducted a study that targeted 36,950 students from 126 US universities and one Canadian university. Results found that 90% of those students are using social networking tools. The number of Facebook users from the percentage of social networking users totaled 97% and they reported daily activity on this site (Smith and Caruso, 2010). Students use Facebook for different

purposes and this use can differ from one student to another. According to Wesseling (2012), there are four major activities practiced by Facebook users which include:

i. information-sharing (receiving/providing information and generating ideas),
ii. sharing for educational purposes (for learning, problem-solving and sharing work),
iii. social purposes (retrieving personal information about others or themselves, chatting, making appointments and generally keeping in touch)
iv. leisure (gaming and relaxing).

In general, students have positive perceptions towards using social networking tools as a learning medium; and they went beyond that when they agreed with a suggestion to adopt social networking as an e-learning platform (Tasir, Al-Dheleai, Harun and Shukor, 2011). In particular, higher education students seem to have a positive attitude towards the use of Facebook for educational purposes. In a focus group study conducted by Ellefsen (2015) it was reported that all focus groups' participants had positive feelings towards the potential use of Facebook within higher education. Wesseling (2012) revealed that students use social networking sites (e.g. Facebook) for a number of purposes and in different percentages; the percentage of students who use these sites for social purposes is 70.1% and to exchange information 70.2%. The study also showed that 49.7% of students use Facebook for educational purposes. The percentage of information exchanged by Facebook users reflects the current trend of the users to take the benefits of this tool. On the other side, student highly believe that Facebook can facilitate and enable the instructors to achieve their online roles of instructional design and organization, facilitating students' discourse and providing direct instructions (Al-Dheleai and Tasir, 2016). This finding is considered as encouraging for the idea of using Facebook for learning purposes. Different findings have been found in the Malaysian context by Hamat et al (2012) where it was discovered that 84% of Malaysian students use social networking sites to interact and communicate with their peers for informal learning purposes. However, only 49.7 of students communicate with their lecturers for academic matters and this is quite similar with Wesseling's (2012) findings. Therefore, to encourage students' to interact more with the instructors, Al-Dheleai and Tasir (2015) recommeded the use of Facebook group as interaction medium as students and instructor can interact through Facebook group without being Facebook friends; this can reduce students' concern about invading their privacy. From the findings of those studies, it is obvious that students are trying to gain benefits from Facebook for their learning activities.

Further research on learning through Facebook has been conducted by, Idris and Ghani (2012) where they analyzed Facebook discourse. They stated that social network sites could indeed become a platform where users generate reflective thinking, construct knowledge and consequently enhance learning. Their findings showed that users generally utilized all the indicators of construction of knowledge in their Facebook interaction, despite the virtual and asynchronous nature of social network sites (Idris & Ghani, 2012).

In continuous efforts by researchers to examine the possibility of using Facebook for specific course-related learning, another study in Malaysia was conducted by Kabilan, Ahmad, and Abidin (2010) concerning Facebook as an online environment for English learning in Malaysia. The findings of their study revealed that students have a positive opinion about the use of Facebook for learning English; students believe that Facebook can facilitate English language learning in terms of (1) language skills improvement, and (2) students' motivation, confidence and attitudes towards English language learning. Additionally, students agreed that the use of Facebook would enhance their communication skills. Researchers attributed students' positive opinions towards Facebook as an environment in which to facilitate English learning in that online platforms, such as Facebook, provide authentic interaction and communication opportunities that the students might not have experienced before. Researchers concluded that, through Facebook, students would be the managers of their own learning with the help of other Facebook members and their instructors (Kabilan et al., 2010). However, a study by Kabilan et al (2010) focused on learning English while other courses need to be investigated to determine how Facebook can further facilitate students' learning processes.

Facebook and students' performance

It is certain that the way in which students use Facebook can determine the effect of its use on students' academic achievement. Facebook has a positive effect on students' achievement when used for educational purposes. Junco (2012) found that when students use Facebook for educational purposes such as gathering information ,checking to see what friends are up to and sharing information (sharing links), it results in a positive academic outcome better than when they used it merely for socializing such as status update and chatting. There is also a positive effect when students contact or visit their instructor's website. Students viewing their instructor's website reflect a high level of motivation, effective learning, teacher credibility and positive attitudes towards the course and the teacher (Mazer, Murphy, & Simonds, 2007, 2009). In her study, Haverback (2009)

observed and examined her students' activities within the Facebook community. The activities she observed included the ways in which students discuss their assignments, ask and answer questions, post information and support each other for their Reading Education Methods course. She found that students are motivated to be involved in Facebook discussions with better understanding of the theoretical principles of effective reading. The development of good reading ideas can be seen better when students work in-group rather than when they read individually. Therefore, university students believe that Facebook and similar social networking tools have the possibility to support classroom work (Roblyer, McDaniel, Webb, Herman, and Witty, 2010).

OBJECTIVES

i. To determine students' perceptions about the use of Facebook for student-student interaction;
ii. To analyze the difference in students' perception of using Facebook for student-student interaction based on their gender;
iii. To analyze the relationship between students' perception regarding the use of Facebook for student-student interaction and their academic performance.
iv.

METHODOLOGY

The quantitative method was employed for both the data collection and data analysis process of this study. The questionnaire was used as a data collection instrument to collect data from the respondents. Forty-nine (49) students in Universiti Teknologi Malaysia were the respondents for this study. The data of this study was collected during the academic year of 2015/2016 Semester 1. The data was analyzed using the Statistical Package for Social Science SPSS 20.

INSTRUMENT

The questionnaire was developed by the researcher to measure students' perception of course-related interactions on Facebook and their academic performance. The questionnaire is comprised of eight constructs which are: question; answer; comment; discussion; information–sharing; scaffolding; and reflection. The independent variables constructs are based on a pattern of electronic discussions and knowledge construction (Zhu, 1996). The researchers developed the items that measure each construct in order to explain students' perception on each interaction category. The dependent variable items were also developed by the researchers to measure students' perceived academic performance when using Facebook for student-student course-related interaction. The researchers conducted a reliability test to determine the level of internal consistency of the measurement instrument. The findings of the reliability test showed that the questionnaire has a high internal consistency level with Cronbach's Alpha 0.95.

Table 1: Questionnaires' items reliability statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.956	.958	23

DATA ANALYSIS

The data analysis were done using Statistical Package for the Social Science "SPSS, version .20" software. Students' perceptions of student-student interaction in online interaction via Facebook were analyzed through a descriptive analysis process by finding the mean and standard deviation for every construct. One simple t-test was used to analyze the difference between students in their perception about student-student online interaction via Facebook based on their gender. Pearson correlation was used to ascertain the correlation between student-student interaction and their academic performance.

Findings

The findings in Table 2 show that students strongly believe that they can post questions to other peers with mean 4.22 and SD of .77. Students also expected that posting questions on Facebook should help them to understand course content with mean 4.12 and SD of .92. In general, students have a high and positive perception about posting questions on Facebook with an overall mean of 4.17 and SD of .67.

Table 2: Students' perception of posting questions on Facebook

Question			
Item No	**Item**	**Mean**	**SD**
1	I can post my questions to other course participants via Facebook.	4.22	0.77
2	Students' questions via Facebook should be related to the course content.	4.18	0.69
3	Posting questions via Facebook should help me to find an appropriate answer from other course participants.	4.12	0.92
Overall mean		4.17	0.67

The findings shown in Table 3 revealed that students believe that they can post their answers via Facebook with mean of 4.18 and SD .69. They also expecting that other students' answers via Facebook can help them to better understand the course content with mean of 3.96 and SD of .64. The overall mean value 4.11 shows that students have a high perception of posting answers via Facebook with overall mean of 4.10 and SD .64.

Table 3: Students' perception of posting answers on Facebook

Answer			
Item No	**Item**	**Mean**	**SD**
1	I can post my answers to other course participants' questions via Facebook.	4.18	0.69
2	I should receive answers for my questions from other course participants via Facebook.	4.16	0.68
3	Students' answers via Facebook should help me to understand the course content.	**3.97**	0.77
Overall mean		4.10	0.64

The findings in Table 4 reveal that students strongly believe that they can comment on other students' course-related posts on Facebook with mean of 4.32 and SD of .51. Students also expecting that other students should comment on what they posts on Facebook with mean of 4.14 and SD of .67. In general, students have a high perception about posting comments related to their course via Facebook with overall mean of 4.22 and SD .57.

Table 4: Students' perception of posting comments on Facebook

Comment			
Item No	**Item**	**Mean**	**SD**
1	I can comment on other students' course-related posts on Facebook.	4.32	0.51
2	Other students should comment on my course-related posts on Facebook.	4.20	0.76
3	Comments' from peers on course-related posts via Facebook should help me to understand the course content.	4.14	0.67
Overall mean		4.22	0.57

The findings in Table 5 indicate that students strongly believe that they can participate in discussions related to their course on Facebook with mean of 4.20 and SD .57. They also believe that discussion on Facebook should be related to the course content with mean of 4.16 and SD .65. Students in general have a high positive perception regarding the discussion on Facebook with overall mean of 4.14 and SD .54.

Table 5: Students' perception of participating in discussion on Facebook

Discussion			
Item No	**Item**	**Mean**	**SD**
1	I can participate in the course-related peer discussion via Facebook.	4.20	0.57
2	Other students' should participate on the course-related discussion via Facebook.	4.16	0.58
3	Students' discussion via Facebook should be related to the course content.	4.16	0.65
4	Course-related discussion via Facebook should help me to understand the course content.	4.06	0.71
Overall mean		4.14	0.54

The findings in Table 6 show that students believe that they can share information related to their learning via Facebook with mean of 4.38 and SD .57. Moreover, students have a high perception that sharing information related to their learning via Facebook can help them to better understand the course content with mean of 4.36 and SD .60. In total, students have a high perception about the ability and benefit of sharing information related to their course with overall mean of 4.40 and SD .52.

Table 6: Students' perception of sharing information on Facebook

Information Sharing			
Item No	**Item**	**Mean**	**SD**
1	I can participate in sharing information with other students via Facebook. (ex: website link, video, document)	4.38	0.57
2	Other students should share information via Facebook. (ex: website link, video, document).	**4.44**	0.61
3	Information sharing by students via Facebook should be related to the course content.	4.42	0.61
4	Information sharing by peers via Facebook should help me to understand the course content.	4.36	0.60
Overall mean		**4.40**	0.52

Findings in Table 7 demonstrate that students greatly believe that via Facebook they can scaffold their peers to help them to understand the course content with mean of 4.14 and SD .54. Additionally, students strongly believe that other students' support via Facebook help them to understand the course content with mean of 4.10 and SD .68. Generally, students have a high perception of the ability and benefit of students' scaffolding in their learning with overall mean of 4.10 and SD .54.

Table 7: Students' perception of scaffolding peers via Facebook

Scaffolding			
Item No	**Item**	**Mean**	**SD**
1	I can provide information via Facebook to support peer students understanding of the course content.	4.14	0.54
2	Other students should provide information via Facebook to support my understanding of the course content**.**	4.08	0.57
3	Students' support via Facebook should help me to understand the course content.	4.10	0.68
Overall mean		4.10	0.54

The findings in Table 8 highlight that students believe that Facebook allows them to post statements that reflect their level of the course content understanding with mean of 4.28 and SD .57. Moreover, students strongly believe that other students' should reflect on their level of the course understanding with mean of 4.18 and SD .66. Generally, students have a high perception on the ability posting reflection statements via Facebook with overall mean of 4.20 and SD .56.

Table 8: Students' perception of posting reflections on Facebook

Reflection			
Item No	**Item**	**Mean**	**SD**
1	I can poste statements via Facebook that reflect my level of course content understanding.	4.28	0.57
2	Other students should post statements via Facebook that reflect their level of the course content understanding.	4.18	0.66
3	My posts, comments and discussion via Facebook should reflect a good level of the course content understanding.	4.14	0.64
Overall mean		4.20	0.56

An independent sample t-test was conducted to examine whether there was any significant difference between female and male students in their perception of using Facebook for student-student interaction. The findings of group statistics table revealed that female students reported a slightly lower level of perception (Mean = 4.13, SD = .421) than their counterpart male students (Mean = 4.37, SD = .567). However, the difference between female and male was not significant (t = -1.601, df = 47, p = .116).

Table 9: Group statistics for students' difference on perception of using Facebook for student-student interaction based on gender.

Group Statistics

	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Student-student interaction	Female	35	4.13	.4210	.07117
	Male	14	4.37	.5678	.15176

Table 10: Independent Sample Test for students' difference on perception of using Facebook for student-student interaction based on gender.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Student-student Interaction	Equal variances assumed	2.39	.128	-1.60	47	.116	-.23602	-.23602	-.53266	.06061
	Equal variances not assumed			-1.40	18.99	.175	-.23602	-.23602	-.58686	.11481

The Pearson Correlation Coefficient test was conducted to determine the relationship between students' interaction via Facebook and their academic performance. The findings of the test revealed that student interaction via Facebook was positively and significantly related to students' academic performance, r = .567, n = 49, p = .000.

Table 10: The correlation between students' perception about the use of Facebook for student-student interaction and their academic performance.

		Student Academic performance
Student-student interaction	Pearson Correlation	.567**
	Sig. (2-tailed)	.000
	N	49

**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION AND CONCLUSION

The findings of this study indicated that students have a positive perception regarding interaction with their peers for learning purposes via Facebook. It is clear that students' interaction via Facebook is seen to be important for students, as it links students with each other outside of their class time. Students' interaction via Facebook can allow them to discuss course contents at any time they need. Via Facebook, a student can post questions, share information and discuss with peers when facing any difficulties during their study time or during preparation of their assignments. Asking questions in order to share information, conduct discussions or other investigated acts among peers can help students to better understand the course content and, as a result, enhance academic performance. Therefore, the findings of this study show the positive and significant relationship between students' interaction via Facebook and their academic performance. Similarly, previous studies found that academic use of Facebook is related to students' better academic performance (Junco, 2012).

In terms of specific types of students' interaction, this study shows that students in general expressed a positive perception towards all students' interaction types via Facebook. However, these findings also showed that students believe that their interaction via Facebook is to be varied according to the type of students' interaction. This difference may reflect the level of importance of each type of student interaction from his/her particular point of view. For example, students seem to be inclined to ask direct questions and provide direct answers. This appears to have less importance than other processes investigated in this study. Of course, students still believe that they can post questions and answers that are related to the course as it will help them in understanding the course content. However, students may think that direct questions and answers might provide specific and limited information compared to other methods investigated in this study. Similarly, Zhu (1996) found that students posted questions in order to seek opinions and initiate discussions rather than asking for specific answers.

On the contrary, students registered a higher perception regarding information-sharing via Facebook and its impact in helping them to understand the course content. The higher education students' perception of information-sharing can be attributed to students' experience of using Facebook to share a wide range of information in different forms. Therefore, students can share information in the form of text, photo, and video. Students also can share information through disclosing links of online information sources via Facebook. Additionally, students can share their course events, announcements and even learning materials on a Facebook page. Therefore, students tend to give this type of student interaction via Facebook more importance than the other investigated types. This finding is compatible with previous findings which showed that 70.2% used Facebook in order to exchange information (Wesseling, 2012).Student's "comments" on other students' posts was found to be important from the students' point of view. In the interaction type "comment", students can comments on other students' posts and give their opinions in a way that keeps it in line with the course content. Students believe that comments on learning posts can considerably help them to understand the course content. Interestingly, as students are willing to comment on other students' posts, they also welcome other students to comment on their posts. These findings indicate that students have trusted others sufficiently to be able to express their opinions and respect their opinion even when they disagree about their post. However, previous studies argued that accepting the points of view of other people, and also disagreement, reflects the level of respect and build-up of trust among learners (Kehrwald, 2010).

In terms of discussions on Facebook as being one of the types of students' interaction, students strongly believe that they can participate in course-related discussions via Facebook. Discussions on Facebook can be conducted based on a student's own initiative with or without the presence of the instructor. Nevertheless, students still believe their discussions on Facebook will be related to the course content. Moreover, students still agree that their discussions on Facebook can help them to better understand the course content. This perception indicates that students are willing to be given the chance to work more independently and to have more control over their online learning environment. This finding is in contradiction with other studies which found that only five per

cent (5%) of undergraduates and graduates agreed about the use of Facebook mainly for purposes of collaboration with classmates (Manasijević, D., Živković, D., Arsić, S., and Milošević, 2016)

Reflection on the various types of student learning practices is one of the types of student interaction that has been investigated via Facebook. Students strongly believe that they can share their reflections concerning the level of their understanding of the course content. This point indicates that students have the confidence to share their level of understanding of the course content with others. Similarly, students expect other students to also have their understanding level of the course content. Upon reflection, students tend to let others know their level of the course content understanding either positively or negatively. In this case, students are willing to openly share their learning experience and seem to be looking for support from others who can help them to continue their positive feeling about their study. Similarly with negative learning experience reflections, students need support from others to help them to overcome difficulties. Therefore, one of the student interaction types investigated is that of scaffolding. Interestingly, in the scaffolding interaction type, students expressed their willingness to provide scaffolding and support to other students in the form of information that can help them to better understand the course content.

Conclusively, this study proved that many types of student online interactions can be conducted on Facebook. Moreover, interactions via Facebook can significantly enhance students' academic performance. Additionally, it was found that students are willing to continue their learning tasks and work with peers through Facebook interaction so as to enhance their learning academic performance. Generally, students consider Facebook as an appropriate environment for course-related interaction with their peers. One of the significant advantages is that, on Facebook, students can initiate the discussion and control their learning environment. Moreover, this finding shows that students were open to interaction with other course participants and also were willing to share with them whatever can facilitate their learning and enhance course content understanding. This finding is supported by previous studies which found that a relatively high percentage (70%) of students are comfortable to interact with other students and support more opportunities for interaction with the instructor and other students (Spears and Miller, 2012; Sher, 2009).

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Value-Based Interactive Multimedia Development through Integrated Practice for the Formation of Students' Character

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ABSTRACT
This study aims to describe the development of value-based interactive multimedia through integrated practice for the formation of students' character. This study uses Research and Development Design at the Department of Social Sciences Education at Indonesia University of Education. Conceptually, the design in question is integration of living values and social studies learning materials into interactive multimedia by involving students through an integrated practice in schools (university and junior high school). Implementation of the design is realized through several steps: negotiation of subject matter and character, presentation of materials, group distribution based on social science topics, exploration of character values according to the topics, integrated practice (initial observation to school, multimedia scenario development, multimedia production, multimedia simulations in class, and multimedia utilization in school). Implementation of the interactive multimedia design significantly affects the formation of students' character.

Keywords: interactive multimedia, value, integrated practice, character, student

INTRODUCTION
Higher Education as an educational institution responsible for shaping younger generation for future leaders holds a very strategic role in the formation of local wisdom-based character. According to Komalasari and Sapriya (2016) and Saripudin and Komalasari (2015) on the implementation of character education models in colleges and schools, it is necessary to cultivate methods of character education that meet the following characteristics: value-based education; college culture-based character education; and character education which involves aspects of "knowing the good, desiring the good/loving the good and acting the good" (Lickona, 1991).

The above characteristics must be integrated into learning activities as core activities in college. This is in accordance with the format of character education developed by the Ministry of National Education (2010: 43), namely integration of character values in classroom learning activities in all subjects, which encompasses entire learning components, namely materials, methods, media, resources, and evaluation (Komalasari, 2010; Komalasari and Saripudin, 2015; Saripudin and Komalasari, 2016a). Thus, learning media is among the principal learning components.

In the global era, selection and use of media should consider the development of science and technology by heeding the values to nurture the character of students. A type of media that is viewed effective in learning is value-based interactive multimedia. Multimedia is a blend or a mix of two or more media formats such as texts, graphics, animations, and videos to integrate information into computer (Heinich et al, 2005; Vaughan, 2004: Mayer, 2009). Interactive multimedia is the use of a computer to blend texts, graphics, audio, moving images (video and animation) into a single entity with proper links and tools to enable users of multimedia to navigate, interact, create, and communicate" (Hofstetter, 2001). Interactive multimedia exhibits these characteristics: displaying more than one converging media, interactive, and independent (Munir, 2012; Sutopo, 2003).

Utilization of multimedia in learning serves as a possible solution to enhance the quality of learning in class, and as a viable alternative to overcome the limitations of teachers in teaching (Daryanto, 2010). In addition, multimedia in learning functions as a facilitator, a transmitter, a connector, and others. Multimedia in learning may allow the communication process to be more effective in order to reach the desired goal, i.e. changes in students' behavior (Munadi, 2008).

Instructional multimedia should involve students in its creation and utilization, so as to elevate students' creativity. It can also empower students in active learning. Institutes of teachers' education offer a specific course of Instructional Media and Information Communication and Technology (ICT). In this course, instructional multimedia should be developed and implemented as part of students' project through integrated practice. This means that the students establish their own instructional multimedia to be presented in class, which later can be applied in teaching practicum in school.

Therefore, a Research and Development-based study on a modest scale to produce a value-based interactive multimedia integrated practice assumed to effectively nurture students' character is called for. This type of model will be developed in the course of "Instructional Media and ICT in Social Science Education" at the Department of Social Sciences Education and its application will be integrated into teaching practicum in school.

This study aims to describe the development of value-based interactive multimedia in teaching social science education through integrated practice and its impact on the character formation of students. In particular, this study aims to describe: i) a conceptual model of value-based interactive multimedia through integrated practice for the formation of students' character; ii) its implementation; and iii) its impact on the character formation of students.

RESEARCH METHODOLOGY

This research was conducted using Research and Development Design (R&D) of Borg and Gall (1989). The method used is an explorative method to discover a model and an experimental method to test the model. Subjects were students of the Department of Social Science Education at Indonesia University of Education in the course of Instructional Media and ICT in Social Science Education academic year 2016/2017, totaling 92 people: 50 students of the experimental group and 42 the control.

Data collection instruments used in this study include: (i) observation sheets (ii) documentation study; (iii) focus group discussion; and (iv) questionnaires. Borg and Gall's (1989) model is adapted and modified into four stages, namely: 1) a preliminary study; 2) preparation of a conceptual model; and 3) validation and revision of the model; and 4) implementation of the model.

Qualitative data analysis is carried out through the following steps: (1) data reduction by summarizing reports, noting the key points that are relevant to the research focus; (2) systematic data organization based on specific categories and classifications; (3) data display in the form of tables or graphics so that the relationship among the data is clear and coherent; (4) cross-site analysis by comparing and analyzing the data in depth; and (5) presentation of the findings, drawing conclusions in the form of general trends and the implications of its implementation, and recommendations for the development (Fraenkel and Wallen, 2006). Quantitative analysis is performed through attitude scale by using two different tests of mean/gain score (Shadish, et.al:2002).

RESEARCH RESULTS

The conceptual model of value-based interactive multimedia development through integrated practice

Value-based interactive multimedia in social science education is integration of the values of life and social studies learning materials into interactive multimedia by involving students through an integrated practice in college and school. In light of this, a number of developmental principles emerge.

1. Developing core competencies and basic competencies in the social studies curriculum of 2013 and developing the values of character, unearthed through "contract of character" at the beginning of the semester.
2. Developing principles of living values education (Tillman, 2004: xv; Yunianto, 2009) which include: undertaking reflection, imagining widely, training relaxation and focus, expressing artistic creation, cultivating social skills, enhancing cognitive awareness about justice, nurturing social harmony, and gathering cultural values.
3. Applying the principle of interactive multimedia development. The interactive multimedia concept under examination combines and synergizes all sorts of media consisting of texts, graphics, audio, video, and interactivity (Green & Brown, 2002). Interactivity is designed to enable a person (student) as a user to access various forms of media as a new way to present and share group work so as to provide motivation and satisfaction for the students. Among the media types integrated into multimedia are texts, pictures/photographs/ posters, animations, videos, and list of Value Clarification Technique (VCT) in a single power point material. Each media has the following contents:
   a. Texts, containing facts, data, concepts, principles, procedures, and values-moral norms (living values);
   b. Pictures, photos, posters, comics, used as a stimulus to clarify learning materials and values;
   c. Graphs, charts, and diagrams, used to present data issues/problems/phenomena that exist in the real life;

d. Animation, in the form of audio-visual media that contains cartoon stories packed with interesting, rich, and conflicting values, and stimulates students to think, clarify, reflect and apply the values of life;
e. Sounds, intended to give effect to make the material more attractive and easy to understand;
f. Learning material videos, containing clarification of learning material in the form of facts, data, concepts, principles and procedures presented in the form of video lessons;
g. Video reflection, in the form of audio-visual media which contains a movie about the phenomenon in everyday life that motivates students to apply the values of life;
h. VCT List, containing a list of symptoms in the form of behavior statements and how the frequency of such behavior is applicable in everyday life, along with the rationale for the application of such behavior.

Interactivity involving some of the above components facilitates students as teacher candidates to make a power point that integrates a mix of media types (multimedia) that have been selected and developed. Value-based multimedia interactivity can be seen in figure 1.

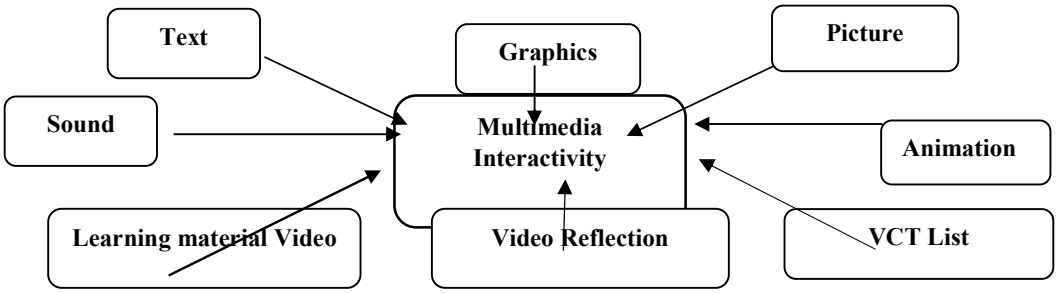

Figure 1: Interactivity as the Center for Multimedia Applications

The development of value-based interactive multimedia in instructional media and ICT in social science education is to:

a. foster capacities of social science student teachers in analyzing core competencies, basic competencies, indicators, and materials to be developed into a more appropriate and effective instructional media in achieving social science competences (social knowledge, social attitudes, and social skills) of the students;
b. assist student teachers in establishing the criteria of value-based instructional media in accordance with the material to be covered.
c. assist student teachers in choosing various types of media combined into a multimedia (texts, pictures/ photographs/posters, animations, videos, and VCT-list) in a single power point material.
d. assist student teachers in making a power point that integrates a variety of media (multimedia) that have been selected and developed. The power point is then burned into a Multimedia CD per subject matter.

4. Applying the integrated practice

Practical integrated activities refer to an experience-based curriculum prepared with the motivation and experience of students involved in a particular activity. Practical integrated activities are defined as an integrated practicum activities, where the integration is performed through interactive multimedia production practices in classrooms in colleges and in schools. With the experience gained from the practical integrated activities, students' desire to investigate the use of media in real terms in schools, the operational capability of value-based interactive media, and of course students' knowledge-attitude-social skills is developed simultaneously, comprehensively, and an integrated manner. This practical integrated approach blends project-based learning model and work-based learning in lectures.

Implementation of Value-based Interactive Multimedia through Integrated Practice

Following are measures in developing interactive multimedia through integrated practice in Instructional Media and ICT of Social Science Education:

1. Negotiation of Subject Matter and Character

   At the first meeting, students and faculty brainstorm the instructional material to be studied and learning strategies to be implemented as well as the assessment systems. In addition, characters to be developed in the classroom are clarified and agreed upon. Results of the negotiation of subject matter and character are then formulated into classroom manuals that will serve as a joint commitment among the teacher and students.
2. Presentation of instructional media about social studies learning and life values.

   At several meetings, learning materials related to instructional media and ICT in social science education will be presented according to the syllabus and lecture reports.
3. The class is divided into 12 groups on the basis of the topics of social science education of junior high school with regard to the core competencies and basic competencies in social studies curriculum of 2013.

4. Exploration of life values based on the social science topics in line with the curriculum of 2013, which include religious and social values.
5. Integrated Practice
   Integrated practice integrates theory and practice in making the media, as well as classroom lectures with practice in schools. Steps under integrated practice activities include:
   a. School observation, whereby students make observations in social studies teaching in school, with a focus on its instructional media and its utilization in learning. In this activity, students together with the teacher explore the various types of learning media, problems in the construction of instructional media, and the solution.
   b. Developing value-based interactive multimedia. In this activity, students integrate the social science learning material with values of life into interactive multimedia. Through project-based learning, students generate products in the form of learning scenarios by utilizing interactive multimedia and developing interactive multimedia based on values in accordance with the relevant topics and subtopics, core competencies and basic competencies in the curriculum of 2013.
   c. Teaching simulation by using value-based interactive multimedia. This is done through the following steps: i) describing the learning scenario; ii) presenting the learning materials using the prepared multimedia; and iii) exploring and clarifying the values extracted from the learning material presented in the interactive multimedia. This simulation process of teaching is reviewed by another student assigned as an observer.
   d. Review of the simulation is undertaken by the lecturer. At the end of the interactive multimedia presentation, the lecturer provides clarification and review of the student's presentation. The review includes evaluation of the learning scenario, presentation/simulation of interactive multimedia, and interactive multimedia content (creativity, appropriateness of the content with the purpose, and clarity of the message), as well as a wealth of values in interactive multimedia.
   e. Reflection on life values (character). The lecturer together with the students reflect on the values of life embedded in the interactive multimedia that the presenting group is exhibiting. In this respect, the lecturer and the students explore, clarify, internalize, and create an action plan regarding the application of values in everyday life in a family environment, campus, community, and the country.
   f. Implementation of value-based interactive multimedia in teaching social studies at school by involving teaching practicum students by way of work-based learning. The interactive multimedia the students developed is then utilized in the teaching practicum process in school in order to enhance the quality of social science learning.

   Developing value-based interactive multimedia through integrated practice can be seen in figure 2.

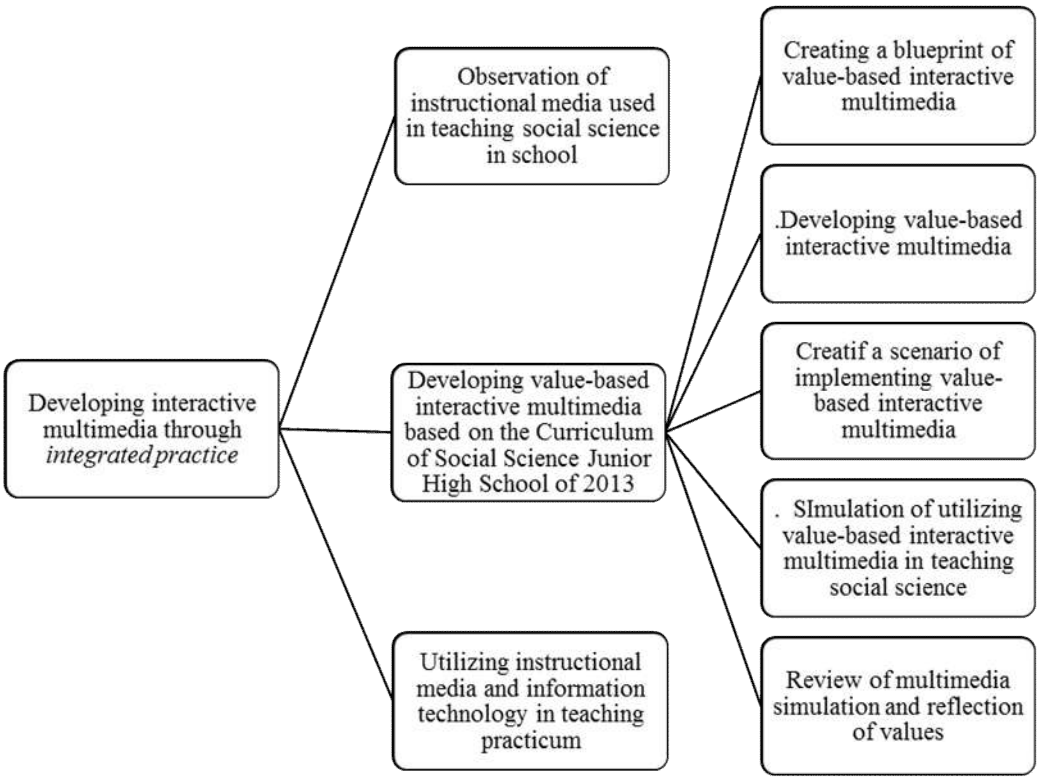

Figure 2: Developing Value-based Interactive Multimedia through Integrated Practice

Effect of Application of Value-Based Interactive Multimedia through Integrated Practice on Students' Character Development

The test analysis of n – gain reveals that in each class, the experimental class and control class, students character increased, but there is a difference in the degree of increase between these two classes. In the control class, the increase is 0.30, which means that the increase is at n-gain g<0.7, a category of medium. Meanwhile, the increase in the experimental class occurs at 1.04, equivalent of n-gain>0.7, a high category. N-gain test results can be seen in the table 1.

Table 1: Increase in Character Score in Pretest and Posttest of Control and Experiment Groups

Data	***Mean***	***Standard Deviation***	***Variants***	***Gain***	***N Gain***
Pretest in control	56.65	5.641	31.823	1.32	0.30
Postest in control	69.93	4.752	22.584		
Pretest in experiment	57.27	5.511	30.369	4.48	1.04
Postest in experiment	106.28	8.693	75.576		

Based on the analysis of n - gain test, it can be concluded that in both experimental and control classes increase occurs; however, increase in the experimental is greater than that in the control. Based on calculation of n-gain significance, the significant value is smaller than α (0.05), indicating that there is a significant difference in the character development of the students in the experimental and control groups.

Value-based interactive multimedia through integrated practice in instructional media and ICT of social science education can nurture the character of students. This is apparent on the students' behavioral patterns in the process of developing the media. Descriptions of Students character that developed through Value-Based Interactive multimedia development can be seen on table 2.

Table 2: Characteristics of Students in Value-Based Interactive Multimedia Development

No	Character	Behavioral Patterns in Developing Interactive Multimedia
1	Creativity	Creativity in making instructional scenarios and produce value-based interactive multimedia products
2	Curiosity	Increased curiosity on technology, as demonstrated by willingness to learn to develop interactive multimedia
3	Appreciation	the ability to appreciate and review interactive multimedia work of their own and other students
4	Hard work	Optimal performance in planning/designing media/creating a scenario, developing multimedia, and simulating it in class, as well as utilizing it in school;
5	Self-reliance	Individual work management in accordance with sub-topics and simultaneously coordinating with the groups of the same topic
6	Honesty	Citing sources from the internet and others and using them as materials used in developing value-based interactive multimedia
7	Discipline	Accuracy in completing the task in accordance with the agreed upon timetable and goals

DISCUSSION

Interactive multimedia evinces characteristics that distinguish it from other types of instructional media, namely, it is interactive; has more than one converging media (audio and visual); provides convenience of feedback; give the freedom to independently determine the topic of learning and conduct the ease of systematic control in teaching social science (Sutopo, 2003; Munir, 2012). In addition, interactive multimedia offers the following advantages: 1) learning is more innovative and interactive; 2) teachers will always be required to be innovative in seeking a breakthrough in teaching; 3) it combines texts, pictures, audio, music, animated images or video in a single entity in order to achieve the learning objectives; 4) it boosts students' motivation in the learning process; 5) it visualizes the material perceived difficult to be explained merely through a lecture or a conventional props; and 6) it trains students to be more independent in gaining knowledge. Given these characteristics and advantages, the students are more motivated to attend lectures and understand the learning material.

Interactive multimedia applied in social science education classrooms is a value-based one. The values of life are integrated in interactive multimedia, so that the instructional media not only motivate the students to learn and understand the material, but also explore, clarify, internalize the values and apply them in everyday life. This is in accordance with the concept of micro character education in schools (Ministry of National Education, 2010) that values should be integrated in the learning activities. Komalasari (2012) and Komalasari et al. (2014) assert that character values must be integrated in learning across all of its components, including materials, methods, media, resources, and assessment. Thus, media as one component of learning should be based on values. Value-based interactive multimedia complement character education in class, namely teaching or guidance to the students to make them realize the truth, virtues, and beauty through the process of considering the proper value and consistent actions. Character education is aimed to help students to understand, realize and experience values and be able to apply them in their life (Mulyasa, 2005).

Value Integration in interactive multimedia can be done through a variety of character educational approaches as stated by Banks (1990) as follows: 1) Evocation, an approach that provides the students the opportunity and freedom to freely express their affective response to stimuli they receive; 2) Inculcation, an approach in which the students receive a stimulus directed toward a poised state; 3) Moral Reasoning, an approach in which intellectual taxonomic transactions occur in seeking a solution to a problem; 4) Value Clarification, an approach through targeted stimulus in which the students are invited to seek clarity of the message of moral values; 5) Value Analysis, an approach in which the students are stimulated to perform analysis of moral values; 6) Moral Awareness, an approach in which the students receive a stimulus and raise an awareness of certain values; 7) Commitment Approach, an approach in which the students are invited to agree on the existence of a mindset in the character educational process from the outset; and 8) Union Approach, an approach in which the students are directed to implement values in their real life. Thus, value-based interactive multimedia can exhibit the knowledge, skills, and attitudes of values. Values can be presented in a variety of interactive multimedia, for example, through a motivational video or a video of character. Not only that, the lecturer should facilitate the students to clarify the value out of the video, and reflect on how it is applied in everyday life in a family environment, campus, community, and the country.

Interactive multimedia in instructional media and ICT learning of social science education is done through integrated practice (Xiaoman, 2006). This shows two forms of integrated practices, namely:

1. Integration of theory and practice in manufacturing instructional media in social science education; the students are equipped with an understanding of the relevant theory of instructional media and ICT as well as how to develop the practice of instructional media and ICT according to the curriculum of 2013.
2. The integration of classroom lectures with practice in schools; the students develop instructional media and ICT in social science education in classroom lectures based on the analysis of observation of instructional media used in schools, and the result of the development of instructional media and ICT will then be utilized in schools in teaching practicum activities.

This activity will be more beneficial to the students of social science education as future teachers in developing and utilizing instructional media and ICT in social science education. It is also in line with the notion of Edgar Dale (Heinich, et al., 2005) that hands-on experience is the most effective medium for the achievement of learning outcomes because it provides a concrete experience to the students.

Value-based interactive multimedia development through integrated practice can develop the character of the students. This further confirms that character education can be integrated in the lectures, either through direct learning in the classroom and outside the classroom, and learning is not directly in the form of nurturant effects of learning activities (Ministry of National Education, 2010; Komalasari, 2012). The substance of value is not solely captured and taught, but it is rather internalized, and standardized as an inherent part of the personal qualities of a person through the learning process. Therefore, the educational process is basically a civilizing process that produces a civilized man, including a cultured man (Hermann, 1972; Saripudin and Komalasari, 2016b)

CONCLUSION

Value-based interactive multimedia in social science learning is the integration of the values of life and social studies learning materials into interactive multimedia by involving students through an integrated practice in classrooms. The model was carried out through several steps: negotiation of subject matter and character, material presentation, group division based on the social science topics of junior high school, exploration of character values according to the topics, and integrated practice (initial observation to school, development of multimedia scenario, multimedia production, multimedia simulation in the classroom, and practice on the use of multimedia in school). There is a significant difference between the class using value-based interactive multimedia through integrated practice with that of a conventional classroom. Therefore, students at institutes of teacher education, as prospective teachers, should be equipped with the ability to craft value-based interactive multimedia through a combination of theory with practice, and a combination of practices in the classroom and in school.

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Views of Students about Technology, Effects of Technology on Daily Living and their Professional Preferences

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ABSTRACT
The aim of this study is to examine the views of students about technology and their professional preferences and put forth the correlation between professional preferences and views about technology. For this purpose, in a private school in Ankara, 109 students from 6th and 7th grades were asked about their views on what technology is, the benefits and harms of technology and also about the professions they would like to perform in the future. The study was designed with phenomenological method, which is one of the qualitative research designs, and it was found as a result of the study that technology is defined under three main categories as an instrument that makes things / people's lives easier, a technical advancement and improvement tool, a tool for production / an instrument of production. Students explained the benefits of technology as facilitating communication, making life easier and acquisition of information / providing the sharing of information, whereas they expressed its harms as addiction, wasting of time and cyber threats. Lastly, considering the correlation between the professional preferences of students and their views about technology, it was found that there is an existing correlation where the quality of the profession is coherent with the views about technology. From this perspective, suggestions were developed for future studies.

INTRODUCTION

In our day, there is a stunning increase in the use of technology. Such increase resulted in the rapid penetration of technology into the daily lives of children. Wherever they are, the children are surrounded with various technologies and technological elements including smart phones, tablets, wireless internet, game consoles, TVs, videos, mobile devices and applications. Moreover, every year, the diversity of technology increases and goes into the daily lives of children. In a previous research, according to the statistics about the technologies in the homes of children between ages of 8 and 12 in the US, it was revealed that among homes with children, 98% have televisions, 80% have video systems, 72% have computers, 68% have internet connection, 67% have video game systems, 29% have educational game systems, whereas 42% of children have their personal TVs, 2% have personal phones, 11% have personal video game systems and 4% have personal computers (Duggan, Lenhart, Lampe, & Ellison, 2015). According to the results of the Research on the Household Use of Information Technologies by Turkish Statistical Institute (TÜİK) (2016), 96.9% of the household in Turkey has mobile phones or smart phones whereas the percentage of fixed line phones is 25.6%. For the same period, 22.9% of household has desktop computers, 36.4% has laptop computers, 29.6% has tablets and 24.6% has smart TVs (TÜİK, 2016). As may be inferred from the statistics, technological facilities in homes reveal that children are surrounded with technology. In the study by Chaudron (2015) in various European countries, the views and experiences of children aged 0 to 8 about such technologies as tablets, smart phones and computers as well as the awareness of parents about technology were examined. Looking into the results of the research, the children that are digital natives grow up in a technology-rich environment and are in interaction with technology.

At this stage, it is clear that technology is an important part of children's lives. Children are able to acquire basic skills of technology use very easily and quickly and to make creative use of not many but certain kinds of technology creatively. Children express the concept of technology along with game whereas families consider technology as something positive and functional but also reckon that its use may cause some problems and controlling and regulating the use of technology is challenging. Additionally, they also express anxiety about the hazards of technology upon health and the potential of coming across improper content and websites.

Matsumoto et al. (2016) carried out a study similar to the study by Chaudron (2015) in partnership with 13 countries and summarized the example of Spain. In this study, it was revealed that children in Spain defined technology as game and entertainment by 58% whereas 24% defined it as design and 18% defined it as science and that tablets were the most popular tool and technology enriched environments play an important role in the daily lives of children.

Today's students, who have been growing up within a digital environment are called "digital natives", "millennials", "the net generation" and "grasshopper minds". The concept of "digital native" is generally used to coin students of the new millennium (the year 2000 and after). Digital natives are students who were born into a technology-rich world, have met technology earlier in life, make heavy use of technology, create a technological learning environment around themselves and create their own unique language (Oblinger & Oblinger, 2005; Pedró, 2006; Prensky, 2001).

Although children are interacting with technology in our day (via games, e-mail, chat), the meaning of technology from their eyes and what their understanding of technology can be is still worth dealing with. Children's definition of technology, which shapes life and has become indispensable, the way and according to which means it is used, could impact the way they make effective and conscious use of technology both during childhood and adulthood and even their professional preference. There are many studies about how children make use of technology (Chaudron, 2015; Gronn, Scott, Edwards, & Henderson, 2014; McKenney & Voogt, 2010). The results of these studies demonstrate that children define the purpose of using technology under three main categories as communication, game and research. If children make the right and effective use of technology, they start being productive. This depends on the way they define what technology is. As educationists, if we become aware of these facts, we can guide children. Moreover, the purpose of use of technology and the effective skills of using technology may also affect the professional preferences among children. Ardies, De Maeyer and Gijbels (2015) have noted that the interest of children in technology increases every day and as they age and that the students that use technology effectively or that attend classes about technology tend to make their professional preferences also in the area of technology. In the European Union report headlined "Science Education Now: A Renewed Pedagogy for the Future of Europe" (Rocard, Csermely, Jorde, Lenzen, Henriksson, & Hemmo, 2007), it is underlined that science and technology education is under risk across Europe, especially among the young individuals, interest towards science, technology and maths has decreased, and unless effective action plans are prepared, the long-term innovative capacity of Europe will decline to a significant extent. In the same report, not only the science and technology education at schools but also the skills of processing information that could adapt to the scientific and technological atmosphere of the time are highlighted. The European Union utters great importance to sharing of scientific processes and newly developed technological products in forms that could be perceived by the society and discusses about the ways to raise up individuals with scientific and technological literacy. Similar conclusions were also reported by OECD (2008) and it was underlined that the interest among students towards science and technology is lessening.

Looking into the relevant literature, it is discussed that the influence of the lack of interest or negative approach among students towards science and technology on their future vocation preferences is among the priority topics and it is observed that the use of technology among students, their attitude towards technology and how these attitudes should be managed are also the subjects of primacy. The interest of students towards technology also defines their career objectives (de Vries, 2011; Osborne, Simon, & Collins, 2003; Van den Berghe & De Martelaere, 2012). Ardies, De Maeyer, Gijbels and van Keulen (2015), in a study with students of 12-13 years of age, examined the way the interest of students towards technology impacted on their career preferences. Meanwhile, Ardies, De Maeyer and Gijbels (2015) carried out a longitudinal study about the technology use of students in academic life. At the end of this study, it was highlighted that the education on technology affects the technology-related career planning among students.

Only a few studies can be observed in the literature about the correlation between the views of students about technology, their definitions of technology and their career planning. In this context, the aim of this research is to examine the views of students about technology and their professional preferences and to put forth the correlation between vocational research and the views about technology. Within the framework of this general aim, answers were sought for the following sub problems:

1. What are the views of students about what technology is?
2. What is the views of students about the benefits and harms of technology?
3. What is the correlation between the views of students about technology and their professional preferences?

METHOD

Study Group

The study group of this study consists of students from 6th and 7th grades at a private school in Ankara. The data collection was carried out throughout the educational year of 2015-2016 and among 109 students who volunteered to take part in the study. 55% of the students (n=60) are from the 7th grade and 45% of the students (n=49) are from the 6th grade. 40% of the 7th grade students (n=24) are female and 60% of them (n=36) are

male. 41% of the 6th grade students (n=20) are female and 59% of the students (n=29) are male. Among the entire group of students 40% (n=44) are female and 60% (n=65) are male. On Table 1, the distribution of students according to grade and gender is shown. Additionally, considering the age of all students, 50 students are 12 years old (46%), 58 students are 13 years old (53%) and 1 student is 14 years old (1%).

Table 1: Distribution of Students in the Study Group According to Gender and Grade

Grade	Gender		Total
	Male	Female	
6th Grade	29	20	49
7th Grade	36	24	60
Total	65	44	109

Research Method

This study, which aims at examining the views of students about technology and their professional preferences and putting forth the correlation between professional preferences and views about technology, was designed with the phenomenological method, which is one of the qualitative research methods. The reason why phenomenological study design was used in this study is to be able to make an in-depth examination of the collected data and also to be able to define the potential themes. Yıldırım and Şimşek (2013) note that phenomenological studies develop a convenient ground for research for the studies that aim at examining the phenomena that are not fully alien but that cannot also be grasped fully. In this study, in order to find out the themes, the answers to the 3 open-ended questions directed to students were examined and the analysis continued until certain patterns were reached. There are 2 phenomena examined within the scope of this study. The first one of these contains the views about technology and the second one contains the professional preferences.

Data Collection Tools and Analysis of Data

The data of the research was collected through a survey with 3 open-ended questions sent to the 6th and 7th grade students of the aforementioned private school over their tablet computers. In this survey, the questions directed to students are as follows:

1. What do you think technology is? Can you define with your own words?
2. Can you explain the benefits and harms of technology through examples?
3. What profession do you want to choose in the future?

These questions directed to students were sent over tablet computers and were responded by students within one week and then combined within a central database. This database is called “AROBER - K12NET Student Information System” and contains very detailed information about the education and training of students that are studying at the private school. The information in this system are obtained through optical forms or data entry from the Internet. The information obtained in this study were transferred to the aforementioned database over the Internet. Each student, through their personal tablet computers, has access to the system through the username and password provided to them. The information monitored on this student information system is not regarded as official information and they do not have legal validity. The official information about the students are handed personally to the students and/or parents by the school’s administration. However, this database has significant contribution for the institution in the way that it facilitates the monitoring of the academic achievement of the students, the recording of personal information about the students and the customization of various education systems and curricula.

The answers from the students aim at making an assessment and these answers were examined with content analysis. Fraenkel, Wallen and Hyun (2012) express that content analysis has a wide area of practice in research about education and provides the researchers with a viewpoint about the problems that can be tested through more direct methods. In this study, cross checks were made on the codes and themes determined by the researcher and thus the validity and reliability of the research was ensured as much as possible. Additionally, during the presentation of the findings, detailed descriptions were made. The purpose here is to report some of the examples provided by the participants fully in order to increase the quality of the study (Yıldırım, 2010). In these findings, some citations were made from the expressions of students and the students were coded as Ö1, Ö2, Ö3, etc. Additionally, another coding was made by another by another researcher and a consensus was

sought for. At this point, Cohen's Kappa coefficient was calculated as 0.78 and a significant compatibility was found.

FINDINGS

The answers to the questions directed to the students were examined and in the context of sub problems, they are provided respectively as follows.

Findings about the Definition of Technology

Considering the answers given by students about what technology is, the answers can be grouped under three main categories as an instrument that makes things / people's lives easier, a technical advancement and improvement tool, a tool for production / an instrument of production. In this categorization, the most common answer was around the theme that it is an instrument that makes things / people's lives easier (n=80, 73%). It was followed by the category of a technical advancement and improvement tool (n=15, 14%) and the category of a tool for production / an instrument of production (n=14, 13%). The students that regard technology as an instrument that makes things or people's lives easier are found to be the students that are aware of the contribution of technology into the daily life, that are openly interested in technology and that can think concretely and exemplify their answers. The following sentences can be given as examples to the expressions by the students that regard technology as an instrument that makes things or people's lives easier and that are coded under the first theme;

"Technology are the devices that make my daily life easier. For example, thanks to technology, I can make research on the web, play games and read books on the computer ." Ö14
"It makes it easy for someone to do something. For example, like the smartboard we use during classes." Ö46
"I think that technology is all of the scientific inventions that make people's lives easier. We can play games and we can use it for fun. Of course we can also learn things through it." Ö67
"It is science that makes life easier. For example, the cars we use, smart homes, phones computers etc…" Ö81

The students that regard technology as a technical advancement and improvement tool are the ones that know of the potential contributions that technology can bring about and are aware of the benefits of these contributions to industry, society and service industry. The following sentences can be given as examples to the expressions by the students that regard technology as a technical advancement and improvement tool and that are coded under the second theme;

"It is a name given to all instruments that are used in factories and in private sector thanks to technology. For instance, steam machines, thermal plants and the propellers that transform wind into energy. All of these are technology. Developed countries are into these technologies and we, as a nation, should also develop and make these widespread." Ö3
"I think that technology is now beyond simple inventions. There are bigger scale devices, instruments, technically developed planes and UAVs etc. Yes, computers, televisions are also technology but they are getting out of date now. Each day, new and different technologies emerge. The countries that are technically more powerful are ahead from this aspect." Ö19
"We know that powerful countries are advanced in terms of industry and economy. Thanks to technology, they are making progress. When used consciously technology in a way takes effect on the improvement of countries." Ö22
"Technology means being ahead in terms of technique, economy and wealth. The countries with powerful technology always win and make progress." Ö50
"Technology is a sign of development. It is used at schools, health institutions and court houses." Ö68

The students that regard technology as a tool of production draw attention to production supported by technology. It can be asserted that these students focus on products and exemplify technological production concretely. The following sentences can be given as examples to the expressions by the students that regard technology as a tool of production and that are coded under the third theme;

"I think that technology means production. Simply a steel door is technology. Locks were not safe before and now the doors are safer. Steel doors are now serially produced. This means that there is a need and therefore they are produced." Ö10
"The rapid change brought along improvements and new technologies. This has facilitated production. Even copier machines are faster than before. They do your work quickly." Ö31
"I heard something called the Industrial Revolution. Technology has played a great role in it. A job done by 10 people before can now be done simply by pressing a button." Ö77

Findings about the Benefits of Technology

Looking into the responses given by students about the benefits of technology, it is possible to assert that the responses can be categorized under three groups as facilitating communication, making life easier and acquiring information / sharing of information. The most significant share in this group is that of the theme making life easier (n=61, 56%). It is followed by the theme acquiring information / sharing of information (n=31, 28%) and by the theme facilitating communication (n=17, 16%). The students that describe the benefit of technology as making life easier are observed to draw the attention to the characteristics of various technologies and define at which points it facilitates daily life. It can be asserted that among these students, the perception of benefit has significance. The following sentences can be given as examples to the expressions by the students that point out to benefits of technology in making life easier and that are coded under the first theme;

"Thanks to technological devices, things get easier to achieve every day. The houses that used to be built in 3 years are now built in 3 months. Our daily lives have now become easier. We are able to get to anywhere easily thanks to cars and airplanes that are also technologies." Ö2
"I think that technology is all improvements that make our lives easier and move it to a higher level. Its greatest benefit is that it makes our daily lives easier." Ö27
"There are now big screen televisions. We watch better TV. This is also a benefit isn't it? We also have smart boards in our classrooms. Our teachers are better at teaching classes." Ö33
"My father is a doctor and he uses robots. The operations are now easier than before as I heard." Ö56
"We have all kinds of electric appliances in our homes. These are all products of technology. Without our refrigerator and freezer, we would not be able to store our food. We are luckier than the older generations." Ö97

It was observed that the students that express the benefits of technology as facilitating communication draw the attention that with the support of technology, communication has become easier and more effective. These students have also highlighted social life and focused on the benefits of social media, telephones, the Internet and mobile phones. The following sentences can be given as examples to the expressions by the students that point out to benefits of technology in making communication easier and that are coded under the second theme;

"Thanks to the Internet, I can communicate with my friends. Through Skype we can communicate for free. I communicate through the smart phone they bought me." Ö4
"Social media keeps us together all the time. Even when there is no school, I can see what my friends are doing. I'm glad that there is Internet. It is a technology, I think. Maybe it is not a device but I can communicate through it." Ö37
"My friends and I can communicate whenever we want. We have a class group. We chat through that. We share photographs." Ö39
"I think that the Internet is the greatest technology so far. Thanks to it, I can follow my friends from my old school. We have an ongoing communication." Ö40

Students that regard the benefit of technology as the acquisition of information / sharing of information are able to get access to information at anytime and anywhere, to share information, do their homework and follow up their personal portfolios. The following sentences can be given as examples to the expressions by the students that point out to benefits of technology in providing information and sharing of information and that are coded under the third theme;

"There is a beautiful technology called the Internet and through it we can make research. I can do my homework. I now go to the library merely for getting a story book. Everything is on the Internet now." Ö6
"I can even view my school marks on the e-state now. This is something good for us. We also do our homework ad study on our tablets. Life is more fun now through technological devices." Ö15
"We have this AROBER system. Even this can be an example of technology, right, Teacher? It seems so to me. We ensure the sharing of information with this system." Ö48
"With the phone in my hand, I can go online wherever I want. I search about something I wonder and learn about it instantly. Was there any such thing before?" Ö66
"The thing I most enjoy doing online is listening to music. Somebody uploads a video and the whole world watches it. Everyone likes it. Information on the Internet get better when shared." Ö78

Findings about the Harms of Technology

Looking into the responses given by students about the harms of technology, it is possible to assert that the responses can be categorized under three groups as addiction, wasting of time and cyber threats. The most significant share in this group is that of the theme addiction (n=80, 73.4%). It is followed by the theme wasting

of time (n=19, 17.4%) and by the theme cyber threats (n=10, 9.2%). The students that describe the harm of technology as addiction are focused on the addition to technology among individuals and point out to the potential consequences, results and signals of such addiction. It was observed that these students offer clues about the levels of addiction among their friends from school and exemplified these. The following sentences can be given as examples to the expressions by the students that point out to harms of technology in terms of addiction and that are coded under the first theme;

"I cannot help but check my mobile phone all the time. I do not take it to school with me but when I come home, I never leave it aside. The same with the tablet, although I also study on it." Ö5
"When I have too much of TV or computer, my fingers get numb. My eyes are defected now too, I'm using eyeglasses. I really love playing games, I can do that for hours." Ö11
"Some of my friends are so much into technology. They even forget to eat their meals. They may even be coming to school without sleep and doze off during lessons. I think they play games all night." Ö19
"When I put too much time on the computer, I started doing poorly at school. Therefore I use it less. I do not want to get addicted." Ö44
"At home I devote most of my time for the pone, tablet and the computer. My parents get cross with me as I do not speak to them. They tell me I am not sociable." Ö49
"Addiction to technology is a bad thing. So is the addiction to the internet. I both takes up my time and harms my health. Teachers talk about these in the classes too. I am actually afraid to become addicted." Ö68

It was observed that the students that describe the harm of technology as wasting of time point out to the potential negativities that they may face when they spare too much time for technology. These students regard the overuse of technology as a significant waste of time and note that technology may obstruct social life. The following sentences can be given as examples to the expressions by the students that point out to harm of technology in terms of wasting of time and that are coded under the second theme;

"When we get carried away watching television, we do not have time for homework. For this reason, I plan my time. Each day I watch for maximum 1 and a half hour. There is nothing on television actually but I sit in front of it anyway." Ö23
"In fact, phones and tablets are useful devices. But overusing these makes us forget how time passes. Sometimes I cannot do my homework on time because of playing games on the tablet." Ö67
"I use my computer less and less each day. The tablet has been replacing it. The more the technology diversifies, the more time we start losing. You have to allocate certain amount of time for each." Ö72
"I think both technology and the Internet takes time. It would be better if both did not exist. People would go towards books, encyclopedias and libraries." Ö77
"I wish we could spare the time we normally spare for technology for one another and our families." Ö89

The students that describe the harms of technology as cyber threats focus on threats, psychological oppressions, the cyber crimes such as insults and bullying that could take place through technological devices. The expressions of students also make the distinction that in fact such acts are not directly through a technological device but through the Internet. The following sentences can be given as examples to the expressions by the students that point out to harm of technology in terms of cyber threats and that are coded under the third theme;

"In fact you should be careful when surfing the Internet. There are inappropriate sites, about swindling or threats. We were taught about it in class." Ö40
"They steal credit card information on the web. This is something important. One should be careful not to lose money." Ö55
"When I surf on the web with my tablet, suddenly some websites open. Such sites about online gambling. These are in fact inappropriate sites. But I cannot block them." Ö61
"People may threaten each other online. They do it a lot on Facebook. There are also those who insult. I did not come across but one of my friends was intimidated by such people." Ö101

Findings about Professional Preferences

Looking into the responses given by students about the professions they would like to choose in the future, it can be asserted that the responses can be grouped into three different categories as professions based on science and maths skills, professions based on verbal skills and liberal professions. In this grouping, the most significant share is that of professions based on science and maths skills (n=65, 59.6%). It is followed by the theme professions based on verbal skills (n=32, 29.4%) and by the theme liberal professions (n=12, 11%). It is observed that the students that are willing to choose professions based on science and maths skills want to be engineers, doctors, pharmacists or branch teachers. It was observed that the students that are willing to choose professions based on verbal skills want to become lawyers, judges, presenters, academics or journalists and the

students willing to have liberal professions want to become jewelers, artists, photographers, real estate agents or self-employed lawyers. From these findings, a correlation could not be established between the views of students that want to have liberal professions about technology and the profession they want to choose. It is presumed that these students express their choice of profession largely because they are influenced by their parents' professions. However, it is possible to assert that the students that have high awareness about technology and express the benefits of technology clearly and properly prefer the professions based on science and maths skills and that the students that focus more on the harm of technology prefer the professions based on verbal skills.

CONCLUSION, DISCUSSION AND SUGGESTIONS

In this study, the views of students about technology and professional preference are examined and the correlation between vocation preferences and the views on technology are studied. As a result of the study, it was found that from the eyes of students, technology is regarded in three categories as an instrument that makes things / people's lives easier, a technical advancement and improvement tool and a tool for production / an instrument of production. Especially the definition of technology as an instrument that makes people's lives easier has yielded a parallel result to the study by Özdemir, Aksal and Gazi (2006). In this study, it was concluded that technology is a phenomenon that makes people's lives easier and the materials of teaching were regarded as a tool in education.

Within the scope of the study, the students have defined the benefits of technology as facilitating communication, making life easier and acquiring information / sharing of information. Considering the expressions of the students in the study group and the patterns among their expressions, it can be asserted that the students are aware of the advantages of technology and can define at which points it facilitates daily life. Another cause for this finding can be that the students are receiving education at a private college. For this reason, this phenomenon should be studied in different types and levels of schools.

The students categorized the harm of technology under three groups as addiction, wasting of time and cyber threats. Within the body of literature there are studies about the threatening aspect of technology, computers, and Internet (e.g. Canbek and Sağıroğlu, 2007; Çelen, Çelik and Seferoğlu, 2011) and studies that point out to addiction (e.g. Arısoy, 2009; Şahin and Tuğrul, 2012). From this perspective, it can be inferred that the awareness of students about the negativities that could be caused by technology is high.

Lastly, considering the correlation between the professional preference of students and their view about technology, the existence of a correlation where the character of the profession matches the views about technology. However, this finding was not obtained as a result of a direct inquiry among students. Therefore, the existence of such correlation can also be studied in a different data collection process with direct expressions from students in future studies. Additionally, Ardies, De Maeyer and Gijbels (2015) noted that the students that make effective use of technology or attend classes about technology make professional preferences also in the area of technology. Thus, this inference is also coherent with the findings of this study.

Although Ardies, De Maeyer and Gijbels (2015) indicate that the willingness and interest of students towards technology may change over time, since no longitudinal research was not carried out in this study, the change over time could not be examined. It can be asserted that for future studies, there is need for a longitudinal research as to whether there is a change in the views of students about technology, its benefits and harm.

In conclusion, it can be asserted that there is a need to examine how the varying viewpoints about technology and their changes in time influence professional preferences. Likewise, within the body of literature, there is no adequate amount of research as to how a potential change in the students' definition of technology could influence their professional preferences.

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