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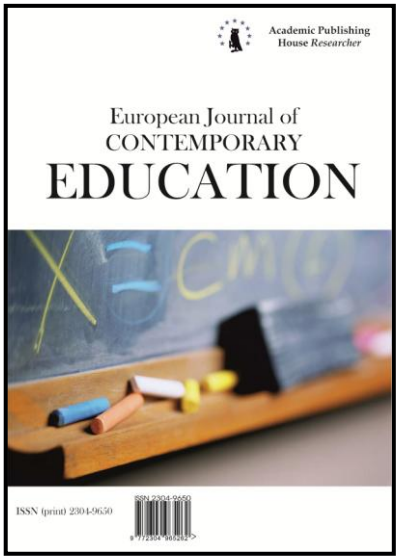

Computer-Assisted Learning, Multimedia Instruction, Learning, Design, Development and Methods for Future Learning Designs: A Special Issue

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"There is a real danger that computers will develop intelligence and take over. We urgently need to develop direct connections to the brain so that computers can add to human intelligence rather than be in opposition."
Stephen Hawking

Dear Colleagues and Comrades,

We are pleased to publish the special issue of the European Journal of Contemporary Education (EJCE) which deals with modern issues on computer-assisted learning, multimedia instruction, learning, design, development and methods for future learning designs.

The issue covers the articles on educational technology, instructional technology and other related topics. We, as a guest editorial team, would like to thank all the authors and almost sixty reviewers for their contributions and good performance, as well as a genuine interest in our journal. The articles are original and were not published in any other journals.

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EJCE provides equal opportunities for academicians, researchers and scholars who work in Russia, Turkey or other countries. EJCE has been included in Web of Science (ISI) Core Collection since December 2015, and listed in many other indexes and databases as well. We invite you to visit our website to review articles and items of interest.

And finally, we would like to dedicate this special issue to the friendship, bright and peaceful future of two great countries, Turkey and Russia, which in the present or in the past made an invaluable contribution to humanity and human virtue, protection of human values, strengthening of the family institution, and humanizing the system of education.

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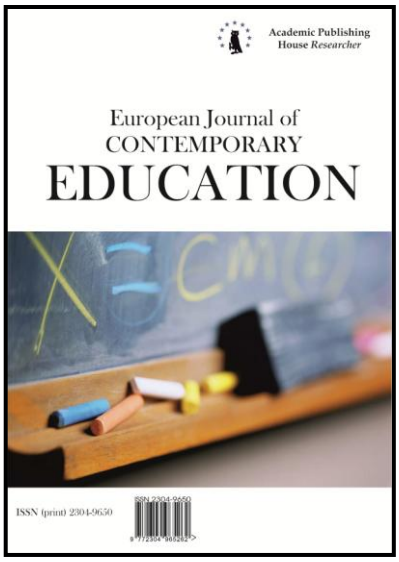

Examination of University Students' Level of Satisfaction and Readiness for E-Courses and the Relationship between Them

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Abstract

The success of a distance education program can be evaluated according to student satisfaction, aside from comprehensive examinations, projects and presentations. The purpose of this research study is to determine both the relationship between e-course satisfaction and online learning readiness by ascertaining student levels, and the effect of the materials used in e-learning on student satisfaction. A general screening model was used in this study to determine the characteristics of a group and to clarify the existing situation in their own conditions. The study was conducted during the 2014-2015 academic year at Kocaeli University. The E-Course Satisfaction Scale (ECSS), consisting of 35 five-point Likert-type items, and the Online Learning Readiness Scale (OLRS) consisting of 18 five-point Likert-type items, were applied to 352 university students. The data were analyzed by methods of descriptive statistics, independent t-test and regression analysis in the SPSS program.

According to the survey the satisfaction level of the students is moderate; when the sub-dimensions were examined, satisfaction was high in the instructor-student interaction and environment design sub-dimensions while it was moderate in the course content and teaching process, materials used and communication tools, and attitude towards e-learning sub-dimensions. When interaction and communication tools such as a virtual classroom, forum, chat, e-mail, web pages, animation, video, graphics and images as content tools, and questionnaire as assessment tool were used there was a difference in student satisfaction, and satisfaction was higher in these courses. There was not a significant difference in the students' satisfaction with the exams and homework as assessment tools, or content of .pdf and text documents as content tools, but .pdf-text documents and exams were among the most-used tools in the courses. Student satisfaction was high when the number of materials used in courses was 7 and over, that is, as the number of materials increased, so did the satisfaction level.

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The levels of students' readiness for online learning were high in all sub-dimensions in total, and there was a positive significant relationship between students' levels of readiness and their satisfaction level. Moreover, the satisfaction levels of learners who were self-directed, had high motivation and could control their own learning appeared to be affected positively.

In conclusion, to increase the satisfaction level of the students it would be useful to increase the number of materials used in the e-courses; give more importance to interaction; and use more tools such as animation, virtual classroom, video, forum, survey, chat and email. In order to increase satisfaction, student readiness should be considered, students should be able to use technology effectively.

Keywords: E-course satisfaction; Online learning readiness; Interactive materials.

Introduction

Advances in technology have changed education methods as well as social living conditions. The more rapidly technology changes, the more rapidly knowledge increases; so individuals always need to improve themselves in order to maintain and enhance their success. Hence, one of the methods that can be used is e-learning, which provides access to information independent of time and place, communication with a synchronous or asynchronous instructor, the use of internet technologies, and by which the individual manages to learn by self-direction. E-learning refers to individual knowledge, practice and experience of the learner to construct knowledge and support teaching and learning with any electronic tool (Tavangarian, Leypold, Nölting, Röser, & Voigt, 2004).

According to Tessema, Ready, and Yu (2012), the efficacy of an instructional programme can be evaluated by direct performance assessment such as detailed exams, projects and presentations and by indirect assessment such as student satisfaction. For the success of this kind of environment, student satisfaction is an important indicator of the quality of the learning experience. Astin (1993) described student satisfaction as the student's perception of the school experience and the importance of the education provided by the institution.

Yukselturk and Yildirim (2008) state that in order to improve the quality of online programmes under today's conditions, higher education institutions should consider the satisfaction of the students. High satisfaction in e-learning decreases the attrition rate of the institution, provides significant permanence in learning and high motivation for following additional courses (Kuo, Walker, Belland & Schroder, 2013).

In the literature, there have been many research studies to determine the factors that influence e-learning satisfaction. According to Sun, Tsai, Finger, Chen, and Yeh (2008), the students' anxiety about computers, the instructor's attitude towards e-learning, the flexibility of the e-learning course, the quality of the course, the perceived benefit and ease of usage, and variety in assessments are the critical factors that affect students' perceived satisfaction. However, Wu, Tennyson, and Hsia (2010) argue that the learning climate and expectations of performance have a considerable impact on student satisfaction. Aside from this, computer self-efficacy, the functionality of the system, the features of the content and interaction significantly affect the expectations of performance. According to Govindasamy (2001), institutional support, enhancements to the course, teaching and learning, the structure of the course, support for the student and instructor, assessment and evaluation are criteria for a high-quality course.

Ilhan and Cetin (2013) state that the instructor's confidence in education and attitude towards online learning, the quality of the internet and computer technologies used within the online learning process; the perceived ease of usage; and the learner's age, gender, learning style, attitude towards online learning; motivation and technical skills related to computer and internet usage are some of the variances that influence the quality of online learning environments and have a determinant role on student satisfaction. The quality of online learning environments is a critical factor for success. Students' e-learning satisfaction levels play an important role in the evaluation of e-courses by institution managers and instructors.

Factors affecting e-learning satisfaction

This study focused on the materials and communication tools used in online learning and interaction, the student-instructor interaction, the instructional environment design, the attitude

towards e-learning, the course content, the teaching process and the readiness for online learning as factors affecting e-learning satisfaction.

Materials used in online learning: Students should have the abilities to communicate and use communication tools effectively as the e-learning environment requires the student to be in a process of constant communication and interaction with content, instructor and other students. If the course is carried out by taking advantage of instructional materials during teaching-learning process, the material will address students' senses of sight and sound; and when the students are able to express their opinions with the help of the instructor, the number of sense organs participating will increase and what is attempted to be learnt will be more easily recalled (Cekirdekci & Toptas, 2011, p:139).

There is a bidirectional information flow and interaction between student, instructor and content in teaching environments. According to Chou, Peng and Chang (2010), interaction represents the functions or actions that can be utilized by users and enable them to study the content presented via computer and get feedback; furthermore it is an important element for the quality and success of online learning. Within online learning, the instructor and students are far from each other geographically. So it is important to use the communication tools effectively. An efficient learning environment should offer synchronous education (virtual classroom), video, animation, simulation software, discussion and chat environments, games, and self-evaluation environments in addition to text, sound and graphics.

Chou et al. (2010) suggest that there are five types of student centered interaction:

- Student-interface interaction: Students' effective and easy access to and ability to control the interface.
- Student-self interaction: Students' ability to pursue his/her improvement in learning.
- Student-content interaction: Providing interaction with all the materials available in the learning environment.
- Student-instructor interaction: Ensuring interaction between instructor and student by means of communication channels provided by the system.
- Student-student interaction: Ensuring interaction with other students using the system via communication tools.

E-learning can be organized as synchronous or asynchronous. During synchronous e-learning, the instructor and students interact with each other using communication technologies such as a live course, chat rooms, or video conference at different places but the same time. However, during asynchronous e-learning, the instructor and students interact with each other via technologies such as a forum or e-mail at different places and times.

Student-Instructor interaction: The instructor's facilitative presence, prompting the students by means of using tools like forum, chat, live courses, e-mail and giving feedback in e-learning environments are among the most important factors of these environments. The instructor should be able to use course tools, ensure the students' engagement in the process via inquiry and discussion, try to increase the motivation by different learning techniques, ensure collaboration between students, prepare guides for them, manage time properly, plan and monitor the learning stages (Kemshal-Bell, 2001).

In a literature study that was carried out by Chou et al. (2010), the tools used for ensuring student-instructor interaction were: class roster e-mail, bulletin board systems, synchronous communication, social tools, grouping the students, ensuring students' assignment submission and giving the related feedback, online examination, voting and questionnaire, and comments about the course and instructor. Effective usage of these tools will motivate the student and consequently will contribute to positive student satisfaction.

Instructional environment design: The main objective of web based instructional environment design is to draw the student's attention and ensure his or her motivation. That's why the design should include high level cognitive activities, support usage of a wide range of tools and sources, discuss the course and social and life skills together, use technology as a tool, encourage the student to interact with the software, help the student complete learning purposes without getting tired or bored or experiencing any conflict (Guney, 2010, p:69, 76).

The primary goal of an instructional interface design that enables the communication between user and computer is to ensure easy surfing by means of assistant tools during learning

and prompt the student directly to related information by using recognizable clues like subsidiary signs or tools (Sung & Mayer, 2012). Instructional interface design is a difficult process which requires information, teaching and visual design skills, psychology, human factors, ergonomic research, computer science and editorial design (Sung & Mayer, 2012).

In instructional design models, behaviorist, cognitive and constructivist theories that try to explain how teaching occurs are drawn on while the environments are being designed. The principles to be used for the interface and teaching design when preparing effective teaching material at the design and development stages in instructional design models are important for the student to ensure an efficient interaction with the content and environment. When examined in literature, it can be seen that there has been a lot of research about how multimedia design should be, e.g. Nielsen (1993)'s interface design principles and Mayer (2001)'s multimedia design principles.

While designing web based environments, attention must be paid to not use unnecessary visual material, to the design of typographic items, text, and colours, and to the design of visual elements and surfing. Sun and Cheng (2007) suggest that multimedia design is costly and only effective in attracting the student's attention rather than ensuring they understand and learn the content; furthermore, the usage of too many unnecessary multimedia items will distract the student's attention, hence, the performance will decrease and the environment will not be as important as the message to be transferred. Also according to Sung and Mayer (2012), ensuring that students able to focus on the content in e-learning to engage in appropriate cognitive activity during learning without having to do any unnecessary cognitive activity is a substantial problem in interface design.

Designing e-learning environments is a long and difficult process. So, during the process, considering the factors like the characteristics of the students and instructor who will use the system, the institution's support and system management in addition to content and interface design is important for the achievement of e-learning systems.

Attitude towards e-course: The factor that has the greatest effect on the success of e-learning is the student as well as the instructor's preparation for the course. One of the determinants that affect the student's success and satisfaction with the system, and helps him/her learn permanently, is the student's attitude towards learning. According to Inceoglu (2010, p:7-8), attitude is a possible way of behavior that an individual can take up towards a situation, an event or case. There is a close relationship between attitude and an individual's personality characteristics, the social and cultural environment in which he/she lives, knowledge and experiences. Attitude is composed of sensual, cognitive and behavioral components. It determines what an individual knows about an issue (mental factor), how he/she will approach it (positive, negative, neutral) and what kind of manner he/she will take up against it (behavioral factor) (Inceoglu, 2010, p:20).

Positive student attitudes towards e-learning and computers will improve their learning levels. Liaw, Huang and Chen (2007) state that students of the instructors who display a positive attitude in e-learning seem to be more willing to use the system and the students who display a positive attitude use the system more effectively. Comprehending the attitude of the instructor and learners towards technology is essential to making learning more efficient and attractive (Liaw et al., 2007). Furthermore, identification of the learner's motivation, confidence, trust, anxiety about computers, fear, anxiety, pleasure, excitement, pride and embarrassment is required for the success of the system (Ozkan & Koseler, 2009). As the students that engage in the system voluntarily for a specific purpose are more motivated than the others, they are likely to be more successful (Gulbahar, 2009, p:65).

Course content and teaching process: In addition to the representation quality of the information, quality of interaction, and perceived benefit and ease of usage, quality of the content has a significant impact on student satisfaction; as the content quality improves, potential users will find the system more useful and adopt it (Calisir, Gumussoy, Bayraktaroglu & Karaali, 2014). E-learning processes that do not adhere to pedagogical principles, lecturers resistant to change, learners who do not know about e-learning, poor student performance and low-quality content hamper the learning process (Govindasamy, 2001).

According to Concannon, Flynn and Campbell (2005), as interaction with the content is essential, the students should be able to surf within the materials easily, notice when new materials

are added, and they should be given feedback like immediate interpreting during interactive exams. Moreover, e-learning content must be designed in the form of learning objects known as manageable and reusable objects (Govindasamy, 2001).

In the teaching process of the course, the instructor must develop constructive techniques to support the students' engagement in the course and make use of teaching strategies in order to ensure the students participate in discussions cognitively. In order for that, the instructor can explain what he/she expects from the students, how they must discuss and how they will be evaluated via a discussion guide during and after discussion (Gulbahar; 2009, p:157). In the teaching process, the quality of the course and student motivation will improve provided that students have frequent and high-quality interaction with the instructor and other students, they are supported when necessary, few technical problems occur and they use many interactive materials (Gulbahar, 2009, p:67).

Readiness for online learning: Online learning environments provide students with flexibility in planning and controlling their learning. The student forms his/her own learning plan by accessing the content he/she chooses in his/her free time, doing exercises and using the material which he/she wants. Learning will be facilitated if the student has enough technical skill, ability to self-learn and communicate, and motivation (i.e. a high level of readiness).

The learner who has a high level of readiness can comment on the topic and do assignments more easily by comprehending the subjects sooner; on learning the previous topic thoroughly, he/she could be ready to move on to the next one (Harman & Celikler, 2012).

Aruk (2008) suggests that readiness has three basic aspects: social, cognitive and educational. Social readiness means ensuring interaction by dual communication in virtual education environments, turning into an information society and undertaking a common responsibility for the outcome and results arising during the education process of interacting learners. Cognitive readiness requires the learner to have the skill of critical thinking. Educational readiness necessitates accessing information through multiple resources, evaluating, sharing and discussing it independently of time and place and using it in life when required (Aruk, 2008).

In web based learning environments, learners' performance is closely related to their computer and internet skills, comprehension of the internet, attitudes and behavior in online environment (Hung et. al, 2010). In addition to external factors like past experiences and educational level, motivation, capacity for self-directed learning and ability to work with the materials offered as text are essential for the learner to be successful in an e-learning environment (Warner, Christie and Choy, 1998).

Online learning readiness focuses on the ability to manage time and adapt to the self-directed nature of online learning which is self-learning, understanding personal learning styles and experiences (Lau, 2008). Self-directed learners have the skills to access and process the information for a specific purpose.

Determining the readiness level of the learners who do not have experience for this method of learning contributes to both the learner and to the instructor's course plan. In order for e-courses to be conducted without any problems, it is essential to assess the effect of students' readiness level on satisfaction.

When the studies regarding readiness in Turkey examined, it is seen that factors such as technical skills, elements affecting success, access to technology, motivation, attitude and personal characteristics, self-directed learning, online skills, online communication, learner control and time management have generally been investigated but only in one study (Kirmizi, 2015) has readiness been associated with satisfaction (Gulbahar, 2012; Ilhan & Cetin, 2013; Kalelioglu & Baturay, 2014).

Purpose of the research

The purpose of this research study is to determine both the relationship between e-learning satisfaction and online learning readiness by ascertaining their levels, and the effect of the materials used in e-learning on student satisfaction. The sub-purposes developed for the main objective are as follows:

a) What are the satisfaction levels of students concerning e-courses?

b) What are the levels of online learning readiness?

c) Do the satisfaction levels of students concerning e-courses vary meaningfully according to demographical variables?

d) Do the satisfaction levels of students vary meaningfully according to the materials used in e-courses?

e) Is there a significant relationship between levels of online learning readiness and satisfaction of students concerning e-courses?

Method

Research Model, Population and Sample

In this research study, an overall scanning model was adopted to determine the features of a group and assess an existing situation under its own conditions. The survey was carried out with the participation of 370 students from various faculties of Kocaeli University, who had completed at least one online course in the 2014-15 academic year. 18 of the surveys were declared invalid as they were not fully filled out; therefore the responses of 352 students were evaluated. 54.3% of the participants were female, 45.7% were male; 22.2% were from the faculty of engineering, 15.3% from the faculty of communication, 14.8% from the school of health sciences, 13.9% from the faculty of arts and sciences, 9.4% from the physical education and sports school, 4.5% from the faculty of architecture and design & fine arts and 4.3% from the faculty of law.

In electronic elective courses that started in Kocaeli University in the fall semester, the Moodle Learning Management System (LMS) is being used as the teaching platform. In order to transfer the content in this system, materials like web pages, pdf and text documents, animations, videos and graphics/images are used; a virtual classroom (synchronous course) is used to ensure interaction; forum (asynchronous applications), chat and e-mail tools are for discussion and communication; finally tools like homework, exams and questionnaires are for evaluation.

There are 28 active elective courses in the system. The students of the 2nd, 3rd and 4th classes must take at least two of these elective courses. Altough mid-term evaluations are carried out in the system, finals are implemented in a face to face environment under the instructor's supervision. This research will reveal which tools are most frequently used and at what rate they are used in the system, the students' satisfaction concerning these tools, their overall satisfaction with the system, and their levels of e-courses satisfaction according to faculty, gender and class. Furthermore, it indicates the relationship between online learning readiness levels and satisfaction of the students. As a result of assessing this data, an opinion about what to do for improving satisfaction with the system and efficiency will be formulated.

Data collection tool used in the research

Scale of satisfaction with e-courses

In this research, the data were collected through the E-Course Satisfaction Scale (ECSS), online learning readiness scale (OLRS), and a short form to gather personal data. The E-Course Satisfaction Scale was developed by Kolburan Gecer and Deveci Topal (2015) in order to determine how satisfied the students were with the e-learning method. The E-Course Satisfaction Scale (ECSS) was composed of 35 5-point Likert-type items and five sub-dimensions (course content and teaching process, materials used and communication tools, attitude towards e-learning, environment design and instructor-student interaction). The scale was conducted on 414 students enrolled in various faculties of Kocaeli University, who had completed at least one entirely online course in the fall of the 2013-2014 academic year. In the principal components analysis, the varimax rotation technique was used; a 5-factor structure with an eigenvalue over 1.00 which explained 67.61% of the total variance was obtained. Factor loading of the items in the scale ranged from ".478" to ".833" and item-total correlations were between .526 and. 872. The reliability of the scale was measured as Cronbach's Alpha=0.966. Table 1 shows the results of the eigenvalue and explained variance rate of factors obtained from the factor analysis.

Table 1. Eigenvalue and Explained Variance Rate of Factor Obtained from Factor Analysis

Factors	Eigenvalue	Explained variance	Total variance
1	17.104	17.657	17.657
2	2.709	16.985	34.642
3	1.650	12.334	46.976
4	1.188	11.053	58.030
5	1.012	9.580	67.610

The first factor was "Course content and teaching process". The factor loadings were between .529 and .722 and the alpha internal consistency coefficient was .932. The second factor was "Materials used and communication tools". The factor loadings were between .546 and .829 and the alpha internal consistency coefficient was .921. The third factor was "Attitude towards e-course". The factor loadings were between .569 and .690 and the alpha internal consistency coefficient was .881. The fourth factor was "Environment design". The factor loadings were between .478 and .681 and the alpha internal consistency coefficient was .914. The fifth factor was "Instructor-student interaction". The factor loadings were between .521 and .833 and the alpha internal consistency coefficient was .900.

Online Learning Readiness Scale

The Online learning readiness scale (OLRS) was developed by Hung and his colleagues (2010) and adapted by Ilhan and Cetin (2013). The scale consisted of 18 Likert-type items and 5 sub-dimensions. It was found out that the corrected item-total correlations ranged from .58 to .87 and there was a significant difference in the means of 27% sub-up groups for all the items in the scale. The results related to the item-total correlation and the internal consistency reliability coefficient were found to be as follows. For "Computer and internet self-efficacy", the reliability coefficient was between .72 and .79, and Cronbach's alpha.87; for "Self-directed learning", the reliability coefficient was between .58 and .85, and Cronbach's alpha .89; for "Learner control": the reliability coefficient was between .58 and .70 and Cronbach's alpha.76. For "Motivation for learning", the reliability coefficient was between .84 and .87, and Cronbach's alpha.89. For "Online communication self-efficacy", the reliability coefficient was between .74 and .80 and Cronbach's alpha .84.

Data Analysis

The SPSS 20.0 program was used for data analysis and the significance level was adopted as .05 in reading the results. The arithmetic mean, frequency, independent sample t-test, variance analysis and regression were checked during independent variables analysis. The analyses were based on sub-factors and total scores.

Findings

In this part, the data were analyzed and read in accordance with the purpose and sub-purposes of the research and the related research results were supported.

Findings related to demographic characteristics of students

The findings related to the demographic characteristics of the students who participated in the research are shown in Table 2. 54.3% of the participants were female, 45.7% were male; 22.2% were from the faculty of engineering, 15.3% from the faculty of communication, 14.8% from the school of health sciences, 13.9% from the faculty of arts and sciences, 9.4% from the physical education and sports school, 4.5% the from faculty of architecture and design & fine arts and 4.3% from the faculty of law.

42.3% of the students were enrolled in their 4th year, 36.9% were in their 3rd year and 20.7% were in their 2nd year. 61.1% of the students had a good or very good command of internet usage. 39% of them were using the internet for more than 15 hours per week.

Table 2. Findings related to the demographic characteristics of the students

Gender	**N**	**%**
Female	191	54.3
Male	161	45.7
Faculty		
Faculty of Education	33	9.4
Faculty of Arts and Sciences	49	13.9
Faculty of Law	15	4.3
Faculty of Economics and Administrative Sciences	32	9.1
Faculty of Communication	54	15.3
Faculty of Architecture and Design - Faculty of Fine Arts	16	4.5
Faculty of Engineering	78	22.2
Physical Education and Sports School	23	6.5
School of Health Sciences	52	14.8
Class		
2nd year	73	20.7
3rd year	130	36.9
4th year	149	42.3
Internet usage frequency (weekly)		
1-2 hours	15	4.3
3-5 hours	64	18.2
6-10 hours	75	21.4
11-15 hours	60	17.1
15 hours and above.	137	39
The level of Internet use		
Little	8	2.3
Medium	78	22.2
Good	172	48.9
Very good	94	26.7

Findings related to satisfaction levels of students

Satisfaction rate was measured as follows: Satisfaction rate=(obtained mean score/the highest that could be obtained)*100. If the satisfaction rate was 49% or less, the satisfaction was regarded as low; if it was between 50% and 69%, the satisfaction level was moderate; and if the rate was over 70%, the satisfaction level was regarded as high and read accordingly.

Table 3. Satisfaction rates related to scale of satisfaction with e-courses and its sub-dimensions

Dimensions of the scale	**N**	**Min**	**Max**	$\bar{x}$	**S.d.**	**Satisfaction rate (%)**
Materials used and communication tools	352	8	40	23.9	8.1	60
The instructor-student interaction	352	4	20	14.1	4.4	71
Instructional environment design	352	8	40	28.7	7.5	72
Attitudes towards e-course	352	6	27	19.7	4.7	66
Course content and teaching process	352	16	41	30.4	4.9	68
Total	352	47	164	116.8	25.2	67

Table 3 shows that students' satisfaction with the materials used and communication tools in e-courses was at a moderate level (60%), their satisfaction with instructor-student interaction and environment design was at a high level (71% and 72%), and their satisfaction with the attitude towards e-course, and course content and teaching process was at a moderate level (66% and 68%). Overall the students' satisfaction was determined to be at moderate level (67%).

Table 4. Students' satisfaction levels based on their faculty

Faculty	N	Min	Max	$\bar{x}$	S.d	Satisfaction rate (%)
Faculty of Education	33	47	161	110.2	23.6	63
Faculty of Arts and Sciences	49	56	159	119.7	23.9	68
Faculty of Law	15	93	144	124.1	16.2	71
Faculty of Economics and Administrative Sciences	32	60	149	117.0	20.6	67
Faculty of Communication	54	48	164	113.7	26.9	65
Faculty of Architecture and Design - Faculty of Fine Arts	16	47	150	111.9	35.2	64
Faculty of Engineering	78	61	163	123.5	23.4	71
Physical Education and Sports School	23	47	159	114.0	31.1	65
School of Health Sciences	52	62	163	112.2	25.1	64
Total	352	47	164	116.8	25.2	67

When the satisfaction levels of students based on their faculty are examined in Table 4, it is seen that satisfaction levels in Faculties of Engineering (71%) and Law (71%) were high whereas those in other faculties were moderate.

Table 5. T-test results related to satisfaction levels of students based on gender

Gender	N	$\bar{x}$	S.d	Df	t	p
Female	191	115.75	24.879	350	0.867	.387
Male	161	118.09	25.632			

Table 5 shows how the t-test results related to satisfaction levels based on students' gender revealed that there was not any significant difference between females ($\bar{x}$ =115.8) and males ($\bar{x}$ =115.81), (t(350)=0.867, p>.05). In other words, students' satisfaction levels did not differ across gender.

Table 6. Results of variance analysis performed on the mean scores of satisfaction levels based on students' class year

Variability Source	Sum of Squares	df	Mean Square	F	Sig.
Between groups	803.902	2	401.951	.631	.533
Within groups	222401.178	349	637.253		
General	223205.080	351			

Table 6 shows, as a result of one-way variance analysis, it was found that there was not any statistically significant difference in mean scores of satisfaction based on students' class year (F(2,349)=.631, p=.533).

Table 7. T-test results related to students' satisfaction levels based on materials used in e-courses

		N	$\bar{x}$	S	sd	T	p
Interaction and communication tools							
Virtual classroom	Not	209	113.91	24.417	349	2.563	0.011
	Exist	142	120.87	25.81			
Forum	Not	238	114.96	25.291	349	2.01	0.045
	Exist	114	120.71	24.723			
Chat	Not	293	114.69	25.356	349	3.605	0.000
	Exist	59	127.44	21.769			
E-mail	Not	277	115.29	25.824	349	2.207	0.028
	Exist	75	122.49	22.210			
Content tools							
Pdf and text documents	Not	101	113.22	26.614	349	1.707	0.089
	Exist	251	118.27	24.538			
Web pages	Not	238	114.46	25.376	349	2.563	0.011
	Exist	114	121.76	24.256			
Graphic-Images	Not	192	112.66	25.745	349	3.445	0.001
	Exist	160	121.82	23.697			
Animation	Not	278	114.48	25.458	349	3.434	0.001
	Exist	74	125.64	22.331			
Video	Not	227	114.65	24.837	349	2.189	0.029
	Exist	125	120.77	25.523			
Assessment tools							
Survey	Not	246	113.46	24.911	349	3.884	0.000
	Exist	106	124.62	24.288			
Exam	Not	71	113.49	27.745	349	1.247	0.213
	Exist	281	117.67	24.519			
Homework	Not	248	117.33	24.934	349	0.582	0.561
	Exist	104	115.62	25.962			

Students' satisfaction with the tools of the virtual classroom ($t(349)=2.01$, $p<.05$), chat ($t(349)=3.60$ $p<.01$) and e-mail ($t(349)=2.21$, $p<.05$) among interaction and communication tools used in e-courses; web pages ($t(349)=2.56$, $p<.05$), animation ($t(349)=3.43$, $p<.01$), video ($t(349)=2.02$, $p<.05$), graphics-images ($t(349)=3.45$, $p<.01$) among content tools; and questionnaire ($t(349)=3.88$, $p<.01$) among assessment tools revealed a significant difference in favor of courses in which these tools were used (Table 7). In other words, students' satisfaction levels were higher in courses where these tools were used. The mean scores of students' satisfaction in courses where particularly the tools of animation, chat, questionnaire and e-mail were used were found to be higher. However, there was not any significant difference in student satisfaction levels related to tools such as exam ($t(349)=1.25$, $p>.05$) and homework ($t(349)=.58$, $p>.05$) among assessment tools, pdf and text documents ($t(349)=1.71$, $p>.05$) among content tools. On the other hand, it was understood that the most-used tools in courses were pdf-text documents and exam.

Table 8. Satisfaction levels of students based on the number of materials used in courses

Number of material	N	Min	Max	$\bar{x}$	S.d	Satisfaction rate (%)
1	29	47	153	109.7	27.6	63
2	48	47	153	111.2	27.0	64
3	59	56	158	107.8	23.4	62
4	62	61	163	120.3	24.4	69
5	46	57	163	117.1	26.2	67
6	38	47	148	115.3	22.0	66
7	19	87	163	124.6	22.5	71
8	15	78	163	130.5	25.0	75
9	20	90	158	124.5	15.8	71
10	6	113	151	128.7	14.5	74
11	10	93	164	143.7	24.2	82
Total	352	47	164	116.8	25.2	67

When the number of materials and satisfaction rate are examined (Table 8), it is understood that provided the number of materials was 7 and over, student satisfaction was at a high level. As the numbers of material increased, satisfaction level got higher.

Findings related to levels of students' readiness for online learning

The results of the analyses performed to check students' readiness for online learning have been summarized below.

Table 9. Results of Online Learning Readiness Scale (OLRS)

Dimension of scale	N	Min	Max	$\bar{x}$	S.d	Satisfaction rate (%)
Computer/Internet self-efficacy	352	3	15	11.1	3.1	74
Self-directed learning	352	5	25	18.5	4.6	74
Learner control	352	3	15	10.8	2.8	72
Motivation for learning	352	4	20	16.1	3.6	81
Online communication self-efficacy	352	3	15	11.4	3.0	76
Total	352	18	90	68	1.5	76

The levels of students' readiness for online learning appeared to be high in all sub-dimensions and in total (Table 9). This also means that students were ready for online learning.

Table 10 shows that there was a positive significant relationship between students' satisfaction with e-courses and levels of readiness for the courses ($R=0.565$, $R^2=0.32$, $F(1, 350)= 163.889$, $p<.01$). 32% of the total variance related to satisfaction in e-courses could be explained by how ready the students were.

There was a positive significant relationship between students' scores of materials used and communication tools, and readiness levels ($R=0.430$, $R^2=0.18$, $F(1, 350)= 79.543$, $p<.01$). 18% of the total variance related to materials used and communication tools in e-courses could be expressed by students' relative readiness.

There was a positive significant relationship between students' scores of instructor-student interaction and readiness levels, $R=0.417$, $R^2=0.174$, $F(1, 350)= 86.75$, $p<.01$. 17% of the total variance related to instructor-student interaction could be expressed by students' relative readiness.

There was a positive significant relationship between students' scores of environment design and readiness levels, R=0.542, R^2=0.29, F(1, 350)= 145.223, p<.01. 29% of the total variance related to environment design could be expressed by students' relative readiness.

There was a positive significant relationship between students' scores of attitude towards e-courses and readiness levels, R=0.448, R^2=0.20, F(1, 350)= 87.781, p<.01. 20% of total variance related to attitude towards e-courses could be expressed by students' relative readiness.

Table 10. Results of basic regression analysis performed to estimate scores of student satisfaction in e-courses according to the scores of the OLRS

	B	T	p	R^2	F	p
Materials used						
Regression coefficient	7.485	3.989	.000	.185	79.543	.000
OLRS score	.430[a]	8.919	.000			
Student-instructor interaction						
Regression coefficient	5.378	5.509	.000	.174	86.750	.000
OLRS score	.417[a]	9.314	.000			
Instructional environment design						
Regression coefficient	9.830	6.130	.000	.293	145.223	.000
OLRS score	.542[a]	12.051	.000			
Attitudes towards e-course						
Regression coefficient	9.909	9.280	.000	0.20	87.781	.000
OLRS score	.448[a]	9.369	.000			
Course content and teaching process						
Regression coefficient	16.990	16.680	.000	.343	182.393	.000
OLRS score	.585[a]	13.505	.000			
Total						
Regression coefficient	50.186	9.429	.000	.319	163.889	.000
OLRS score	.565[a]	12.802	.000			

There was a positive significant relationship between students' scores of course content and teaching process, and readiness levels, R=0.585, R^2=0.343, F(1, 350)= 182.393, p<.01. 34% of total variance related to course content and teaching process could be expressed by students' relative readiness.

Table 11. Regression analysis to estimate students' readiness scores according to satisfaction rate

Sub factors	**B**	**S.E.**	**β**	**t**	**p**
(Constant)	49.622	5.435		9.130	.000
Computer/Internet self-efficacy	.895	.501	.109	1.787	.075
Self-directed learning	1.099	.411	.199	2.678	.008
Learner control	1.410	.672	.154	2.097	.037
Motivation for learning	1.195	.530	.170	2.256	.025
Online communication self-efficacy	.206	.597	.025	.345	.730
R=.57; R^2=.32; F=32.99; p=.00					

The results of multi regression analyses (Table 11) revealed a positive significant relationship between students' scores in the sub-dimensions of the readiness scale and their satisfaction levels, $R=0.57$, $R^2=0.32$, $F(1, 350)= 32.99$, $p<.01$. According to the results of the analysis, there was a significant positive relationship between the sub-dimensions of self-directed learning ($\beta=.199$, $p<.01$), motivation for learning ($\beta=.170$, $p<.05$) and learner control ($\beta=.154$, $p<.05$) in the OLRS, and students' satisfaction levels. There was not any significant relationship between the sub-dimensions of computer/internet self-efficacy ($\beta=.109$, $p>.05$) and online communication self-efficacy ($\beta=.025$, $p>.05$), and the satisfaction of students. That is, satisfaction levels of the students who had high motivation and the skills of self-direction and control over their learning were higher.

Discussion and Conclusion

The objective of this research study was to ascertain students' levels of satisfaction with e-learning and their readiness for online learning, and to determine the relationship between these factors along with the effect of the materials used in e-learning on student satisfaction. So as to check students' satisfaction with e-courses, the E-Course Satisfaction Scale (ECSS) which was developed by Kolburan Gecer and Deveci Topal (2015) was used and in order for levels of students' readiness for online learning, the online learning readiness scale (OLRS) which was developed by Hung and his colleagues (2010) and adapted by Ilhan and Cetin (2013) was applied.

The E-Course Satisfaction Scale (ECSS) consisted of 35 5-point Likert-type items and five sub-dimensions of course content and teaching process, materials used and communication tools, attitude towards e-learning, environment design and instructor-student interaction. Meanwhile, the Online Learning Readiness Scale (OLRS) consisted of 18 items and 5 sub-dimensions of computer/internet self-efficacy, self-directed learning, learner control, motivation for learning and online communication self-efficacy.

When the findings obtained from the results of this research study are examined, it is seen that students' overall satisfaction with e-courses were at a moderate level, and if the sub-dimensions are examined, it is understood that satisfaction was high with instructor-student interaction and environment design while it was moderate with course content and teaching process, attitude towards e-learning, materials used and communication tools. As Liaw et al. (2007) state, learners who believe that an e-learning environment is an effective learning tool display a positive attitude towards e-learning. However, Levy (2007) has determined that learners' satisfaction is an important indicator for the drop-out rate for e-courses and satisfaction of the learners who leave the system seem to be lower than those who are successful. Also Ozkan and Koseler (2009) suggest that there is a positive relationship between learners' attitude and their satisfaction. Within e-learning environments, students' satisfaction is affected by factors such as an environment with high interaction, which is well-designed and user-friendly, where the learner can control his/her own learning and easily access information, a learner interface in which students are given the content based on their needs, the flexibility and quality of the course, the perceived practicality of the environment, variety in assessment, the instructor's attitude, and the student's readiness (Eom, 2014; Shee & Wang, 2008; Sun et al., 2008). According to Liaw and Huang (2013), perceived satisfaction may be influenced by interactive learning environments, perceived self-efficacy and anxiety.

Based on the faculties the students enrolled in, the satisfaction levels of those in the Faculties of Engineering and Law were found to be high whereas those of other faculties were moderate. In addition, it was found that there was not a significant difference in overall student satisfaction across gender and class year. In one of the studies that supported these findings, Cole, Shelley, and Swartz (2014) could not find a significant difference in student satisfaction across gender and age. On the other hand, Gómez, Guardiola, Rodríguez and Alonso (2012) mention that the females' satisfaction level with e-learning is higher than the males', and the females find it more important to communicate with the instructor and control their own learning.

It was determined that in courses where the e-course interaction and communication tools such as a virtual classroom, forum, chat, e-mail; web pages, animation, video, graphics/images as content tools; and questionnaire as an assessment tool were used there was a difference in student satisfaction, and satisfaction was higher in these courses. The mean scores of students' satisfaction were observed to be higher in courses where particularly the tools of animation, chat, questionnaire and e-mail were used. On the other hand, there was not a significant difference in student

satisfaction regarding exams and homework as assessment tools, or pdf and text documents as content tools, but pdf-text documents and exams were among the most used tools in the courses. According to these findings, it may be more practical to use interactive web pages instead of pdf-text documents. Wei, Peng and Chou (2015) point out that all the interaction tools in the e-learning system, especially homework processing and monitoring, following the scores, system announcements and updates, multimedia presentations, discussion boards and e-mail are useful for the learners and that case is correlated with their targets of learning and needs. Chou et al. (2010), however, state that interactive functions like self-directed learning, retrieving and sharing information and material, communication with the instructor and other students are essential for the learners. According to Cole et al. (2014), the system's ease of usage affects learner satisfaction positively while lack of interaction has a negative influence on it.

It was revealed that students' satisfaction was at high level when the number of materials used in courses was 7 and over, that is, as the number of materials increased, satisfaction levels did so as well. As Ilgaz and Gulbahar (2015) mention, satisfaction is influenced by the teaching content, communication and usability, and the teaching process; in addition, the usage of various interaction tools, activities organized to enhance interaction and different types of assessment methods are important factors that affect learner satisfaction.

It was identified that levels of students' readiness for online learning was high in all sub-dimensions and in total, and students were ready for online learning. Also, it was seen that there was a positive significant relationship between students' levels of readiness and their satisfaction with e-courses, and that readiness mostly influenced the scores of course content and teaching process, teaching environment design, attitude towards e-courses, materials used and communication tools and instructor-student interaction, respectively. Moreover, the satisfaction levels of learners who were self-directed, had high motivation and could control their own learning appeared to be positively affected. Kirmizi (2015) suggests that learner motivation from readiness sub-dimensions is the one that influences satisfaction most. According to Ilgaz and Gulbahar (2015), elements such as individual factors, accessibility to the system, graduation, close deadline of submission and time management affect learner readiness. Liaw et al. (2007) states that there is a close correlation between learning at one's own pace, multimedia teaching, the instructor and effective learning, but Kuo et al. (2013) claim that while instructor-student interaction, student-content interaction and levels of confidence in internet self-efficacy are considerable determinants of student satisfaction, interaction between students and self-regulatory learning do not have any impact on student satisfaction.

According to Holmberg (1996), encouraging learners to create their own knowledge in terms of flexibility, hypertext approaches, a convenient environment, courses functioning as guides to selected texts, discourse and empathy, homework for teaching cognitive skills, quick-response instructor-student interaction (via fax or e-mail), teleconference and computer conference, a traditional teaching design and constructivist approaches help to increase the potential of distance education.

In conclusion, for more satisfaction, the materials used in e-learning and content must give the student chances for interaction, synchronous or asynchronous, and different interaction methods must be provided for student-instructor interaction; while transferring the content, tools such as different dynamic web pages, video, animation, graphics, and images should be used; a variety of assessment methods should be offered together and the opportunity to learn by practicing and doing exercises during their free time should be provided. In order to increase satisfaction, student readiness should be considered, students should be able to use technology effectively and activities that enhance student motivation should be developed and used frequently throughout the course. Administrators and teachers can see even better which tools should be used more to make e-learning environment more efficient and useful, the importance of student-teacher interaction, the impact of motivation and readiness on academic achievement. Thus, a better corporate support, teaching and learning environment, student support, teacher support, better quality measurement and evaluation will be able to be provided.

In future research, the relationship between satisfaction and readiness, which has been examined in terms of learners only, can be studied regarding the relationship between instructors' readiness and student satisfaction. In addition, institutional support and readiness may also be investigated in future.

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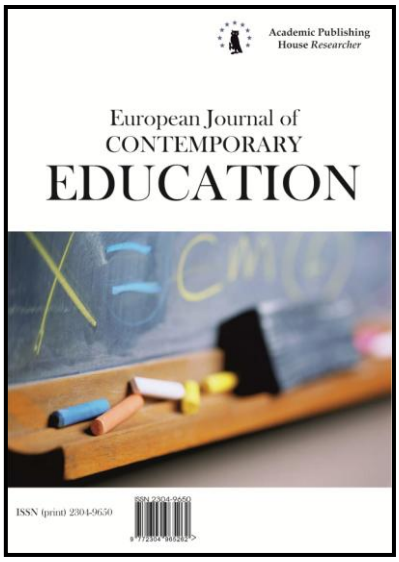

The Use of Interactive Environments to Promote Self-Regulation in Online Learning: A Literature Review

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Abstract

Distance education in the 21st century often relies on educational technology as the primary delivery of teaching to learners. In distance education, the source of the information and the learner do not share the same physical setting; therefore, the information is delivered by a variety of methods. The new emerging tools that are used in online learning have changed the view of pedagogical perspective in distance education. Although online learning shares some elements with traditional classroom environments, the shared elements often take very different forms, and each type of learning environment has distinct limitations and affordances. Because current practices often compare or assess the effectiveness of online learning by comparing it with traditional instruction methods, educators and researchers often find it important to consider the methods and strategies that are used in classroom settings when designing online learning environments. Online environments should provide opportunities for students to master necessary tasks by using appropriate strategies, such as self-regulation. Self-regulation is one of the predictors of student performance in both traditional and modern learning environments. In an online platform, when students use strategies that are related to self-regulation, they can regulate their personal functioning and benefit from the online learning environment by changing their behaviors accordingly. Thus, it is important to explore and embed new interactive functions to the online learning environments and lead learners to use self-regulatory behaviors in those learning environments. This article discusses the importance of self-regulation in online environments, and provides recommendations for best practices in the design and implementation of interactive online learning environments with the self-regulated learning approach.

Keywords: Distance education, online learning, self-regulation, interactive environments.

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Introduction

Learning environments continue to evolve especially with advances in technology, with online learning environments being one such advance that has become increasingly common in the 21st century. As the cost of technology decreased without necessarily compromising its quality, the access of wide user groups to new technologies increased. The Internet and computer-mediated communication have broadened our conceptualizations of learning environments and distance education to online learning environments. While online learning affords learners' autonomy or choice in their education, it also requires learners to be self-regulated or self-directed in their learning. To be successful in online learning environments, learners need to remain motivated, engaged, and persistent without the physical presence and reinforcements of instructors or peers that are afforded by traditional learning environments. One of the primary concerns in online education is how to design online learning environments for effective teaching and learning, particularly in light of keeping learners motivated, engaged, and persistent (i.e., self-directed or self-regulated) in online learning environments. Importantly, design and development of effective online learning tools that keep learners motivated and self-regulated in their learning need to be informed by learning theories and research-based principles and practices on self-regulation.

This article provides an overview on the concepts of Distance Education, Online Learning, and Self-Regulation. We review research on self-regulation in online environments and highlight recommendations for best practices in the design and implementation of interactive online learning environments with the self-regulated learning approach. The main goal of this article is to clarify the role of self-regulatory behaviors in learning, and discuss how to transfer these behaviors to online learning environments by providing various supporting interactive functions to learners.

Distance Education

Distance education in the 21st century often relies on educational technology as the primary delivery of teaching to learners. In distance education, the source of the information and the learner do not share the same physical setting; therefore, the information is delivered by a variety of methods (Carswell & Venkatesh, 2002; Keegan, 1986). According to McIsaac and Blocher (1998), the goals of distance education are "to provide degree granting programmes, to battle illiteracy in developing countries, to provide training opportunities for economic development, and to offer curriculum enrichment in non-traditional education settings" (p. 43).

Development of distance education has been linked to improvements in technology, and different delivery methods have been used including "Print materials, broadcast radio, broadcast television, computer conferencing, electronic mail, interactive video, satellite telecommunications and multimedia computer technology" (McIsaac & Blocher, 1998, p.43). Emerging technologies play key roles in distance education, particularly for making the education accessible by learners at any time and from any place (Beldarrain, 2006).

Based on technologies and procedures used in distance education, there are two communication methods of delivery: synchronous and asynchronous. Researchers have discussed the advantages of choosing one method over another (see Branon & Essex, 2001; Carswell & Venkatesh, 2002; Johnson, 2006; Offir, Lev, & Bezalel, 2008). In synchronous learning, learners are supposed to follow and interact with instruction in a specified time, whereas in asynchronous learning, learners are free to choose when to access the educational materials. Educational institutions have moved toward the use of online delivery systems (Akdemir & Koszalka, 2008) after computer and internet technology became more accessible, and these online delivery systems provide numerous opportunities for using synchronous and asynchronous delivery systems (Beldarrain, 2006).

Online Learning

With the rapid growth of digital technology, students in the 21st century have changed in numerous ways. They are surrounded with digital devices in their daily life, and they do not need to expend extra effort to get used to them because "technology is assumed to be a natural part of the environment" (Oblinger, 2003, p. 38). In addition, dissemination of online learning environments in the 21th century has given more learning opportunities to learners and more responsibilities to course instructors. That is why "technology tools may also change the roles of learners as well as instructors" (Beldarrain, 2006, p. 143). The new emerging tools that are used in online learning

have changed the view of pedagogical perspective in distance education as well. Additionally, teachers have taken the role of teaching students how to direct their own learning (Cerezo et al., 2010).

Wide learning groups have been interested in online learning in the first decade of 21st century, because of its potential to serve learners by offering learning with flexible times and reasonable costs (Howell, Williams, & Lindsay, 2003). Because learners come from diverse backgrounds (Rovai & Downey, 2010), and their availabilities vary, they take advantage of comprehensive online learning opportunities with affordable cost.

There are many definitions of online learning in the literature and they describe the practice of online learning as a way of instruction via computer or mobile devices with Internet connections. Ally (2004) broadened his view of online learning and defined it as

> "the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (p. 5).

When designing online learning courses, there are several points that should be considered. For example, Oblinger and Hawkins (2006) stated, "Developing and delivering effective online courses requires pedagogy and technology expertise . . . it [online instruction] requires deliberate instructional design that hinges on linking learning objectives to specific learning activities and measurable outcomes" (p. 14). It is not always likely for an instructor to have these two skills (pedagogy and technology) together. That is why, most of the time, responsibilities of online courses need to be shared between an instructor who is pedagogically skilled and a person with technical skills. Otherwise, students will be reading papers and visiting websites that are provided online by the instructors, which is not a satisfactory way of online instruction (Dağhan & Akkoyunlu, 2016).

Although online learning shares some elements with traditional classroom environments, the shared elements often take very different forms, and each type of learning environment has distinct limitations and affordances. For example, interaction is a very important part of the instruction process and it is challenging to facilitate the same type of dynamic, collective interaction online (Childers & Berner, 2000; Oblinger & Hawkins, 2006). On the other hand, there are many benefits of online learning environments including flexibility of access regardless of time and place Ally (2004), and these environments can be used effectively after eliminating the potential barriers (see Galusha, 1997; Muilenburg & Berge, 2001

Self-Regulation

According to Zimmerman (1989), self-regulated learners "personally initiate and direct their own efforts to acquire knowledge and skill rather than relying on teachers, parents, or other agents of instructions" (p.329). In modern educational systems, students may need to be more mindful in exerting self-regulation in their learning, because education practices are trending from teacher-centered toward student-centered learning and instruction. With the shift towards greater emphasis on learner-centered education, students need to become more personally responsible and self-directed in their own learning. When students have meta-cognitive, motivational, and behavioral control in their learning process, they can be described as a self-regulated learner (Zimmerman, 1989). In a society saturated by information, media, and technology, Liew, Chang, Kelly, and Yalvac (2010) proposed that self-regulated and self-directed learning need to be viewed as the bedrock of 21st century skills for all learners.

Self-regulation has a strong relationship with Bandura's (1986, 2001) social cognitive theory. In social cognitive theory (Bandura, 1986), human behavior is viewed as motivated and regulated by the ongoing influence of self-influence or self-regulatory mechanisms. Zimmerman's (1989) model of self-regulated academic learning was based on Bandura's (1986) triadic theory of social cognition, consisting of reciprocal interactions between the person, behavior, and environment

Zimmerman stated in his triadic model that personal process, the environment, and behavior are three factors of self-regulation. Self-regulated learners should be aware of the learning environment and try to use appropriate strategies and activities to support their self-regulation.

These activities are also key elements of determining students' motivation and action (Bandura, 1989).

Zimmerman (1989) identified self-regulated strategies to "improve students' self-regulation of their (a) personal functioning, (b) academic behavioral performance, and (c) learning environment" (p. 337). When these strategies are embedded in instruction, they support learners to self-regulate themselves (Ley & Young, 2001). According to Zimmerman's model (2002), self-regulation is not an innate personal characteristic and learners can improve their self-regulation abilities and become more self-regulated especially when they are trained with self-regulation strategies (Wang, Quach, & Rolston, 2009). A growing body of research on self-regulation and self-regulatory strategies show positive relationship with academic performance (see Ablard & Lipschultz, 1998; Dermitzaki, Leondari, & Goudas, 2009; Magno & Lajom, 2008; Purdie & Hattie, 1996; Vermunt, 2005). For instance, Zimmerman and Martinez-Pons (1986) studied eighth grade students and found that high achievers and low achievers differed on their self-regulation, and their self-regulation strategies contributed to their academic performance. Thus, evidence supports the view that using self-regulation strategies in instruction may help to reduce the achievement gap (Young, 1996). With technology increasingly used to facilitate learning, the use of educational technology that considers individual differences in learners' self-regulation may serve as a powerful tool for all learners, especially low academic achievers. Students tend to self-regulate themselves (and continue doing it) when they experience self-efficacy and a sense of achievement and mastery through successful learning experiences (Cleary, 2006; Greene, Costa, Robertson, Pan, & Deekens, 2010; Zimmerman, 1990).

Self-regulation strategies and skills enable individuals to direct their own learning and to "achieve desired academic outcomes on the basis of feedback about learning effectiveness and skill" (Zimmerman, 1990, p. 7). Self-regulation strategies and skills could be targeted and supported in one or more of the factors in Zimmerman's (1989) triadic model of self-regulation (person, behavior, or environment). Designing learning environments that support learners' self-regulation based on the affordances and capacities or needs of the person, behavior, or environment may maximize learning (Ley & Young, 2001). Schunk and Zimmerman (2007) stated that students might have different self-regulation skills; therefore, learning environments could be designed to compensate for and scaffold learners with poor self-regulation while also challenging and advancing learners with good self-regulation.

Self-Regulation Strategies

According to Zimmerman's (1989) triadic model of self-regulation, self-regulation strategies can be classified into three broad domains: personal, behavioral, and environment. Although the three domains of self-regulation strategies are distinct, there is some overlap or shared elements between them. In the design and development of online learning environments, it is helpful to consider ways of support learners' use of self-regulation strategies in each of the three domains.

Personal regulation: It is essential for learners to be self-aware and mindful of their learning processes including knowing why they are learning something and thinking through appropriate learning approaches (e.g., goal orientation and metacognition). Before and during the learning process, metacognitive strategies such as *organizing and transforming, goal setting and planning, rehearsing and memorizing* could be used (Zimmerman, 1989).

Previous studies show that these metacognitive strategies have positive effects on academic performance when they are properly embedded into learning activities. For example, Zimmerman, Bandura, and Martinez-Pons (1992) found goal setting to be an important a self-regulation strategy that has positive effects on learning and academic outcomes. Wolters and Rosenthal (2000) concluded that goal setting and focusing on learning goals were essential to overcome motivational problems and keep learners engaged and persistent on completing assigned tasks. Goal setting is also important for next phase of self-regulation (behavioral functioning) because learners need some timeline and reference points in mind for which to monitor and evaluate their progress (Pintrich, 1999a).

In addition to metacognition, goal orientation also plays a key role in improving self-efficacy, which is also related to student performance (Greene, Miller, Crowson, Duke, & Akey, 2004; Pintrich, 1999a; Schunk, 1991, 2003). Some students are motivated by learning (mastery) goals and some students are motivated by performance goals. Additionally, the way of using these strategies

may change according to the subject area and context (Wang et al., 2009). For instance, a student can draw content maps in biology course as a strategy to organize and transform his knowledge for deep learning and mastery of course information. Another student in the same course might choose to ask the instructor what material will be covered in the exams and decide to only study the tested material to earn a high test score. Students who are aware of their goals for learning can choose the appropriate self-regulation strategies to meet such goals.

Behavioral functioning: There are behavioral strategies that learners could learn and to use in supporting themselves to become active and self-directed in their learning. Some behavioral self-regulation strategies include *self-evaluation and self-consequences, and keeping records and monitoring*. These behavioral strategies are useful for learners to seek evaluative feedback and apply reinforcement and correction to improve learning and performance (Pintrich, 1999b).

In using various self-regulation strategies, Bandura (1989) emphasized the importance of "self" based activities on personal behavior change as follows: "In acting as agents over themselves, people monitor their actions and enlist cognitive guides and self-incentives to produce desired personal changes" (p. 1181). For self-regulation strategies to be effective, learners need to have a desire to learn and to take some personal responsibility for their learning. For example, high achievers often apply consequences for themselves as a way to evaluate and monitor their own progress (Wolters & Rosenthal, 2000).

Learning Environment: Self-regulated learners influence their own learning through their personal beliefs and behaviors about the environment, but the environment also influences learners' personal beliefs and behaviors (Bandura, 1989). There are some self-regulation strategies that are related to learners' immediate learning environments (Zimmerman, 1989) such as *environmental structuring, seeking information, reviewing, and seeking assistance*. Suitability of the learning environment for these strategies is essential and influences personal and behavioral functioning as discussed in the triadic model. According to Bandura (1989), learners "are just as much agents influencing themselves as they are influencing their environment" (p. 1181). Thus, self-regulated learners know how to seek or extract the resources, help, or information they need from their learning environments in order to achieve their learning goals.

Self-Regulation in Online Learning Environments

Because current practices often compare or assess the effectiveness of online learning by comparing it with traditional instruction methods, educators and researchers often find it important to consider the methods and strategies that are used in classroom settings when designing online learning environments. Online environments should provide opportunities for students to master necessary tasks by using appropriate strategies, such as self-regulation (Santhanam, Sasidharan, & Webster, 2008). Well-designed learning environments facilitate improved self-regulatory skills (Boekaerts, 1999), and are needed for successful learning (Azevedo & Cromley, 2004).

It should also be noted that online course instructors are more likely to have pedagogical and technological problems than face-to-face course teachers (McIsaac & Craft, 2003). Therefore, "online learning materials must be designed properly, with the learners and learning in focus, and that adequate support must be provided." (Ally, 2004, p. 4).

Self-regulation is one of the predictors of student performance in both traditional and modern learning environments. In an online platform, when students use strategies that are related to self-regulation, they can regulate their personal functioning and benefit from the online learning environment by changing their behaviors accordingly. In online learning environments, learners are supposed to control their own learning practice in order to benefit from the instruction; hence, self-regulation strategies can help them in this process (Chang, 2005).

There is a growing body of evidence showing that the environment plays a significant role in supporting self-regulation and academic performance (Ari et al, 2014; Garner, 1990; Ley & Young 2001). Self-regulated learners are neither passive nor helpless, but "are those who demonstrate persistence and are able to adapt or modify their learning strategies or their environment in order to achieve their learning goals" (Liew et al., 2010, p. 63). For learners who may lack strong self-regulation skills, external supports provided by a well-designed learning tool or learning environment that intentionally embeds self-regulation strategies into instruction may support and enhance students' self-regulated learning (Bernacki, Byrnes, & Cromley, 2012). For instance, in an

online environment, optional additional resources (e.g., image, animation, and graphic) can be provided to learners to prompt their use of information seeking strategies (Delen, Liew, & Willson, 2014).

Learning environments that allow students to practice self-regulation skills may teach students to internalize or automatize these skills over time (Schunk & Zimmerman, 2007). According to Zimmerman (1989), "all learners try to self-regulate their academic learning and performance in some way, but there are dramatic differences in methods and self-beliefs among students" (p. 6). Thus, self-regulation strategies for online learning environments need to recognize and meet the self-regulatory needs of diverse learners.

Usage and scope of self-regulation in online learning environments have changed with improvements in Internet technology. Although in its nascent stage, online learning environments are increasingly being designed to offer learners with self-regulation support and to foster self-direction in students' use of self-regulation strategies and tools. However, it is very important for learners to be able "to select, combine, and coordinate cognitive strategies in an effective way" (Boekaerts, 1999, p. 447). Examining self-regulation in online learning environments also facilitates obtaining more accurate information from students because students' behaviors could be logged or recorded to identify students' use of strategies or functions and their effectiveness (Bernacki et al., 2012; Biesinger & Crippen, 2010.

In the process of transferring instruction through Internet, several learning management systems (LMSs) that are either commercial or open source such as WebCT, Blackboard, and Moodle have been used. Especially, higher education institutions commonly use these LMSs in their online degree programs. In addition, some social media platforms have been also used as an LMS with their unique features (Varol & Ahmed, 2013). That's why their suitability for self-regulation is essential for students. In this regard, Cerezo et al., (2010) reviewed most commonly used LMSs and found that they have several useful functions that support self-regulation. However, students may be unaware of such functions and how these functions support their self-regulation and improve their learning. Therefore, informing and guiding students can increase the benefit of the self-regulation functions during the learning process.

Previous research has investigated the effectiveness of self-regulation strategies in online learning and hypermedia-learning environments from various perspectives. Although there are several researches on hypermedia learning environments, limited research exists on online learning environments in regard to self-regulation. In a study on self-regulation in online learning environments, Chang (2005) examined 28 vocational university students enrolled in a web-based course and focused on their motivation perception and how it changed regarding to self-regulatory activities including recording study time, writing journals, and reflective summaries. Results indicated that using self-regulatory strategies in a web-based instruction increased students' learning motivation after one semester (Chang, 2005).

It is accepted by researchers that learners can improve their self-regulation by using and experiencing activities aimed at training meta-cognitive strategies, executive attention, and emotion regulation. Delfino, Dettori, and Persico (2010) conducted a study with trainee teachers and examined the use of self-regulation activities in an online course. In their study, Delfino and colleagues assigned four different tasks to trainees, which aimed to foster self-regulation. These activities were linked to self-regulatory behaviors including planning, monitoring, and evaluation. The online course was designed properly for course takers and allowed them to accomplish the tasks by using self-regulation strategies. It was reported by Delfino et al. (2010) that online courses could foster learners' self-regulation when relevant activities are embedded into the instruction.

There are some factors that influence the use of self-regulation strategies in online learning environments. For example, Bernacki et al. (2012) studied 160 undergraduate students to investigate the relationship between achievement goals, self-regulation strategy use, and comprehension scores in a hypermedia-learning environment. Students' self-regulation related actions such as note-taking, seek information, and monitoring were recorded. Path model analyses indicated that self-regulation strategy use was a mediating mechanism between achievement goals and academic performance. Specifically, achievement goals predicted self-regulation strategy use, which then predicted the student performance in a hypermedia environment (Bernacki et al., 2012). Thus, it can be stated that use of self-regulation strategies has positive relation with academic performance in online learning environments (Delen et al., 2014).

Student engagement or involvement in the learning process is critical for academic performance, particularly when students are low-achievers and the learning environment is online. In this regard, Lee, Shen, and Tsai (2010) designed an online course that supported self-regulation strategies, and they examined its effects on students' engagement or involvement in learning. At the beginning of the course, students met with the instructors and took advice to develop their self-regulation skills. After one semester long online course, it was found that students increased their involvements in online learning environment by self-regulatory behaviors (Lee, Shen, et al., 2010). This study clearly shows us the need of teaching students the self-regulation strategies and their benefit in online learning environments. In a randomized experiment, Azevedo and Cromley (2004) randomly assigned 131 undergraduate students to one of two conditions (training condition or a control condition). In the training condition, students were trained 30 minutes on the use of self-regulation strategies and control group did not get any training. Then, students were given a science course in a hypermedia environment to learn about the circulatory system. Study results indicated that students who were trained to use self-regulation strategies learned more on complex topics in the hypermedia environment than students without training (Azevedo & Cromley, 2004).

In another study that explored whether self-regulation strategies could be taught, and whether self-regulation strategy use could improve students' learning in online learning environments, Santhanam et al., 2008 found that when learners are taught how to use self-regulatory learning strategies, they tend to apply them more in their learning. The authors suggested that self-regulation is critical to successful learning and performance in online learning environments, and embedded self-regulation strategies could foster learners' self-regulation learning strategies and this enhance learning outcome.

Conclusion

Based on the body of research reviewed in this article, it is clear that learners need to be self-regulated, self-directed, motivated and engaged in learning process to achieve optimal learning outcomes. Evidence suggests that self-regulation is needed in both face-to-face and online learning environments. However, research on, and application of, self-regulatory strategies in online learning environments remains relatively limited relative to what is known about face-to-face learning environments. Thus, it is important to explore and identify effective interactive functions in online learning environments in order to enhance learners' self-regulated learning. Emerging technologies will undoubtedly continue to change learning environments. To harness the power of educational technologies for self-regulated learning, it is essential to use evidence-based and effective elements or functions in the design of online learning environments to optimize learning and achievement.

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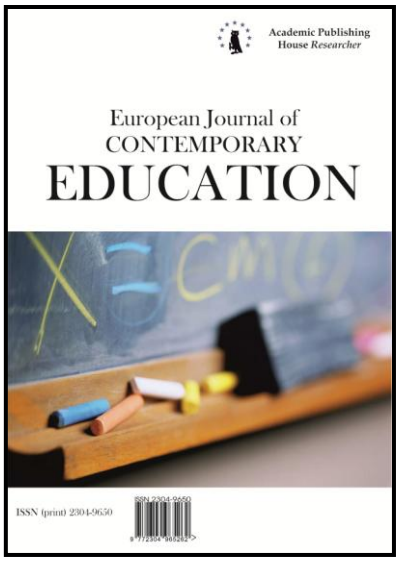

The Analysis of the Relationship between Primary Learning Styles and Learning Objects in an Online Environment

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Abstract

This study investigates the relationships between the primary learning styles of students and different learning objects presented simultaneously in an online learning environment in the context of the usage levels of these objects. A total of 103 sophomores from a Turkish State University participated in the study. Felder-Solomon Index of Learning-Styles (F-SILS) was used to determine the learning styles of the participants. Four different types of learning objects (i.e. video lecturing, audio lecturing, PDF lecturing and subject comprehension tests) were prepared for the course 'Basic database operations with MySQL'. Koper's (2003) classification model was used in selecting these learning objects. Descriptive analysis methods were used to determine the distribution of the participants according to their learning styles. Independent-Samples T-Test and the Mann-Whitney Wilcoxon test were used to test the differences between learning styles and learning objects. The usage levels of the learning objects were analysed in the context of interdimensional primary learning styles in the scale of the F-SILS. Those with sensory and visual learning styles were in the majority among the primary learning styles of participants. The study did not include the findings of students with other primary learning styles due to their small sample size. The findings of the study on the usage frequencies of subject comprehension tests and the duration of video lectures by primarily visual and sensory students demonstrated a significant difference on behalf of the primary sensory students. On the other hand, there was no statistically significant difference between students with primarily sensory styles and students with primarily visual styles in terms of the reading frequency of PDF lectures and the listening frequency of audio lectures.

Keywords: learning object, learning style, Moodle

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Introduction

Information can be transferred to students in a traditional learning environment directly by educators or in online learning environments through the various learning materials offered. It is challenging to meet the learning requirements of all students in traditional learning environments with a large number of students. Therefore, online environments may provide many advantages for educators to communicate with students [16]. However, technological learning resources presented to students in online environments may have a detrimental effect rather than a facilitating effect on their learning unless integrated to their cognitive processes [33]. Meeting the requirements of the students and providing adaptive courses and learning experiences for them are major challenges in online learning environments [16]. One way to overcome these challenges may be to design the online learning environments considering the cognitive styles of the students. In this way, preferences for students' learning styles may be affected in a positive way. In particular, cognitive styles are one important factor that affects the learning performance in the development of hypermedia-based learning [32]. Information in online learning environments can be transferred to the students not only as stable textual information but also as auditory, visual or a combination through the facilities provided by advanced information and communication technologies [6; 22]. The transfer of knowledge in these ways can contribute to the cognitive processes of the students. The learning objects with multimedia elements can be used to organise the information presented to the students in a way that addresses both visual and auditory channels.

Learning Objects

Learning objects are defined as any digital or non-digital items that can be reused or referred to throughout technology-supported learning [19]. There are various definitions and classifications of learning objects in the literature.

This study uses Koper's (2003) classification model on learning objects because this model complies with the classification definitions of the learning objects preferred frequently by lecturers in today's online learning environments.

Learning objects are classified by Koper (2003);

a) **Tool objects:** learning instruments that are used to support learning activities,

b) **Monitor objects:** learning objects that allow students to monitor their own learning and get information about learning processes,

c) **Knowledge objects:** learning objects that can be organised by the content resources such as text, audio, video and graphics [36] in order to support and ensure learning,

d) **Test objects:** learning objects used to assess learning results, learning progression or prerequisites, and

e) **Resource organisation objects:** learning objects at a lower level that contain subjects and paragraphs as well as texts and charts that can be organised within these paragraphs.

According to this classification approach, the following learning objects were used to transfer knowledge to the students in an online learning environment: audio lecturing (AL) in the category of **tool objects**, video lecturing (VL) in the **knowledge objects** category, PDF lecturing (PDFL) in the **resource organisation objects** category and subject comprehension tests (SCT) in the **test objects** category. The learning objects in the **monitor objects** category were not included in the study since tracking one's own learning and having information on the learning process do not meet the purposes of the study. Learning objects can be presented to the students in online learning environments generally in two ways. First, the lecturer uploads the learning resources to the online learning environments, and the students download these resources and study them. Secondly, students, without downloading the learning objects, interactively study the learning objects presented as animation, simulation or structured course in online environments [3]. In order to obtain reliable data on the preferences of the students for learning objects, this study utilised the second option. Students obtain and process information based on their learning styles [15]. Therefore, the availability of the learning objects that are not appropriate to the learning styles of students may have a negative impact on their learning [6]. For instance, students with a visual learning style mostly prefer visual presentations (pictures, diagrams, flow charts, movies, presentations), whereas those with verbal learning styles may prefer verbal explanations rather than visual representations [12; 13].

Learning Styles

Learning styles are the individual characteristics of students, which are reflected in their learning behaviours, such as how they learn, how they should be taught and how they interact in a learning environment [5; 25; 40; 41; 45]. Individuals may differ from each other in terms of processing, making sense and using information in new situations [13; 15; 20]. These differences play significant roles in both learning and teaching processes [21]. Each learning style contains different behavioural features that can be analysed and collected from the learning behaviour of a student [5].

Learning style models used in literature to determine the learning styles of students (e.g. [13; 17; 27; 38]) suggest different descriptions and classifications for learning styles of individuals [26]. Among them, in particular, the learning style model developed by Felder and Silverman (1988) are highly suitable for studies about learning styles in online courses, in which the information is presented by multimedia applications [4]. This model, which is highly referenced in the literature as an important conceptualiser of learning styles [40], can analyse the sizes of learning styles clearly according to a scale ranging between +11 and -11 [2]. For this study, this learning style model was used because learning objects were presented to students in an online environment. Felder and Silverman's learning style model [13] determines the learning style of an individual by scoring the nature and power of his/her learning preferences in four dimensions (perception, input, processing and understanding) [30]. The *perception* dimension describes the relationship of a student with the information type he/she prefers perceiving; the *processing* dimension describes the conversion pattern of the perceived information to understanding; the *input* dimension describes the preference pattern of the students to receive external information; and the *understanding* dimension describes the student' understanding processes [15]. Each of these dimensions contains two different student types that can make use of some specific learning approaches (perception, sensory/intuitive; processing, active/reflective; input, visual/auditory; understanding, sequential/global) [40].

In this study, it was assumed that the presentation of online learning objects that are suitable to the students' prominent learning styles rather than their additional learning styles may provide a greater contribution to their learning. In this context, relationships between the students' learning styles and their usage levels of learning were examined in the context of primary learning styles (PLS) [11; 29; 35; 39; 46]. "An empirically robust scale can measure not only one's primary learning style but additional styles with a tool to assess students' learning styles" [35]. Felder-Solomon Index of Learning-Styles (F-SILS), developed by Felder and Soloman (1994) is also included in these assessment tools [31]. PLS considered in this study were primary among all dimensions (interdimensional) of F-SILS.

Purpose of the study

The purpose of this study is to investigate the relationships between the primary learning styles of students and different learning objects presented simultaneously in an online learning environment in the context of the usage levels of these objects.

Relevant Studies

In recent years, studies conducted with the aim of personalising the online learning environments according to the students' individual needs and of determining their behaviours in these environments have considerable importance [2; 40; 16]. The majority of the studies (e.g., [1; 2; 6; 7; 8; 10; 15; 16; 24; 32; 34; 40; 43; 44; 47]) explored the relationships between learning styles and learning performances by using different learning environments/ materials and different learning style models (Table 1).

Table 1. Studies on the relationship between learning performance and learning styles

Resources	Purpose	Findings	Test Environment(s)	Learning Styles Analysed
Graf et al., 2009	They examined the relationships between the cognitive styles of students in an adaptive web-based educational environment and their working memory capacities and cognitive characteristics.	A relationship between the active/reflective, the sensory/intuitive and the visual/verbal dimensions was shown, but no relationship was found for the sequential/ global dimension.	Web-Based Educational Environments	Active/ reflective, visual/ verbal, sensory/ intuitive and sequential/ global [13]
De Boer, Kommers, and De Brock, 2011	They examined the relationship between the video viewing behaviours of the students as well as their personal characteristics such as learning styles and short-term memory.	There wasn't a primary relationship between the video viewing behaviours of the students and their current personal characteristics. However, the study found that some of the students changed their own video viewing behaviours based on their cognitive needs without causing any change in their test scores.	Instructional videos	Sequential and global [13]
Shaw, 2012	The researcher examined the relationships between the types of participants and learning styles on the education of programming language supported by an online forum.	The researcher found that learning styles and the types of participants are linked to learning outcomes and that learning satisfaction does not differentiate in a significant way by learning styles or the types of participants.	Online forum	Diverger, Assimilator, Converger and Accommodator [27]
Chen and Sun, 2012	They examined how multimedia materials affect the learning performances and feelings of the students with visual and verbal learning styles.	They concluded that video materials enable a better learning performance and a more positive feeling for those with verbal style whereas multimedia materials involving videos and animations are better than text and video materials for those with visual style.	Static text, picture and video-based and animation-based multimedia materials	Visual and verbal [13]

Ocepek et al., 2013	Researchers focused on designing adaptive learning system by relating combinations of different learning styles to preferred types of multimedia materials.	Students preferred well-structured learning texts with color discrimination, and the hemispheric learning style model was the most important criterion in deciding student preferences for different multimedia learning materials.	Animation and video- simulation and educational computer game-learning texts that have a color discrimination-well-structured learning materials-audio learning materials	Kolb's learning styles [27]
Kassim, 2013	The researcher examined the relationship between multimedia learning materials and the creative thinking and learning styles of students.	The researcher found that the use of multimedia learning tools has a positive impact on the creative thinking of the students with active, reflective, intuitive and high-degree visual styles.	Multimedia learning materials	Active, reflective, sensory, intuitive, sequential and global [13]
Mahazir et al., 2013	They focused on the relationship between the acceptance levels of technical high school students taking the Mobile AutoCAD course and their learning styles.	They found out that there is a positive and significant relationship between their acceptance levels of mobile learning and their learning styles.	Mobile learning AutoCAD course	Activist, reflective, theorist and pragmatist [18]
Feldman, Monteserin and Amandi, 2014	They suggested a new approach that can determine the sensory styles of the students by analyzing their interaction with the (puzzle games) games.	They concluded that the sensory style could be successfully estimated (with an accuracy rate of 85%) by means of the use of games.	Puzzle game	Sensory and intuitive [13]
Cheng, 2014	The researcher focused on the learning styles, behaviors and acceptances of the students towards the use of Second Life as a tool supporting the learning in higher education	While active students stated mostly that Second Life was helpful and easy-to-use, it was found that visual students are satisfied with its communication and identity properties.	Second Life	Active and visual [13]
Van Waes, Van Weijen and Leijten, 2014	They aim to investigate the effect of learning styles on the approaches of students to the writing process, and on the letters they wrote in an online environment.	They determined that reflective students were more focused than active students on the section of theory at the beginning of the task.	Online writing center	Active and reflective Kolb's learning styles [27].

Shinnick and Woo, 2014	They aimed to determine the effect of learning styles on knowledge acquisition of nursing students after using a simulated heart failure.	Whereas there was an increase in the knowledge acquisition of the students with assimilating and diverging learning styles, there was no increase in that of those with converging and accommodating styles.	Simulation	Diverging, assimilating, converging and accommodating [27]
Abdul-Rahman and Du Boulay, 2014	In programming education by means of worked-examples, they compared the active and reflective students in terms of their cognitive loads and successes.	They found that there was no difference between active and reflective students in terms of both their cognitive load and post-test performances.	Worked-examples	Active and reflective [13]
Chen and Wu, 2015	They examined the impacts of three instructional video formats on the performances of the visual and verbal students involving sustaining attention, feelings, cognitive load and learning.	They observed that verbal and visual students achieved a learning performance at the same level in three video formats (lecture capture, voice-over and picture-in-picture). The video format with voice-over was significantly better than that with picture-in-picture in terms of sustaining attention.	Instructional Video	Visual and verbal [13]
Lei et al., 2015	They examined the effects of the 100 Taiwanese fifth graders students' metacognitive strategies and verbal-imagery cognitive style on their video searches on YouTube.	Cognitive style (verbalizer and imager) could not effective on video search behaviors, search performance, and learning performance	Videos on YouTube	Visual and verbal [13]

Most of the studies shown in Table 1 (e.g. [1; 7; 8; 10; 15; 16; 24; 32; 34; 43; 44; 47]) examined the relationship between instructional materials and learning styles based on a single type of learning material, and furthermore the studies (e.g. [6; 40]) conducted on the preferences of students for multiple learning materials remained limited. Nevertheless, in these studies, the learning materials were presented to the students in different times or environments. However, it may be useful to take into account the preferences towards learning objects of students in studies aimed to investigate the relationship between learning styles and learning objects presented in online environments. In this regard, unlike the above-mentioned studies, this study attempted to find out which learning objects are frequently preferred by the students. For this reason, the learning objects with the same subject content were simultaneously presented to the students in an online learning environment.

Method

Design and Participants

In this study, the preferences of the participants towards online learning objects were analyzed in terms of their usage levels of learning objects. Therefore, the relational screening model among the general screening methods was preferred. The screening model is a research approach aiming to describe the situation existing as it is. Relational screening can be done in two ways as comparison or correlation [23]. In this study, comparative method is preferred. The participants were 103 sophomores (42 female and 61 male students with an average age of 21) of the Computer Education and Instructional Technology Department at Çanakkale Onsekiz Mart University in Turkey.

Research Questions

1. What is the distribution of all students participated in the study in terms of their preferred learning styles?

2. What is the distribution of the participants in the study according to PLSs?

3. Is there a significant difference between the usage levels of different learning objects (VL, PDFL, AL, SCT) presented simultaneously in an online environment by students with PLS?

Teaching Context

The study was performed with third-grade undergraduate students enrolled to the course of "Internet-Based Programming" in the Department of Computer and Instructional Technologies in Canakkale Onsekiz Mart University in Turkey. This course lectured in the first semester of the academic year of 2013-2014 consists of three units as "Fundamentals of Php", "Basic database operations with Mysql", and "Php-MySql Relationship". The data of this study were obtained in the weeks that the second unit was taught and the application process lasted for two weeks. The lecturer taught the first and third of these three units as face-to-face in the classroom. Students learned the second unit by studying with the four different learning objects. These learning objects are presented to students in the Moodle [37] learning environment without the support lecturer in a computer laboratory. They were free to choose what they want among this learning object. Prior to the application, the students were informed that there would be an achievement test on the relevant unit topics, which would affect the results of their final exams at a rate of 40%. The reason that the topics of relevant unit was taught via Moodle was to determine how frequently students used the learning objects. Log reports of Moodle were used to achieve this goal. The watching durations of the VLs uploaded to Moodle as SCORM package could be obtained temporally in its 2.6.2 release. Furthermore, click-through rates of PDFLs, the click/download rates of ALs and the trial quantities of the SCTs could be reported numerically.

Data Collection Tools

Felder and Silverman's Index of Learning Styles (F-SILS) developed by Felder and Soloman (1994) was used in order to determine the learning styles of the participants in the study. This index was adapted to Turkish by Samancı and Keskin (2007). The authors also performed the validity and reliability study.

Moodle Log Data and Learning Materials

In the study, PDF materials presented in Moodle environment were divided into single pages and adapted into SCORM packages. Thus, the number of hits to PDF pages by students could be obtained in this way. PDF materials were vocalized by the instructor of the course and uploaded to Moodle learning environment, and thus it was ensured that the students could follow the topic content with AL. Then, VLs with the same topic content was uploaded to Moodle as SCORM packages. At the end of each chapter, SCTs took place in order to see if the students comprehended the topics taught in that unit. Students were freed about applying or not applying these tests as well as the trial amount. Figure 1 indicates a class opened in the learning environment of Moodle and four different learning objects pertaining to each subject based on the learning preferences of the students in the class. Annex-1 presents the sample figures on these learning objects.

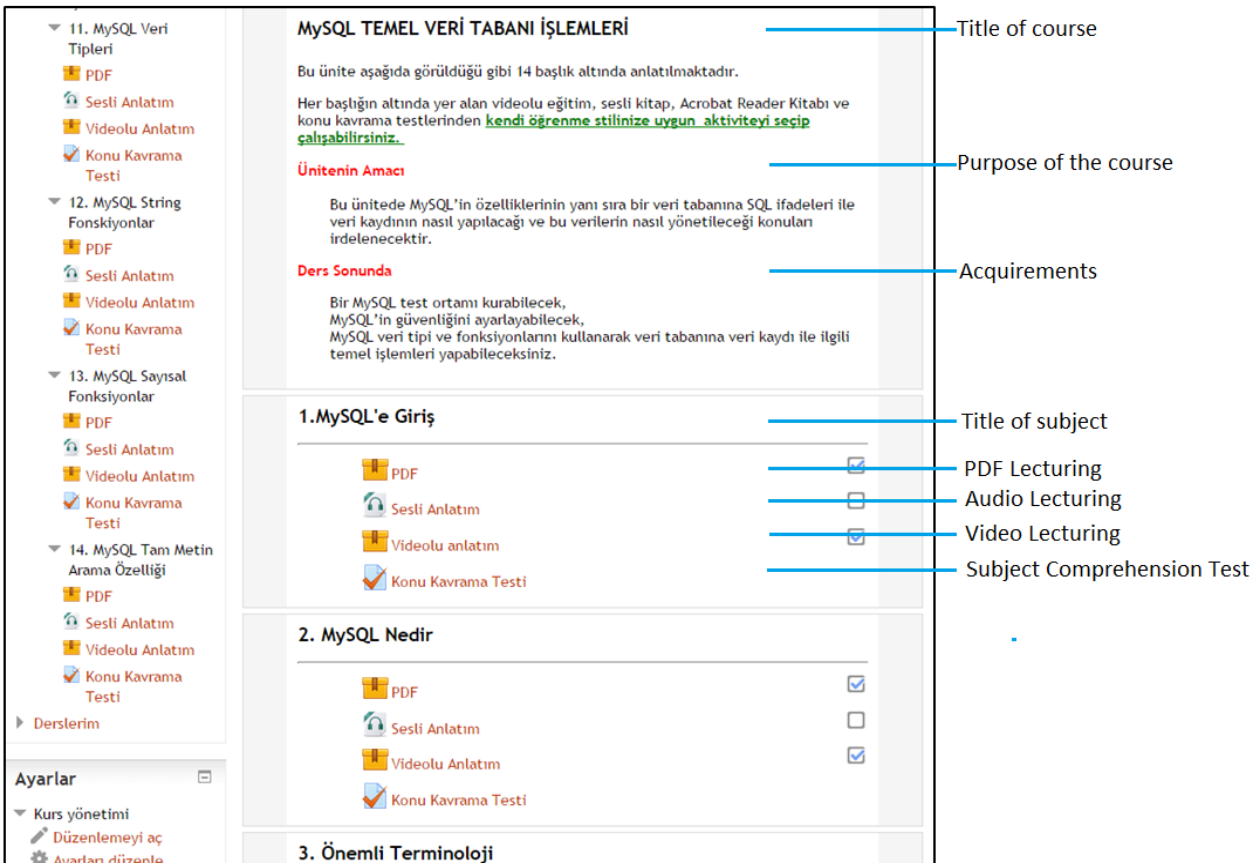

Figure 1. Online class opened in Moodle and four different type learning objects associated with each subject of the unit

In order to determine usage frequencies of students, the below-mentioned report outputs of the learning objects uploaded to Moodle learning system were used; Click-through rates of PDFL pages, Watching durations of VLs (minutes), Click/download rates of ALs and trial quantities for SCT. In order to be able to compare different data types of the report outputs with each other, these data were converted to standard scores.

Implementation Process

The implementation process lasted for two weeks. Prior to the application, F-SILS was applied in order to determine learning styles preferences of the students. Students have practiced the unit named "basic database operations with Mysql" for two weeks at the computer lab under the surveillance of the instructor, only on Moodle and by means of the different learning objects offered to their preferences simultaneously.

Data Analysis

SPSS was utilized for analysis of quantitative data. Descriptive analysis methods were used to determine the distribution of the participants according to their learning styles. In addition to this, independent-Samples T-Test and Mann-Whitney Wilcoxon test were used to test the differences between learning styles and online learning objects.

Implementation and analysis processes of the study are given in Figure 2 in a summary manner.

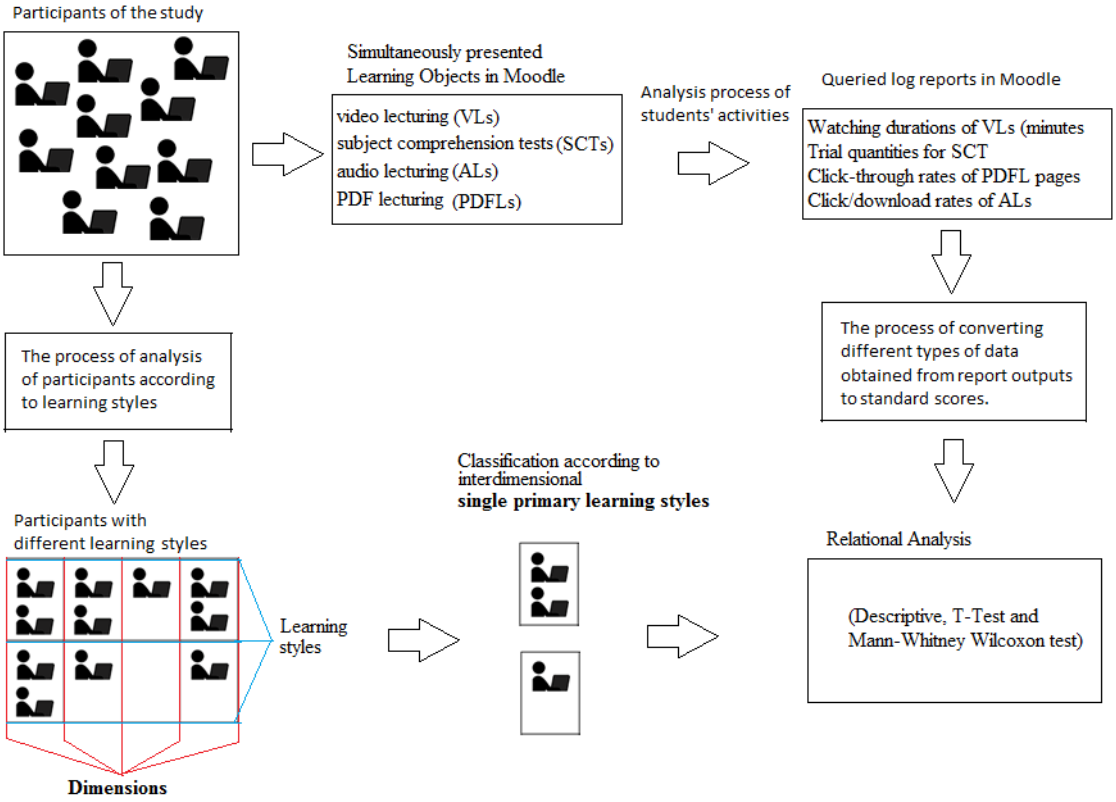

Figure 2. The implementation and analysis process of the study

Findings

What is the distribution of all students participated in the study in terms of their preferred learning styles?

There are 44 items, each of which has two different options, in the F-SILS. All of the four dimensions in the index are associated with a total of 11 statements; the "a" options refer to the active, sensory, visual or sequential pole of the relevant dimension whereas the "b" options refer to the reflective, intuitive, auditory or global pole of the relevant dimension [42]. Participants were asked to select the most appropriate option (a or b) for each of the items in F-SILS and evaluate themselves. Then, the selections were converted to the scores to be analyzed with the F-SILS Report (http://www.ncsu.edu/felder-public/ILSdir/ILS.pdf). Regarding the obtained scores, Felder and Solomon (1994) stated that 1 and 3 pointed out a balanced preference for both sides of dimension, 5 and 7 pointed out a moderate preference for one of the dimensions, and 9 and 11 pointed out a highly primary preference for one of the dimensions.

First, all of the participants were classified within only one of the styles among the dimensions stated in F-SILS (for e.g. "visual" learning style in input dimension). However, according to the Felder and Silverman's Learning Style Model [13], a student could also take place in one of two learning styles in other sub-dimensions [8] (Table 2), which means that the students may have characteristics of other learning styles as well. Accordingly, Table 2 indicates the distribution of all of the students participated in the study in terms of their learning styles.

Table 2. The distribution of all of the participates in terms of their preferred learning styles

F-SILS Dimension	Learning Style	Frequency	Percentage (%)
Perception	Sensory	63	60,19
	Intuitive	5	4,85
	Balanced on Both Style	35	34,95
	Total	103	100

Input	Visual		72	69,90
	Auditory		3	2,91
	Balanced on Both Style		28	27,18
		Total	103	100
Processing	Active		29	28,15
	Reflective		9	8,73
	Balanced on Both Style		65	63,10
		Total	103	100
Understanding	Sequential		34	33,00
	Global		11	10,67
	Balanced on Both Style		58	56,31
		Total	103	100

Table 2 shows that the mostly preferred learning style by participants is visual learning style (69.9%). This is followed by sensory (60.19%), sequential (33%) and global (10.67%) learning styles, respectively. According to that, most of the participants stated that they learned the most information when it was presented in visual formats such as images and diagrams. Auditory (2.91%), intuitive (4.85%), reflective (8.73%) and global (10.67%) learning styles are the least preferred styles by students. The distribution graph of all participates according to F-SILS dimensions is given in Figure 3.

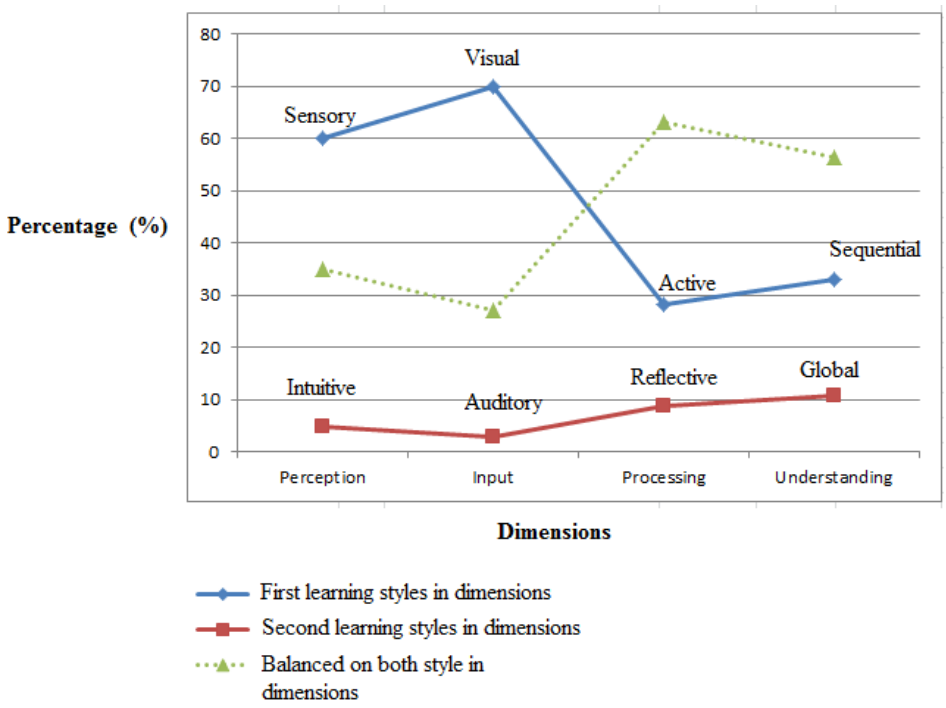

Figure 3. The distribution of all participates according to F-SILS Dimensions

What is the distribution of the participants in the study according to S-PLSs?

The data obtained on the usage levels of the online learning objects were analyzed in the context of interdimensional primary learning styles of students. In other words, when the students were being classified according to PLS, the highest score obtained in all sub-dimensions (interdimensional) in F-SILS was taken into consideration. In addition to this, just one primary, (hereinafter referred as Single-Primary or S-P) learning style was assigned for each student. For example, in Figure 4, one student's highest score is "11a" in all sub-dimensions. According to this, student' primary visual style is visual. Besides, any student may have more than one primary learning style. But, these students' data did not take place in analysis of this study. Namely they are excluded from the Single-Primary Learning Style (hereinafter S-PLS) class. This classification also allowed the creation of two independent learning style groups to perform relational analysis tests.

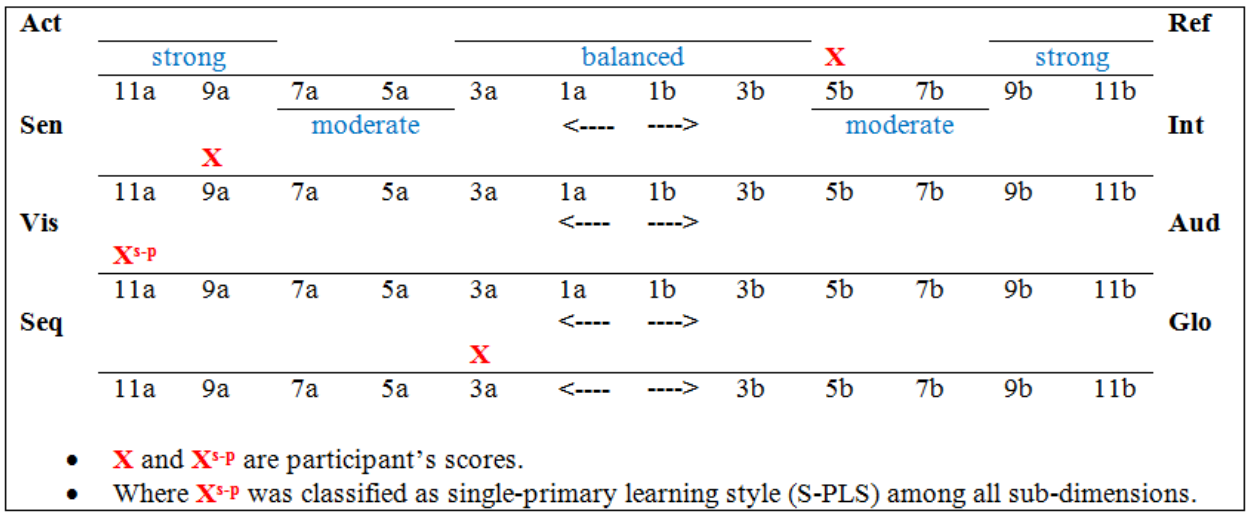

Figure 4. The F-SILS scale and the "Single-Primary Learning Style" classification approach used in study

Table 3 indicates the distribution of the participants according to their S-PLS. As it can be seen in the table, in the distribution according to S-PLSs of students, S-P visual style (34.95%) was in first order, whereas S-P sensory style (29.13%) was in second order. Since those with other S-PLSs have a small sample size and it is thought that it is not appropriate to generalize their analysis results to a larger universe, only the data of the students with S-P visual and S-P sensory styles on the second and third research questions were analyzed.

Table 3. The distribution of the participants according to S-PLSs

F-SILS Dimensions	S-PLS	Frequency	Percentage (%)
Perception	Sensory	30	29,13
	Intuitive	5	4,85
Input	Visual	36	34,95
	Auditory	0	0,00
Processing	Active	4	3,88
	Reflective	4	3,88
Understanding	Sequential	2	1,94
	Global	1	0,97
Balanced in one dimension or student has more than one primary style		21	20,39
	Total	**103**	**100**

Is there a significant difference between watching durations of VLs by students with S-PLS?

An independent-samples T-Test was performed in order to determine whether there is a significant difference between VL watching durations by students with S-P sensory and S-P visual styles (Table 4). Cohen d [9] statistics was used to calculate the effect size.

Table 4. The results of independent-Samples T-Test on the VL watching durations

PLS	N	$\bar{X}$	SD	t	P	d
Sensory	30	182.87	132.14	2.266	.028*	0.58
Visual	36	119.97	82.41			

* p<.05

As shown in Table 4, the difference between these two groups in terms of the watching durations of VLs was statistically significant (t(64)= 2.266, p<.05, d=0.58). Accordingly, it can be stated that the VL watching durations of the students with S-P sensory style (M=182.87, SD=132.14) were longer than that of those with S-P visual style (M=119.97, SD=82,41). Moreover, the difference between these two groups had a moderate effect size (Cohen's d=.58). Cohen's d values of 20, .50, .80 and 1.0 respectively refer to small, moderate, large and very large effect sizes.

Is there a significant difference between reading frequencies of PDFLs by students with S-PLS?

An independent-samples T-Test was performed in order to determine whether there is a significant difference between the reading frequencies of PDFLs of the students with S-P sensory and S-P visual styles (Table 5). According to the findings, there was no statistically significant difference between students with S-P sensory style (M=36.46, SD=25.12) and S-P visual style (M=32.35, SD=23.48) in terms of the reading frequencies of PDFLs (t (64)= 0.69, p>.05).

Table 5. The results of the independent-samples T-Test of the reading frequencies of PDFLs

PLS	N	$\bar{X}$	SD	t	p
Sensory	30	36.46	25.12	0.69	.5*
Visual	36	32.35	23.48		

* p>.05

Is there a significant difference between listening frequencies of ALs by students with S-PLS?

According to the results of the Shapiro-Wilk normal distribution test, data obtained from the listening frequency of ALs of the students with S-P sensory and S-P visual styles did not provide the normal distribution condition. For this reason, Mann-Whitney Wilcoxon test was performed for the analysis of the data (Table 6).

Table 6. The Results of U-Test on the listening frequency of ALs

PLS	N	Mean Rank	Sum of Ranks	U	p	r
Sensory	30	33.10	993.00	528.00	. 87	-.020
Visual	36	33.83	1218.00			

As it can be seen in Mann-Whitney Wilcoxon test results in Table 6, there was not a significant difference between students with S-P sensory style (Mdn=5) and S-P visual style (Mdn=1) in terms of the listening frequency of ALs (U=528.00, z= -0.167, p>.05, r= -.02).

Is there a significant difference between trial quantities of SCTs by students with PLS?

According to the results of Shapiro-Wilk Normality distribution test, the data on the trial quantities of SCTs of the students with S-P sensory and S-P visual styles did not show a normal distribution. For this reason, Mann-Whitney Wilcoxon test was performed for the analysis of the data (Table 7).

Table 7. The Results of U-Test on the trial quantities of SCTs

PLS	N	Mean Rank	Sum of Ranks	U	p	r
Sensory	30	39.18	1175.50	369.50	.025*	-.28
Visual	36	28.76	1035.50			

* p<.05

According to the results of Mann-Whitney Wilcoxon test in Table 7, there was a statistically difference between the two groups in terms of trial quantities of SCTs (U=369.50, z= -2.25, p<.05, r= -.28). Accordingly, it can be stated that the students with S-P sensory style (Mdn=11) utilized SCTs more frequently than those with S-P visual style (Mdn=4.5). Furthermore, the difference between the two groups can be considered to have an approximately moderate effect size (r= -.28).

Discussion and Conclusion

Majority of the studies in the literature investigated the relationships between instructional materials and learning styles based on a single type of learning material, whereas the studies conducted on the preferences of students for multiple learning materials remained limited. However, in studies on the relationship between the learning styles and learning objects, which are presented especially in online environments, it would be useful that students' preferences for these learning objects were taken into consideration. Therefore, in this study, four different learning objects with the same subject content were presented simultaneously to the students. Besides, the differences between the usage levels of these learning objects by the students with different learning styles were examined. In terms of all participants, the mostly preferred learning style was visual learning style, which was followed by sensory, sequential and global learning styles respectively. These findings are consistent with the findings of Cheng (2014) and Felder and Silverman (1988) reported that the students in college education had generally visual learning styles. Moreover, it is stated that sensory learning style is important due to its relation to the career preferences, skills, management styles and a variety of behavioral tendencies of the students particularly in higher education [15]. In this regard, it was concluded that the findings and interpretations in the study would be useful for the educators in the selection of learning objects to be presented to the students with these two styles (visual and sensory) during their university education.

In study, it was assumed that presentation of online learning objects which are suitable to the students' prominent learning styles rather than their additional learning styles may provide a greater contribution to their learning. In addition to this, by addressing the interdimensional prominent learning styles in learning styles models, it may be provided strong clues in relationships between learning objects and these learning styles. For this reason, the data on the usage levels of the learning objects were analyzed in the context of the S-PLSs. it is hoped that, S-PLS classification approach, which was presented in this study, will provide a contribution in the designing of the adaptive online learning environments in accordance with the various learning styles and learning objects. According to the findings of the study, the students with visual and sensory styles were in majority among the students with S-PLS (Table 3). Since it is believed that students with other learning styles in primary level were in a quite small sampling size and the generalization of the analysis results to a larger universe would not be appropriate, findings on the students with these S-PLS were not included in the analysis. Therefore, it can be said that there is need for further studies on the relationships between the learning objects and the other S-PLS which are not included in the study.

The results of the analysis indicated a significant difference between the watching times of VLs of the students with S-P visual style and those with S-P sensory style. Given the average of the two groups (Table 4), the students with S-P *sensory* style seem to spend more time on VLs than the students with S-P *visual* style in order to learn the subjects presented in online environment. According to Felder and Silverman (1988), sensory students may be careful but slow and are patient with detail but do not like complications. In this regard, that the students with S-P *sensory* style spent more time on VLs than those with S-P *visual* style learning style can be explained by the assumption that they may be careful and slow and might spend more time on the details of the subject. The reason that they spent more time on VLs may be that their desire to repeat the practices of the subject through VLs was higher than that of students with S-P *visual* style. The study revealed some promising results in providing a positive contribution to the learning outcomes of the students with two S-PLS (S-P sensory, S-P visual) most preferred by the students.

It is essential to plan and configure in-class activities and evaluation strategies by taking individual differences of students into consideration [42]. The awareness on the individual differences enables the educators (the teachers and instructional designers) to become more responsive to their teaching roles [21]. Online education environments provide prosperous

opportunities for the educators to find out these individual differences. Additionally, thanks to the developments in education technology, the learning objects structured based on students' individual differences can be quite important factors to reveal the their learning styles. Moreover "Adaptive hypermedia based on student learning styles provides the ability to individually tailor the presentation of course material to each student" [4].

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Annex-1

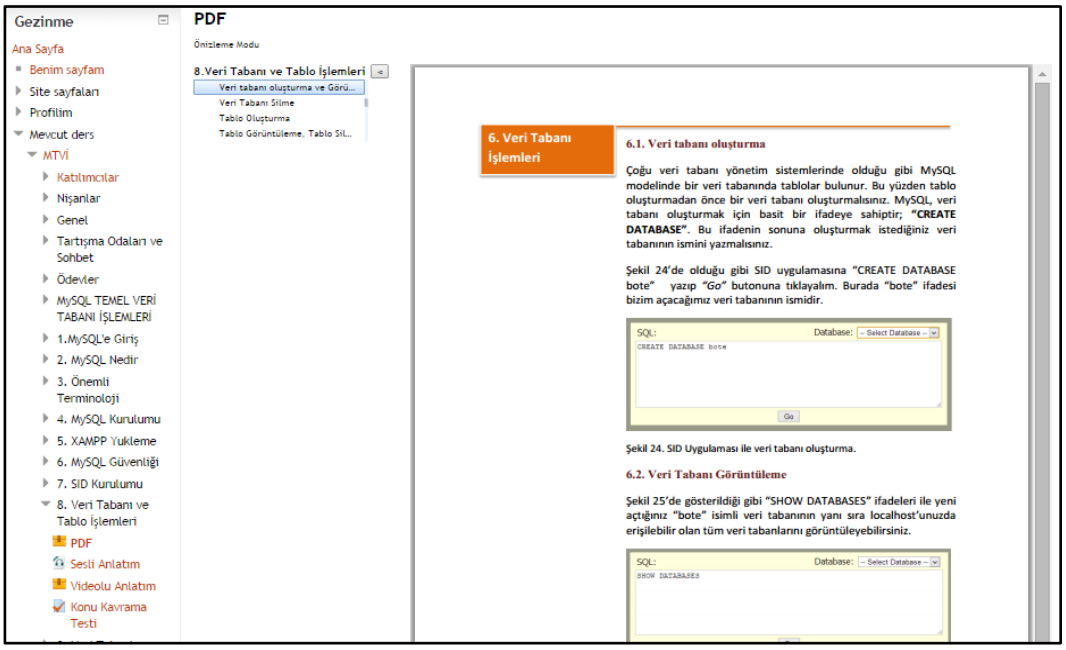

Figure 5. Example of PDF lecturing about a subject, which was uploaded to system by means of SCORM package.

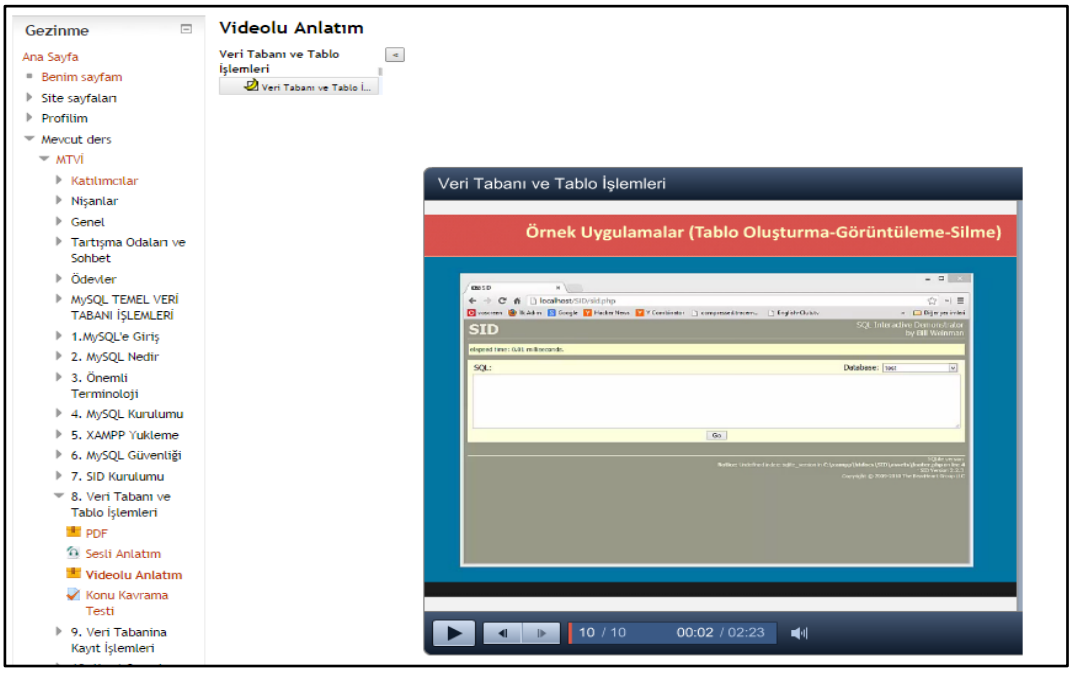

Figure 6. Example of video lecturing about a subject, which was uploaded to system by means of SCORM package.

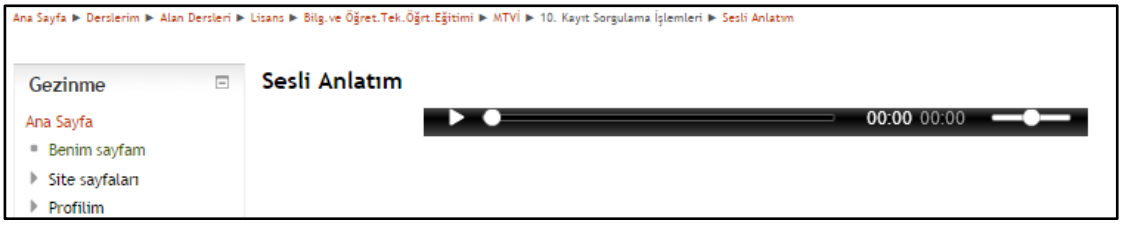

Figure 7. Example of audio lecturing about a subject

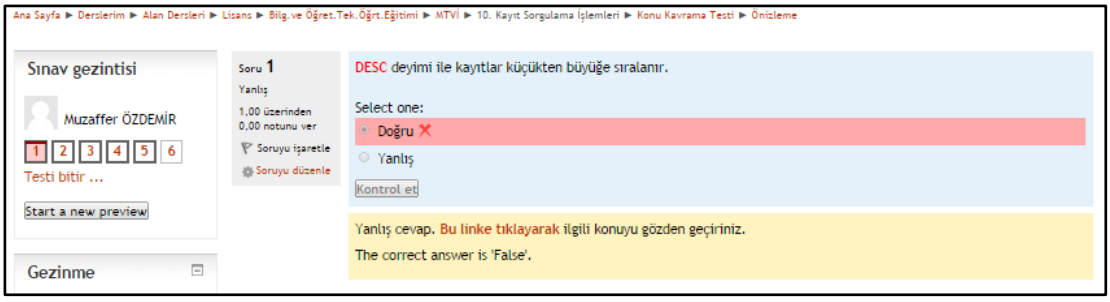

Figure 8. Comprehension test on a subject

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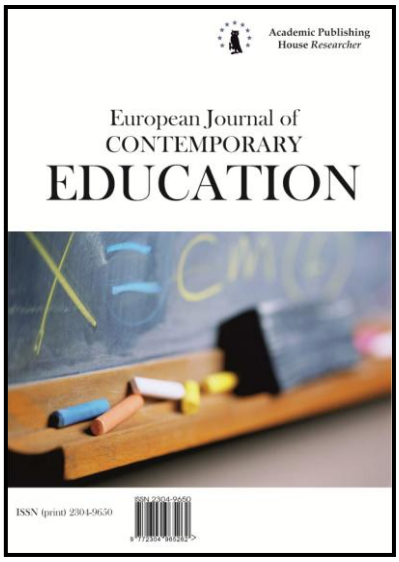

The Investigation of Preservice Teachers' and Primary School Students' Views about Online Digital Storytelling

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Abstract

This study was aimed at investigating the views held by preservice teachers from the department of Computer Education and Instructional Technology (CEIT) and those of 6th grade students about the process of online digital storytelling activities as it applies to the students' education. The study was designed as a case study. The data were collected through direct observations, semi-structured interviews and surveys. The participants of the study were eight senior preservice teachers from CEIT and 47 6th grade students from Eskisehir Cagdas Private Elementary School. The study followed two stages. In the first stage, the preservice teachers from CEIT were trained in online digital storytelling; and in the second stage, the preservice teachers performed online digital storytelling activities with 6th grade students. According to the findings obtained in the study, the preservice teachers thought that carrying out digital storytelling activities in an online environment engages students' attention, accelerates the digital storytelling process, increases communication between students and contributes to the development of students' digital stories. In addition, both the preservice teachers and the elementary school students agreed that digital storytelling developed the students' 21st century skills. On the other hand, the preservice teachers complained about the fact that digital storytelling activities lasted for a long period of time; that the students were reluctant to participate; and that the students copied their scenarios from the Internet; meanwhile, the students mostly complained about technical problems, about the lack of sufficient sources related to the their stories and about the extended time-taking aspect of the activity process.

Keywords: Digital Storytelling, 21st century skills, technology integration, Web 2.0, distance learning.

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Introduction

Advances in technology have influenced many environments and individuals. One of the most important environments influenced by technology is the educational environment because preparing students for real life as individuals capable of using technology is one of the requirements of an educational environment. In order for technology to be used effectively in an educational environment, it is essential that technology be integrated into educational curricula (Bitner & Bitner, 2002). The integration of technology into educational curricula requires the use of technology as a tool to teach the educational content effectively (Harris, 2005). Earl (2002) stated that the integration of technology is not related to the amount or type of technology but to why and how technology is used. In this respect, technology should focus on the content of the curricula and learning.

There are many of approaches in which technology is integrated into teaching and learning. One of these approaches, digital storytelling, has recently gained more popularity among educational environments (Ware, 2006).

Digital Storytelling

When the literature on digital storytelling is reviewed, a great number of definitions emerge. According to Dreon, Kerper and Landis (2011), digital storytelling refers to delivering storytelling art with the support of technological tools. Another researcher, Robin (2006), however, defines it as the relationships between such multimedia elements as text, graphics, audio, video and music in order to provide information on a specific topic. Robin and Pierson (2005) define digital storytelling as creating meaningful stories that address students' and teachers' imaginations and increase their related experiences. Generally speaking, digital storytelling combines multimedia technologies and content, establishing an emotional connection with the content, and allows for sharing the content with others (Moseley, Gdovin, & Jones, 2013).

While creating digital stories, students generally should adopt a study process that includes the students' determining a topic, conducting research on that topic, using technological tools, relating multimedia elements to each other and eventually creating a short video (Kajder & Swenson, 2004). Digital stories may vary in length yet last only a few minutes (Robin, 2008).

Digital Storytelling and Web 2.0

In general, Web 2.0 technologies are defined as the second-generation web which provides users with the opportunity to share their knowledge and thoughts, thereby increasing access to various online applications and sources, and allowing for cooperation between individuals in the Internet environment (Cormode & Krishnamurthy, 2008; Mcloughlin & Lee, 2007). Smeda, Dakich and Sharda (2010) stated that Web 2.0 technologies allow for the sharing of information between individuals and developing the cooperation between them; additionally, these technologies create a participatory environment which supports multimedia learning.

Web 2.0 provides users with access to Web 2.0 tools that enable users to create, edit and broadcast content (Alexander & Levine, 2008). This feature provides an ideal platform for interactive educational environments such as digital storytelling (Safran, Helic, & Gütl, 2007). Alexander and Levine (2008) define online software utilized for using and combining multimedia resources and sharing digital stories as 'Web 2.0 storytelling'. It was observed in situations involving the use of Web 2.0 technologies that students were more enthusiastic; that student participation increased; and that students were more willing to express themselves and to communicate with their peers (Shih, 2010).

Digital Storytelling in Education

Digital storytelling brings about a number of positive features thanks to the traditional storytelling method in educational environments: Students take active roles in the digital storytelling process; and they can develop their oral and writing skills and use technology effectively (Kocaman-Karaoğlu, 2014; Ohler, 2013). Also, digital storytelling increases students' motivation for learning and allows for personalization of the learning experiences and understanding of the expectations regarding the instructional process (Hung, Hwang, & Huang, 2012; Ohler, 2013; Ware, 2006). In addition, digital storytelling can clarify concepts that are

difficult to understand in the classroom environment and also facilitate discussions regarding these subjects (Ohler, 2013).

Activities carried out in the digital storytelling process in a classroom environment transform passive students into active participants of the learning process (Howell & Howell, 2003). These activities allow students to become narrators, authors, actors and producers. In addition, thanks to digital storytelling, students ask questions of themselves such as 'Why am I telling this story?', 'What is the purpose of the study?' or 'Where am I in this story?'; thus, digital storytelling can be regarded as a strong learning tool that helps students personalize their learning experience (Jakes & Brennan, 2005; Salpeter, 2005).

In the digital storytelling process, students thinking about telling a personal story have a number of opportunities to have the story formulate an original dimension. These opportunities allow students to express themselves, to develop an understanding of humour and to shape the instructional process align with their new needs (Hull, 2003; Sarıca & Usluel, 2016). Sadik (2008) states that digital storytelling encourages students to share their knowledge and to express their thoughts. Also, in the digital storytelling process, students can criticize not only their own studies but also others' studies by sharing their stories. This could contribute to the development of students' emotional intelligence and of their social learning (Robin, 2008). In addition, digital storytelling could also contribute to the development of students' technological skills in the 21st century.

Digital Storytelling and 21st Century Skills

Over the last decade, new skills and competencies necessary to prepare students for business environments as well as for life in the digital era constitute the focus of both the education world and the business world (Lemke, Coughlin, Thadani, & Martin, 2007). It is seen that most of these skills and competencies have a relationship with the digital environment and with information management which covers the selection of information, its integration, analysis and sharing (Ananiadou & Claro, 2009). When the related literature is examined, it is understood that these skills focusing on the digital environment are generally referred to as 21st century skills and competencies (Ananiadou & Claro, 2009; Jakes, 2006).

The researchers in 'Partnership for 21st Century Skills' published a report on the skills that students must possess in the 21st century and categorized these skills as 'learning and innovation skills', 'information, media and technology skills', and 'life and career skills' (Partnership for 21st Century Skills, 2003). It is seen that digital storytelling helps students develop these skills. Robin (2008) stated that thanks to the digital storytelling approach, students could improve their digital, technological, visual and information literacy. The digital storytelling process contributes to the development of students' 21st century skills since it requires them to research, synthesize information, to be creative and to think critically (Hull & Katz, 2006; Husband, 2014; Ohler, 2008; Yang & Wu, 2012; Yuksel, Robin & Mcneil, 2011; Ware, 2006). In addition, as they use technology in the digital storytelling process, students develop their problem solving skills (Bull & Kajder, 2004; Czarnecki 2009; Gaeta et al, 2014; Ming, 2014; Ramble & Mlambo, 2014; Robin, 2008). The traditional storytelling method allows for problem solving within the structure of the story, while digital storytelling enhances these opportunities by combining the traditional storytelling method with the digital environment (Miller, 2009). In general, the process of creating digital stories forms a strong sub-structure for the development of students' skills called 21st century literacy or 21st century skills (Brown, Bryan, & Brown, 2005; Robin, 2008; Partnership for 21st Century Skills, 2003). In this respect, digital storytelling can equip students with the skills required to meet the demands of society in the 21st century (Jakes & Brennan, 2005).

It is crucial that technology merges with educational curricula and strategies within the framework of educational standards and helps students develop skills that meet the expectations of the society and of the business world. For this reason, it does matter how technology is used in the classroom for the development of students' 21st century skills, which, in other words, means that information and communication technologies should be used effectively in class to help students achieve meaningful learning, to structure their knowledge and to develop their 21st century skills.

Taking the above-mentioned into consideration, the aim of this study was to investigate the views of preservice teachers from the department of Computer Education and Instructional

Technology (CEIT) and those of elementary school 6th grade students who are in the process of formulating online digital storytelling activities.

For this purpose, the following research questions were directed in the study:

1. What are the views of preservice teachers and students about the effects of online digital storytelling activities on the development of 21st century skills?
2. What are the views of preservice teachers and students about the advantages of online digital storytelling activities?
3. What are the views of preservice teachers and students about the limitations of online digital storytelling activities?
4. What are the students' and preservice teachers' suggestions regarding the online digital storytelling activities?

Method

Research Model

The study followed two stages. In the first stage, the senior preservice teachers from the department of Computer Education and Instructional Technology were trained in online digital storytelling; in the second stage, the preservice teachers performed online digital storytelling activities with 6th grade students within the scope of the course of 'Teaching Practice' in the Spring Term of 2012–2013. The second stage of the study was designed as a case study.

Participants

The participants of the study were eight senior students from the department of Computer Education and Instructional Technology at Anadolu University in the Spring Term of 2012–2013 and 47 6th grade students from Eskisehir Cagdas Private Primary School. The participants were selected with the purposeful sampling method.

Data Collection Tools

The research data were collected via direct observations, semi-structured interviews and the 21st Century Skills survey regarding digital storytelling activities.

The 21st century skills survey regarding digital storytelling activities

Before the survey items were formed, the related literature was reviewed. Following this, a survey questionnaire including 41 items was created to determine the effects of the activities implemented within the framework of indicators of 'Partnership 21st Century Skills' as to the development of 21st century skills. The survey was composed of three sub-categories identified as 'learning and innovation skills', 'information, media and technology skills' and 'life and career skills'.

The Research Process

The study was carried out in two stages: the preparation stage and the implementation stage.

The preparation stage: Before the implementation stage of the research, the video editing software with which the students could engage in the digital storytelling activities online was determined. For this reason, the researcher searched for and examined a variety of video editing and digital storytelling web pages in order for students to create digital stories online and found that some of these web pages were too complex and some did not include the features that were suitable for the purpose of the research.

However, after a considerable amount of research, 'Wevideo', which is online video editing software, was selected to be used for the study since it had a straightforward interface, cloud technology and effective features. In addition, Wevideo is used in digital storytelling workshops by the 'Center of Digital Storytelling (CDS)' at Houston University. Figure 1 depicts a screenshot of Wevideo:

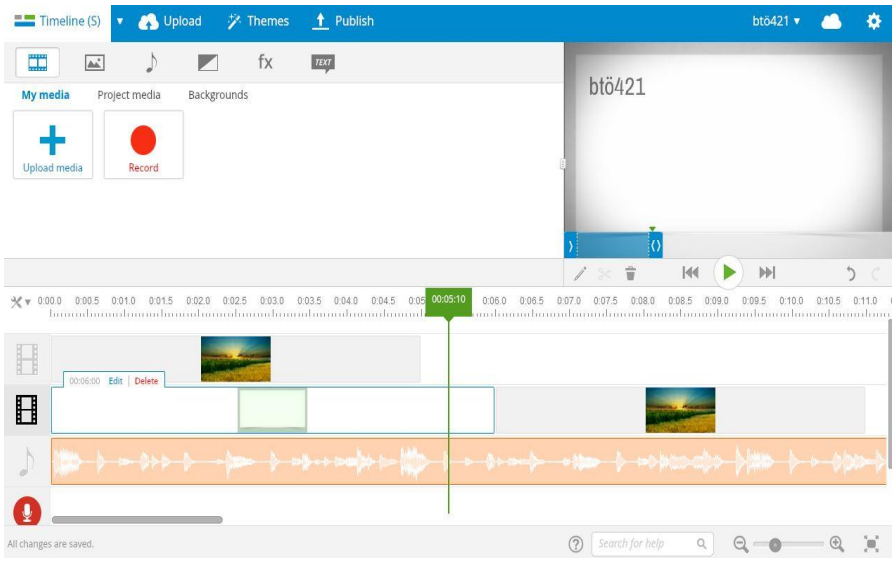

Figure 1. Wevideo screenshot

Next, a new webpage called 'Digital Storytelling Webpage (*www.digitaloykuleme.com*)' was created so the students could perform online digital storytelling activities and communicate with each other about their activities. This webpage was designed to complete the missing aspects of the online software 'Wevideo'. The 'Digital Storytelling Webpage' was used for the steps of the digital storytelling process, which included developing a scenario, getting feedback, creating a storyboard and sharing digital stories. The webpage had a menu bar of four hyperlinks: home page, scenario, storyboard and video, which are described below:

Home page: This page included announcements regarding the students.

Scenario: On this page, the students created their scenario drafts and received feedback from other students.

Storyboard: On this page, the students edited the storyboards of their scenarios that they had created previously.

Video: On this page, the students created their digital stories with the help of Wevideo, shared them on YouTube and then included links to the digital stories they shared on YouTube.

Figure 2 presents a screenshot of the scenario page of the Digital Storytelling Webpage.

Figure 2. Digital Storytelling webpage screenshot

Finally, before the implementation stage, the literature on digital storytelling was reviewed, and a training program was prepared on digital storytelling. Then, the eight senior students from the department of Computer Education and Instructional Technology were trained on digital storytelling and its software use for a total of 10 hours over the course of 4 weeks. After the training, the preservice teachers created their digital stories and shared them online.

The implementation stage: The implementation stage of the study was done between 04.03.2013 and 17.05.2013 with the 6th grade students at Eskisehir Cagdas Private Primary School who partook in a non-credit course covering information technologies. The digital storytelling activities were performed with 47 students in total from three different classrooms. The implementation stage lasted 10 weeks, and encompassed one hour a week for each classroom.

First, the students were provided with training on digital storytelling, Wevideo and use of the digital storytelling webpage. After the training, the students determined the topics for their digital stories and added their scenario drafts to the Digital Storytelling Webpage. Having created their scenario drafts, the students received feedback (comments) from the preservice teachers as well as from their peers through the webpage. Then, the students edited their scenarios on the webpage in accordance with the feedback and finalized them.

Next, the students narrated their own scenarios and researched multimedia materials to use with their scenarios on the Internet and from other media. Following this vocalization process, the students created their storyboards by relating the multimedia materials they had found to their scenarios and added them to the digital storytelling webpage. After that, the students edited the multimedia materials via Wevideo, the video editing software. Lastly, having finalized their digital stories, the students shared their videos with their peers on YouTube and the digital storytelling webpage.

Data Analysis

The qualitative data obtained from the study were analyzed with the content analysis method. In addition, the quantitative data obtained from the survey were analyzed with SPPS 20.0 software, and descriptive statistics for the items in the questionnaire were applied.

Findings

According to the findings obtained in this study, 45 6th grade students created digital stories; however, two students were unable to complete their stories. It was also revealed that out of the digital stories created, 42 were informative (introductory) and the remaining 3 were personal (reflective). The informative stories were videos that mainly included interesting information (27), the life stories of celebrities (10) and the development of technology (5).

Findings Regarding the Effects of Digital Storytelling on the Development of 21st Century Skills

Findings obtained from the students: Table 1 shows the findings regarding the data obtained from the 'Survey on 21st century skills regarding digital storytelling activities' applied to the students.

Table 1. Descriptive statistics for the values regarding the 21st century skills survey

	n	$\bar{X}$	SS
Learning and Innovation skills	45	3,55	,830
Information, Media and Technology skills	45	3,84	,791
Life and Career skills	45	3,57	,881
General average	45	3,61	,791

As can be seen in Table 1, the mean scores for each indicator were considerably above the mean value of 3, which demonstrated that the 6th grade students believed digital storytelling activities improved their skills in 'learning and innovation', 'information, media and technology' and 'life and career'. When the data in Table 1 are examined, it can be seen that 'information, media, and technology skills' had the highest mean, while 'learning and innovation skills' had the lowest. Taking the general average into account, it can be suggested that the students thought digital storytelling activities improved their 21st century skills ($\bar{X}$ = 3,61).

Findings obtained from the preservice teachers: Table 2 shows the preservice teachers' views about the effects of digital storytelling activities on the development of the students' 21st century skills.

Table 2. Themes related to the 21st century skills

21st Century Skills		
Learning and Innovation	Information, Media and Technology	Life and Career
Critical Thinking and Problem Solving	Information and Communication Technologies literacy	Flexibility and Adaptability
Creativity and Innovation	Information literacy	Social and Cross-Cultural skills
Communication and Collaboration	Media literacy	Responsibility Productivity

Learning and innovation skills. As can be seen in Table 2, the preservice teachers' views about the effects of digital storytelling activities on the development of the students' learning and innovation skills included such dimensions as 'critical thinking and problem solving', 'creativity and innovation' and 'communication and collaboration'.

The preservice teachers believed that the students' critical thinking skills were improved since it was possible for the students to make comments on each other's scenarios and to edit their scenarios accordingly; likewise, the fact that they solved the problems they encountered while creating their digital stories improved their problem solving skills. One of the preservice teachers, A.S., said:

> *A.S.: 'The students made critical comments on their peers or their scenarios. And this could have improved their critical thinking skills'.*

Some preservice teachers thought that students' creativity and innovation skills were developed during the process due to the fact that the students created a product from their own perspectives and learned new information about the topics they researched and about the videos their peers created. G.B.'s remarks were as follows:

> *G.B.: 'The students created a product by combining their previous knowledge with the new information they obtained, and we asked them to create the product from their points of views. This developed their creativity skills'.*

However, some other preservice teachers belonging to the study group stated that the fact that the students made comments on each other's scenarios through the digital storytelling webpage was a step that improved their communication skills, while the fact that they helped each other during the digital storytelling process was another step that improved their collaboration skills. The comments of one of the preservice teachers, F.S., were as follows:

> *F.S.: 'Since the students made comments on each other, their communication skills improved. In other words, they improved their communication skills as they commented on each other's scenarios'.*

Information, media and technology skills. As shown in Table 2, the preservice teachers' views about the effects of digital storytelling activities on the development of the students' information, media and technology skills included such dimensions as 'information and communication technologies literacy', 'information literacy' and 'media literacy'.

According to the preservice teachers, the fact that the students used Wevideo to edit their digital stories, uploaded their scenarios online and made comments on each other's projects could have improved the students' information and communication technologies literacy. One of the preservice teachers, A.S., reported as follows:

A.S.:'I think the students learned to use Wevideo software basically and to create a video'.

Some of the preservice teachers thought that the students' information literacy was improved by completing the process since the students made information choices, related a variety of information to each other and made decisions on which information to use and whether the information they obtained was correct or not. One of the preservice teachers, Y.O., said:

Y.O.: 'The students did research about the topics. They related the information they found to each other. They evaluated the information in terms of two aspects: which information to use and which information was more accurate. I think all these improved their information literacy skills'.

On other hand, according to some other preservice teachers, the fact that during the digital storytelling process the students edited the multimedia materials by using online video editing software, vocalized their stories and then streamed the videos they created over the Internet might have improved their media literacy. One of the preservice teachers, G.B., reported as follows:

G.B.: 'The students did sound recordings, for example – how is sound recorded? Some students learned how to do it. This is related to media literacy. For example, the students' creating their videos and sharing them online can count in media literacy'.

Life and career skills. As can be seen in Table 2, the preservice teachers mainly believed that digital storytelling activities improved the students' skills regarding 'flexibility and adaptability', 'social and cross-cultural skills', 'responsibility' and 'productivity'.

The preservice teachers not only thought that the students improved their 'flexibility and adaptability' because the students adapted themselves to specific tasks during the process and were flexible while making comments on each other's scenarios and but the teachers also believed that the students improved their 'social and cross-cultural skills' because they expressed themselves and maintained in-class communication. Furthermore, the preservice teachers added that the students' 'responsibility' improved since completing specific tasks in order was required during the digital storytelling process and that their 'productivity' improved as they created a final product. One of the preservice teachers, S.K., reported as follows:

S.K.: 'It could be that the students adapted to specific tasks and were flexible about the comments made. During this storytelling procedure, editing the pictures depending on vocalization, for example, or other similar things can improve the students' adaptability skills'.

Findings Regarding the Advantages of Digital Storytelling

The preservice teachers reported that the online environment intrigued the students and accelerated the process of digital storytelling. In addition, they believed that since the online environment allowed the students to comment on each other's scenarios and to perform the activities more easily, the communication between the students and the development of the students' products were improved. The remarks of one of the preservice teacher, B.Y, were as follows:

B.Y.: 'Students like to go online. As they are always online, it was a plus that this program was online, too, together with the fact that they can make comments through our webpage. It might not have been so appealing if it hadn't been online or if we'd had them create the stories with Movie Maker'.

Findings Regarding the Limitations of Digital Storytelling

Table 3 shows the problems that the participants of this study encountered during the digital storytelling process.

Table 3. Problems the participants encountered during the digital storytelling process

Problems Encountered	
Students' views	**Preservice teachers' views**
Use of Wevideo	Lack of time
Insufficient resources	Lengthy implementation stage
Lengthy implementation stage	Reluctant students
	Scenarios copied from the Internet

As can be seen in Table 3, the problems that the students encountered during the storytelling process included the use of Wevideo, insufficient resources and the lengthy implementation stage.

The students indicated they had trouble using Wevideo; that the implementation stage lasted too long; and that a lot of time was wasted during this stage. One of the students, Z.G., commented as follows:

Z.G.:'It took so long. It was for 10 weeks and exhausting. I think we wasted a lot of time'.

As shown in Table 3, the problems that the preservice teachers encountered during the storytelling process included lack of time, the lengthy implementation stage, reluctant students and scenarios copied from the Internet.

In particular, the preservice teachers stated that there was not enough time to perform all of the scheduled activities since the weekly class time allocated for the information technology course was only one hour and that the implementation stage took so long. One of the preservice teachers, B.Y.'s, said:

B.Y.:'Perhaps it would have been wiser to implement the activities in courses where the allocated weekly class hours for the course were 2-3 hours. Or maybe if there had been another course or if they had been implemented for 3-4 hours a week, it would have finished in 3 weeks, and it would have been more fun – without long interruptions at least'.

Some preservice teachers pointed out that the students were reluctant to perform the activities. One preservice teacher, S.K., said:

S.K.:'The biggest problem I had during the process was, I guess, that they were a bit demotivated and unwilling. There were a couple of students that really bothered me. I was completely tired of asking them to do the activities'.

Some otherpreservice teachers, on the other hand, stated that the students copied and pasted information from the Internet at the beginning of scenario writing; that they were not able to compile the information obtained and showed a lack of originality in their scenarios. One of the preservice teachers, G.B., reported as follows:

G.B.:'One of the biggest problems was that some students copied and pasted their scenarios. For us, it is to make students write scenarios that was itself a huge problem. And some students copied and pasted the scenarios'.

Findings Regarding the Suggestions on Digital Storytelling

It was found that the students had varied viewpoints about group work during the digital storytelling activities. Some students stated that more comprehensive products could be created with group work, while some others believed that less comprehensive products could be created with group work. One of the students, E.B., said:

E.B.:'It would have been better if we were divided into groups – not individually. Each of us could have researched a different thing, I mean, about the same thing more research could be done in detail, so I think group work might have been better'.

With regards to the digital storytelling activities performed in the course of information technologies, the preservice teachers' suggestions were to increase the weekly class hours allocated, to create personal stories and to prepare multidisciplinary activities. The preservice teachers mainly expressed that the number of weekly class hours allocated should be increased as the implementation stage took so long. Moreover, they suggested that students create personal stories and that activities be multidisciplinary as a solution to problems such as students' lack of motivation and copying of scenarios. One preservice teacher, S.K., stated:

S.K.:'Actually, we could have done more effective things during the implementation stage if there had been more weekly course hours allocated'.

The preservice teachers stated that digital storytelling was compatible with the information technology course since it helped the students increase their content knowledge and developed their technology skills. The preservice teachers added that in their future educational instructions, they would possibly use digital storytelling to teach software use and other specific subjects. The preservice teachers believed that the digital storytelling activities were appropriate to teach particularly computer hardware and technology development. One of the preservice teachers, G.B., said:

G.B.:'I don't really think digital storytelling can be widely used while teaching Office programs or Photoshop programs, but I think it can be quite useful while teaching hardware topics, hardware pieces or the historical development of the computer'.

In addition, both the preservice teachers and the students thought that digital storytelling activities might be appropriate applications for science, social studies and Turkish language courses.

Discussion and Conclusion

It can be stated that performing digital activities online attracted the students' attention, enhanced communication among the students and contributed to the students' products as they facilitated task achievement. According to Shih (2010), web-supported learning environments allow students to give feedback and evaluate each other. Furthermore, Shih (2010) used Web 2.0 technology in his research and stated that Web 2.0 technology enhanced the students' communication skills and increased their enthusiasm and participation. Similarly, Behmer (2005) pointed out that the digital storytelling process provides the opportunity to use communication and technology tools allowing students to work collaboratively and to examine a variety of topics critically.

The participants of this study believed that the digital storytelling activities improved learning and innovation skills. The communication among the students while creating digital stories and the comments and evaluations on each other's digital stories promoted the students' critical thinking skills (Yang & Wu, 2012). Jenkins and Londsdale (2007) reported that digital storytelling activities help students solve problems innovatively and boost their creativity. In addition, Sadik (2008) stated that teachers believe digital storytelling improves students' communication and collaboration skills in long-term projects.

The participants also stated that digital storytelling activities improved information, media and technology skills. Tendero (2006) stated that digital storytelling is basically a process in which students can use technology as designers; that students interpret their opinions parallel to their own experiences during this process; and that they create their own narrative languages while interpreting their opinions through technological facilities. According to Barret and Wilkerson (2004), digital storytelling causes students to be more successful in using, restructuring, relating and interpreting the knowledge they obtain during the learning process than other students. In addition, students improve their technology skills by using certain computer software and

technological tools while restructuring the knowledge during the digital storytelling process (Robin, 2008; Yuksel, Robin, & McNeil, 2011). Robin (2008) states that information literacy, visual literacy and media literacy can all be enhanced on the condition that student involvement in the digital storytelling process is achieved. According to Dogan (2012), students think that digital storytelling promotes technology skills and media literacy skills the most.

The participants also thought that life and career skills, which are among the 21st century skills, developed thanks to digital storytelling activities. In this respect, Yuksel, Robin and McNeil (2011) stated that during the storytelling process, students improve such life-related skills as a sense of community, empathy, collaboration, social interaction and communication skills. Besides this, it is seen that students develop a sense of responsibility over time for the activities during the digital storytelling process (Tatum, 2009). Daigle (2008) carried out research on digital storytelling in special education and concluded that digital storytelling promotes students' literacy and social skills. Likewise, Jakes (2006) categorized the 21st century skills as digital age literacy, creative thinking, effective communication and high level of productivity and reported that digital storytelling helps students acquire all these skills.

The preservice teachers generally stated that there was not enough time to perform the activities scheduled since the weekly class time allocated for the information technology course was only one hour a week and that the implementation stage lasted too long. Additionally, they thought that the number of weekly class hours for the information technology course should be increased due to the fact that the implementation stage took so much time. In this respect, it could be stated that lack of time prevented performing the activities as scheduled, which resulted in the lengthy implementation stage as well. Reviewing the literature, it can easily be found out that one of the biggest issues with technology integration is shortage of time. With respect to this, Robin (2006) stated that gathering all of the components required in digital storytelling and creating a story is a long process that needs a considerable amount of time. According to Cuban (2011), among the obstacles to technology integration at schools are shortage of time and insufficient technical support. To conclude, students need more time during the digital storytelling process so as to learn how to use the software and to do research on the topics determined (Gakhar, 2007).

Another obstacle encountered in the research process was that the students were mostly reluctant and demotivated to engage in the process. The preservice teachers expressed that the students were mostly reluctant to do the activities at the implementation stage. The fact that the information technology course was a non-credit one might have caused the students to act unwillingly. Additionally, it was discovered that many of the students copied their scenarios from the Internet. In this respect, it can be concluded that lack of enthusiasm in participating in the activities resulted in copying the scenarios.

When the suggestions regarding the activities are taken into consideration, it is seen that elementary school students have different points of views about whether the activities should be performed in groups. With respect to this, Jakes and Brennan (2005) state that the digital storytelling process is indeed a personal process rather than a collaborative one. Similarly, Sadik (2008) states that students do not tend to work in groups and that those who work in groups have trouble reflecting upon each other's thoughts and opinions.

The participants of this study also agreed that digital storytelling activities are particularly appropriate to science, social studies and Turkish language courses. In one study, Gakhar (2007) stated that the students considered digital storytelling a useful learning tool and would like to benefit from it in such courses as history, science, mathematics and verbal communication. Dupain and Maguire (2005) underline the fact that teachers can make use of digital storytelling activities in such various areas as reading, writing and science.

All of the preservice teachers stated that digital storytelling activities were appropriate to the course of information technologies and that they were planning to use them in their future educational instructions. In their study, Dogan and Robin (2008) conducted digital storytelling activities with elementary school teachers and stated that all of the participants expressed the idea of using digital storytelling activities in their classrooms in the future.

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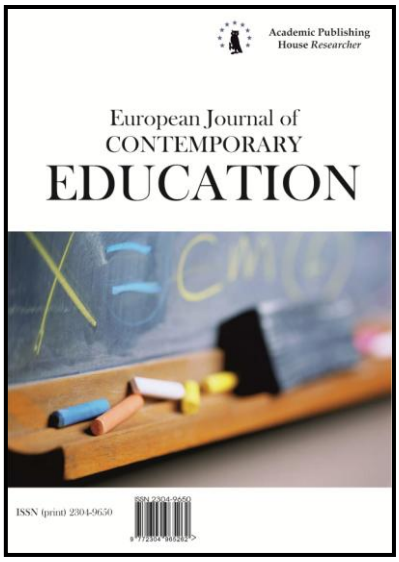

Students' Opinions on the Use of Tablet Computers in Education

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Abstract

One of the most important tools for the integration of ICT in education, especially with tablet computers, has been employed in Turkey through the FATIH Project. This study aimed to determine students' views on the use of tablet computers in learning and teaching processes. Eighty-four first-year high school students studying at three schools in service within the scope of the FATIH Pilot Project were selected as the sample of this study. The quantitative data obtained were gathered using the "Questionnaire for Students' Opinions on the Use of Tablet Computers". The Cronbach's alpha coefficient for the whole questionnaire has been measured at .82. Frequency, percentage, and arithmetic mean values have been used for the data analysis. It was found that students mostly use tablet computers to access the Internet. Students stated that the content presented on tablet computers supports the topics in textbooks and that teachers encourage them to use tablet computers in the learning and teaching process. The students also agreed that tablet computers weaken communication between students and teachers. Most of the students stated that, during the teaching process with the use of tablet computers, they do not learn more quickly and easily, they have some difficulty understanding topics, learning is not permanent, and it does not contribute to increasing their level of success. Most of the students expressed that, when they study with tablet computers for a while, they face some adverse physical effects such as headache and eyestrain, and they are worried about radiation.

Keywords: FATIH Project, tablet PC, information technologies.

Introduction

In recent years, many new projects have been conducted to promote the integration of the Internet and information technologies into education all over the world. Apple's "Classes of the Future" of the 1980s, the USA's "Preparing Tomorrow's Teachers to Use Technology", Portugal's

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"Magellan" project that aims to obtain a laptop computer for each student, and South Korea's project to grant tablet computers to all students can be categorised as examples within this framework (Le Ber, Lombardo & Quilter, 2008; Pamuk, Çakır, Yılmaz, Ergun & Ayas, 2013; Weitz, Wachsmuth & Mirliss, 2006).

In the Turkish education system, projects to incorporate the use of computer technologies in education were launched with the 1st and 2nd Phases of Basic Education project conducted between 1998 and 2007 within the scope of the Basic Education Development Project and were expedited with the establishment of information technology (IT) classes at schools. Within this process, the Ministry of National Education established 7,100 IT classes at 5,800 schools throughout the country to improve the quality of teaching and learning and equipped the classes with computers, delineascopes, and multimedia devices. At the schools within the scope of aforementioned project, subsequent to realising the former aim of skill-building in the use of IT, a new process emerged in terms of the more efficient use of IT tools in all classes with the FATIH Project, which is the "Increasing Opportunities and Improvement of Technology Movement" (Aytaç & Sezgül, 2012). As a milestone in the integration of technology into education, tablet computers have become the most significant agenda topic in education with the FATIH Project and brought discussions on their contribution to educational outcomes.

FATIH Project in Education

The main objective of the FATIH Project, which is carried out by the Ministry of National Education, is to provide equality of opportunity in education and improve the technology used at schools. This project consists of five basic components: a) to provide hardware and software infrastructure, b) to provide and manage educational e-content, c) to use efficient information technologies in the curriculum, d) teachers' in-service training, and e) the use of conscious, secured, manageable, and measurable information technologies (MEB, 2012). The objective intended to be achieved within this project is to grant tablet computers to approximately 700,000 teachers and 17 million students, to set up LCD panel-type interactive whiteboards in 570,000 classes and 42,000 schools and to provide a Web platform that can respond to the need, together with multifunctional printers, cameras, and relevant documents. According to data from the Ministry of National Education, tablet computers have been granted to 2,259 teachers and 9,435 students in 17 different provinces and 52 schools (48 secondary and four primary schools), and classes of 5th and 9th grade students have been equipped with interactive whiteboards since the beginning of a pilot scheme started in the second semester of the 2011-2012 academic year (MEB, 2012).

It is becoming more and more important to identify students' understanding of tablet computers in terms of education, their intended purposes in using these devices, and challenges encountered within this process to materialise FATIH Project in an efficient way, to achieve optimum success in educational outcomes, and to ensure efficient use of the resources. The current study aimed to identify students' opinions on the use of tablet computers and the challenges encountered. It is thought that the study will be beneficial in terms of both its positive responses within the implementation process and contributions to the literature. Moreover, previous studies conducted at the schools chosen for the pilot scheme of the FATIH project are considered inadequate (Pamuk et al., 2013). Given the IT integration into a huge multidimensional and macro-size education system, elaborative analysis of this project becomes more of an issue.

Because the FATIH Project also includes the integration of technology into educational processes, further analysis on the efficiency of tablet computers in education, particularly in terms of hardware properties, and the identification of possible challenges within the process becomes significant (Aytaç & Sezgül, 2012; Bozdoğan & Uzoğlu, 2012). Kaya and Koçak (2011) stated that the FATIH Project is at risk of being regarded as costly and ineffective in terms of its contribution to the education system. As for school principals, it is thought that students can develop negative attitudes and concerns towards tablet computers and interactive whiteboards and that there is a need to create new policies to prevent this possible problem (Dursun, Kuzu, Kurt, Güllüpınar, & Gültekin, 2012). In another study, it was determined that almost half of the teachers (46%) believed that the aforementioned project would not attain its goals, while the other half believed quite the contrary (Çiftçi, Taşkaya & Alemdar, 2013). As indicated by the results of the study, there is a difference in teachers' thoughts on the future of the FATIH Project.

Relevant Studies

Tablet computers were granted to students between the ages of 5 and 15 in Scotland through a pilot scheme in 2011, and it was observed that tablet computers together with access to the Internet facilitates access to information (Dailyrecord, 2010). It was observed in a study related to the use of tablet computers handed out to 1,250 primary school students in Switzerland that tablet computers could be used as efficient educational materials and that students' attitudes were positive towards this technology (Fri-tic, 2012). According to Weitz, et al. (2006), students stated that they would prefer using tablet computers in classes and that these devices improved the quality of the learning process. However, the researchers expressed the need for further analysis on whether students' thoughts were based on the positive effects of these devices or just because they were a novelty. Stickel (2009) expressed that study enrichment (enriched e-books) was a significant variant in the efficient use of tablet computers in education.

According to Aydemir, Küçük, and Karaman (2012), Balcı (2013), Enriquez (2010), Gündüz, (2010), Aksal (2011), Delen and Bulut (2011), Fister and McCarty (2008), Güzel (2011), and Kenar (2012), the use of tablet computers has increased students' interest and eagerness to learn and provided a rich teaching environment for teachers. Amelink, Scales and Tront (2012) showed that tablet computers have increased class participation too. It was also identified through the studies of Balcı (2013), Gündüz (2010) that students mostly use tablet computers for Internet, communication, games, e-books and participation to virtual classes. At Southern Queensland University, tablet computers were given to 383 and 406 students in both 2008 and 2009 respectively. Students using and not using tablet computers were observed for a whole academic year and compared in terms of the variants relevant to participation and success. A significant difference was identified in success of tablet users who had low, medium, and high socio-economic backgrounds. The increase in the success of tablet users from low socio-economic backgrounds was identified as higher than others' (Phillips & Loch, 2011).

Two hundred eighty students were involved in Stickel's (2009) study, and 90% of those students stated that tablet computers were beneficial, particularly in terms of their visual and multimedia properties. In addition, 81% of the students stated that they found that the use of tablet computers in class was more entertaining and enjoyable than the use of conventional blackboards. It was stated by Betcher and Lee (2009) that the use of tablet computers had to be planned properly to make a difference for both teachers and students.

Pamuk et al. (2013) found through class observations that some of the students did not use tablet computers for the intended purpose and could not focus on the class, as they played games with the devices. It was also found that some of the teachers did not want to use tablet computers during classes because they distracted students' attention and motivation.

Identifying students' opinions on the use of tablet computers in educational processes, this study will provide feedback to decision-makers and executors of the FATIH Project within the implementation and popularisation processes. It is also thought that an analysis of students' opinions, particularly prior to the implementation of such a project, which has high risk in terms of applicability and cost with all the components such as tablet computers, interactive whiteboards, Internet infrastructure, e-content, and teacher trainings, which are actually intended to be used to prevent digital inequality in the context of technology's integration into education, would be strongly beneficial in terms of either improving the quality of education or the efficient use of state resources.

The main objective of the study is to determine students' opinions on the use of tablet computers within learning and teaching processes. The following questions were developed for this purpose:

- Which properties of tablet computers are used most by students?
- What are the challenges encountered by students related to tablet computer use in learning and teaching processes?

Method

In accordance with the scope of this study, a descriptive survey model was used to obtain objective data from information sources. This model is considered an effective approach that aims to describe a current or retrospective situation (Karasar, 2008). The following part consists of

explanations on the subject of the study, the development of data collection tools and their properties, and the analysis of the data collected.

Working Group

The implementation range of the FATIH Project includes all high schools in Turkey; however, the Ankara province was chosen as the pilot area, and all participants in working group of the current study are students from this province. The chosen schools represent all types of schools throughout the country.

The working group of the study was formed by 131 1st grade high-school students (ranging in age from 14-15) from 2 Anatolian high schools, 1 Industrial Vocational High School and 1 Anatolian Religious High School which are in the scope of the FATIH Project's pilot scheme. A questionnaire was first conducted for 36 students studying at an Anatolian high school to determine the reliability of the questionnaire. Then, it was conducted with another 95 students and 84 (40 from boys and 42 from girls) of the questionnaires were taken under review after a preliminary examination.

Data Collection Tools

The data were collected through a questionnaire titled "Students' Opinions on the Use of Tablet Computers". An item pool was prepared after an analysis of the relevant literature. The questionnaire was prepared with the input of two computer and education technology experts and two computer teachers from the schools that would be analysed within the study. In the first part of this two-part questionnaire, students were asked about the properties of tablet computers they use most. The students' answers were categorised into seven areas. In the second part, which includes grading questions, students' agreement with ideas was determined with five different indicators ranging from "disagree" to "strongly agree". Grading questions are used to identify individuals' thoughts, attitudes, and behaviours (Aziz, 2010).

Experts from different universities were consulted to identify the validity of this questionnaire. First, experts in Turkish language education were consulted about the appropriateness of the questionnaire for determining students' opinions on tablet computer use and the clarity and sufficiency of explanations. In addition, two information technology experts and one assessment and evaluation expert were consulted in terms of whether the questions could evaluate students' thoughts or not.

Four classes in four different schools included in the pilot scheme were equipped with interactive whiteboards, and tablet computers were given to students. One of these four schools was chosen, and a reliability analysis of the questionnaire was conducted on its students. For this purpose, a pre-test was conducted on 36 1st grade students studying at an Anatolian high school included in the working group. The Cronbach's alpha reliability coefficient of the grading questions of the questionnaire was measured at .82. Values over .70 for Cronbach's alpha are regarded as adequate in terms of the reliability of the test (Büyüköztürk, 2007). Accordingly, it can be said that this questionnaire is reliable with respect to identifying students' thoughts.

Analysis of Data

The frequency, percentage, and mean values of the data obtained through the questionnaires were determined by a statistical software package, and the results are given in tables and figures. Equivalents of arithmetic means were measured with a 4/5 formula within the evaluation of the study results. According to this formula, arithmetic mean values of 1.00-1.79 were regarded as *never,* 1.80-2.59 as *rarely,* 2.60-3.39 as *normally,* 4.19 as *mostly*, and 4.20-5.00 as *completely.*

Findings and Comments

The properties of tablet computers used most by students are shown in Figure 1.

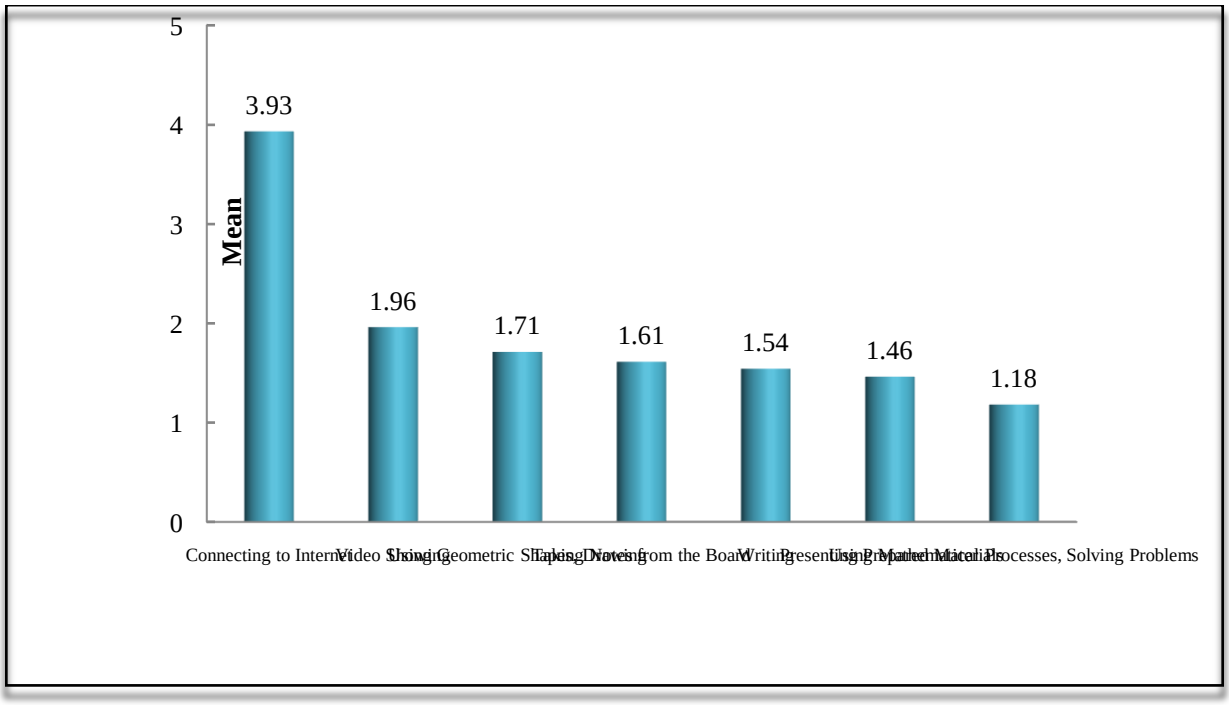

Figure 1. Properties of tablet computers used most by students

Students mostly use tablet computers to connect to the Internet and to view videos. The use of other properties (using geometric shapes and drawing, taking notes from the board, writing, presenting prepared materials, using mathematical processes, and solving problems) is rather rare. The agreement levels of students about tablet computers' contribution to learning and teaching processes are given in Table 1.

Table 1. Students' opinions on the use of tablet computers

Opinions on Tablet Computers	Never	Rarely	Normally	Mostly	Completely	$\bar{\chi}$	Agreement Level
1) I can learn easily when I use a tablet computer in class.	21	27	27	0	9	2.39	Low
	25.0	32.1	32.1	0	10.7		
2) Writings and drawings related to course subjects are more understandable with tablet computers.	24	15	9	18	18	2.89	Medium
	28.6	17.9	10.7	21.4	21.4		
3) I cannot learn when we use tablet computers because of the crowdedness of classes.	15	15	24	21	9	2.93	Medium
	17.9	17.9	28.6	25.0	10.7		
4) I like using tablet computers in classes.	9	30	15	9	18	2.96	Medium
	11.1	37.0	18.5	11.1	22.2		
5) Teaching and learning processes are more entertaining and enjoyable with tablet computers.	24	18	15	12	15	2.71	Medium
	28.6	21.4	17.9	14.3	17.9		

6) I can easily present my own presentations and content using tablet computers.	18	27	12	18	9	2.68	Medium
	21.4	32.1	14.3	21.4	10.7		
7) I have difficulty using tablet computers.	39	21	12	12		1.96	Low
	46.4	25.0	14.3	14.3			
8) Tablet computers encourage us to use the Internet.	3	6	18	18	39	4.00	High
	3.6	7.1	21.4	21.4	46.4		
9) Our teachers enable us to use tablet computers in classes.	6	6	18	27	27	3.88	High
	3.8	3.8	23.1	34.6	34.6		
10) Tablet computers improve my interest in and enthusiasm for lessons.	15	27	18	12	12	2.75	Medium
	17.9	32.1	21.4	14.3	14.3		
11) I cannot follow courses because they are taught too quickly with tablet computers.	18	12	15	15	24	3.18	Medium
	21.4	14.3	17.9	17.9	28.6		
12) I cannot make eye contact with the teacher when we use tablet computers.		3	15	18	48	4.32	Highest
		3.6	17.9	21.4	57.1		
13) Course content presented with tablet computers does not interest me.	18	15	30	9	12	2.79	Medium
	21.4	17.9	35.7	10.7	14.3		
14) I learn more quickly and easily with tablet computers.	21	24	21	9	9	2.54	Low
	25.0	28.6	25.0	10.7	10.7		
15) Subjects I learn through a tablet computer are not permanent.	9	12	15	27	21	3.46	High
	10.7	14.3	17.9	32.1	25.0		
16) I can use tablet computers efficiently in learning.	9	15	33	12	12	3.04	Medium
	11.1	18.5	40.7	14.8	14.8		
17) The interaction with the teacher decreases when I use a tablet computer.	3		24	9	45	4.15	High
	3.7		29.6	11.1	55.6		
18) Use of tablet computers increases our cooperation with my friends.	42	21	15		3	1.78	Disagreement
	51.9	25.9	18.5		3.7		
19) Courses would be more difficult if we did not use tablet computers.	51	15	18			1.61	Disagreement
	60.7	17.9	21.4				
20) Our teacher mostly sends his/her content to our tablet computers and enables us to prepare for lessons.		3	15	27	39	4.21	Highest
		3.6	17.9	32.1	46.4		

21) Our teacher encourages us to use tablet computers for learning.		12	15	27	24	3.81	High
		15.4	19.2	34.6	30.8		
22) I have a chance to learn one subject from different sources with a tablet computer.	15	6	18	15	30	3.46	High
	17.9	7.1	21.4	17.9	35.7		
23) Contents presented via tablet computers are complementary to course books.	6	3	15	36	24	3.82	High
	7.1	3.6	17.9	42.9	28.6		
24) I like using a tablet computer when I learn course content.	15	21	18	18	12	2.89	Medium
	17.9	25.0	21.4	21.4	14.3		
25) I have difficulty using tablet computers in class.	18	18	15	18	3	2.41	Low
	33.3	22.2	18.5	22.2	3.7		
26) Learning with tablet computers increases my success.	36	18	24	3	3	2.04	Low
	42.9	21.4	28.6	3.6	3.6		
27) I get eyestrain when I look at a tablet computer's screen for a while.	15	12	6	15	36	3.54	High
	17.9	14.3	7.1	17.9	42.9		
28) I can easily access to different materials (blogs, Wikipedia, Web pages) and show them to my friends via a tablet computer.	12	6	18	15	33	3.61	High
	14.3	7.1	21.4	17.9	39.3		
29) I do not write as much as before when I use a tablet computer in class.	6	6	15	15	42	3.96	High
	7.1	7.1	17.9	17.9	50.0		
30) My concentration is broken when I study with a tablet computer.	6	12	27	15	24	3.46	High
	7.1	14.3	32.1	17.9	28.6		

The agreement levels of students on the use of tablet computers in the learning and teaching process are given in Figure 2.

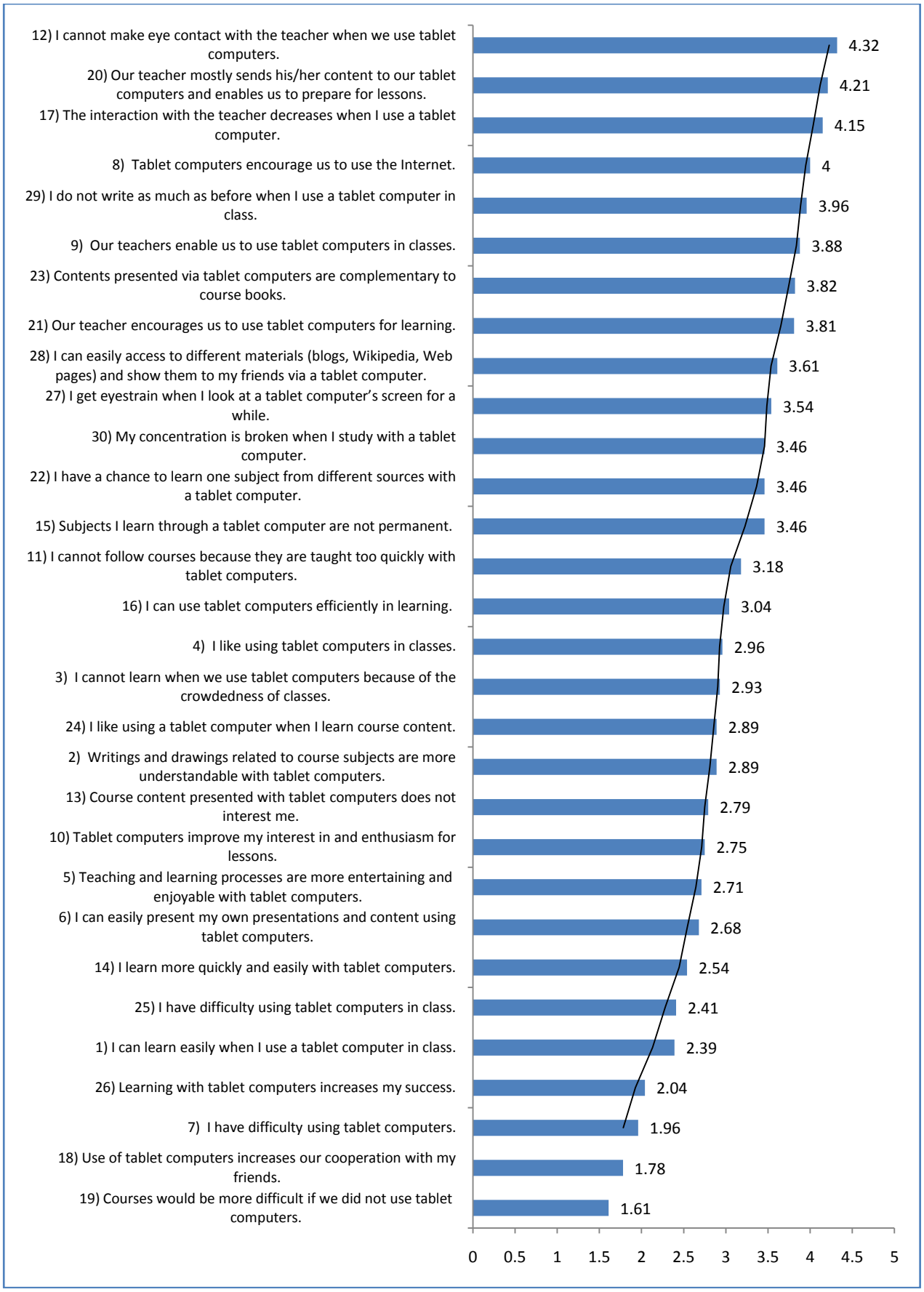

Figure 2. Agreement levels of students on the use of tablet computers

When the findings presented in Figure 2 are analysed, students' top level of agreement concerns the thought that tablet computers limit communication (eye contact) between teachers and students and that content prepared by teachers enables students to study with tablet computers. Students' agreement level is high for the thought that the use of tablet computers decreases communication between students and between teachers and students within the learning and teaching process.

Students have a high level of agreement for the thought that tablet computers enable them to present content prepared by both students and teachers, access the Internet (blogs, Wikipedia, Web pages), and study. In addition, most of the students stated that content presented via tablet computers complements the subjects in course books and that their teachers encourage them to use tablet computers in the learning and teaching process. A majority of students expressed that they start to experience eyestrain when they study with tablet computers for a while and that they lose attention when they use these devices during classes.

Most of the students stated that the use of tablet computers does not cause them to learn more quickly and easily, that they have difficulty understanding, that the subjects learned through the devices are not permanent, and that tablets do not contribute to their success. Almost half the students expressed that course content presented on tablet computers does not interest them and that they have difficulty following courses because they go too fast. In contrast, students' agreement level on having difficulty using tablet computers is low.

Students have a medium level of agreement on the thought that tablet computers increase their interest and enthusiasm for classes, enable them to learn from different sources, and make the learning and teaching process more entertaining and enjoyable. In contrast, students' low level of agreement on "understanding would be more difficult without the use of tablet computers" is highly significant, as it shows that their thoughts on the use of tablet computers are not quite positive. The lowest level of agreement was found for this thought. In one sense, it can be understood as indicating that students' need for tablet computers is rather low.

Discussion, Results, and Suggestions

The fact that students mostly use tablet computers for connecting to the Internet reveals the need to raise students' awareness in terms of conscious and reliable Internet use to prominence within the scope of the FATIH Project. Students think that tablet computers decrease communication between students and between students and teachers within learning and teaching processes. For this reason, both tablet computers and interactive whiteboards should be used properly during teaching and learning processes to avoid a negative effect on in-class communication. Students think that tablet computers encourage them to listen to the virtual teaching of these devices and restrain them in communicating with their teachers. Generally, the use of tablet computers in classes has negative effects on both in-class communication (student-student, student-teacher) and learning and teaching processes. According to Chen and Sager (2011), positive effects of the use of tablet computers in class were recorded. Although Işık and Çukurbaşı (2012) emphasised the fact that teachers would not have to cut off their face-to-face communication with students and that they would conduct in-class management in a better way, the findings of the current research assert the contrary.

Students stated that learning through tablet computers is not permanent because of the deficient and inadequate content presented and the fact that lessons are taught too fast to follow efficiently; this result shows a similarity with research conducted by Pamuk et al. (2013).

When the related literature is examined (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012; Hew & Brush, 2007), it can be seen that educational content is a significant component in the integration of technology. Through the findings obtained in the current study, it can be said that the content presented with tablet computers does not help students improve their success. In parallel with the results of Pamuk et al. (2013), it is thought that the use of tablet computers in classes decreases students' interest in and attention to the subject.

There is a need for the FATIH Project to create appropriate control mechanisms for applications to be used in tablet computers granted within the scope of this project for the good of the communication between teachers and students, as the aforementioned devices normally restrain this communication.

A majority of students stated that they experience eyestrain when they study with tablet computers for a while. Although tablet computers and interactive whiteboards were only used in two classrooms and in a limited way, they caused physical ailments in students such as headache and eyestrain. Students think that the use of tablet computers and interactive whiteboards together increases the amount of radiation inside classrooms, and they are worried about this issue. In one sense, this situation can be regarded a message about the use of different teaching methods and techniques together with tablet computers rather than continuous usage. It can be said that tablet computers should not be used in all classes and continuously.

Students' opinions on the use of tablet computers in classes are not quite positive. The results indicating that tablet computers affect in-class communication negatively and are an unusual implementation that have inadequate content show similarities with the findings obtained by Gill (2007) and Pamuk et al. (2013).

The fact that tablet computers are open to students' continuous use in out-of-class environments would ensure the continuity of the learning process. Tablet computers and interactive whiteboards should be complementary in both technical and pedagogical terms. Issues such as the radiation emitted by tablet computers, interactive whiteboards, mobile phones, and wireless Internet connections and the height of the SAR limit that will affect the physical and psychological health of students and teachers should be clarified. Required precautions should be taken in this respect. Reliable e-content should be used with tablet computers in accordance with the class levels stated in the Educational Information Network. Enriched e-books should be prepared for the FATIH Project to maximise the interaction between the material and the students.

Finally, we can say that there are inevitable responsibilities for institutions training prospective teachers and policy-makers in education. In our country, where sizeable investments have been made to implement major projects such as FATIH, the success of such projects in contributing to students' achievements depends greatly on well-trained teachers who will be able to use technology within the teaching process. For this reason, trainings should address not only teachers' content knowledge or knowledge of technology but also their technological pedagogical content knowledge (TPCK), which contains technological, pedagogical, and content knowledge together in itself.

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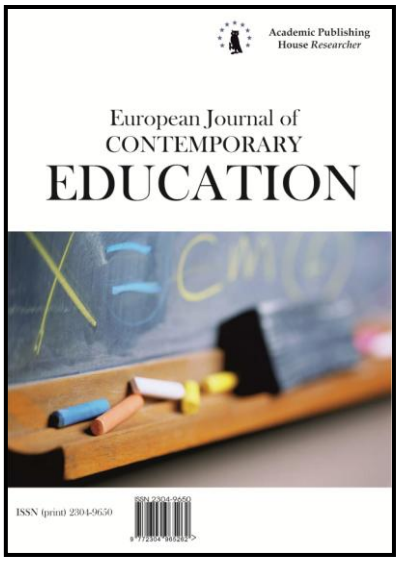

A Study to Determine the Contribution made by Concept Maps to a Computer Architecture and Organization Course

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Abstract

Concept mapping is a method of graphical learning that can be beneficial as a study method for concept linking and organization. Concept maps, which provide an elegant, easily understood representation of an expert's domain knowledge, are tools for organizing and representing knowledge. These tools have been used in educational environments to better connect the relationships among theory and practice as well as among other concepts covered in a course. They also help the learners build relationships between previous knowledge and newly introduced concepts, encouraging meaningful learning rather than rote learning.

The overall interactions among hardware, computer basics, computer functions and etc., used to be simple and transparent enough for understanding computer systems. Nevertheless the modern computer technologies have become increasingly more complex which makes it very difficult to understand the whole system of the computers. This study is an analysis of the contribution made by concept maps to a Computer Architecture and Organization course (CAO). For a period of one semester, students were asked to prepare concept maps that they were later allowed to use when revising for their final exam. The students' success in the exam was then evaluated and their attitudes towards the course, the concept maps and the questions on them were surveyed and analyzed. The results lead to the conclusion that not only did concept maps make a positive contribution to the students' overall success during the course, they also helped with their exam preparation.

Keywords: concept map, computer architecture and organization, survey, SPSS.

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Introduction

A concept map is a two dimensional diagram in which concepts and the links between them are displayed graphically, showing their interconnected relationships under a wider concept heading (Novak *et al.*, 1984; Kinchin *et al.*, 2000). A concept map can be described as a kind of planning tool for organizing and representing knowledge to show students what concepts need to be studied and how connections can be formed between them (Demirel, 2002).

Concept maps are a form of metacognitive strategy used to identify what students know (Novak, 1990) and a graphic illustration of how particular concepts are interconnected. These concepts are not described with the use of sentences; they are formed through connections. The maps aid the learning of concepts in an easy and lasting way, allowing both the student and the teacher to focus on a special topic and commit it to memory. Furthermore, the connections between the concepts can be understood visually and after the learning process is complete, the maps serve as a summary of what has been learned.

Concept maps create a distance between the student and memorization, making the learning experience more permanent. Using these maps as a teaching-learning strategy builds a bridge between the foci of *how people learn* and *meaningful learning,* combining close connections with creative learning.

They not only allow us to form connections with our existing knowledge but also to display a relationship between previously unrealized concepts. Many teachers and students have said that as a result of this method they have formed connections that they had not previously comprehended. In this respect, a concept map is a creative activity that encourages creativity (Novak and Gowin, 1994).

CAO is one of the basic Information Technology courses and has a wide curriculum base; CAO subjects involve numerous related technological concepts. These concepts are constantly used during students' education and future careers. Very often students can find learning these varied and new concepts difficult and if these concepts are not learned correctly it may not only result in flawed learning but also impact negatively on other subjects related to these concepts (Stallings, 2000).

In the literature, the general use of concept maps as a learning tool in the area of Information Technology has been well researched (Chang *et al.*, 2001; Tsai *et al.*, 2001; Keppens and Hay, 2008; Roy, 2008; Tokdemir and Cagiltay, 2010; Charsky and Ressler, 2011; Huang *et al.*, 2012; Kuk et al., 2012; Larraza-Mendiluze and Garay-Vitoria, 2012; Uğuz and Aydoğan, 2014). The studies frequently draw attention to the following areas: Web and computer-based concept mapping for learning, concept map assessment for teaching computer programming, the use of game based concept mapping to learn basic concepts for computing science courses.

The most important aspect of this study, and one that makes it different from the others, is that for the CAO course, concept maps are shown to be a useful tool for exam revision. In addition, it identifies the contribution made by concept maps to the CAO course, the overall success of the students, and how the students' attitudes improved towards this course. The current analysis includes the provision of concept maps, the final exam questions, and data collection tool; the sample of the study, reliability and validity studies, analysis of data parts are defined in the method section. The basic survey findings are discussed in the results section and elaborated in the discussion and conclusion sections.

Method

The study was initiated with a training period one semester prior to the CAO course, in which the students were given information about how to prepare and use concept maps. It was then included as part of the CAO syllabus, which lasted for a period of 14 weeks. During the module, the students were asked to prepare concept maps, which they would then be allowed to use as part of their final exam revision. Lastly, after the final exam, which also involved questions relating to the concept maps, the students were asked to complete a survey, to be used as a data collection tool. The answers given to the exam questions and the students' assessments, gained through the survey, were analyzed and evaluated using scientific methodology.

Preparation of Concept Maps

The CAO course program consisted of seven sections, including: An Introduction to the Subject, Computer Evolution and Performance, General Computer Functions and Internal Connections, Cache Memory, Internal Memory, External Memory and Input/Output. Each section was allocated to two separate student groups, each consisting of two students, for the preparation of concept maps. From the prepared maps, three that were found to be the most comprehensive, in terms of their visual and relational connections (4, 6 and 7), were used in the preparation of the final exam questions. In addition, the maps distributed to the students for revision a week before the final exam were published on the web site.[*]

Preparation of the Final Exam Questions

The final exam consisted of 30 multiple-choice questions, 18 of which were associated with the concept maps. The concept maps relating to parts 4, 6 and 7 were distributed to the students and six questions from each section were given in the exam.

Preparation of Data Collection Tool (Survey)

In order to determine the students' attitudes to studying with concept maps, a form was prepared that consisted of two surveys. Attitudes were determined by their opinions of the expressions set to measure attitudes and not by a question/answer method.

In the first survey, there were 18 expressions used to ascertain the students' attitudes on the CAO course. The survey opinions were obtained through a five-point Likert scale (I totally agree, I agree, I am indecisive, I do not agree and I totally do not agree).

In the second survey, 17 expressions were used to assess the students' opinions on the contribution made by using concept maps as revision material for the final exam, and their exam success. Opinions on the 11 questions in the survey were obtained using a five-point Likert scale (I totally agree, I agree, I am indecisive, I do not agree and I totally do not agree) and the opinions on the four expressions that were determined as, a lot, medium, not much and opinions on two questions through a *yes* or *no* rating.

This research was a field study of a descriptive nature; descriptive methodology is a research approach that aims at determining a situation, past or presents (Karasar, 2012).

The Sample of the Study

The study sample consisted of three groups of 129 students, who took part in the CAO course at the Technical Education Faculty of the Electronic Computer Education Department at Suleyman Demirel University.

Reliability and Validity Studies

First, in order to obtain meaningful results, the reliability and validity of the data collection tools used in the study was analyzed. The reliability of the measurement tool is an "indication of to what extent the measurement tool determines the feature or features" (Tekin, 2000). While the reliability of a measurement tool can be calculated using various methods, the one used most widely is the internal consistency method. In this study, the Cronbach's Alpha Coefficient (Özdamar, 2002) was used to test the reliability of the scale. The alpha coefficient of the applied measurement tool was 0.732, showing that the measurement tool was very reliable.

Validity is used to determine whether a scale can measure the intended feature. After the reliability of the scale has been determined, in order to establish to what extent the scale in question measures the intended content, a convergent and discriminant validity analysis has to be conducted (Lamm, 2002).

In order to make content validity possible, during the preparation of the expressions to measure the attitudes in the surveys, relevant experts were consulted to increase the intelligibility of the expressions.

The convergent and discriminant validity of the scale had to be initially controlled using item analysis and then using explanatory factor analysis. First, a correlation matrix of the scale relating to the expression factors was prepared. Following this, in order to determine the convergent and

[*] http://tef.sdu.edu.tr/assets/uploads/sites/158/files/bmokavramharitalari-09112015.pdf

discriminant validity, a correlation of the variables and dimensions occurring within the same expression was analyzed. An explanatory (descriptive) factor analysis was also used as a validity test for the expressions used in the survey form.

In order to be able to apply an explanatory factor analysis, certain prerequisites must be met. First, the number of surveys subject to factor analysis needs to be larger than the number of expressions. In the study, since the number of students undertaking the survey was 129 and the number of total expressions in the survey was 41, this prerequisite has been met. The second prerequisite required that the KMO Kaiser-Meyer-Olkin Measure of Sampling Adequacy sample efficiency measure and the Bartlett's Test of Sphericity were of a sufficient level (Field, 2009). Analysis showed the KMO sample efficiency measure to be 0.948 and the Bartlett's Test of Sphericity, 4526.548; with p<.000. From these results it was seen that the sample was sufficient and meaningful expressions could be obtained from the research data.

Analysis of Data

The opinions used in the data collection for the scale provided by the sample were analyzed using the SPSS 16.0 statistical package program. To analysis the data frequency (f) and percentage (%), the values were calculated.

Findings

The findings of the study consisted of the analysis of the answers given to the questions relating to the concept maps in the final exam questions and the analyses of the data obtained from the first and second surveys.

Results of Questions about Concept Maps used in the Final Exam

The section numbers of the questions associated with concept maps, together with the number of correct answers given to these questions and their percentages, are shown in Table 1. The reason for the number of correct answers given to questions 9, 12 and 14 being much lower than the others is that their answer choices consisted of contradictory and very closely related concepts. Otherwise, it can be seen that the number of correct answers is quite high.

Table 1. Answers given to questions related to concept maps

#Question	#Section	# of students who gave correct answers (N=129)	%
7	7	114	87
9	4	46	35.1
11	4	128	97.7
12	4	43	32.8
13	4	90	68.7
14	4	50	38.2
15	4	86	65.6
16	6	104	79.4
21	6	70	53.4
22	6	75	57.3
23	6	85	64.9
24	6	80	61.1
25	6	79	60.3
26	7	69	52.7
27	7	89	67.9
28	7	88	67.2
29	7	53	40.5
30	7	72	55

Outcome of the First Survey in which Students' Attitudes towards the Course were established

The students were indecisive about whether they liked the course, felt bored while studying for it, or were enjoying the course. However, they stated their negative opinions on learning more with CAO subjects. They remained indecisive about being anxious about the CAO course, the number of course hours allocated for the course and allocating a majority of their time for this course. While the students said that the CAO course was not necessary for their education, they remained unsure about whether or not they would take this course if it were not obligatory. This shows that the students' were unable to be clear in their attitudes towards this course.

The students, who had indicated that the course would not be any more enjoyable if it were taught using an applied approach, remained indecisive about using the CAO course in their daily lives. The students with this view claimed that they did not get tired while listening to the lecture, did not later forget what they learned from the lecture and were not able to associate the course topics with those of other courses. However, the CAO course is directly related to other vocational courses and it is an accumulation of the fundamental knowledge of these courses.

While the students said that they have not been able to differentiate the different parts of the CAO course from each other, they believed that they were able to make up for their deficiencies in the other courses with the help of this course.

The course is taught during the sixth semester and when it was asked how the syllabus would have benefited them if it had been taught in a previous semester, the students did not think that the course would have been more beneficial. In addition, they believed that the course would not be more beneficial even if changes were made to the teaching style.

As a result of the analysis of the first survey, due to reasons such as the high number of concepts in the CAO course curriculum, their complexity, the high number of concepts and the relationships between them and their being easily forgotten, it was observed that the students were not able to develop a clear attitude towards the CAO course.

Outcome of the Second Survey in which Attitudes Related to the Contribution made by the Concept Maps to the Success in the Final Exam:

Have the concept maps reduced the study time of students for the exam?

The question "How much did you study for the CAO course's final exam?" and the opinions given by the students for the expressions, "Concept maps reduced my preparation time for the exam" and the distribution of frequency and percentage can be seen in Table 2.

Table 2. The relationship between the students' preparation time for the final exam and the concept maps not reducing their preparation time for the exam

				Concept maps have reduced my preparation time for the final exam		
		Total (f)	Percentage %	Very much	Medium level	Not much
How much did you spend to get prepared for the final exam?	1-2 hours	9	7.0	1	3	5
	3-5 hours	51	39.5	4	20	27
	6-10 hours	37	28.7	4	18	15
	11-15 hours	13	10.1	3	3	7
	15 hours and more	19	14.7	2	6	11
	Total (f)	129	100.0	14	50	65

Eighty-eight of the students stated that their preparation time for the final varied between three and ten hours. Whether or not the concept maps affected the preparation time for the final exam was determined by 80 of the students in this group, in that it did not reduce the study time in the *medium-not much* level and only eight of them said that it reduced the study time *very much*. As a result, it can be seen that concept maps do not significantly reduce their preparation time for

the exam. However, this supports the theory that concept maps may help retain knowledge in the subject's memory for a longer period and its use in revision and for solidifying abstract concepts.

What are the students' views on how much concept maps contributed to their final exam revision time?

Table 3 shows that eight of the expressions in the survey relate to this.

Table 3. Students' views on how much concept maps contributed to their final exam revision time

Percentage (%)	Expressions
35.7	They had opportunities to share the concept maps they prepared, analyzed various different concept maps, use them for exam revision
31.8	Homework facilitated their exam preparation
7	They used all sections of the concept maps while preparing for the exam
51	Since they were in command of the subject related to the concept map they prepared, they were able to spend more time studying for other subjects
45.7	They more easily understood subjects that had concept maps
31	As a result of concept maps they were able to solidify the abstract concepts included in the CAO course
25.6	Due to the concept maps it was easier for them to learn the topics covered in the course

As a result of the concept maps they prepared, the students were able to simplify the revision for their final exam and make it efficient and productive. In addition, sharing the concept maps among themselves meant that they were able to compensate for their knowledge deficiencies and understanding due to diversity in the study process.

What are the students' views in terms of whether or not they understood the questions associated with the concept maps in the final exam?

There are two expressions in the survey relating to this. A total of 56.6% of the students chose "very much" for the expression "In the exam there were questions about the subjects illustrated in the slides used as course documents"; 31.8% stated "medium" and 10.9% stated "not much" as the answer to the same expression. 21.7% of the students stated "very much" for the expression. "There were questions that were illustrated in the concept maps in the exam"; 45% stated "medium" and 32.6% stated "not much" as the answer to the same expression.

This result shows that the concept maps circulated amongst the students did not steer them towards memorization and although the questions were not directly formed from the concept maps, 60.26% of the students gave correct answers to these questions.

What are the students' views on understanding the speed with which students have answered questions relating to concept maps?

There are two expressions in the survey for this purpose. While 24.8% of the students stated "I agree" for the expression "I have easily answered the questions about the components supported by concept maps"; 30.2% of the students stated "I agree" for the expression "I have been able to answer certain questions in the exam more quickly because I knew them from the concept maps."

What are the students' views on the use of concept maps in exams for other subjects?

Altogether, 29.5% of the students said, "They thought about using the concept maps while revising for exams in other subjects."

What are the general attitudes of the students who prepared the concept maps of the sections associated with the concept maps in the final exam in the surveys?

Only three out of seven sections that constituted the CAO curriculum were used in the final exam to prepare the 18 questions associated with concept maps. Nine of the 129 students who were given the survey prepared the concept maps for the fourth section, ten prepared the content maps for the sixth section and 12 prepared the content maps for the seventh section. Of these 31 students, in the range of 78-82% said "I agree" for the expressions in the survey and expressed that revising for the final exam using concept maps significantly contributed to their success in the course.

Discussion and Conclusion

This purpose of this study was to establish the contribution made by concept maps, prepared by the students during final exam preparation, for the CAO course. An analysis was conducted establishing to what extent the concept mapping method could be effective in terms of teaching these types of course, in which there are many concepts and much conceptual confusion.

When the students' opinions to the course in the first survey were analyzed it could be seen that they remained indecisive in their general attitude towards this course. However, it was observed that the concept maps distributed between them to revise for the final exam increased their success in the course, their understanding of the course and their interest in the course. In fact, it can be understood from the analysis of the surveys that the actual preparation of the concept maps further increased their success. The students had not realized that the questions they had answered easily (and mostly correctly) were those associated with the concept maps. Therefore, one of the study's objectives, to strengthen the relationships between the concepts and removing conceptual confusion, correctly learning concepts and information by making these concrete through the content maps, was achieved.

One of the expressions achieved as a result of the study was that the students thought that they could have received higher scores if they had been given content maps prior to the mid-term and their wish to use content maps while studying for exams in other subjects.

It has been established in this study that the content maps made a positive contribution not only in the teaching of the course but also in the students' success rate when they were used for other exams.

Since content maps are an efficient teaching-learning strategy it can be considered that the use of this method may be beneficial both in course teaching and studying. In addition, it can be effective when learning a subject containing many concepts, which can result in conceptual confusion.

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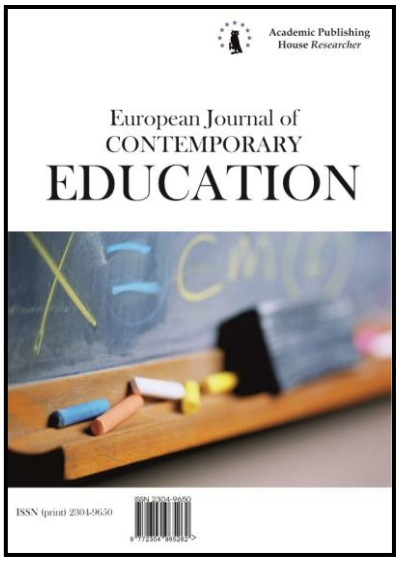

An Investigation into the Perceptions of Mathematics and Information Literacy Self-Efficacy Levels of Pre-Service Primary Mathematics Teachers

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Abstract

The purpose of this study is to examine the relationship between perceptions of the self-efficacy levels for both mathematics literacy and information literacy in pre-service primary mathematics teachers and the factors on which the relationship depends (variables include gender, class level, hours spent reading books and computer-access facilities). The research model is a relational-survey model of the quantitative patterns. According to the results, it was determined that there was a positive relationship between perceptions of the self-efficacy levels of mathematics literacy and information literacy in pre-service teachers. Separately, it was ascertained that mathematics literacy self-efficacy levels in pre-service teachers showed meaningful differences according to variables such as class level and book-reading frequency/rate, whereas their information literacy self-efficacy levels depended on variables such as gender and computer-access status. According to these results, when considering the factors influencing literacy levels, it is seen that the variables such as computer-access status and book-reading frequency/rate are significant in terms of the pre-service teachers having these positive features. In addition, for future researches it can be examine the relationship between perceptions of the self-efficacy levels for both mathematics literacy and information literacy in in-service primary mathematics teachers and the different factors on which the relationship depends.

Keywords: information literacy, mathematics literacy, literacy, perception of literacy self-efficacy.

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Introduction

The concept of literacy is based on the ability to use verbal, written and visual communicative systems in an efficient way. The word, 'literacy', is also added to the terms of different fields, apart from its meaning as regards functional literacy, such as computer literacy, graphics literacy, environmental literacy, economics literacy, legal literacy, library literacy, digital literacy, political literacy, technology literacy, consumer literacy, media literacy, critical literacy, citizenship literacy and web literacy. The word, 'literacy', within the terms in question, signifies the possession of basic knowledge and skills in a given field (Snavely and Cooper, 1997, p. 12). Considering this in terms of educational teaching/training, on the other hand, it is important to constitute efficient teaching-learning environments (and to organize various events and activities) as multiple literacies in order to enable individuals to possess the characteristics of literacy (Ersoy, 1997). The term, 'information literacy', which is the first of the abovementioned types of literacy that is analysed in this study, was first used in the USA in 1974, and was included in a report in a simple way by Paul Zurkowski (1974), the President of the US Association of Information Industry at the time, who defined it as: "Educating individuals in order to enable them to use their information resources involving their jobs". Although a number of definitions were made later, a broadly used definition of information literacy was developed by the Association of the American Library (AAL). According to this definition, information literates are individuals who have already learned how to learn. The reason that they have mastered the learning process is that they know how information is organized and how to access information, as well as being able to arrange that information in a way that enables others to learn. However, it is accepted that mathematics literacy, the second type of literacy discussed here, does not only comprise skills such as reading, writing and performing digital processes/operations in line with current changes and innovations within the concept of literacy in general (Özgen and Bindak, 2011). Mathematics literacy was defined by the OECD (2006) as: "The capacity of an individual to understand, acknowledge and recognize the role of mathematics in the world around him/her by using the thinking and decision-making processes in solving the problems to be encountered today and in the future as a citizen who is capable of thinking, producing and criticizing".

Considering this in terms of mathematics education and teaching, on the other hand, teachers should educate their students in such a way that they are allowed to question what has been learned, by guiding them towards acquiring a deep understanding of the subject in order to develop their mathematics-literacy levels (Edge, 2003).

A number of studies associate information literacy with other types of literacy. Spitzer, Eisenberg and Lowe (1998) associated information literacy with visual literacy, media literacy, computer literacy and web literacy. While Curzon (1995) defined information literacy as the combination of library literacy, computer literacy, media literacy and technology literacy; McLure(1994), similarly, defined information literacy as a concept including computer literacy, media literacy and web literacy, but also, most notably, functional literacy (Jager and Nassimbeni,2002). Including the use of computers within information literacy turned the discipline into one with a broadening spectrum, including factors from social, cultural and even philosophical content to the effects posed by these aspects, including access to information (Shapiro and Hughes, 1996).

One result of these definitions, on the other hand, is that the primary condition for reaching the desired level in all types of literacy is to become information literate to a sufficient level. Considering this issue in terms of the teaching profession, which entails a learning process lasting a lifetime for the sake of professional development, Akkoyunlu (2008) established the relationship between information and the lifetime-learning process by starting from the importance of information in his study "Information Literacy and Lifetime Learning". He also explained the strategic and correlatively empowering relationship between information literacy and lifetime learning. As for mathematics literacy, there are several studies of secondary-school students for the purpose of the Programme for International Student Assessment (PISA) practices. Tekin and Tekin (2004), in a study conducted along with pre-service teachers, aimed to determine the literacy levels of mathematics pre-service teachers of primary education. As a result of the study, it was determined that the mathematics-literacy levels of the mathematics pre-service teachers proved to be at an average level in general. Papanastasiou and Ferdig (2006), however, investigated both

current and potential relationships between the use of computers and mathematics literacy. Although, according to a number of studies, there was a significant relationship between the use of computers and information literacy, it was found that there was a relationship between mathematics-literacy levels and the various activities of computer usage.

Even though literacy skills always stand to be improved, societies lose reading habits acquired in previous periods as a result of the strengthening of the visual mass media; an unfortunate consequence is that they become unable to fulfil literacy tasks (Lester, 2006). Along with such losses, raising individuals with literacy skills and the ability to question the quality of information at each stage of their educational lives are priorities that are gathering more prominence. In this respect, analysing different types of literacy possessed by teachers in terms of different variables can help show which variables affect literacy skills. In this way, literacy levels can be raised by positively influencing these variables.

As a result of the research carried out, literacy is conceived as a set of skills. Information skills include being aware of information requirements, as well as being able to define it; developing information-seeking strategies; searching for information, as well as using and evaluating it; integrating new information with existing information, as well as transferring it. Mathematical skills, such as being able to reason, problem solve, think analytically and critically and being able to synthesize material, are all expected to be at high levels in teachers and pre-service teachers. They are the primary societal architects, particularly in terms of literacy levels acquired during a period in which science and technology are affecting human life quite intensely. According to the Annex of a Recommendation of the European Parliament and Of The Council (2006) (Key Competences For Lıfelong Learnıng — A European Reference Framework), The Reference Framework sets out eight key competences:Communication in the mother tongue,Communication in foreign languages;Mathematical competence and basic competences in science and technology; Digital competence;Learning to learn;Social and civic competences;Sense of initiative and entrepreneurship; Cultural awareness and expression. The key competences are all considered equally prominent, because each of them can support to a successful life in a knowledge society. Competence in the fundamental basic skills of language, literacy, numeracy and in information and communication technologies (ICT) is an necessary foundation for learning, and learning to learn supports all learning activities. But two of these key competences (Mathematical competence/basic competences and leraning to learn) are directly related to mathematics and information literacy. It is thought that primary teachers have to possess such skills and literacy self-efficacy so that students can acquire mathematical and information literacy skills, which are essential in the educational process.

Also, when the TIMMS data was analysed in terms of teacher characteristics, it was observed that 30% of eighth grade mathematics teachers who participated in the TIMMS 2011 study in Turkey have participated in professional development activities in the field of mathematical subjects within the last two years. Regarding international average, the mathematics teachers of 55% of students have participated in professional development activities in the field of mathematical subjects within the last two years. It was determined that teachers who attended the training in the field of mathematical subjects were found the most in Israel (79%), whereas they were found the least in Finland (9%). It was also determined that the students of teachers who have participated in professional development activities have higher rates of success. When teacher characteristics were analysed in terms of their self-confidence regarding mathematics education, it was observed that the teachers of 65% of students who took the test in Turkey have a high self-confidence regarding their status in mathematics lectures, whereas the teachers of the remaining 35% have partial self-confidence. The success average of the students of teachers who have a high self-confidence in situations that may be encountered during mathematics lessons was 461; whereas the students of teachers with partial self-confidence had an average of 436. Regarding international averages, 76% of teachers had very high self-confidence regarding mathematics education, and the mathematics success average of their students was found to be 470. It was observed that, as the confidence level of mathematics teachers increases, the success average of their students increases as well. The information and mathematics literacy levels contained in this study are important both for professional development and self-confidence of teacher candidates. Studies have shown that the preparedness and professional qualities of the teacher are more predictive of success regarding the cognitive and affective properties of the student. For this

reason, the primary aim is to determine the competency of teachers.(Büyüköztürk et al., 2011). This study was conducted in the light of this information, and aimed at analysing the self-efficacy perceptions of the primary-school mathematics pre-service teachers during their path through the teaching profession. It also sought to determine the extent to which mathematics and information literacy is effective in developing the literacy skills of students, analysing the phenomenon in terms of several variables and investigating the relationships between those variables.

Method

In line with the stated objective, the problem of the research is as follows: "What is the relationship between perceptions of the self-efficacy levels of mathematics literacy and information literacy in pre-service primary mathematics teachers?". In addition, it was examined whether these perceptions altered according to the variables of gender, social class, book-reading frequency/rate, Internet-access facilities and the duration of computer usage.

The research model is a relational-survey model of the quantitative patterns used, in order to examine the relationship between the perceptions of mathematics and information literacy self-efficacy levels of pre-service primary mathematics teachers, and the factors on which such literacies depend. The survey model is an approach that aims to reveal the status of a phenomenon in either the past or the present. The individual, object or another event is the subject of the study, defined as it is within its own conditions and without any intervention (Karasar, 2009).

This research project was carried out with the cooperation of 127 pre-service teachers attending the 2015 Summer School of Dokuz Eylul University, Buca Faculty of Education, Department of Elementary Mathematics Education.

During the research, two data-collecting tools were used. The scales used in this respect are the perceptions of mathematics literacy self-efficacy scale, and the perceptions of information literacy self-efficacy scale. "The perceptions of mathematics literacy self-efficacy scale", developed by Özgen and Bindak (2008), aims to measure belief in one's own self-efficacy in mathematics literacy. The five-point Likert scale consists of a total of 25 items, four of which are negative, and includes the options, 'Totally Agree', 'Agree', 'Not Sure', 'Do not Agree' and 'Totally Disagree'.

It was reported that the item-total score correlations of the scale varied between 0.48 and 0.75, and that Cronbach's alpha reliability-coefficient was calculated as 0.94. The lowest score to be obtained from the scale is 25, whereas the highest is 125. The highest score to be obtained from the scale was based on the acceptance that the self-efficacy levels of the pre-service teachers as regarding mathematics literacy were at high levels. The reliability coefficient of this scale in this research was found to be 0.83.

On the other hand, "The perceptions of information literacy self-efficacy scale", developed by Kurbanoğlu and Akkoyunlu (2004), is a seven-point Likert scale involving the following options: 7= 'I trust myself quite a lot', 4= 'I am not sure' and 1= 'I do not trust myself at all'. The Cronbach's alpha value of this scale, arranged in the form of 28 items, was determined to be 0.92. The mean scores obtained from the self-efficacy scale of information literacy were classified as high if they proved to be between 5 and 7, average if they were between 3 and 4.99 and low if they were less than 2.99. Furthermore, as the result of this research, the reliability of the information-literacy scale was recalculated, and the Cronbach's alpha value was found to be 0.93.

In the data analysis — according to the Kolmogorov-Smirnov analysis results, indicating whether or not the scores that the pre-service teachers obtained from the scales were in compliance with the normal distribution — the scores of the pre-service teachers were obtained from the perceptions of the mathematics literacy self-efficacy scale ($K\text{-}S_{maths}=1.019$, $p=0.250$). Those obtained from the perceptions of the information literacy self-efficacy scale ($K\text{-}S_{information}=0.955$, $p=0.322$) were seen to have complied with the normal distribution. According to the variables found in the section detailing the pre-service teachers' personal information, it was found that all of the distributions were homogeneous and in accordance with the Levene's test result. That test was performed for the purpose of determining the differentiation status between their self-efficacy scores for mathematics and information literacy. During the study, parametric-test methods were used, since the conditions for normality and variance homogeneity that are required for performing the parametric tests were ensured.

In order to put forward the differentiation status of the pre-service teachers' self-efficacy perceptions for information and mathematics literacy in accordance with the variables (such as

book-reading frequency/rate and the duration of computer usage), a one-way analysis of variance (ANOVA) was calculated by using the SPSS program. A t-test was performed, however, for the independent groups in order to analyse the differentiation status according to gender, class and Internet-access facilities. On the other hand, the Pearson's correlation coefficient test was used for examining the relationship between the perceptions of self-efficacy in both information and mathematics literacy.

Findings

In this section, the pre-service primary mathematics teachers' perceptions of mathematics and information literacy self-efficacy levels are presented, besides the statistical analyses performed on the data obtained from the personal information forms. The personal information of the pre-service teachers who participated in the research is shown in Table 1.

Table 1. Personal Information of the Research Group

	f	%
Gender		
Female	76	59.8
Male	51	40.2
Class Level		
1st Grade	37	29.1
3rd Grade	90	70.9
Book-Reading Frequency/Rate		
Always	13	10.2
Quite often	21	16.5
Occasionally	65	51.2
Rarely	22	17.3
Never	6	4.7
Period of Computer Usage		
1–7 hours	37	29.1
8–21 hours	43	33.9
22–35 hours	26	20.5
Above 36 hours	21	16.5
Computer-Access Status		
Yes	107	84.3
No	20	15.7

The descriptive findings regarding the pre-service primary mathematics teachers' perceptions of mathematics and information literacy self-efficacy levels are shown in Table 2.

Table 2. The descriptive findings regarding the perceptions of mathematics and information literacy self-efficacy levels

	N	Mean	Max	Min	S.D
Mathematics literacy self-efficacy levels	127	89.01	115.0	65.0	9.95
Information literacy self-efficacy levels	127	127.00	167.0	71.0	20.42

As stated in the Method section, the perceptions of mathematics literacy self-efficacy was measured using a five-point Likert scale and the perceptions of information literacy self-efficacy was measured using a seven-point Likert scale. The mean of the perceptions of mathematics literacy self-efficacy levels was determined as x=89.01, while this average (according to the score range of the scale) was determined as corresponding to the answer 'Agree'. When the views of the pre-service teachers as to the items of the mathematics literacy self-efficacy scale were reviewed, it

was found that the item with the highest score was, 'I trust myself in performing any sort of digital operation' (x=3.88), whereas the item with the lowest score was, 'I fail to notice the mathematical relations in current events' (x=3.06). On the other hand, the mean of their perceptions of information literacy self-efficacy levels was determined as x=127. Considering the score range of the scale, it can be concluded that the pre-service teachers, according to this average, perceive themselves to have an average level of information literacy self-efficacy. When the views of the pre-service teachers regarding the items within the perceptions of information literacy self-efficacy scale were reviewed, it was found that the item with the highest score is 'Interpreting visual information' (tables, graphics, etc.) (x=5.58), and the item with the lowest score is 'Using different libraries' (x=4.66).

Table 3. Comparison of the literacy scores of the pre-service teachers according to gender

Dimension	Gender	N	X	S.D	p
Mathematics literacy	Male	51	88.25	10.28	0.48
	Female	76	89.52	9.76	
Information literacy	Male	51	121.68	21.32	0.016
	Female	76	130.57	19.11	

The mean score obtained from the perceptions of mathematics literacy self-efficacy scale for the male pre-service teachers proved to be lower ($\overline{X}$ =88.25) than that of the female pre-service teachers ($\overline{X}$ =89.52). The fact that the significance level of the 'p' value (0.48) was greater than 0.05 suggests that there is no significant relationship between gender and self-efficacy perceptions as to mathematics literacy.
On the other hand, the perceptions of the female pre-service teachers regarding the information literacy self-efficacy scale were found to be higher ($\overline{X}$ =130.57) than those of the male pre-service teachers ($\overline{X}$ =121.68). The fact that the significance level of the 'p' value (0.016) was smaller than 0.05 suggests that there is a significant relationship between gender and perceptions of self-efficacy in information literacy.

Table 4. Comparison of the literacy scores of the pre-service teachers according to class

Dimension	Class level	N	X	S.D	p
Mathematics literacy	1	37	85.94	9.24	0.025
	3	90	90.27	10.01	
Information literacy	1	37	124.89	16.95	0.456
	3	90	127.87	21.71	

The mathematics literacy self-efficacy scores of the pre-service teachers belonging to the third grade proved to be higher ($\overline{X}$ =90.27) than those of the pre-service teachers belonging to the first grade ($\overline{X}$ =85.94). The fact that the significance level of the 'p' value (0.025) was smaller than 0.05 suggests that there is a significant relationship between the class level and perceptions of self-efficacy in mathematics literacy. The fact that the significance level of the 'p' value (0.456) was greater than 0.05 suggests that there is no significant relationship between class levels and perceptions of self-efficacy in information literacy.

Table 5. Comparison of the literacy scores of the pre-service teachers according to their computer-access status

Dimension	Computer Access	N	X	S.D	p
Mathematics literacy	Yes	107	88.71	9.89	0.42
	No	20	90.65	10.37	
Information literacy	Yes	107	129.43	19.40	0.002
	No	20	114.00	21.32	

The fact that the significance level of the 'p' value (0.42) was greater than 0.05 suggests that there is no significant relationship between computer access and perceptions of self-efficacy in mathematics literacy. When information literacy is analysed, the fact that the significance level of the 'p' value (0.002) was smaller than 0.05 suggests that there is a significant relationship between computer-access status and perceptions of information literacy self-efficacy. The information literacy self-efficacy scores were seen to be higher in the pre-service teachers who had access to computers ($\overline{X}$ =129.43).

Table 6. Comparison of the literacy scores of the pre-service teachers according to the period of computer usage

Dimension	Period of Computer Usage	N	$\overline{X}$	S.D	d.f	F	P
Mathematics literacy	1–7 h	37	87.89	10.49	3–123	0.585	0.626
	8–21 h	43	90.32	9.21			
	22–35 h	26	87.76	9.09			
	Above 36 h	21	89.85	11.67			
Information literacy	1–7 h	37	128.05	24.59	3–123	0.126	0.945
	8–21 h	43	126.37	18.85			
	22–35 h	26	128.07	16.44			
	Above 36 h	21	125.14	21.14			

The fact that the significance levels of the 'p' value (0.626–0.945) were greater than 0.05 suggests that there is no significant relationship between the perceptions of mathematics and information literacy self-efficacy and the duration/period of computer usage.

Table 7. Comparison of the literacy scores of the pre-service teachers according to book-reading frequency/rate

Dimension	Book-Reading Rate	N	$\overline{X}$	S.D	d.f	F	P	Scheffé Analysis
Mathematics literacy	Always	13	95.76	9.22	4–122	3.058	0.019	2–5
	Quite often	21	92.14	11.69				
	Occasionally	65	87.93	9.50				
	Rarely	22	85.63	8.46				
	Never	6	87.50	7.94				
Information literacy	Always	13	127.76	22.96	4–122	1.333	0.261	
	Quite often	21	130.19	21.93				
	Occasionally	65	129.01	19.95				
	Rarely	22	120.95	18.49				
	Never	6	114.66	18.75				

The findings suggest that there is a significant difference among pre-service teachers' perceptions of mathematics literacy self-efficacy levels in accordance with their book reading frequencies/rates ($F=3.05$, $p=0.019<0.05$). Therefore — according to the results of a Scheffé test performed for the purpose of determining in which groups the differences in the mathematics-literacy levels of the pre-service teachers could be found — the difference was found to lie in the fact that the pre-service teachers who always read books had a higher mathematics literacy-level than those who rarely read books.

On the other hand, the fact that the significance level of the 'p' value (0.261), in terms of information literacy, was greater than 0.05 suggests that there is no significant relationship between perceptions of self-efficacy in information literacy and the book-reading frequency/rate.

Table 8. The relation between the mathematics and information literacy self-efficacy levels

Dimension	N	Correlation	p
Mathematics and information literacy self-efficacy levels	127	0.267**	0.002

A significant relationship, at a low level but in a positive direction, was found between the self-efficacy perceptions of the pre-service teachers as to mathematics literacy and information literacy, in accordance with the 'r' score range ($r=0.267$, $p=0.002<0.01$). In this sense, it can be stated that the information-literacy levels of the pre-service teachers increase with an increase in their self-efficacy perceptions regarding mathematics literacy.

Results

A positive relationship was determined between the mathematics and information literacy self-efficacy levels of the pre-service teachers. When the literature was reviewed, there were a number of studies found that associated information literacy with other types of literacy. In the studies conducted with respect to information literacy — by Curzon (1995); Spitzer, Eisenberg and Lowe (1998) and Jager and Nassimbeni (2002) — it was defined as being a broad spectrum involving different types of literacy. In line with these definitions, it was concluded that there was a need to apply information-literacy skills in an accurate way, so as to enable the possession of advanced skills in all types of literacy. From this perspective, the fact that there is a positive correlation between mathematics literacy and information literacy is an expected outcome. In addition, since there is a positive correlation, it follows that increasing the information-literacy level, which is pre-requisite for all literacies, means increasing the level of mathematics literacy, as well. For this reason, the mathematics-literacy level can be maximized within the information-literacy curricula organized in universities by enabling librarians, academics, experts of information technologies and administrators to work collaboratively in this subject. According to the research findings, the perceptions of the pre-service teachers regarding their information literacy self-efficacy levels are average according to the scale's score rating; therefore, practices for the purpose of increasing those levels can be devised.

The experimental study performed by Kurbanoğlu and Akkoyunlu (2006) with respect to the information-literacy levels of sixth-grade secondary-school students found that there was a significant difference between the information-literacy levels of the students in the control group and those in the experimental group, as a result of education and training in information literacy. According to this study, it can be appropriate to provide education and training on information literacy, both for students and for teachers, with the help of librarians who graduated from a department of library science, experts in information technologies or academics. These educational programmes can be supported by activities involving the subjects, such as topic selection, setting an objective, tools for accessing information, library catalogues, searching techniques using a computer, writing sections of a report and the preparation of resources. As a result of this training, the individuals are expected to develop their capacities, such as using Boolean operators and apostrophes; performing language restrictions; being careful about such characteristics as

chronological-statistical resources, etc.; using Internet tools and search engines efficiently and being able to analyse written resources.

While the perceptions of the pre-service teachers' information literacy self-efficacy levels were seen to have not differed according to their class levels, their perceptions of mathematics literacy self-efficacy levels did, which agrees partially with the view of Bandura (1977). Bandura thought that an individual's belief in their self-efficacy increased with the passage of time and gaining of experience. In this study, self-efficacy perceptions regarding mathematics literacy increases with the class level, because the pre-service teachers came across different fields or practices of mathematics at each class level. On the other hand, the fact that fields unique to information literacy are not included in the course programme can be given as the reason that self-efficacy perception levels regarding this form of literacy failed to exhibit significant progress in this matter.

In this study, the perceptions of mathematics literacy self-efficacy levels were highest in those pre-service teachers who stated that they always read books. It can be said that there is a significant correlation between a person's book-reading frequency/rate and their mathematical literacy, because reading a book (whatever the subject) is an activity that develops an individual's thinking skills to a high level. This allows them to establish relationships among phenomena, as well as to operate mental processes associated with mathematics, such as performing analysis, speculation or generalization.

Library use and book-reading activities or events within the university curricula can be organized in order to eliminate the book-reading inefficacies of the pre-service teachers who will be the architects of future society. Studies finding ways to boost their interest in reading activities can also be conducted.

According to the research findings, it was concluded that the pre-service teachers' perceptions of their information literacy self-efficacy levels varied according to their access to the Internet or computers. There are a number of studies confirming this result as regards the relationship between computer usage and information literacy. As stated by Shapiro and Hughes (1996), information literacy is a process that also involves computer usage. For this reason, information literacy cannot be considered separate from computer usage.

Consequently, as the factors influencing the information and mathematics literacy levels of the pre-service teachers were determined regarding their access to the Internet or computers and book-reading frequencies/rates, library and computer literacy lessons should be added to the curriculum of the universities with regard to the teaching of Primary Mathematics Teachers. In addition to the results obtained, according to the independent variables examined, further descriptive and experimental studies can be conducted on broader research populations at different scales so as to acquire more varied and detailed information.

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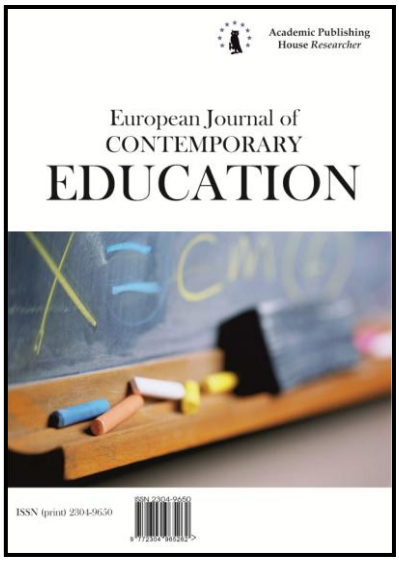

Computer Assisted Educational Material Preparation for Fourth Grade Primary School Students' English Language Class in Teaching Numbers

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Abstract

In this study, using ADDIE instructional design model, it is aimed to prepare English language educational material for 4th grade primary students to teach them numbers. At the same time, ARCS model of motivation's attention, relevance and satisfaction phases are also taken into consideration. This study also comprises of Design Based Research which includes design, theory and application processes. The first phase of the ADDIE method is the analysis where there is a discussion with primary school English language teachers so as to determine the topic, the content and the target groups. During the design phase; objectives, strategies, activities, assessments, and methods of learning are determined to organize and present the content on the basis of learning objectives. In the development phase; images, animations and user interface are created in accordance with students' ages. Additionally, sounds including the pronunciation of digits and numbers are created and the codes of the visual scenarios that are designed are written in ActionScript 2.0 in Adobe Flash CS3 Professional. At the implementation phase, some of the target group students are tested with prototype material that has been implemented. In the classroom, students learn both the pronunciation and the spelling of the numbers. After checking their spelling and typing errors of numbers with quizzes, the students repeat what they have learned and then they take the spelling quizzes. The program checks the misspelled words. Students who correctly complete the quizzes are entitled to have one flag. And when they have all the flags (4 flag), they receive a certificate of achievement. With this rewarding technique, it is intended to raise the motivation of the students. Finally, at the evaluation step, the observed problems in the materials are revised. At every stage of the process, expert evaluations are consulted. With this study that is based on ADDIE instructional designed model and ARCS motivational model, it is

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expected that students enjoy learning pronunciation and the spelling of the numbers in a semi-game environment.

Keywords: Instructional Design, ADDIE Instructional Design Model, ARCS Motivational Model, English Pronunciation of Numbers, Computer Assisted English Education.

Introduction

According to Chastain (1976); individuals who speak foreign languages have a better understanding of the world, easily overcome the cultural and linguistic hindrances and acquire new learning skills that enable them to have a profession. Although everyone agrees on the importance of foreign language, it is clear that the level of foreign language education is not sufficient in Turkey (Aydın, 2014). It is widely believed among the educators that the foreign language education in Turkey is one of the biggest problems of national education systems.

According to Karal & Berigel (2006), the problems encountered in teaching foreign languages is that English teachers are not be able to find "suitable" materials in order to use in classes. The main reason why some materials cannot be used efficiently in classes is that the materials are not designed in a way suitable for target group and purposes of the class. This is another problem faced in teaching foreign languages (Karal & Berigel, 2006). Işık (2008) states that traditional methods used in foreign language teaching, in other words perceiving foreign language teaching as learning grammatical rules, is one of the biggest problems in foreign language teaching. Crowded classes, poor physical conditions, troubles to train qualified teachers, language policies and mistakes in applying modern language education is amongst the most important problems in English language teaching in Turkey (Erkan, 2012). According to Saricoban (2012), some other factors also affect the success of foreign language teaching in Turkey such as curriculums, text books and teaching methods.

According to Yaşar (1990); although there are several reasons not to achieve the expected success in the foreign language education, at a level of program development, not adopting the concept of modern program development in education and not giving place to program development studies in a sufficient level are amongst the reasons that affect the foreign language education adversely.

Büyükaslan (2007) claims that the root of the problem is about how to, what to and whom to teach. The question or the problems that are among the main principles of linguistics are the most important aspects that need to be taken into consideration either in Turkish or in other foreign languages. The success of foreign language education for a target group in line with planned objectives is possible through the correct and proper use of methods to apply and materials to choose (Büyükaslan, 2007).

Gündüz (2005) emphasizes that the role of computers "to provide service for users" along with the "assistance" role in education should be considered. At this point, the methods and materials to be used within the framework of modern program development should be integrated into language education. At the same time, aside from traditional methods, providing alternative learning environments or opportunities for foreign language learners is critical.

According to She, Wu, Wang and Chen (2009), technology offers web-based alternatives comparing to traditional methods. Thanks to these alternatives, the concepts hard to learn becomes much easier to understand; thus learning process becomes more permanent. Besides, learning becomes more understandable with the help of various materials. Additionally, students' motivation can be kept at the highest level. At the same time, the elements such as illustrations, pictures, videos and animations in these materials that students can easily use make the learning process more enjoyable (She, Wu, Wang and Chen, 2009).

Games that enable learners to actively participate and have a learning oriented process play an active role in this phase. The students feel more relaxed and comfortable in this kind of an enjoyable learning environment (Uzun, 2009). Moreover, an effective language education is related to what extent attention, wishes and expectation of the learner is taken into consideration. Thus, the long and boring language learning process can be turned into a more enjoyable and active learning environment via the games created with purpose of education (Aydın, 2014).

Büyükaslan (2007) states that these learning environments that make a learner to have an active role rather than a passive one and that appealing to more than just one sense have a significant place in terms of the permanence of learning.

According to Baturay, Yıldırım and Daloğlu (2009), making the learning and teaching process more effective can be possible through the better evaluation of computer and its opportunities of multimedia. These environments and materials used are the support of language learning interaction (Baturay, Yıldırım and Daloğlu, 2009). Computers are crucial in language learning since they provide more repetition and practice opportunities in individualized learning environments and their impact is long-lasting in foreign language learning (Baturay, Yıldırım and Daloğlu, 2009).

According to Karal & Berigel (2006), the aspect that will boost the success of learning English, is to benefit from the multimedia such as sound, picture, video and animation in the class as much as possible as English teachers also agreed. At this point, the lack of technical infrastructure is the most important problem (Karal & Berigel, 2006). Forming the learning environments in a way promoting active participation of the learner should be considered in language education as well as all other domains. Materials that can motive students and keep them interested are a need in the classes (Karal & Berigel, 2006). The main purpose of this material is to meet this necessity. Therefore, the opportunities of the information and communication technologies should be benefited to the fullest by taking technical infrastructure opportunities into account so as to achieve success.

Another important step is the selection and design of the materials that will enrich the learning environments. The materials that are selected and designed in order to make the teaching-learning process more organized and favorable require to be functional as well as to have a solid theoretical framework. Teaching theories have an important role in the design, formation and output of teaching materials (Reigeluth, 2013). At this point, one or some of the instructional design models in addition to materials that need to be used and methods to be applied, if included, will bring more positive results.

According to Wang and Hannafin (2005); designed-based research is a research that researchers and participants cooperatively take place in the analysis, design, development and application processes and that conducted in a real environment of application. In this material dealing with 'English digits and numbers', ADDIE design model, one of the instructional design models, and ARCS motivational models are utilized. This study of a planned 14 week period will be explained step by step in accordance with the basic design model ADDIE and analyzed in detail in the method section.

Method

This study based on ADDIE design model, one of the basic instructional design models, is a product of a planned 14 week period.

This theoretical framework -ADDIE Instructional Design Model- that instruction designers and education developers use as a guideline comprises of five phases: Analysis, Design, Development, Implementation and Evaluation (Piskurich, 2015). This model whose name composes of the capital letters of each phase in English is the basis of many studies in the literature.

ARCS motivation model that is selected as a support to our basic model, emerged as a synthesis of Keller's researches about motivation model in 1987 (Keller, 1987). This model acquired its name from the capital letters of Attention, Relevance, Confidence and Satisfaction phases in English. The practices and activities in this study are designed by taking the attention, relevance and satisfaction steps of ARCS motivational models into consideration into consideration. The explanation of the practice and activities in the each phase of ARCS motivational is going to be placed in the design and development phase of the study.

It is found that students are confused about the English equivalent of numbers in the range 13-19 (one by one) and 30-90 (by ten). Based on the idea of eradicating the confusion, the preparation of a material that would allow a computer-assisted English education started. After analyzing the curriculum, the scope of the material are broadened, which will allow both the pronunciation and the spelling of the numbers in the range 0-100. Some videos and instructional

techniques such as 'Mind Palace*' that are developed special to the material by the researcher are utilized with the aim of the permanence of subjects.

In a design-based research, the first version of the design is developed and put into practice. In the application, the state of designed is observed. According to the experiences from application, arrangements are made by revising regularly. Finally the design becomes solid, correct and efficient (Kuzu, Çankaya & Mısırlı, 2011).

In this section, each step of the preparation process will be explained according to ADDIE instructional design model.

Analysis

The idea of this project emerged from the problems students faced in mock exams on a subject within the scope of the project when the researchers work as an English teacher in private institution. As a result of the research, the outline of the project is prepared on the basis of videos shared online. Project developer handled this project within the scope of the class, 'Software Design for Computer Assisted Instruction', during his master's degree at Balıkesir University, Institute of Science, in the department of Computer and Instructional Technology. A series of activities have been designed in order to make students learn the related subject more permanently, enjoyably and interactively in an easy way.

In this process, three separate domain experts, i.e. English teachers are consulted in person or through phone calls and texting. The feedbacks of the teachers demonstrate that learning and teaching of the subject especially of some numbers in certain ranges are hard or/and confusing. Additionally, when inquired about the teaching strategies of experts themselves, the answers showed that the subject was taught by memorizing or singing. This situation, also realized by the researcher is the origin of the problem in the project developing phase. Taking all these aspects into consideration, a computer-assisted instructional material that will draw students' attention and make the process entertaining.

To sum up, in the analysis step which is the first phase of ADDIE design model; at the meetings with the English teachers the title and the scope of the subject and the target group are determined. Afterwards, English education program of the primary school 4th grade is also examined. It is found that in the education program, the relevant gain of the subject is "Students will be able to recognize numbers twenty through one hundred" (M.E.B., 2013). The scope of the material is broadened by including the digits and numbers zero through twenty in order to help the target group to learn English pronunciation and spelling of the numbers in range of 0-100.

Design and Development

In these phases, the design of the material and the developing process as a result of feedbacks will be explained.

The design and development process is planned weekly and it is demonstrated in Table 1.

Table 1. Activity Calendar

Phases	Activities	Duration
Analysis	• Process to determine a subject • Meetings with domain experts • Analyzing curriculum • Title and content of the subject and determining target group	2 weeks
Design	• Determining the learning objectives • Designing the learning strategies • Designing the learning activities • Designing the learning assessments	3 weeks

* "Mind Palace" section belonging totally to the developer, is designed especially for the instruction of the subject.

Development	• Designing the outline of the material • Designing the scene and buttons • Drawing several items and images (building, roads, vehicle etc.) • Designing menu and instructions • Designing the logo, main page and information pages • Designing the content of classes • Designing certificate and print out screen • Setting the confidentiality of collecting flags and the button to have certificate and designing quiz application • Designing the section of Mind Palace • Editing the material for the last time • Programming the material with programming language, ActionScript 2.0, in the Adobe Flash Program	7 weeks
Application and Evaluation	• Using, testing, editing the material and making some improvements	2 weeks

It is decided that the material to be designed should teach the numbers in the range 0-10, 11-20 and 21-30 by counting by ten and the numbers ten through one hundred counting by one. To this end, "garbage truck" and "taxi" activities have been designed. Students can prefer to learn either with a garbage truck or a taxi. They can also switch the vehicles when bored thanks to the menu options and continue to learn.

There is a quiz session after each class. In these quizzes, it is aimed to test whether a student learn the subject by producing numbers randomly (in the relevant range). A student who answer "ten" questions correctly will have a right to end the quiz and have a "flag" that shows he completed the quiz. In the upper right corner of the screen, the number of acquired flags* is shown. A student who acquires 4 flags in total will qualify for a "Success Certificate" in his name. This information is offered to the student with the help of related instructions as long as they complete quizzes. This stage of this practice was designed by taking the stage of "attention" in ARCS Motivation Model into consideration in order to draw students' attention and maintain it throughout the instruction (Keller, 1987). When a student wants to log out before completing the quiz -if the other vehicle belonging this level did not get a flag- should get a notification indicating he/she will not obtain a flag that would help to receive a certificate and thus the student will be informed about the new target.

At the end of the classes and quizzes including the instruction of the numbers in the range 11-20 mind palace section is added. Also after instruction of the numbers in the range 10-100 (by ten), necessary explanation about the rest of the numbers (in the range 31-99) should be made, a video about the subject –that the numbers are taught by singing- is added. Additionally, an exclusive quiz practice is included to the material. In this practice, students are expected to write the total of randomly produced numbers according to their different levels "beginner, intermediate and advanced". All the practices and instructions that respond to the question of "what is the benefit of this program for me?" can be evaluated within the scope of the "Relevance" stage of ARCS Motivational Model (Keller, 1987).

A menu is added to each scene so as to provide the ease of use. Therefore, the user can easily switch locations as he/she wants. In the class screen buttons that enable to move from one number to another as well as the play/pause buttons that helps to stop and resume the animations are included.

When the answers are true, false or blank, students will get an audiovisual feedback.

* The number of flags to collect is determined to be "4" in total, acquiring one flag after each.

Students who qualify to have 4 flags and the certificate in their names will have an opportunity to save their certificates in "pdf" format and print them out. The stage that aims to award students is designed by taking the "satisfaction" phase of ARCS Motivational Model into consideration (Keller, 1987). This certificate aims to make students feel valuable and sufficient in this subject. It is thought, therefore, that the motivation can be kept at a high level in this process.

General scene designs and menus of the prepared material is as follows:

In the main page, there are a designed logo and the title of the subject and the buttons that enables access to other sections of the material (Fig. 1). In the Numbers Track screen, there is a map drawn in the form of cutout dashes from the start button to the finish button (Fig. 2).

Fig. 1: Main Screen

Fig. 2: Track Screen

There is certain explanatory information -instructions- in each button (start, help and finish) of the map in the Fig. 2 about the use of the material. The sample screenshots of the explanations are demonstrated in Fig. 3 and Fig. 4.

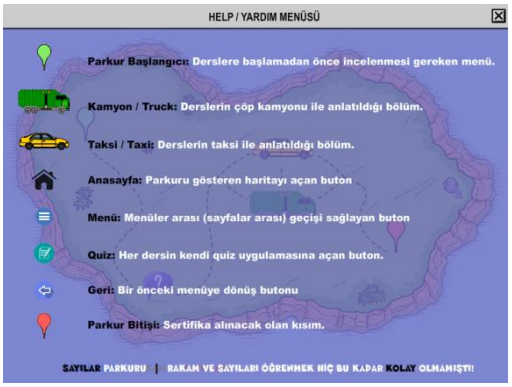

Fig. 3: Help Screen

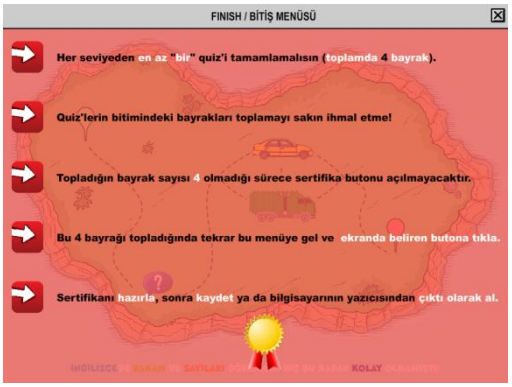

Fig. 4: Finish Screen

In the Fig. 3, there is information indicating the function of each button. In the Fig. 4, there is a screenshot of the information showing this must be the last menu to be visited as well as of the "certificate button*".

When clicked on the buttons of garbage truck and taxi on the track screen, there are entry buttons and explanation of classes divided into certain number ranges so as to teach (Fig. 5 and Fig. 6).

* The button in Fig. 4, is confidential at first. It appears when a student having 4 flags open this menu -finish menu- in order to obtain the certificate.

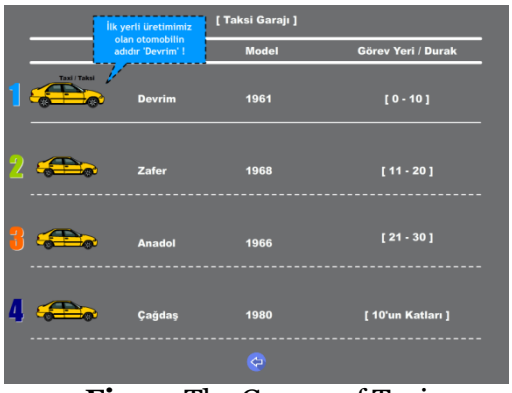

Fig. 5: The Garage of Taxi

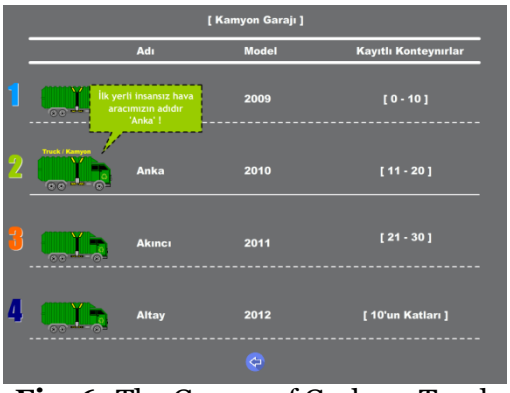

Fig. 6: The Garage of Garbage Truck

As seen in both figures above, the numbers are analyzed for four different ranges of numbers. Additionally, items in screen are designed to keep students interested. Instead of complex and distracting items, a plain design is preferred.

The designs of the scenes in which lessons are given (the ones taught via taxi and garbage truck separately) can be seen in Fig. 7 and Fig. 8.

Fig. 7: Sample Lesson Screen With Garbage Truck

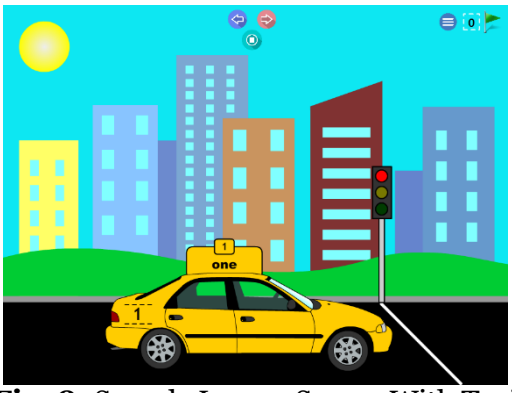

Fig. 8: Sample Lesson Screen With Taxi

As seen in both figures, there are buttons at the top-center of the screen to access the previous and the next page and play/pause buttons. In the upper right corner of the screen, there are the total number of the flags he obtained and the menu button that enables to switch the menus. It is shown how to write in figures and to spell in English of the digits and numbers demonstrated to teach by the vehicles in both classes. Besides, the English pronunciation of these numbers and digits are given in the background. During classes it requires having equipment such as headphones or speakers, in order to listen the pronunciation of digits and numbers.

The screenshots of the quizzes that come up at the end of each class and the menu showing up when a student wants to log out before completing the quiz -if he/she did not get a flag with a taxi or a garbage truck from the same level- can be seen below (Fig. 9 and Fig. 10).

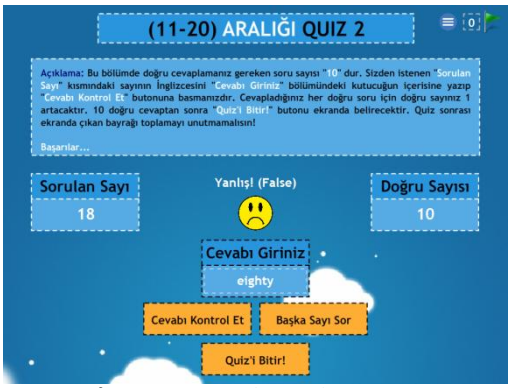

Fig. 9: Sample Quiz Screen

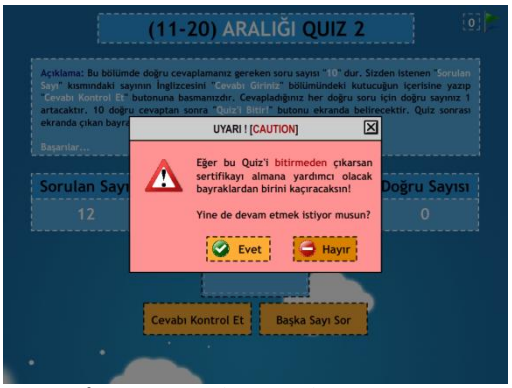

Fig. 10: Quiz Caution Screen

In Fig. 9, aside from some explanations, there are the information of the total number of the questions that were asked to students and answered by them, of answers submitted and confirmation of these questions, as well as a button to jump to another number, to finish the quiz and to check the answer. In Fig. 10, students is being constantly made aware of the target by warning them they may miss one of the flags that would help them to get the certificate.

The section of "Mind Palace" and the screenshots of the particular range of numbers that are not taught can be seen in Fig. 11 and Fig. 12.

Fig. 11: Mind Palace Screen

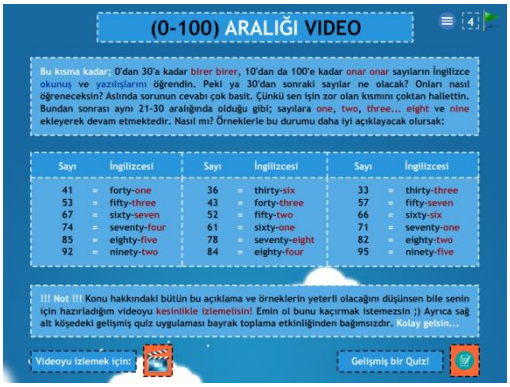

Fig. 12: The Numbers to the Other Range

After making short explanations on the screen of Mind Palace, the English spelling of the numbers in the range 13-19 are given. Since the numbers in this range are compared to numbers, multiple of 10 in the range 10-100, the number 16 is chosen as an example. The spelling of the number 16 as "sixteen" in English is separated as "six" and "teen". It is tried to emphasis that the spelling of 16 includes both 6 "six" and 10 "ten". The spelling of the rest of numbers in the range 13-19 is painted in writing by using different colors for the first part of the numbers and the "teen part" and it is tried to be shown that this is the same for the numbers in this range. It is emphasized that the number 60 which is usually confused with 16 and whose equivalent is "sixty" does not even have a "ten" in it and this method facilitates the differentiation between 16 and 60.

In Fig. 12 there are explanations regarding the instruction of other numbers in the range 31-99. Next to the English equivalents of the numbers -after 30- which are the multiples of ten, "one, two, three, … , eight and nine" should be added and maintain this way up to 100 (for example: thirty-one, forty-six, fifty-five… etc.). To support this instruction, a video that teaches all the numbers in the range 0-100 was added to this material (Fig. 13). The button to access this video was shown at the bottom-left corner in the previous figure -Fig. 12- while at the right bottom corner there is a quiz practice button. The screenshot of the menu button that facilitates jumping to other menus especially to the main page is as follows (Fig. 14).

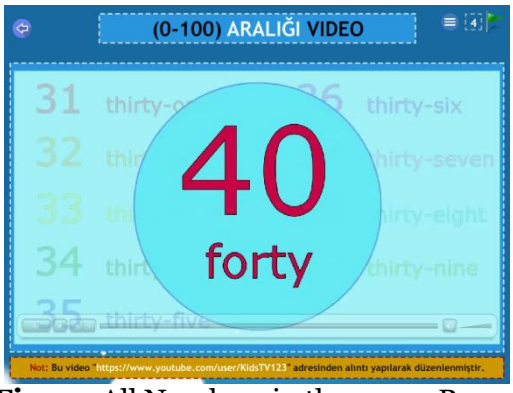

Fig. 13: All Numbers in the 0-100 Range (Video)

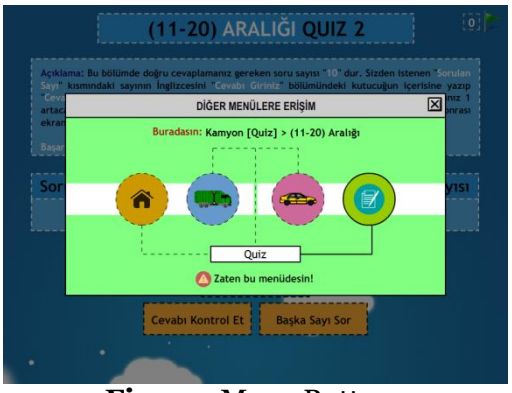

Fig. 14: Menu Buttons

As seen in the Fig. 14, with the expression "you're here", the user is informed about which menu he/she sees. There is a warning as "you're already here" that shows up whenever the user clicks the quiz button when he/she is already in this section. In this menu, it can easily be switched to the sections about the instruction where the garbage truck or taxi are used to teach, and especially to the main page. Besides, students can reach the quiz related to the subject whenever he wishes.

The illustration of the certificate given to the students who successfully completed the instruction process is demonstrated in Fig. 15.

Fig. 15: Certificate Screen

In the certificate demonstrated in Fig. 15, there are students' names, date of the certificate and print button that allows them to print it out.

As seen in many illustrations, it is aimed to use English equivalents of the words that used in menus and buttons. The purpose is to make students familiar with the words used on a daily basis and learn their meanings.

In the design of the material, it is generally avoided to include distracting items, shapes and colors.

Application and Evaluation

At this stage, some primary school students (3 children) along with some undergraduate students were asked to use the material.

In the classroom, students learn both the pronunciation and the spelling of the numbers. After checking their spelling and typing errors of numbers with quizzes, the students repeat what they have learned. Then they take the spelling quizzes and the program checks the misspelled words automatically. Students who correctly complete the quizzes are entitled to have one flag. And when they have all the flags (4 flag), they receive a certificate of achievement. With this rewarding technique, it is intended to raise the motivation of the students.

Necessary adjustments were made in the light of the feedbacks coming from the students For instance, play and pause buttons that are placed in the instruction screen are the results of the said

feedbacks The design of the track page is revised in order to make the material more understandable. What this new design intends is to prevent the misunderstanding that a certain part of the class is taught by one vehicle complements the other parts that are taught by the other.

There is also another problem it is observed that students are confused about the English spelling of the number 40. When researched, there is a difference between British and American English of the spelling of 40 as "fourty" and "forty" and it prompted necessary updates.

Throughout the process and after the updates, expert opinions are consulted.

Findings

During the development of the material, in order to evaluate the compatibility of the material with the target group and the program, the feedbacks from the primary and secondary school students who used the material were collected and they were positive. The reactions of the students who used the material are as follows:

-"Now, I want to try the taxi".

-"Well, I already know this, I will directly skip to the questions".

-"Now, there is only one flag leeeeft".

-"What should I write for my name? Will it be on the certificate?"

There are not a lot of findings since only a small group is used as a pilot study. It is planned to use the material with the experimental and control groups in a real classroom. The effect of the learning material is investigated.

Conclusion and suggestions

A computer-assisted material related to instruction of digits and numbers in English in the range 0-100 for the 4th grades was designed. In the development process of the material, necessary adjustments were made in accordance with the views of both experts in this domain or the instructional design experts.

According to Akçay, Aydoğdu, Yıldırım & Şensoy (2005), Computer Assisted Instruction (CAI) whose main difference from the traditional methods is interaction, is used in order to individualize the education. Because CAI is a designing and building process of the mechanism that helps students to organize, complement, integrate and codify the information in their minds. Besides, CAI is an effective method using audiovisual elements comparing to other materials and methods. The opportunities that CAI offers should be benefited at a maximum level in order to increase the success of a student. When the elements such as time and performance are considered, CAI is more preferable than other methods.

CAI materials and its opportunities should be taken into consideration more in terms of the instruction process and the success of the student and these materials need to be integrated more into the process.

This material that is designed to be suitable for personal use, it should be used in personal computers or computer laboratories in schools. During classes it requires having equipment such as headphones or speakers, in order to listen the pronunciation of digits and numbers. To use it in computer laboratories, it is more appropriate to use headphones not to get distracted by other students.

The purposes and the consequences of this study can be listed as follows. It is expected that the so-called material development process in this study help researchers that study design and development processes. It is planned to use the material with the experimental and control groups in a real classroom. The effect of the learning material is investigated. It is thought that with this designed instructional material, subjects can be learned and taught more permanently and more lively.

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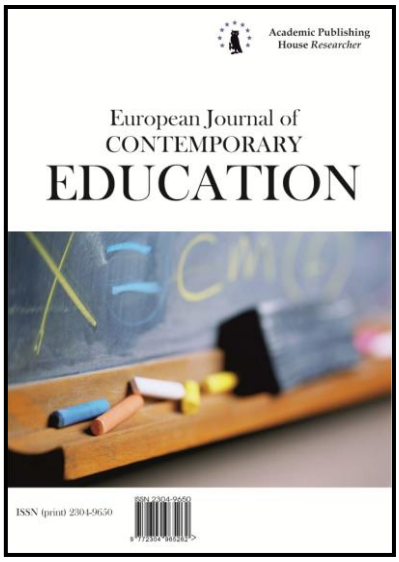

The Effects of a Computer-Assisted Teaching Material, Designed According to the ASSURE Instructional Design and the ARCS Model of Motivation, on Students' Achievement Levels in a Mathematics Lesson and Their Resulting Attitudes

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Abstract

This study examined the effects that computer-assisted instruction had on students' attitudes toward a mathematics lesson and toward learning mathematics with computer-assisted instruction. The computer software we used was based on the ASSURE Instructional Systems Design and the ARCS Model of Motivation, and the software was designed to teach fractions to fourth-grade students. The skill levels of these students were gauged before and after receiving the computer-assisted instruction. We structured our experimental design to use one group for both pre- and post-tests, which is considered to be one of the weak experimental designs. We conducted our research with 28 students studying in Balıkesir, Turkey, for a period of six weeks, using the specifically developed teaching material. We gathered our research data by applying an attitude scale to our mathematics lesson and to computer-assisted instruction. We also applied the Academic Achievement Test for Fractions Unit in Mathematics, a test we developed for our research. We analyzed our gathered data with the Wilcoxon Signed-Rank Test ($n<30$) by using the statistical software SPSS 15. The conducted analyses showed that the activities of the developed instructional material had positively affected the attitude of the students toward computer-assisted instruction ($z=-2.807$, $p< 0.05$) and increased their academic success ($z=-4.623$, $p<0.05$). Although the attitude scale toward our mathematics lesson indicated an increase in their scores, this increase was not found statistically significant ($z=-2.807$, $p>0.05$). Based on the research results, we believe that similar materials can also be used for instructing other topics of mathematics, and similar computer-assisted activities can be developed for other courses.

Keywords: Instructional Design, ASSURE Model, ARCS Model of Motivation.

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Introduction

In 2005 and 2006, to keep up with the fast changes occurring in today's world, the Turkish Ministry of Education started to apply a constructivist teaching approach, which is different than the policies previously applied. In a constructivist teaching approach, students take knowledge in an active way: They combine past and present knowledge with new knowledge, and then they build up new comments in their brains (Duit & Treagust, 1998; Treagust, Harrison & Venville, 1996). In a constructivist teaching environment, which is based on the constructivist learning theory, students are encouraged to form their own concepts and develop their own solutions for problems. In this approach, the classroom environment is prepared so that students can actively participate in the learning process, which is very important in education. In a constructivist teaching environment, students are given the opportunity to use their own initiative, evaluate and practice what they learn, and gain hands-on experience (Özden, 2003).

Since a critical aspect of this approach is to allow students to construct their own understanding, the teaching method chosen by the teacher must also facilitate this concept. Considering the rich variety of cutting-edge technologies and considering the ample amount of activities that can be used in perceiving abstract concepts, there is no doubt that computer-assisted instruction is one method that provides a constructivist learning environment. By boosting students' interest and motivation, a computer (which is used as a teaching–learning tool in this method) can improve students' attitudes toward a lesson and help them to be more enthusiastic about learning. We thus assert that computer-assisted instruction (CAI) may help students learn in a more effective, accurate, and intrinsic way.

Software that is specifically designed to teach a course is the most important element among other elements of CAI. (These other elements include hardware, teachers' training, computer laboratories, and assistant training.) Moreover, many researchers have frequently stated that the success of CAI is directly related to the quality of the software (Numanoğlu, 1990; According, Aktümen, & Kaçar, 2003). Alongside the constant progress in computer technology, a number of software programs that are designed for teaching are also rapidly increasing. In this regard, on the website of the Ministry of Education, a list of such resources is offered for teachers to use. Also, as part of an education project called *FATİH,* run by the minstry, an Education Informatics Network has been created, which allows teachers to use teaching materials more effectively. Integrating software programs used in classrooms with school curricula will surely increase productivity of CAI. Because of this, courses must be planned accordingly, and software that will be used during an educational term must be selected carefully.

To render instructional software programs to reach their targets, the teaching/learning period must also be planned with the most convenient methods, at carefully arranged stages and levels. Otherwise, if faced with a poorly planned syllabus, both instructors and students may suffer great difficulties and encounter repercussions. Though there are many instructional design models that use technology for teaching activities, the ASSURE model (**a**nalyze learners; **s**tate standards & objectives; **s**elect strategies, technology, media & materials; **u**tilize technology, media & materials; **r**equire learner participation; **e**valuate and revise) stands at the forefront. According to Uysal and Gürcan (2004), "If a course material and technology is wanted to be used effectively and productively, the course must be planned systematically. The ASSURE model is the most suitable method for creating such a plan." The ASSURE model is the most convenient model for integrating the theories of education technology and research with practice (Megaw, 2006). The ASSURE model was designed by Heinrich and Molenda (1996) as an instructional systems design, to integrate technology and mass media tools into learning–teaching environments, which allows teachers to plan and execute their lessons in ways that best suit their students' needs (Heinrich, Molendo, Russell, & Smaldino, 1996). The ASSURE model focuses on selecting and making the best multimedia tools to help reach instruction goals carefully, and within actual instruction situations, it also encourages the learners to interact and participate (Chen & Chung, 2011).

One of the biggest contributions of CAI in a learning environment is that it motivates students. Motivation is an important component of any instructional design (Barbuto, 2006). Here we focus on John Keller's ARCS Model of Motivational Design Theories, which examines motivational factors throughout a learning process and guides and orientates teaching, according to these factors: **A**ttention, **R**elevance, **C**onfidence, and **S**atisfaction. The ARCS model is one of the most valid tools used in the design, application, and evaluation of instructional software programs;

furthermore, it ensures motivation in learning, which is critically important for the instruction to be successful and influential. In addition, this model stimulates and motivates learners to continue learning (Huett, 2006).

In the available literature, there are many studies that compare traditional teaching methods with CAI. These studies show that CAI significantly increases academic achievement levels and improves student attitudes (Şataf & Ural, 2009; Malta, 2010; Çelik & Çevik, 2011; Öztürk, 2011; Yücesan, 2011; Liao, 2007). When findings of studies on subjects such as CAI, instruction design, and motivation are taken into consideration, it can be asserted that instructional software programs developed on the ASSURE and ARCS models positively affect students' academic performances and their attitudes toward learning.

In this study, we examine the effect of a CAI material, which was developed on the ASSURE and ARCS models, on students' attitudes toward CAI and on their successes in mathematics––our case study consisted of teaching fractions to fourth graders. To do this, we defined the problems and subproblems of the research:

What are the effects of a CAI material, developed from the ASSURE and ARCS models, on students' attitudes toward CAI and their successes in learning fraction-based mathematics?

1. Is there any statistically significant difference between the pre- and post-test scores in regard to the effect of the material developed from the ASSURE and ARCS models on students' attitudes toward CAI?

2. Is there any statistically significant difference between the pre- and post-test scores in regard to students' attitudes toward learning mathematics, after teaching fractions using the specifically developed CAI?

3. Is there any statistically significant difference between the pre- and post-test scores in regard to students' academic performances, as a result of the instruction with the specifically developed CAI?

Method

The Research Model

In our study, we used only one group for both the pre-test and post-tests as our quantitative research method. This research design is called weak because the effect of the experiment is tested on only one group; however, it is better than other weak experimental designs because the measurements needed for the research are gathered by using the same measuring tools on the same groups of participants––both before and after the experimental instruction.

Students in the experiment group used the game activities (developed by using the ASSURE and ARCS models) without any selecting or matching operation. This design depicts the values obtained from a single group of participants that are measured before and after applying the experimental treatment; then it tests the statistical significance of the difference between the pre- and post-tests values (Büyüköztürk, Kılıç, Çakmak, Akgün, Karadeniz, & Demirel, 2010, p. 192).

Table 1. Figurative Display of the Research Model

Group	Pre-test	Treatment	Post-test
28 students	• Attitude scale toward mathematics lesson • Academic performance test • Attitude scale toward CAI	• Application of the game activities developed for CAI	• Attitude scale toward mathematics lesson • Academic performance test • Attitude scale toward CAI

The concept of our research model is shown in Table 1. Pre- and post-tests were applied to the group of 28 students to measure their academic performances in Mathematics topic of "Fractions", their attitudes toward learning math, and their attitudes toward the CAI.

The Study Group

The study group comprised 28 fourth graders, who were students from a primary school in Balıkesir, Turkey. While 64.2% were girls (n=18), 35.7% were boys (n=10).

The Data Gathering Tools

We used an academic performance test tailored specifically with maths topic "Fractions", a math attitude scale (Askar, 1986), and an attitude scale toward CAI (Askar, Yavuz, & Köksal, 1991) as data-gathering tools.

The Academic Performance Test

For the purpose of determining the effect of the game activities designed on the ASSURE and ARCS models, we designed a particular achievement test. The test comprised 12 questions about fractions, taken from a course syllabus that the Turkish Ministry of Education recommends for fourth graders. The pilot scheme of the test was given to 168 fourth-grade students. Teachers examined the test, and it was restructured in accordance with their recommendations. The scale's Cronbach's α reliability coefficient was calculated as 0.828. Since the reliability coefficient is higher than 0.70, we consider the conducted test to be reliable (Büyüköztürk, 2010).

The Attitude Scale Toward Mathematics Course

The Attitude Scale Toward Mathematics developed by Aşkar (1986) is a 5-point Likert-type scale composed of 20 items. The reliability coefficients of the attitude scale toward mathematics were calculated as 0.86 in the pre-test and 0.90 in the post-test.

The Attitude Scale Toward Computer-Assisted Learning

The Attitude Scale Toward Computer-Assisted Learning developed by Yavuz and Köksal (1991) is a 3-point Likert-type scale and comprises 10 items. The reliability coefficients of this scale were calculated as 0.78 in the pre-test and 0.64 in the pro-test.

Application Process of the Research

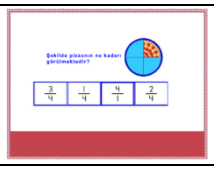
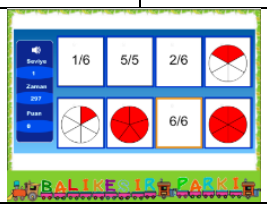
Because the number of students at the school, where the research was conducted, was low and class levels were not equal, we studied only one group. The material we used in the research was designed following the steps laid out by the ASSURE (Analyze learners, State standards and objectives, Select technology, media and materials, Utilize the technology, media and materials, Require learner participation, and Evaluate and revise) model. First of all, we defined the preliminary information about the students, their general attributes, and the topics they found most difficult to learn. Then we examined the acquisition expected from the mathematics syllabus designed by the Ministry of Education for fourth graders, and we accordingly planned corresponding teaching methods. Taking into consideration the ages of the students and the types of games this age group prefers, we designed a platform comprising educational games called "Balıkesir Parkı." We also previewed the material used in our research and conducted final adjustments to prepare the material for our research. The learning material was then put into the hands of the students, and any problems that emerged during this stage were solved promptly; meanwhile, we took into account the students' recommendations, and we provided the material to work smoothly.

While developing the material, we also paid attention in using elements that can increase students' motivation. Applying the aspects of the ARCS model, we were careful when picking stories to use in our material; we sought stories that this age group would likely find appealing. We designed the activities in a similar way, by choosing to use games that these students would likely enjoy. Furthermore, we structured these stories and games so that students would be aware of the targets they were required to reach. The activities were designed to reflect real-life situations and were arranged in an order from difficult to easy. The students were asked questions that became increasingly difficult. As they progressed, they were provided motivation through positive reinforcement and were provided their test scores, which encouraged them to experience the pleasures of success after playing the game (Karakış, Karamete ve Okçu 2013).

Before we started our experimental instruction, we conducted pre-tests for the students at the beginning of the fall term.

The experiment took place for six weeks, and the activities were conducted during free-activity classes, in parallel with the course syllabus. Below in Table 2, the screen shots of the first-week activities are shown.

Table 2. Screen shots of Week 1 activities

Acquisition	Activities
Name the fractions with the biggest two-digit numerators and denominators by using the parts of the fraction.	    

Students played the activities under the supervision of both the class teacher and our researcher. Rules of the activities were first explained to the students, and during their playing, the teacher shortly reminded the students of the points they seemed to forget. Students explained the topic to their classmates and conducted in-class activities during the mathematics lesson, and during free-activity classes, they played the game activities that had been instructionally designed for the experiment. In this process, they had the opportunity to practice what they had learned during the class, and playing the games reinforced the knowledge they had gained.

The same data-gathering tools, applied in the pre-tests, have also been used for the post-tests at the end of the experimental treatment.

Findings and comments

1. Findings related to the Subproblem

One of the subproblems of the research was whether there is or is not a statistically significant difference between the pre- and post-test scores, in regard to the effect of the material developed according to the ASSURE and ARCS models on the attitudes of students toward CAI. According to the results of the tests conducted on the scores attained from the attitude scale toward CAI before and after the experimental treatment, it is concluded that the data set has not shown a normal distribution. To be able to determine whether the difference between the pre- and post-test scores obtained from the attitude scale toward CAI is significant or not, we applied the Wilcoxon Signed-Rank Test to the results.

Table 3. Pre- and post-test scores obtained with the attitude scale toward CAI

		N	SO	ST	z	p
Attitude scale toward computer assisted learning	Negative Rank	6(a)	6.75	40.50	-2.807(a)	0.005
	Positive Rank	16(b)	13.28	212.50		
	Ties	6(c)				

Table 3 shows that there is a significant difference between the pre- and post-test attitude scores of the students ($z=-2.807$, $p<0.05$). These results indicate that the computer game activities, which were designed according to the ASSURE and ARCS models, have positive effects on the attitudes of students toward the CAI. These results resemble the research of Akçay, Tüysüz, Feyzioğlu, and ve Oğuz (2008); Pilli (2008); and Yenice (2003).

2. Findings Related to the Subproblem

The second difficulty of the research was to examine the effect of the activities of the CAI material on students' attitudes toward mathematics lessons. To be able to find out whether the difference between the pre- and post-test scores of the students is significant or not, we applied the Wilcoxon Signed-Rank Test––a nonparametric test––to the results, because the data sets obtained before and after the experimental instruction from the attitude scale toward learning mathematics did not show a normal distribution.

Table 4. Mathematics attitude scale pre- and post-test scores

		N	SO	ST	z	p
Attitude scale toward CAI	Negative Rank Positive Rank Ties	10(a) 17(b) 1(c)	13.40 14.35	134.00 244.00	-1.322(a)	0.186

Table 4 shows that although there is a difference between the pre- and post-test averages of the students, the difference is not statistically significant (z=-2.807, p>0.05). This result indicates that the pre- and post-test results show no significant shift in the students' attitudes toward CAI, despite the computer-based teaching materials being precisely designed on the ASSURE and ARCS models. This result reflects those of Andiç (2012), Çankaya and Karamete (2008), Uygun (2008), and Korkmaz (2000).

Effects on the Academic Achievement Scores

In this respect, the first problem of the research was to examine the effect of the computer-assisted game activities (developed to teach fractions) on the students' academic achievements in mathematics lessons. Since the pre- and post-test data sets obtained from the academic achievement test did not show a normal distribution, we applied the Wilcoxon Signed-Rank Test to the results, to compare these two data sets.

Table 5. Pre-test and post-test scores of the academic achievement test

		N	SO	ST	z	p
Academic achievement test	Negative Rank Positive Rank Ties	0(a) 28(b) 0(c)	.00 14.50	.00 406.00	-4.623(a)	0.000

Table 5 shows that there is a significant difference between pre- and post-test attitudes scores of the students (z=-2.807, p<0.05) after completing the academic achievement test. These results indicate that the computer-game activities had a positive effect on the academic achievements of the students. This result reflects those of Mesut (2011), Tufan (2011), Şataf (2010), Ural (2009), Cengiz (2009), Durak (2009), and Akınsola ve Anımasahun (2007).

Conclusion and discussion

During the research, we examined to what extent a CAI material had on students' academic achievement levels in a mathematics lesson. The CAI material was designed to teach fractions to fourth-grade students, and it was designed on the ASSURE and ARCS models. We then tested their attitudes toward CAI and toward learning mathematics in general.

Our analyses that examined the changes in students' attitudes toward CAI showed a significant difference on the attitude scales, between the pre- and post-test scores. Our results coincide with the results of past researchers. For example, Akçay, Tüysüz, Feyzioğlu, and Oğuz (2008) analyzed the effects of a computer program (which was created to instruct the topics of atoms and atom models to ninth-grade students) on the attitudes and achievements of these same students. Their study showed that students who received CAI had more positive attitudes toward using computers.

Pilli (2008) studied the effect of CAI on the academic achievements of fourth-grade students in mathematics lessons; in particular, he studied the permanence of these achievements. He also studied students' attitudes toward CAI and students' attitudes toward traditional instruction methods. He found that there was a significant difference between both groups' attitude scores. His results showed that in the students who received CAI, their attitudes were positively affected toward the CAI, versus the students who were instructed using traditional methods. In short, the use of CAI reinforces future use of CAI.

Yenice's (2003) study "Bilgisayar Destekli Fen Bilgisi Öğretiminin Öğrencilerin Fen ve Bilgisayar Tutumlarına Etkisi" (The Effect of Computer-Assisted Instruction on Students' Attitudes Toward Science and Computers) intended to determine how effective CAI is in education and concluded that it positively affects the attitudes of students toward computers.

The analyses we conducted on the pre- and post-test scores obtained from the attitude scale toward our mathematics lesson showed that the difference between these scores is not statistically significant. The reason why the attitudes of students remained unchanged was because we could not continue the experiment for a considerably long period of time. During the entirety of the experiment, the students had barely enough time to become familiar with the applied method; the duration of the experiment was, perhaps, not long enough to allow their attitudes to shift (Andiç, 2012).

Andiç's (2012) research on the instruction of permutation and combination, Çankaya and Karamete's (2008) research on the instruction of ratios and proportions, Korkmaz's (2000) research, and Uygun's (2008) all show that students' attitudes toward mathematics lessons changed positively, but the differences were not significant. The results we obtained from the attitude scale toward our mathematics lessons show that our research is in parallel with the results provided by these researchers.

Meanwhile, in other literature, there are studies that have obtained different findings. In their studies, Aksoy (2010); Hangül (2010); Pilli (2008); Furner and Marinas (2007); Nguyen, Hsieh, and Allen (2006) have obtained statistically significant differences between the scores they attained from an attitude scale toward their mathematics lessons.

Regarding students' academic achievement levels, we found a significant difference between pre- and post-test scores, implying that our computer-assisted game activities had a positive effect on students' academic achievements. This result is in parallel with studies conducted on different topics. For example, in Tufan's (2011) study that examined the effect of a math-teaching software-designed according to the multiple-intelligence theory he stated that it had a significantly positive effect on the academic achievements of the experiment group.

Durak (2009) conducted a study where he applied the stages of the ASSURE model to develop a course material that could be used to teach algorithms. He studied the effect the material had on students' mathematics performances, and he found that this software had a statistically significant effect on the academic achievements of the experiment group.

Cengiz (2009) conducted research that examined the effect of the ARCS model on sixth-grade students' academic achievements in science and technology lessons. He also studied the permanence of their learning. The study showed that the academic achievement levels of the students in the experiment group were higher than those in the control group.

Akınsola ve Anımasahun (2007) conducted research that investigated the teaching of mathematics using games and simulations to develop students' success and positive effects toward mathematic lessons.

On the other hand, in studies that are similar to our research, such as those of Yang, Zhang, Zeng, Pang, Lai and Rozelle (2013); Hava (2012); Andiç (2012); Malaş (2011); Yiğit (2007); and Plano (2004), it was found that, contrary to our findings, there is not a significant difference between the pre- and post-test scores the students attained in academic achievement tests.

Suggestions

Based on the results obtained from our study, we offer the following suggestions.

As part of this study, a CAI material was developed to teach fractions to fourth graders. Similar studies that will be conducted in the future should focus on developing materials on other topics of mathematics (or other lessons, for that matter). Other grade levels should also be

considered. Future researchers can add depth to their studies by examining the permanence of students' learning and motivation––the same elements we examined in our study.

To receive more profound research data, the number of students examined should be increased, or experiment and control groups should be formed.

Necessary adjustments should be made to the instructional software developed for such studies; such changes should deal with allowing the instruction software to be shared, used, and downloaded by students over the Internet. If access is made possible through the Internet, students from anywhere and at anytime can take advantage, and we expect that this will significantly increase the positive effects that such instructional software can provide.

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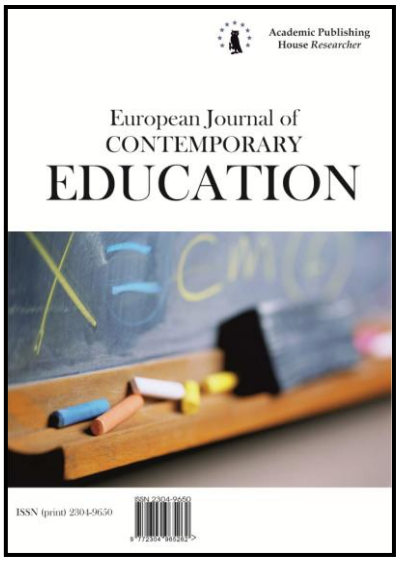

Material Development to Raise Awareness of Using Smart Boards: An Example Design and Development Research

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Abstract

This study aims to develop training material that will help raise awareness in prospective teachers regarding the benefits of using smart boards in the classroom. In this study, a Type 2 design and development research method (DDR) was used. The material was developed by applying phases of ADDIE – an instructional systems design model. The development process was informed by Mayer's multimedia design principles and Gagné's instructional events. The subject and the target group of the research was defined at the stage of needs analysis. Powtoon, an online content development tool, was used to produce multimedia material with the aim of raising awareness regarding the benefits of using smart boards in the classroom. An expert instructional designer guided the entire process of the material development. Upon completion of the development phase, three field experts were consulted and improvements were then conducted in compliance with their suggestions. Next, the material was presented to 39 teacher candidates. After they reviewed the material, their opinions were collected. These opinions were analyzed under four aspects: message, visual, sound, and overall effect. The material reached its final form following the applications of ameliorations in line with observations conducted during its application and the feedback given by the teacher candidates. Participants of the study stated that the material, on the whole, was impressive, beneficial, and captivating.

Keywords: Smart Board, Design Development Research, Instructional Design, ADDIE, Mayer.

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Introduction

The ever-developing state of technology urges the educational system to be renewed constantly. It is now considered necessary to utilize the facilities offered by modern technology and include new tools into the educational process that are appropriate to a younger generation's requirements and characters, alongside traditional educational tools and materials. It is an educator's duty to blend the new technologies of this digital age into education and to help their students to be successful in their academic career and life [1]. For this reason, educators are required to combine technology with their field of profession [2].

Vallis and Williamson believe that smart boards offer a "…good solution for solving the problem of having only one computer for a large number of students by making it easy and enjoyable for both teachers and students to interact with educational software" [3]. Researchers conducted in the field, however, show that teachers shy away from using smart boards, although they think that they are effective and useful and if they are used, they use them only as projectors or for searching the Internet and do not benefit from the many other facilities of the smart boards [4,5]. The main reason teachers and teacher candidates may not feel confident in their ability to use smart boards is because they did not receive adequate user training [1]. Thus, if they feel incompetent, teachers are not less likely to use the smart boards.

In Turkey, as part of an educational project called FATIH, classrooms of many schools have been equipped with smart boards to integrate technology into education [6]. This project aims to encourage teachers to use interactive smart boards to increase the effectiveness of their teaching. In order to increase the rate of teachers' usage of interactive smart boards, the Turkish Ministry of Education is providing in-service trainings during seminar terms held every year [7]. In this regard, it is suggested that if a full awareness can be created in teachers and a subsequent change occurs in their attitudes, the interactive smart boards will begin to be used as commonly as conventional boards. Therefore, it is important to encourage pre-service teachers to integrate interactive smart boards in their lessons when they first begin their teaching careers. When reviewing the curricula of faculties of education in Turkey, it was seen that there are not any courses that teach how to use the smart boards [8]. In our study, to encourage our colleagues to use interactive smart boards more effectively, material was developed that would highlight the many benefits smart boards offer.

Method

In terms of our selected scientific research methods, we preferred to use a Type 2 design and development method (DDR). DDR can be described as the systematic study of design, development, and evaluation process [9]. There are two types of DDR research models. Type 1, also called product and tool research, pertains primarily to studies of the design and development of products and tools. This type of research has a tendency to combine the task of doing design and development and studying the processes. These researches often document a particular design and development process. On the other hand, the Type 2, or model research, pertains to studies of the development, validation, and use of design and development models. Model research (Type 2) may focus the validty or effectiveness of an existing or newly constructed development model, process, or technique. These studies often seek to identify and describe the conditions that facilitate successful design and development [10]. Richey and Klein [11] state that DDR researches are generally reported as phases of the ADDIE model which is considered as the core instructional design model. The name "ADDIE" stands for Analysis, Design, Development, Implementation, and Evaluation, which are the five phases suggested by this instructional design model to create effective teaching tools [12]. In our study, apart from the ADDIE model, the design stage of the material also benefitted from the multimedia design principles [13] and the instructional events suggested by Gagné [12].

In this section, the development stage of the material that was conducted by following the phases of analysis, design, development, implementation, and evaluation (ADDIE) will be presented.

Analysis

During the analysis phase, specifications and preferences of the target group were examined. The target group was defined as undergraduate students who were born in a year between 1980

and 2000 -Generation Y- [14]. In the literature, this generation is described as young individuals, for which two thirds were introduced to a computer before the age of five; who have fast information access devices; who get quickly bored; and who spend about 15 hours of their day using media and communication technologies [15]. Based on knowing their attributes, to be able to reach out this group more directly and gain their attention, we decided to create a computer and Internet based material. Considering also that this group gets quickly bored and can access information very fast, it was important that the material should not take a long time to finish, be captivating so will not bore the teacher candidates, and be comprised of short instructions. Keeping all these aspects in mind, we decided to design the material as an online multimedia video that can be accessed from anywhere over the Internet with a computer or any smart device.

Design

During this phase, the content of the instructional material was designed. The content to be transferred into the material was first written and saved in a word processor file, then the texts and instructions used in the material were extracted from this file. In particular, the contents suggested on the web site of *EBA* (Educational Informatics Network) – a sub-project of FATIH project which comprises reliable online resources- were used for creating this file [16]. For this, a sample of instructional software programs created for various courses and suggested on the *EBA* website, were examined and subsequently referred to in the developed material (Figure 1).

Figure 1. A Screenshot from the Geography Lesson

The examples were chosen from different science fields so that it can be shown that smart boards are technological devices can be used in the instruction of all courses.

To increase the impact of the designed material, personalization and signaling principles were primarily taken into consideration; a concept drawn from Mayer's principles for designing multimedia learning tools. During the design of the material, the instructional events outlined by Gagné [17] were also considered, and the screens were designed in accordance with the events of gaining attention (reception) and informing learners of the objective (expectancy).

After the basic layout and content of the material to be developed were defined, the search for a suitable software program was conducted. Meanwhile, available e-learning tools were examined and the PowToon, the 19th most popular online e-learning tool in 2015 [18], was finally selected as the content development tool with which the screenplay of the content was produced.

Since the interface of PowToon is similar to that of PowerPoint, it offers a familiar development screen for the users. With its wide selection of animated characters, objects, backgrounds, and sounds and video addition, it has all the tools and objects needed for the planned video material to be produced. As it also offers some of its content creation facilities for free, it is an ideal tool for teachers to produce their own materials.

Development

The personalization principle from Mayer's principles for designing multimedia learning tools [12] suggests that close friendly relationships between the teacher and the learner and using words in conversational style rather than formal style, help people learn better. For this reason, it

was decided that an informal conversational language should be used in the produced material. Since the material was going to be watched individually by the teachers, it was thought that establishing a friendlier link with the user could help them to receive the conveyed message in a much more open manner. With this, the aim was to increase the effect of the material and make the learning more permanent.

The second principle of Mayer that was used in the production of the material was the signaling principle. According to this principle, when the key words and pictures that are crucial for the instructional subject are emphasized, the learning process becomes more permanent [12]. For this reason, in the content of the material, some cues have been used, some words have been emphasized, and appearing-disappearing effects and different colors were used to grab the attention of the user. In Figure 2, the introductory screen is shown.

Figure 2. The Introductory Screen

The development phase also benefitted from the instructional events outlined by Gagné. The gaining attention event is described as ensuring the learners concentrate on the content of the material by applying special methods to draw their attention to the subject point. In the developed material, in order to gain the teacher candidates' attention, a page asking a question was designed as shown in Figure 3.

Figure 3. A Sample Screen Shot

This question was expected to stimulate the teachers' abilities to retrieve the information in their mind and become cognitively ready to proceed to other pages. Cognitive preparedness is described as the readiness of the neural system of a learner to receive and process information [19].

Another event we used during the development phase was informing learners of the objective. In line with this event, a screen that provided fundamental information for the teachers was produced in the first part of the material (Figure 4).

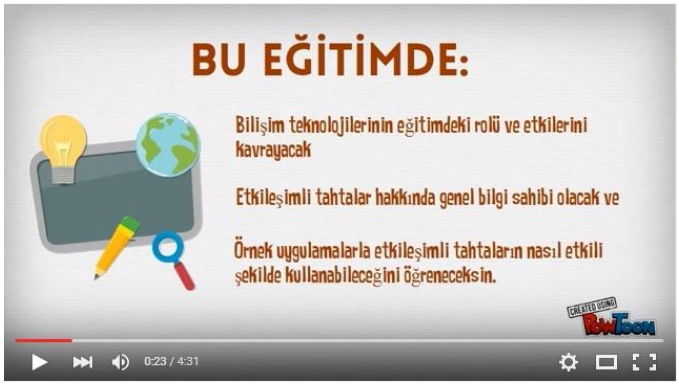

Figure 4. Information Screen

In the last stage, the aim was to produce a material with an appearance that is pleasing to the eye and reflect visual integrity. For this, a color wheel was examined and a color set was formed from the complementary colors on the disk [20]. All of the screens were designed by staying consistent to the colors on the color set. Moreover, while producing the material, we aimed to stimulate the emotions of the teacher candidates. In order to accomplish this, contents that emphasized the importance of the subject and the teacher candidate were designed and accompanied with background music that was expected to motivate the audience (Figure 5).

Figure 5. A Sample Screen for Motivation

Implementation

In DDR research, the developed product must be used in the actual intended context [21]. In this respect, it has been provided that the developed instructional material was used by 39 prospective teachers who were seniors at Balikesir University's Faculty of Education in the 2014-2015 academic year. After they viewed the material, opinions of the teacher candidates were collected through the distribution of a form on which they could write their thoughts about the material. In order to display consistency with the material itself, the same characters and the conversational language used in the material were also used on the form (Figure 6).

Figure 6. The Form Prepared to Collect Opinions from Teacher Candidates

Evaluation

Throughout the development process, an expert of the field was consulted and necessary adjustments in accordance with his advices were conducted. Moreover, additional suggestions from three academics teaching at the Department of Computer and Instructional Technologies were obtained and applied to the material. The evaluation phase of the ADDIE instructional systems design framework requires evaluating each of the four phases during any stage of the development in order to carry out necessary revisions [11]. Below is the summary of the revisions and updates performed according to the results of observations, which were conducted while the teacher candidates were using the material as well as the feedback provided by the teacher candidates:

- The first suggestion was to insert a real voice into the material. In line with this, the background music was removed and instead, voice explanations for each screen were recorded and inserted into the material.
- The second suggestion was related to the font faces used in the material that do not support the Turkish characters. New font faces were selected and used in the material.
- Another criticism was in reference to the speed of screen flow. Users thought that the screens were proceeding too fast. The durations of each screen were extended to make the screens flow at a slower pace.

Findings

In the implementation phase, a content analysis was performed on the opinions collected from the teacher candidates. The main aim of the content analysis was to reach concepts and relations that can explain the gathered data [22]. For this purpose, the suggestive statements in the data have been encoded. The relationships between the codes were examined and the suggestions were analyzed under four aspects: message, visual, sound, and overall effect. These themes as defined at the end of the analysis and the codes and frequencies of these themes are given in Table 1.

Table 1. Themes and Codes

Message	f	Visual	f	Sound	f	Overall Effect	f
Understandable	9	Beautiful	19	Voice can be added	5	Impressive	12
Friendly	7	Remarkable	12	Sound is compatible with the flow	4	Catchy	9
Texts are long	4	Font face	10	Sound is distracting	3	I wasn't bored	6
		Compatible colors	8			Useful	5

Comments of the participants regarding the content of the material were coded within the "message" theme. It is evident that participants mainly concentrated on "understandability", "friendliness", and "length" of the messages. The majority of the participants felt that the messages were clear and understandable.

The video you prepared is clear and understandable. I think the friendly, conversational manner used in the video leaves a permanent effect on the audience (P18).

However, participants also felt that the texts shown on the screen were too long. Meanwhile, they found that the content in general was sincere and friendly. These comments indicate that the use of Mayer's personalization principle has attained its goal.

I liked the video to be enriched with visual objects, the light colored background and its conversational informal language. It was sincere, clear and understandable (P21).

The second theme that was defined via content analysis was the "visual" theme under which the participants stated their opinions on the visual aspects of the material that appeared on the screen. It is evident that the participants mainly focused on "beauty", "remarkability", "font face", and "compatibility of colors". The majority of the participants thought that the design of the material was beautiful and remarkable. This result indicates that Mayer's signaling principle provided the expected benefits.

I really liked the video. I really liked the pictures and screen transition effects. The video flows very smoothly (P6).

Moreover, participants stated that the colors used in the material were pleasantly compatible with each other. This shows that choosing complementary colors has been effective. Meanwhile, many of the participants expressed their dislike of the font face that did not support Turkish characters. The font was changed in a way that satisfied the participants.

To read the texts could be much more enjoyable if a font that supports Turkish characters would have been used (P34).

During the content analysis, the opinions and critiques of the participants related to the sound of the material were coded as belonging to the "sound" theme. While some of the teacher candidates thought that the background music was compatible with the flow of the material content, some of them thought that it was distracting. However, the majority of the participants stated that the material should also have a voice presentation. As previously stated in the evaluation section, experts also suggested adding voice recordings to the material. Taking these suggestions into account, the background music was removed and voice recordings explaining the material content shown on the screen were inserted.

It was a bit difficult to read the texts. Some parts just passed before I managed to read it all. Also, the texts can be voiced over (P14).

Texts were a bit long. This is why, if the texts are voiced, it would be more impressive (P33).

The teacher candidates' thoughts on the overall impression left by the material were coded under the theme "overall effect". The majority of participants stated that the material was catchy. They also expressed that they were not bored watching it and found it really useful. Thus, we can conclude that by conducting the design of the material in accordance with the results obtained from the examination of the target group's personal attributes and specifications of the Generation Y during the examination phase, we were able to create a material that sustained the interest of the participants.

The video you produced was not boring. It changed my thoughts. It was a useful video for me… (P19).

Conclusion and suggestions

In conclusion, both participants and experts found the material impressive and relevant to its aim. It is evident that with the developed material, teacher candidates will be more willing to use the interactive smart boards. With this increased awareness, it is expected that prospective teachers will integrate technologies, such as the interactive smart boards, into their classes when they being their teaching career.

The findings obtained at the conclusion of the research show that theoretical information used while developing a material, increases the quality of the material and helps in producing a useful and functional product.

The study was planned as a Design Development Research (DDR) and the product of the research was presented for the use of a group comprised of prospective teachers. The final form of the material was developed in line with the feedback offered by the group.

It is our recommendation that through cooperative work conducted with the Ministry of Education, teachers can be encouraged to use technology, particularly smart boards, in their classrooms.

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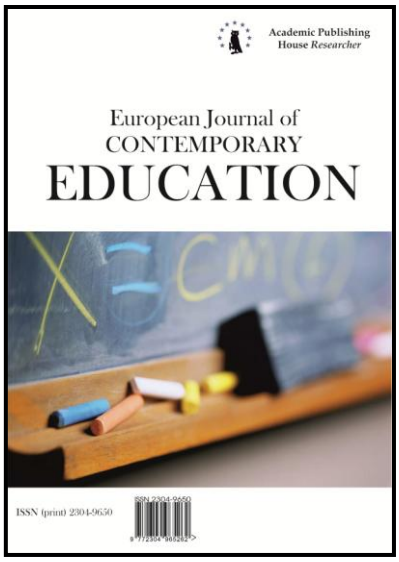

Faculty of Education Students' Computer Self-Efficacy Beliefs and their Attitudes towards Computers and Implementing Computer Supported Education

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Abstract

This study investigates faculty of education students' computer self-efficacy beliefs and their attitudes towards computers and implementing computer supported education. This study is descriptive and based on a correlational survey model. The final sample consisted of 414 students studying in the faculty of education of a Turkish university. The results show that male students have higher computer self-efficacy beliefs; major and class level variables do not affect students' computer attitudes and self-efficacies; students who have their own PC have more positive computer attitudes and higher computer self-efficacies; and the time spent on a computer each day and computer experience are correlated with computer attitudes and self-efficacies.

Keywords: Self-efficacy belief; attitudes; computer; computer supported education; faculty of education students.

Introduction

The concept of self-efficacy is emphasized in Albert Bandura's social cognitive theory (Bandura, 1977). Self-efficacy is related to people's beliefs about their ability to practice control over their own operations or over situations that influence their lives. Self-efficacy is accepted as a key factor affecting student behavior and learning. It works through influencing cognitive and affective processes and driving students' behavioral settings. The higher the perceived self-efficacy, the more a person behaves effectively (Bandura, 1994). Both optimistic and pessimistic thoughts in academic areas come from students' perceived self-efficacies (Bandura, 2006). Students' beliefs in their efficacy to promote their learning and succeed in academic work shape their goals. Teachers'

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beliefs in their efficacy to stimulate and support learning affect the kind of teaching-learning environment they create and their students' academic achievements (Bandura, 1993).

Self-efficacy is correlated with the use of computers in learning (Teo & Koh, 2010). Because of the variety of technological devices available in daily life and classrooms, the ability to use computers is becoming increasingly important. Computer self-efficacy regulates students' affective reactions such as their attitude to computers; this in turn affects their use of computers (Compeau & Higgins, 1995). Attitudes can be defined as generalized reactions to psychological images. These images may consist of people, objects, concepts, living things, values, events, and so forth. Attitude is closely related to behavior and may be affected by the nature of objects, cognitive structure, strength of attitude, and characteristics of verifiability (Satish, 1994). Attitudes also affect information processing and cognitive behaviors (Chenoby, 2014). Kao, Tsai, and Shih (2014) suggest that there is a correlation between computer self-efficacy and attitude. Attitude is correlated with computer use and can be increased by using computer software (Yavuz, 2007). Attitude, as an affective characteristic, can affect other behaviors. For example, either directly or indirectly it may lead to computer anxiety which can lead to computer avoidance (Burkett, Compton, & Burkett, 2001). The more skilled teachers are in information technology, the more they use computers in education and the happier they are with the use of them as educational tools (Bilbatua & Herrero de Haro, 2014).

Technology attitude is one of the main factors affecting computer use and is a predictor of teacher candidates' attitudes towards computer supported education (Çelik & Yeşilyurt, 2013). Teachers' use of technology is affected by their beliefs (Teo & Koh, 2010). Teacher candidates need to have attitudes and self-efficacy beliefs about computers because when they become teachers they are expected to use computers effectively in classroom activities. According to Hakverdi, Gücüm, and Korkmaz (2007), educational computer use is affected by pre-service science teachers' self-efficacies in teaching with computers. For example, computer-based science lessons can be designed using programmed learning principles (Berkant & Efendioğlu, 2010) and the use of computers in science teaching helps teachers to develop different teaching strategies (Morse, 1991). Classroom teachers can also use computers for presenting videos, photos, concept maps, simulations, programmed instruction, and so forth.

The effects of some factors on computer self-efficacy beliefs and attitudes have been tested in a number of studies. According to Agbatogun (2010), there is a significant correlation between computer attitude and gender, and most of the results of the studies show significant differences in favor of male students and teachers. On the other hand, Teo (2010) did not find any significant difference between male and female teachers' computer attitudes. Sam, Othman, and Nordin (2005) documented no significant difference between male and female students' computer self-efficacies and their attitudes towards the Internet. In addition, they did not find a meaningful correlation between the duration of time spent using the Internet and self-efficacy and attitudes. However, Karsten and Roth (1998) showed that students' training experience, consisting of time spent on a computer, increased their self-efficacies significantly. In the same study, gender was not found to be a factor that affects self-efficacy. But Miura (1987) argues that male students rate themselves higher than women for perceived computer self-efficacy. Similarly Durndell and Haag (2002) found that male students tended to report greater computer self-efficacy and a more positive attitude towards the Internet. Çelik and Yeşilyurt (2013) state that teacher candidates' attitudes towards technology and computer self-efficacy beliefs are important predictors of their attitude towards implementing computer supported education. Cassidy and Eachus (2002) found computer experience to be an effective variable on computer self-efficacy and that male students show higher computer self-efficacy than females. According to Yavuz (2007), cooperative learning projects in interactive learning environments positively affect students' technology attitude.

The Purpose of Study

The main purpose of this study was to investigate faculty of education students' computer self-efficacy beliefs (CSEB), their attitudes towards computers (ATC) and their attitudes towards implementing computer supported education (ATICSE) focusing on a number of variables. To achieve this purpose, the following research questions were determined:

1. Are there significant differences between students' CSEB, ATC, and ATICSE in terms of gender, study major, class level, and personal computer ownership?

2. Are there significant correlations between the time students spend on a computer each day and their CSEB, ATC, and ATICSE?

3. Are there significant correlations between students' computer experience and their CSEB, ATC, and ATICSE?

4. Are there significant correlations between students' grade point average and their CSEB, ATC, and ATICSE?

5. Are there significant correlations between students' CSEB, ATC, and ATICSE?

Methodology

This study is descriptive and based on a correlational survey model. In this model, the correlations between dependent and independent variables are examined (Karasar, 2011).

Population and Sample

The population of the study consisted of students studying at the Faculty of Education at Kahramanmaraş Sütçü İmam University in the 2015–2016 educational years. The final sample consisted of a total of 414 students selected by convenience sampling method. The demographic information of the sample is presented in Table 1.

As shown in Table 1, most of the participants were junior, female students who were studying a classroom teaching major and had a personal computer (PC), tablet, or so forth.

Table 1. Demographic information of data

		Frequency	Percent
Gender	Male	74	17.9
	Female	340	82.1
Major	Classroom teacher major (CTM)	237	57.2
	Science teacher major (STM)	177	42.8
Class level	Freshman	101	24.4
	Sophomore	101	24.4
	Junior	109	26.3
	Senior	103	24.9
Having PC, tablet, etc.	Yes	249	60.1
	No	165	39.9
	Total	414	100

Data Collection Tools

For collecting data, the Computer Attitude Scale (CAS) (Ekici & Bahçeci, 2006), the Scale of Attitude toward Implementing Computer Supported Education (SAICSE) (Arslan, 2006), and the Computer Self-Efficacy Scale (CSES) (Ekici, 2004) were used. The CAS includes 18 items, the SAICSE includes 20 items, and the CSES includes 10 items with a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For determining the reliabilities of the scales, their Cronbach's alpha coefficients were recalculated with the data collected from the sample and determined to be .85 for CAS, .91 for SAICSE, and .90 for CSES. According to these results, the scales could be accepted as reliable.

Data Analysis and Interpretation

The data were analyzed with an independent samples t-test, a one-way analysis of variance (ANOVA), and a Pearson's correlation analysis using SPSS 17.0. The correlation coefficients from 0 to 0.30 or from 0 to -0.30 are regarded to indicate low correlation, coefficients from .031 to 0.70 or from -0.31 to -0.70 point to medium correlation, and coefficients from .071 to 1 or from -0.71 to -1 indicate high correlation (Büyüköztürk, 2010). Partial eta-squared effect sizes of the significant differences were calculated. For partial eta-squared, .01 was considered a small effect size, .06 a medium effect size, and .14 a large effect size (Büyüköztürk, Çokluk, & Köklü, 2010). An increase in total points of the scales was interpreted as an increase in attitude and self-efficacy belief while a decrease in points was accepted as a decline in attitude and self-efficacy belief.

Findings

In this section, the findings of the analyses for the dependent variables (CSEB, ATC, ATICSE) in terms of some independent variables (gender, study major, class level, PC ownership, time spent on a computer each day, computer experience, grade point average) are given.

The Findings for the Gender Variable

According to the findings of Levene's test, equal variances were assumed in terms of the gender variable for students' CSEB (F=.333, p>.05), ATC (F=.003, p>.05), and ATICSE (F=.708, p>.05). The findings of an independent samples t-test for the students' CSEB, ATC, and ATICSE in terms of gender are presented in Table 2.

Table 2. The findings for the students' attitudes and self-efficacy beliefs in terms of gender

Variable	Gender	N	$\overline{X}$	SD	t	df	p	η^2
CSEB	Male	74	30.9	7.4	-2.5	412	.01*	.01
	Female	340	28.4	7.7				
ATC	Male	74	61.4	9.4	-1.75	412	.08	
	Female	340	59.2	9.7				
ATICSE	Male	74	70.2	12.0	.043	412	.96	
	Female	340	70.3	12.1				

*p<.05

As shown in Table 2, a significant difference between the students' CSEB, with a low effect size of gender on CSEB, was found in favor of male students [t(412)=-2.5, p<.05], but no significant difference was found for students' ATC [t(412)=-1.75, p> .05] and ATICSE [t(412)=.043, p>.05] in terms of gender. These findings show that the gender variable had an effect on students' CSEB and that the male students had significantly higher CSEB than female students, but the gender variable had no effect on students' ATC and ATICSE.

The Findings for the Major Variable

According to the findings of Levene's test, equal variances were assumed in terms of the major variable for students' CSEB (F=2.905, p>.05), their ATC (F=.782, p>.05) and their ATICSE (F=1.879, p>.05). The findings of an independent samples t-test for the students' CSEB and their ATC and ATICSE in terms of study major are presented in Table 3.

Table 3. The findings for the students' attitudes and self-efficacy beliefs in terms of study major

Variable	Major	N	$\overline{X}$	SD	t	df	p
CSEB	CTM	237	28.5	7.4	-1.01	412	.31
	STM	177	29.3	8.1			
ATC	CTM	237	59.1	9.7	-1.08	412	.27
	STM	177	60.2	9.7			
ATICSE	CTM	237	71.0	11.7	-1.38	412	.16
	STM	177	69.3	12.6			

As shown in Table 3, significant differences were not found for the students' CSEB [t(412)=-1.01, p>.05], ATC [t(412)=-1.08, p>.05], and ATICSE [t(412)=-1.38, p>.05] in terms of their study major. These findings show that the study major variable had no effect on students' CSEB, ATC, or ATICSE.

The Findings for the Class Level Variable

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' CSEB (F=1.202, p>.05). The findings of an ANOVA for the students' CSEB in terms of class level are presented in Table 4.

As shown in Table 4, there was no significant difference between students' CSEB in terms of class level [F(3,410)=1.94, p>.05]. This finding shows that the class level variable had no effect on students' CSEB.

Table 4. The findings for the students' CSEB in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	27.3	8.1	Between Groups	348.9	3	116.3	1.94	.12
Sophomore	101	29.0	8.0	Within Groups	24478.9	410	59.7		
Junior	109	29.8	7.2	Total	24827.9	413			
Senior	103	29.3	7.5						

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' ATC (F=1.748, p>.05). The findings of an ANOVA for the students' ATC in terms of class level are presented in Table 5.

Table 5. The findings for the students' ATC in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	58.6	10.8	Between Groups	268.6	3	89.5	.93	.42
Sophomore	101	60.5	9.6	Within Groups	39098.7	410	95.3		
Junior	109	60.3	8.8	Total	39367.4	413			
Senior	103	59.0	9.5						

As shown in Table 5, there is no significant difference between students' ATC in terms of class level [F(3,410)=.93, p>.05]. This finding shows that the class level variable had no effect on students' ATC.

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' ATICSE (F=1.414, p>.05). The findings of an ANOVA for the students' ATICSE in terms of class level are presented in Table 6.

Table 6. The findings for the students' ATICSE in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	68.9	12.7	Between Groups	797.4	3	265.8	1.82	.14
Sophomore	101	69.3	13.4	Within Groups	59869.3	410	146.0		
Junior	109	72.5	10.5	Total	60666.7	413			
Senior	103	70.2	11.5						

As shown in Table 6, there is no significant difference between students' ATICSE in terms of class level [F(3,410)=1.82, p>.05]. This finding shows that the class level variable had no effect on students' ATICSE.

The Findings for the PC Ownership Variable

According to the findings of Levene's test, equal variances were assumed in terms of the PC ownership variable for students' CSEB (F=.615, p>.05), their ATC (F=.536, p>.05) and their

ATICSE (F=1.887, p>.05). The findings of an independent samples t-test for the students' CSEB, ATC, and ATICSE in terms of whether they had a PC or not are presented in Table 7.

Table 7. The findings for the students' attitudes and self-efficacy beliefs in terms of PC ownership

Variable	PC ownership	N	$\overline{X}$	SD	t	df	p	η^2
CSEB	Yes	249	30.0	7.5	3.57	412	.000*	.03
	No	165	27.2	7.8				
ATC	Yes	249	61.7	9.7	5.54	412	.000*	.07
	No	165	56.4	8.9				
ATICSE	Yes	249	71.8	12.4	3.26	412	.001**	.03
	No	165	67.9	11.2				

*p<.001 **p<.01

As shown in Table 7, there are significant differences between the students' CSEB with a small effect size [t(412)=3.57, p<.001], between their ATC with a medium effect size [t(412)=5.54, p<.001], and between their ATICSE with a small effect size of PC ownership [t(412)=3.26, p<.01] in favor of the students with their own PC. These findings show that the PC ownership variable had an effect on students' CSEB, ATC, and ATICSE. The students who had their own PC had significantly higher CSEB, ATC, and ATICSE than the students who did not.

The Findings for the Time Spent on a Computer Each Day Variable

The findings for the correlations between the time spent on a computer by students each day and their CSEB, ATC, and ATICSE are presented in Table 8.

Table 8. The findings for the correlations between the time spent by students on a computer each day and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Time spent on computer each day	347	.21	.000*
ATC*Time spent on computer each day	347	.30	.000*
ATICSE*Time spent on a computer each day	347	.19	.000*

*p<.001

As shown in Table 8, there are significant, positive, and low correlations between the time spent by students on a computer each day and their CSEB, ATC, and ATICSE (p<.001). These findings show that students' CSEB, ATC, and ATICSE change in parallel with time spent on computers by students, so an increase in time spent on a computer may be expected to increase students' CSEB, ATC, and ATICSE, while a decrease in time spent on a computer may be expected to decline students' CSEB, ATC, and ATICSE.

The Findings for the Computer Experience Variable

The findings for the correlations between the students' computer experience and their CSEB, ATC, and ATICSE are presented in Table 9.

Table 9. The findings for the correlations between the students' computer experience and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Computer experience	343	.29	.000*
ATC*Computer experience	343	.26	.000*
ATICSE*Computer experience	343	.18	.001**

*p<.001 **p<.01

As shown in Table 9, there are significant, positive, and low correlations between the students' computer experience and their CSEB (p<.001), ATC (p<.001), and ATICSE (p<.01). These findings show that students' CSEB, ATC, and ATICSE change in parallel with computer experience, so an increase in computer experience may be expected to increase students' CSEB, ATC, and ATICSE while a decrease in computer experience may be expected to decline students' CSEB, ATC, and ATICSE.

The Findings for the Grade Point Average Variable

The findings for the correlations between the students' grade point average and their CSEB, ATC, and ATICSE are presented in Table 10.

Table 10. The findings for the correlations between the students' grade point average and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Grade point average	313	-.03	.60
ATC*Grade point average	313	-.02	.68
ATICSE*Grade point average	313	.07	.19

As shown in Table 10, significant correlations were not found between the students' grade point average and their CSEB, ATC, and ATICSE (p>.05). These findings show that any change in students' grade point average does not result in change to their CSEB, ATC, and ATICSE.

The Findings for the Correlations between CSEB, ATC, and ATICSE

The findings for the correlations between the students' CSEB, ATC, and ATICSE are presented in Table 11.

Table 11. The findings for the correlations between the students' self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*ATC	414	.55	.000*
CSEB*ATICSE	414	.69	.000*
ATC*ATICSE	414	.32	.000*

* p<.001

As shown in Table 11, there were significant, positive, and moderate correlations between the students' CSEB, ATC, and ATICSE (p<.001). These findings show that the changes between the students' CSEB, ATC, and ATICSE moved in the same direction.

Results, Discussion and Proposals

Self-efficacy, not only as a personal characteristic but also as an important factor in education, influences the use of technology in teaching and learning environments (Gilakjani,

2013) and can be affected by different factors. Gender is one of the factors which may affect computer self-efficacy. Although there has been progress in gender equality over the past few years, a significant gap is still observed between males and females regarding computer use (Hsiao, Lin, & Tu, 2010). In this study, male students' computer self-efficacies were found to be significantly higher than those of female students. This difference may result from social expectation and acceptance of the male tendency to use technological devices. Similarly, according to some studies (Busch, 1996; Hsiao et al., 2010; Öztürk, Bozkurt, Kartal, Demir, & Ekici, 2011; Şimşek, 2011; Topkaya, 2010), male students have higher computer self-efficacy scores than females. On the contrary, Adalıer (2013), Adebowale, Adediwura, and Bada (2009), Busch (1995), Embi (2007), Johnson and Wardlow (2004), Pamuk and Peker (2009), Sam et al. (2005), and Ünlü and Süel (2014) do not document any significant difference between male and female students' computer self-efficacies.

Apart from gender, students' computer self-efficacies may differ according to their study majors. In some majors, pre-service teachers may use computers in the course of their training. In this study, CTM and STM were used as independent variables of computer self-efficacy and no effect was found. This may be a result of there being similar requirements for CTM and STM students and similar patterns of computer use in these majors. In contrast to this result, Şahin and Göçer (2013) found a significant difference between teachers' computer self-efficacies in terms of their branch of study and Adalıer (2013) found a significant difference between students' computer self-efficacies based on their study majors. Similarly, Sam et al. (2005) documented the effect of academic major on students' computer self-efficacies. Adebowale et al. (2009) also showed a correlation between major and computer self-efficacy.

At first sight, an increase in computer self-efficacy may be expected to increase in parallel with class level. But in this study, no significant difference concerning class level was found. When taking into consideration the content of the teacher training being undertaken by the participants, which includes first-year computer education only, this result is not surprising. Correlatively, Ünlü and Süel (2014) did not find any relationship between class level and computer self-efficacy. But Pamuk and Peker (2009), Şimşek (2011) and Öztürk et al. (2011) found that students' computer self-efficacy decreased in parallel with their school level. In Topkaya's (2010) study, a significant difference was found between students' computer self-efficacies, in favor of fourth-grade students when compared with preparatory class students.

The age of technology we live in requires ownership of a smart phone, laptop, or desktop computer. It can be expected that when a student has a computer, more time is dedicated to learning how to use it and this may lead to an increase in computer self-efficacy. This assumption is highlighted in this study by significantly higher self-efficacy scores for students who have their own computer. This result is compatible with other studies (Pamuk & Peker, 2009; Topkaya, 2010; Ünlü & Süel, 2014) which also found that students with their own PC had higher self-efficacies than those who did not.

It may be expected that a student who spends more time on a computer each day will gradually gain self-efficacy towards computer use. This association is supported by the significant positive correlation documented in this study between time spent on a computer each day and computer self-efficacy. This result shows that students accustomed to the use of computers gain self-efficacy in daily life and in education when they spend more time on a computer. Similarly, Bebetsos and Antoniou (2008) argue that students are occupied more with their computers. Topkaya (2010) reports a significant difference between computer self-efficacies of students who use computers frequently and less frequently, in favor of frequent use.

Because of the ubiquitous availability of technology, even if students do not have a personal computer, they can gain experience in computer use in other ways. In general, experience is related to self-efficacy (Bandura, 1977); this study shows a significant positive correlation between self-efficacy and computer experience, thereby supporting this general view. Some other studies (Busch, 1996; Hsiao, et al., 2010; Topkaya, 2010) show a significant relationship between computer experience and computer self-efficacy. Şahin and Göçer (2013) found that computer self-efficacy increases when computer experience improves.

Grade point averages which indicate students' academic achievements may be interpreted by some educators as indicators of various acquisitions. But some achievements that are supposed to be gained by students cannot be related to the scores indicated by these evaluation processes.

In this study, students' grade point averages were tested for their correlation with computer self-efficacy beliefs but no significant relationship was found. As is already known, the educational instruction of science and classroom teachers is not based on computers. So, the ineffectiveness of grade point average as an indicator of computer self-efficacy could be expected. On the contrary, Öztürk et al. (2011) found a significant positive correlation between general academic achievement and computer self-efficacy.

Apart from the CSEB variable, students' ATC and ATICSE were tested as dependent variables in this study. These variables take into account the kinds of attitudes that students may have of the teaching-learning process, and as affective characteristics they can be influenced by internal and external factors. Gender, as an internal factor and an independent variable, was tested on ATC and ATICSE and no significant effect was found. This result might be driven by male and female students' having similar requirements for computer use in daily life and for education purposes. Similarly, in some studies (Adalıer, 2013; Adebowale et al., 2009; Busch, 1995; Chenoby, 2014; Gujjar, Naeemullah, & Tabassum, 2013; Kitchakarn, 2015; Pamuk & Peker, 2009; Sam et al., 2005; Yıldırım & Kaban, 2010) gender was not found to be an effective variable on computer attitude. Tılfarlıoğlu and Ünaldı (2006) did not find any correlation between gender and computer aided instruction. Önder, Çelik, and Sılay (2011) found that students had a positive attitude towards implementing computer supported education, but they did not find gender to be an effective factor on this attitude. On the contrary, there are also some studies that have found gender to be related to computer attitude (Tsai & Tsai, 2003). Male dominance is still prevalent with respect to computer attitudes (Kay, 2007), so it can be observed in the literature that male students have more positive attitudes towards computers than females (Bebetsos & Antoniou, 2008; Daigle & Morris, 1999; Pektaş & Erkıp, 2006; Sadık, 2006; Shashaani, 1997; Smith, 2012). Looking at a different effect, results of some studies (Kaplan, Öztürk, Altaylı, & Ertör, 2013) indicate a significant difference in favor of females in attitudes towards implementing computer supported education. Fančovičová and Prokop (2008) found a significant but weak effect of gender on attitudes towards computer use.

Students' attitudes may vary according to the major they study. The students in majors that naturally involve computer use, such as computer teaching, would be expected to have more positive attitudes towards computers. In this study, CTM and STM students' ATC and ATICSE were investigated. No significant differences were found between the students' of these two majors. This result may be due to the similar level of computer use in the teacher training programs of these majors. This is in accordance with Önder et al. (2011), who found that students' majors do not affect their attitudes towards implementing computer supported education. Similarly, according to Tılfarlıoğlu and Ünaldı (2006), major has no effect on attitude towards computer aided instruction. Adalıer (2013), Sam et al. (2005), and Smith (2012) did not document any significant difference between students' computer attitudes in terms of their academic major. However, in the literature some results can be found that show significant differences in computer attitudes across majors (Adebowale et al., 2009).

Class level could be expected to affect computer attitude due to students' development over time. However, this study found that students' ATC and ATICSE were not affected by their class level. This result may be driven by the constancy of qualitative and quantitative factors related to computer use during educational training. It is compatible with the results of other researchers (Al-Jabri & Al-Khaldi, 1997; Önder et al., 2011; Smith, 2012; Yıldırım & Kaban, 2010), indicating no significant correlation between students' class level and computer attitude.

Students' attitudes towards computers can be observed through their exhibition of different desired or undesired emotions. Expressions, such as computer anxiety and computer-phobia, are used to categorize these emotions (Burkett, Compton, & Burkett, 2001). Having a personal computer may be a solution for overcoming undesired emotions and may lead to some changes in students' cognitive or affective domains; hence computer ownership should affect ATC and ATICSE. In this study, this was validated by the significant difference between ATC and ATICSE, in favor of the students with a computer. This was an expected result due to the contribution of computer ownership on computer use. In a parallel result, Gujjar, Naeemullah, and Tabassum (2013) documented that students who have a computer at home are significantly better than their counterparts on fear of using computer. According to Al-Jabri and Al-Khadi (1997), Pamuk and Peker (2009), and Tsai and Tsai (2003) those who own computers have a higher degree of attitude

than those who do not. Shashaani (1997) reports a significant relationship between computer ownership and computer attitude. But some studies (Fančovičová & Prokop, 2008; Sadık, 2006) did not find any correlation between students' ownership of a computer and their attitude towards computers.

Due to computer ownership, students can spend more time on computers, and therefore be more experienced in using them. In this way an increase in students' ATC and ATICSE may be expected in parallel with computer experience. In this study, significant positive correlations are documented between the students' ATC and ATICSE and the time they spend on computers and their computer experience. Similarly, Shashaani (1997) found a significant positive correlation between computer attitude and the hours spent using a computer in school, and between students' PC experience and their attitudes towards computers. The findings of Fančovičová and Prokop (2008) indicate that time spent on a computer increases students' computer attitudes. Al-Jabri and Al-Khaldi (1997) suggest that more experienced users are likely to have more positive attitudes towards computers. Also, results of some studies (Sadık, 2006; Tsai & Tsai, 2003) show that computer experience affects computer attitude. But Kitchakarn (2015) documents that students' attitudes towards using computers as learning tools are positive, regardless of how long they have been using computers.

Attitudes not only consist of affective components but also cognitive ones (García-Santillán, Moreno-Garcia, Carlos-Castro, Zamudio-Abdala, & Garduño-Trejo, 2012). Thus, scores which show cognitive behavior, such as grade point averages, may be correlated to ATC and ATICSE. In this study, this correlation was tested and found to be significant and positive. In support of this, Wong, Ibrahim, and Ayub (2012) found that some factors affecting grade point average, such as information processing and selecting main ideas, are correlated to computer attitude.

As discussed above, three dependent variables were tested in this study: students' CSEB, their ATC, and their ATICSE. These variables can operate interrelatedly on students' affective, cognitive, and behavioral learnings. For meaningful data, correlations among these variables are required. These correlations were tested in this study and significant positive correlations were found among CSEB, ATC, and ATICSE. As expected, this result shows close relationships between self-efficacy and attitude and is parallel with results of some similar studies (Compeau & Higgens, 1995; Pamuk & Peker, 2009). Pektaş and Erkıp (2006) argue that students' attitude towards computer use in classroom studies is highly related to their general attitude towards computers. Adalıer (2013) found a moderately positive significant correlation between computer self-efficacy and computer attitude.

According to the findings of this research, the following proposals may be put forward:

- Because of the findings about the male dominancy of computer self-efficacy, some activities that would be preferred by females should be organized within a computer-based environment.
- Due to the significant correlation between PC ownership, time spent on a computer each day, computer experience and students' CSEB, ATC, and ATICSE, suitable environments and conditions for sufficient interaction time with computers for educational purposes should be provided.
- In this study, no significant correlation is found between grade point average and CSEB, ATC, and ATICSE. Thus, teachers may be sure that students' academic achievements do not guarantee their attitude and self-efficacy towards computers. Therefore, teachers should take into consideration specific activities which enhance students' self-efficacy and attitudes rather than academic achievement.
- This study involved the students of two study majors (CTM and STM). The students of different majors could be compared in further studies.
- In further studies, a mixed model using qualitative data collection techniques such as interview and observation could be used alongside the quantitative techniques of this research.
- As it is well known, experimental studies of educational sciences can contribute greatly to the implementation of theories. For example, Topal and Akgün (2015) have trialed an educational program for increasing prospective teachers' Internet use self-efficacy and found the program to be effective. In further studies, experimental methods may be preferred more than descriptive ones because of their ability to increase students' or teachers' self-efficacy beliefs and attitudes towards computers.

- This study is based on students' views. The views of instructors working in education faculties could be investigated in future studies.

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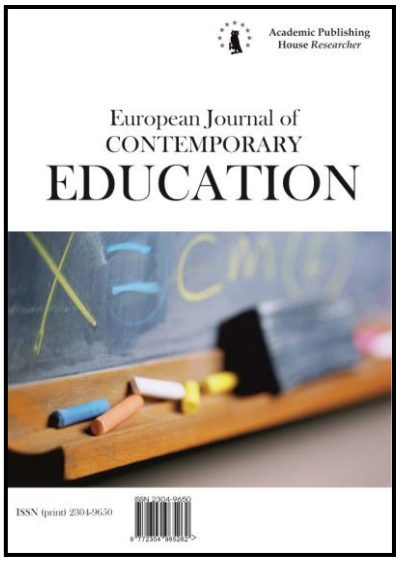

Cyberbully and Victim Experiences of Pre-service Teachers

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Abstract

The aim of this study was to determine the prevalence of different types of cyber bullying, the ways in which cyber bullying occurred, whether the identity of cyber bullies were known, and reaction to being cyber bullied among pre-service teachers. Relationships between gender and likelihood of being a cyber bully/victim were also investigated. Using a questionnaire based on the Cyber Bully and Victim Scale developed by [1], males were found to engage in cyber bullying more than females. Cyber bullying mainly occurred through e-mail, text messages, and phone calls. Although most cyber bullying victims talked with others about their experience, most cyber bullies did not talk about their harmful behavior to others. Victims often did not know the cyber bully and ignored the cyber bullying when it occurred.

Keywords: cyber bullying, cyber bully, cyber victim, cyber crime, pre-service teachers.

Introduction

In the current digital age, constant interaction with the internet via computers, tablets, and mobile phones is a normal way of life for children, adolescents, and young adults. For young, technologically advanced generations, e-mailing, text messaging, chatting, blogging, using search engines, online gaming, and participating in social networks are vital activities. Although young people use the internet for entertainment, education, and other socially beneficial activities, internet activity can also be abusive and result in material and moral damage. Thus, the benefits and advantages of technology may go hand-in-hand with harmful outcomes. Computer viruses, hacking, pornographic web sites, spam, and cyber bullying are some of the most disadvantageous outcomes of technology. Cyber bullying, which is the focus of the present study, is a serious danger for young people. According to recent research by [2], cyber bullying is commonly encountered in age groups ranging from high school to university students.

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Bullying has evolved with the popularization of information and communication devices, with cyber-bullying being that which occurs in virtual environments. Cyber bullying has been defined in several different ways. For instance, [3] define cyber-bullying as a deliberate behavior carried out repeatedly over time that inflicts nontrivial psychological and emotional pain on the victim. [4] define cyber-bullying as a form of covert psychological bullying in which electronic devices such as e-mail, text messages, video clips, instant messaging, photos, and personal websites are repeatedly used to convey hostility with the intent to harm another person. The Wired Safety organization considers cyber-bullying as the intentional and repetitive targeting of one young person by another young person using the internet or other interactive and digital technologies in a way that includes torture, threat, harassment, or humiliation [5]. The International Crime Prevention Council defines cyber-bullying as sending messages or images related to the target person to other people via computers, mobile phones, or other devices to cause harm or embarrassment [6]. [7] Considers cyber-bullying to include the sending or posting of harmful information using digital technology to socially oppress another person. [8] Describes cyber-bullying and other activities that harm those using cyber technologies as the "black face of technology." In light of these definitions, important distinctions have been noted between cyber-bullying and physical bullying. In particular, [9] and [10] describe cyber-bullying as a hidden activity. Therefore, cyber-bullying can be considered a type of bullying performed repetitively and secretively within both dyadic and group virtual interactions that causes psychological damage to the victim.

According to the definitions, cyber-bullying individuals have efficiently used all opportunities of informatics. Having millions of internet and mobile phone users all over the world and connecting to the internet through several tools are indicators that the potential for cyber bully and cyber victim is fairly high. The masterful use of information technology by children and the young facilitates individuals in this age group to be cyber bully/victim.

When analyzing the literature, it should be observed that the studies have been mainly conducted with primary school, secondary school, high school and university students ([11-34]). Part of this study focuses on the relationship between cyber-bullying and demographic characteristics, and another part on the investigated relationship between cyber-bullying and features such as academic success, self-esteem, loneliness, aggressiveness.

Although there are numerous studies conducted with children and young people, it was not observed that there is a study conducted with prospective teachers. It is important to determine the experience of cyber-bullying of the teachers, because of being a role model for children and young people in education, and as part of the main factor to prevent unwanted behavior such as cyber bullying.

For that reason, pre-service teachers created the sample of the research. Within the scope of the research, answers to the questions below were sought:

1) How often have you been exposed to cyber bullying?
2) In what ways have you been exposed to cyber bullying?
3) With whom did you talk about your exposure to cyber bullying?
4) Did you know the cyber bully?
5) What was your reaction to being cyber bullied?
6) How often have you engaged in cyber bullying?
7) In what ways did you engage in cyber bullying?
8) Did you talk about your engagement in cyber bullying with anyone?
9) With whom did you talk about your engagement in cyber bullying?
10) Does the rate of being a cyber-victim differ according to the gender of students?
11) Does the frequency of being a cyber-victim differ according to the gender of the students?
12) Does the rate of cyber-bullying differ according to the gender of the students?
13) Does the rate for the frequency of cyber-bullying differ according to the gender of the students?

Method

Participants

The research sample included 199 randomly chosen students enrolled in the Trakya University Faculty of Education. All students voluntarily agreed to participate in the study.

Cyber bullying questionnaire

A 10-item questionnaire was developed by the researcher to obtain information on student gender and cyber bullying experiences. This questionnaire was based on the Cyber Bully and Victim Scale previously developed by [1], which includes two sections with three dimensions and 19 questions. Questions about experience as a cyber victim were asked in the "I was exposed to cyber bullying" section, and questions about experience as a cyber bully were asked in the "I engaged in cyber bullying" section. Each section included three dimensions: "sexual bullying in a virtual environment," "obstruction and inflicting harm in a virtual environment," and "spreading rumors in a virtual environment." Because the scale was previously used in another age group, Cronbach's alpha values were calculated for this study. The values indicated that the reliability of the scale was acceptable (Table 1).

Table 1. Cyber bully and victim scale reliability coefficients

	Cronbach's alpha
Sexual bullying in a virtual environment (cyber victim)	0.825
Obstruction and inflicting harm in a virtual environment (cyber victim)	0.890
Spreading rumors in a virtual environment (cyber victim)	0.872
General cyber victim	**0.899**
Sexual bullying in a virtual environment (cyber bully)	0.833
Obstruction and inflicting harm in a virtual environment (cyber bully)	0.826
Spreading rumors in a virtual environment (cyber bully)	0.848
General cyber bully	**0.856**

Statistical Analysis

Data were evaluated using descriptive statistics [e.g., number, percentage, average, standard deviation (SD)]. Kormogrov-Smirnov Normal Distribution tests determined that variables were normally distributed. Comparisons between genders were performed using Mann Whitney U and Chi-square tests. Statistical significance was set at $p<0.05$.

Results

Of the 199 pre-service teacher-students, 118 were female, and 81 were male (Table 2).

Table 2. Participant gender

		N	%
Gender	Female	118	59.3
	Male	81	40.7

Average general cyber victim score was 22.327 ± 5.579, and average general cyber bully score was 20.141 ± 3.266 (Table 3).

Table 3. Average general cyber bully/victim scores

	N	Avg.	SD	Min.	Max.
General cyber victim score	199	22.327	5.579	19.000	52.000
General cyber bully score	199	20.141	3.266	19.000	43.000

Considering both males and females, 13.6% of students were exposed to cyber bullying once, 8.0% were exposed twice, 5.5% were exposed three times, and 12.1% were exposed four or more times ("*How often have you been exposed to cyber bullying?*"; Table 4.1).

Exposure to cyber bullying occurred in many different ways, including e-mail (24.1%), SMS (15.1%), phone calls (14.1%), chatting (13.6%), embarrassing or humiliating notes on social networking sites (5.5%), embarrassing or humiliating pictures/videos on social networking sites (1.5%), and online forums (1.0%) ("*In what ways have you been exposed to cyber bullying?*"; Table 4.1).

Students were most likely to talk about their exposure to cyber bullying with friends (34.2%), although some had also talked with siblings (9.5%), parents (7.5%), the police (3.5%), teachers (1.5%), and prosecution officers (1.5%) ("*With whom did you talk about your exposure to cyber bullying?*"; Table 4.1).

Most students reported that they did not know the individuals who cyber bullied them (64.1%) ("*Did you know the cyber bully*?" Table 4.1).

In response to being the victim of cyber bullying, many students reported that they ignored the cyber bullying (48.7%). However, some told friends about the experience (19.2%), some reacted in the same manner (i.e., cyber bullied in return; 15.4%), and some reacted in other ways (16.7%) ("*What was your reaction to being cyber bullied?*"; Table 4.2).

72.9% of students had never engaged in cyber bullying, 15.6% had engaged in cyber bullying once, and 11.6% had engaged in cyber bullying twice or more ("*How often have you engaged in cyber bullying*?"; Table 4.2), indicating that a large proportion of teacher-students had also engaged in cyber bullying.

Engagement in cyber bullying also occurred in many different ways, including embarrassing or humiliating notes on social networking sites (11.1%), text messages (10.6%), embarrassing or humiliating pictures/videos on social networking sites (10.6%), chatting (8.0%), phone calls (7.5%), online forums (7.0%), e-mail (6.5%), and multimedia messages (6.0%) ("*In what ways did you engage in cyber bullying*?" Table 4.2).

Of the 54 students who had engaged in cyber bullying, most reported that they did not talk with anyone about their cyber bullying (64.8%) ("*Did you talk about your engagement in cyber bullying with anyone*?" Table 4.2). However, some students talked about their cyber bullying with friends (72.2%), siblings (61.1%), teachers (61.1%), or parents (59.3%).

Table 4.1. *Distribution of cyber bullying questionnaire responses*

		N	%
How often have you been exposed to cyber bullying?	Never	121	60.8
	Once	27	13.6
	Twice	16	8.0
	Three times	11	5.5
	Four times or more	24	12.1
In what ways have you been exposed to cyber bullying?	Text message (SMS)	30	15.1
	Multimedia message (MMS)	3	1.5
	E-mail	48	24.1
	Chat	27	13.6
	Online forum	2	1.0
	Phone call	28	14.1
	Embarrassing/humiliating notes on social networking sites	11	5.5
	Embarrassing/humiliating pictures/videos on social networking sites		
With whom did you talk about your exposure to cyber bullying?	Parent	15	7.5
	Sibling	19	9.5
	Friend	68	34.2
	Teacher	3	1.5

	Police	7	3.5
	Prosecution officer	3	1.5
Did you know the cyber-bully?	Yes	28	35.9
	No	50	64.1

Table 4.2. *Distribution of cyber bullying questionnaire responses*

		N	%
What was your reaction to being cyber bullied?	Cyber bullied in return	12	15.4
	Told friends	15	19.2
	Ignored the incident	38	48.7
	Other	13	16.7
How often have you engaged in cyber bullying?	Never	145	72.9
	Once	31	15.6
	Twice or more	23	11.6
In what ways did you engage in cyber bullying?	Text message (SMS)	21	10.6
	Multimedia message (MMS)	12	6.0
	E-mail	13	6.5
	Chat	16	8.0
	Online forum	14	7.0
	Phone call	15	7.5
	Embarrassing/humiliating notes on social networking sites	22	11.1
Did you talk about your engagement in cyber bullying with anyone?	Yes	19	35.2
	No	35	64.8
With whom did you talk about your engagement in cyber bullying? (n=54)	Parent	32	59.3
	Sibling	33	61.1
	Friend	39	72.2
	Teacher	33	61.1
	No one	124	62.3

Obstruction and inflicting harm in a virtual environment (cyber victim) score was significantly higher in female students than in male students (U=4016.50, p=0.034; Table 5), indicating that females were more exposed to cyber bullying than males. Also, sexual bullying in a virtual environment (cyber bully) score was significantly higher in male students than in female students (U=4059.50, p=0.001; Table 5), indicating that males exhibited higher rates of sexual bullying in virtual environments than females.

Table 5. Gender differences in cyber bully/victim scores

	Group	N	Avg.	SD	U	P
Sexual bullying in a virtual environment (cyber victim)	Female	118	8.017	1.978	4609.500	0.621
	Male	81	8.000	2.080		
Obstruction and inflicting harm in a virtual environment (cyber victim)	Female	118	9.932	3.134	4016.500	0.034
	Male	81	9.432	2.793		
Spreading rumors in a virtual environment (cyber victim)	Female	118	4.729	1.781	4364.500	0.162
	Male	81	4.383	0.995		
General cyber victim	Female	118	22.678	5.920	4298.000	0.207
	Male	81	21.815	5.035		
Sexual bullying in a virtual environment (cyber bully)	Female	118	7.178	1.001	4059.500	0.001
	Male	81	7.556	1.492		

Obstruction and inflicting harm in a virtual environment (cyber bully)	Female	118	8.398	1.468	4634.500	0.555
	Male	81	8.654	1.831		
Spreading rumors in a virtual environment (cyber bully)	Female	118	4.271	1.043	4641.000	0.517
	Male	81	4.358	1.288		
General cyber bully	Female	118	19.847	2.769	4418.000	0.217
	Male	81	20.568	3.857		

There was no significant relationship between gender and frequency of exposure to cyber bullying (i.e., "How often have you been exposed to cyber bullying?"; X^2=8.162, p=0.086; Table 6), suggesting that males and females do not differ in frequency of being a cyber victim.

Table 6. Gender differences in frequency of exposure to cyber bullying

		Gender			
Frequency of exposure to cyber bullying		Female	Male	Total	X^2/p
Never	Number	74	47	121	
	Percent	62.7	58.0	60.8	
Once	Number	18	9	27	
	Percent	15.3	11.1	13.6	
Twice	Number	11	5	16	
	Percent	9.3	6.2	8.0	X^2=8.162
Three times	Number	7	4	11	p=0.086
	Percent	5.9	4.9	5.5	
Four times or more	Number	8	16	24	
	Percent	6.8	19.8	12.1	
Total	Number	118	81	199	
	Percent	100.0	100.0	100.0	

However, there was a significant relationship between gender and frequency of engagement in cyber bullying ("How often have you engaged in cyber bullying?"; X^2=6.042, p=0.049; Table 7). Whereas 78.8% of female students never engaged in cyber bullying, 13.6% engaged in cyber bullying once, and 7.6% engaged in cyber bullying twice or more, 64.2% of male students never engaged in cyber bullying, 18.5% engaged in cyber bullying once, and 17.3% engaged in cyber bullying twice or more. Therefore, males engaged in cyber bullying more frequently than females.

Table 7. Gender differences in frequency of cyber bullying

		Gender			
Frequency of cyber bullying		Female	Male	Total	X^2/p
Never	Number	93	52	145	
	Percent	78.8	64.2	72.9	
Once	Number	16	15	31	
	Percent	13.6	18.5	15.6	X^2=6.042
Twice or more	Number	9	14	23	p=0.049
	Percent	7.6	17.3	11.6	
Total	Number	118	81	199	
	Percent	100.0	100.0	100.0	

Discussion, conclusion and recommendations

One of the main findings of this study was that a large proportion of students had been exposed to cyber bullying and e-mail, SMS and phone calls were the leading ways in which cyber bullying occurred. Studies exist in the literature that supports this phenomenon. In [17] study 10% of the participants who are 17-25 age group appeared to be the victims of cyber-bullying. In [20] study conducted at Texas University 32.4% of the participants expressed that they have been cyber-bullied at least from SMS, e-mail and social network. In [13] study which was conducted with university students, 57% of them were cyber-bullied less than 4 times, 29% 4-5 times, 14% more than 10 times. In [31] study with female university students who were cyber bullied, they mostly experienced the seizing of someone else's account (hack), receive unwanted sexual messages, sort of harassment in the form of text messages and insulting comments.

Most students who had been exposed to cyber bullying told their peers or parents about the incident. However, studies of elementary and high school students put together demonstrate that most victims do not talk about the incident with anyone and that they are more likely to tell friends than parents or other adults. Talking to teachers about cyber bullying rarely or never occurs ([35]; [36]; [10]; [37]; [3]; [38]). In the present study, the tendency of students to talk about their exposure to cyber bullying primarily with friends may be a result of being away from families and spending most of their time with friends. Based on findings from [34] study, in a higher education setting, as many students as are above 18 and considered adults view the role of parents as perhaps diminished, and parents may not be a helpful support system for students who have been cyber bullied. Very low rates of talking to prosecution officers or teachers may arise from not considering these individuals as providing solutions to this problem. Knowing that there are no legal sanctions or penalties for cyber bullying may also have influenced this result. According to personal communication with an attorney, there are no laws that directly regulate cyber bullying in Turkey. Procedures applied in response to crimes committed on the internet, including cyber bullying, are regulated within the scope of law number 5651 on Regulation of Publications on the Internet and Suppression of Crimes Committed by means of Such Publications, which imposes obligations on parties (i.e., hosting service providers) running the virtual environments in which such crimes were committed. Therefore, sanctions imposed on perpetrators should be researched within the framework of relevant laws [39].

According to the findings, most victims did not know the cyber-bully. Cyber victims generally do not know their cyber bullies who harass them. A cyber bully can be a next door neighbor or a close friend, and this secrecy allows cyber bullies to behave in a manner in which they could never have in real life ([9]; [10]). There have been other studies in the literature in support of this finding. For example, according to [40] cyber bullies send rude messages, photos and videos to their victims and the victims are not aware of the identities of the senders. According to the study [13] conducted at the Midwestern University, 54% of the students have friends who have been cyber-bullied and have received unwanted messages through computer and other electronic devices from people they do not know. There are several potential reasons why young people may behave in such a manner. For example, cyber-bullies can easily hide their identities, they do not have to take responsibility for their actions because there is no face-to-face communication with their victims, cyber bullying allows them a way to establish control over others and they may take pleasure in engaging in assaultive behaviors in a virtual environment [41].

In a previous study, [42] it has been found that teenagers who had experienced cyber bullying avoided chatting with strangers and stayed away from chat rooms. In addition, [36] it was found that teenagers used several different strategies to prevent cyber bullying, including changing private passwords and issuing warnings to the bullies. In this study, a significant percentage of the students did not recognize the cyber-bullying against them. This could have arisen from the fact that students did not know the behavior against them was cyber-bullying and a crime. However, some of the students mentioned that they responded to the cyber-bullying against them, but at a low rate. This behavior could be an indicator of the fact that students did not know cyber-bullying was a legal crime or they were not aware of its negative and destructive impacts.

In this study, most of the students had never engaged in cyber bullying. In [20] study at Texas University only 16% of the students expressed that they did cyber bullying to others. A similar finding was obtained in [17] study which was conducted on 17-25 age group. According to

the findings only 11% of the students were cyber-bullies. The high level of education could be the factor for such findings.

According to the findings; social networking sites, SMS and chat rooms were the leading ways in which engagement in cyber bullying occurred. This finding is consistent with previous studies, which report that methods used for cyber bullying include instant messages, e-mail, phone calls, SMS, sending pictures or videos, chatting in chat rooms, websites, and social networks ([43], [44], [45], [46]). The frequent use of information technology, particularly by young people, is a key factor contributing to this finding. Considering that the young generations are surrounded by information technology from birth, the answers to these questions may not be surprising.

Although most students who had been exposed to cyber bullying shared their experiences with friends, the majority of cyber bullies did not talk about their harmful behavior with others. Cyber bullies generally harass their victims without revealing their identity or talking about their harmful behavior with other people.

According to the findings, males and females do not differ in frequency of being a cyber victim. This finding is in agreement with that by [47], who report that female and male high school students show no difference in cyber victim scores.

The main findings of this study were that female pre-service teachers had experienced more cyber bullying-related obstruction and harm than males, and male pre-service teachers had engaged in more sexual cyber bullying than females. In addition and in general, more males had engaged in cyber bullying than females.

Several studies demonstrate that regardless of age group, males engage in cyber bullying more frequently than females ([44, 48-55]). Females, however, may be greater victims of cyber bullying because they typically spend more time in chat rooms, on message boards, or sending instant messages, with nearly three-fourths of 12- to 18-year-old girls spending more time online than doing homework [56]. Although some studies, such as those by [57-58] and [59], report that gender is not related to likelihood of being a cyber bully/victim, other studies report that males have a greater likelihood of being a cyber bully/victim compared to females. For instance, [35] and [60] found that male high school students are exposed to and engage in cyber bullying more often than female students. The present study also shows that male students engage in cyber bullying more than female students. This finding may be due to male children being given a pass and freer to do what they please as a result of traditional raising attitudes of Turkish families, who may permit male children to use information technology, such as computers and mobile phones, and enter internet cafes more frequently than female children. Considering relevant studies across several cultures, the tendency of males to engage in higher rates of cyber bullying may be indicative of their attempts to maintain physical superiority in virtual environments.

Pre-service teachers enrolled in university have been both cyber bullies and victims of cyber bullying, similar to younger and more vulnerable elementary, middle, and high school students. For this reason, teacher-students should be educated about cyber bullying, legal sanctions, and protection methods via revisions in curriculum and new courses on the topic. Moreover, seminars with police officers and lawyers should be held for teacher-students as well as teachers, administrators, and parents. Because the current Turkish sanctions are not a disincentive for cyber bullies, it is necessary for lawmakers to enact more effective punishments and sanctions for this harmful behavior.

Cyber bullying is a serious danger for young people living in the internet age. Considering the millions of internet users, individuals can potentially be cyber bullies or victims regardless of age, gender, profession, or level of education. There are a few number of studies on cyber bullying among preservice teachers in the literature. Therefore, this study has potential to provide detailed information about that topic for the prospective readers. In the light of its findings, the following suggestions can be offered to researchers and practitioners:

1. Future research can consider educational and socio-economic status of the family as well as details of the social environment in which students reside.

2. Future research can examine the effects of being a cyber bully or victim on students' immediate surroundings.

3. Future research can examine the relationship between cyber bullying and physical bullying.

4. Research findings can be disseminated to university students, who will ultimately become parents.

5. Similar cyber bullying questionnaires can be distributed to raise awareness among elementary, middle, and high school students.

6. Cyber bullying education can be provided to children, adolescents, and young adults.

7. Young people can be taught methods of protecting themselves against cyber bullying.

8. Cyber bullying education can be provided to parents, teachers, and administrators.

9. Laws directly addressing cyber bullying should be passed, and necessary regulations and sanctions should be enacted.

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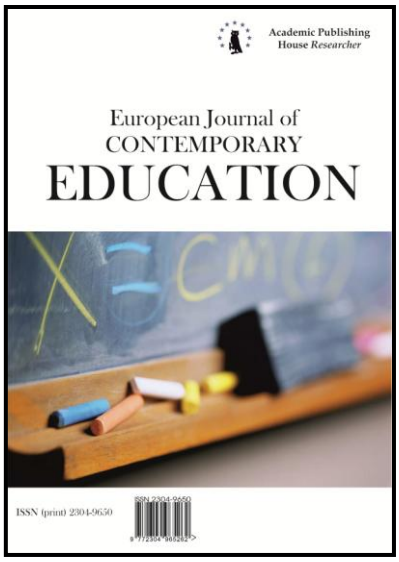

Students' and Teachers' Perceptions of After School Online Course

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Abstract

This study analyzes students' and teachers' perceptions of after school online courses (ASOC) undertaken by an institutional private middle school, which manages several campuses across Turkey. The aim of ASOC is to support students when they are home by helping them to revise the lessons, practice topics synchronously with hundreds of other students. The results of the survey, interviews, and observations show that both students and teachers prefer face-to-face lessons to online lessons. They think that ASOC can be effective only if it is implemented in small groups with more interaction and sound instructional design with engaging methods and adequate feedback is structured for students and teachers' needs. This study may contribute to similar future research studies of online education in middle schools by revealing the upsides and downsides of this blended learning environment with recommendations offered.

Keywords: after school, blended learning, synchronous online lessons, perceptions, middle school

Introduction and Related Literature

Various technology-supported lessons are now being used to enhance students' achievements and engagement for educational purposes (Motteram, 2003). One of the most common ways of using technology in education is online learning as an alternative to traditional, face-to-face education (Yang & Cornelius, 2004). Online environments offer opportunities for accessing education from any place at anytime (Gedera, 2014; Hoon, 2008; Stacey & Wiesenberg, 2007). These opportunities can be listed as flexibility (Gedera, 2014; Stacey & Wiesenberg, 2007) and interactive and collaborative communication which seems as a unique feature to face-to-face

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learning environments (Sher, 2009). Also, it is more cost effective and convenient than traditional face-to-face lessons, with more learners being able to benefit from an online lesson (Wattakiecharoen & Nilsook, 2012). Furthermore, by offering access to resources and educators not locally available, they give precious opportunities for students who are not able to attend traditional schools because of some obstacles; such as living in a remote area, having some responsibilities at home, travelling costs, and transportation problems or cultural and traditional values (Richardson & Swan, 2003; Sher, 2009). In addition to this also the teachers have opportunities of serving more students than in a classroom environment (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004).

In spite of all these opportunities online learning offer, there are many concerns such as isolation, social development of students, and lack of physical demonstrations about using these methods in education (Cavanaugh et al., 2014). It is claimed that online or web-based education's lack of face-to-face interaction makes it less effective than traditional classroom learning (Richardson & Swan, 2003). To overcome the disadvantages and to make such learning more effective, blended learning environments seek to combine the strengths of both traditional and online learning environments (Orhan, Altun, & Kablan, 2004). Blended learning creates an educational environment combining both online and face-to face learning (Staker, 2011). They maximize the advantages of online materials by maintaining the motivational effects of group learning and teacher support (Tomlinson & Whittaker, 2013).

For these reasons it is obvious that blended learning has been preferred more in education according to recent research studies in the field of education (Yı, 2014). Further, it has been foreseen that, as in the other educational levels, in primary and middle schools blended learning will soon come to gain considerable importance (Sarıtepeci & Çakır, 2014). Many students, across different educational levels - primary, secondary and university - are now taking hybrid, blended and mixed mode online courses as they were born into a totally wired world (Palley, 2012; Singh, 2014). With this in mind, educational institutions should enable and prepare their students and teachers for the adoption of such systems (Gagnon, 2014). While adopting these systems in education students' perceptions of these online courses gains one of the most important role that needs to be questioned (Picciano, 2002).

Also, the challenges in education such as time and place constraints have increased the need of using online learning environments (Cavanaugh et al., 2014). These environments offer an opportunity to learners and educators to communicate synchronously using features such as audio, video, text chat, interactive whiteboard, and application sharing (Martin & Parker, 2014). Synchronous learning environments have many advantages such as chances of communication, engaging students more thanks to the real time communication between the students and teachers, fostering a learning community, authentic and engaging activities supporting higher level of learning compared to purely asynchronous modes and, decreasing the classroom management problems (Hastie, Chen & Kuo, 2007, Hrastinski, 2008, Murray, 2007).

This study focuses on the effectiveness of after school online courses which are called as "e-etudes", based on the perceptions of a middle school's students and teachers. Also the perceptions of higher education students regarding blended, online and virtual learning have been investigated in many research studies, but there is a scarcity of similar research studies on elementary and middle school level students' perceptions (Chen, Barnett, & Stephens, 2013; Cavanaugh et al., 2014; DiPiedro et al., 2008; Krause & Lowe, 2014). With findings of this study, administrators, teachers, and instructional designers can come to take advantage of its results describing how students perceive these learning experiences.

The purpose of this study is, from the students and teachers' points of view to obtain information on the perceptions of students and teachers about after school online courses (ASOC) as grouped into four main categories: (1) the perceptions on design of the instructions, its content and its resources; (2) the perceptions on students' participation, interactions and collaboration; (3) the perceptions on feedback, assessment and evaluation; (4) the perceptions on course technology and support. The further aims of this work include exploring the factors affecting students' and teachers' perceptions of after school online courses, discovering whether these lessons are useful for the students, and to guide those researchers and practitioners seeking to undertake similar studies, who already completed such work, or who wish to use this analysis to

improve their existing courses. In addition, possible drawbacks to such lessons and courses will be identified. The study was designed to answer the following questions:

RQ1: What are the students' perceptions of ASOC in terms of design of instruction, content & resources (RQ1.1), participation, interaction and collaboration (RQ1.2), and feedback and assessment (RQ1.3), and course technology and support (RQ1.4)?

RQ2: What are the teachers' perceptions of ASOC in terms of design of instruction, content & resources (RQ2.1), participation, interaction and collaboration (RQ2.2), and feedback and assessment (RQ2.3), course technology and support (RQ2.4)?

Methodology

1. Research Design

This is a quantitative descriptive research combined with qualitative interviews. The researchers collected both qualitative and quantitative data. For the quantitative data, a survey was given to students and teachers in order to collect data about their perceptions of ASOC lessons implemented within the institution. After collecting the quantitative data, the qualitative data were obtained to follow up and support the quantitative findings.

2. Participants

The participants were the students who were studying in grades 6 and 7 of a private school chain in Turkey. The school had 28 kindergartens, 11 primary schools, 12 middle schools and 9 high schools in Turkey. At school there were around 8000 students and 1000 teachers in various campuses but in this study, only students, and teachers from 6th and 7th grades of the main campus were interviewed and observed. The number of students who took part in this study is 204 in total, 91 of these students were in grade 6, and 113 of them were in grade 7.

Other participants were the teachers giving lectures in e-etudes at the same school. Twenty-one teachers from Turkish, Math, Science, Social Studies and English departments from different grade levels answered the survey questions online since ASOCs were implemented in those lessons. Also, one teacher from each department (5 teachers in total) was interviewed and observed. The participants were selected using convenience sampling for this study as it was preferred when a group of participants in a study that happen to be available at the time of data collection (Picciano, 2006).

2.1 Demographics of Students, Teachers, and Course Designer

Questions about the participants' age, grade level, and computer and internet usage were collected as demographic data. Through these questions necessary information about the participants were collected. The results revealed that 44% of the students were in the 6th grade and 56% of them in the 7th grade. Most of the students were 11-12 years old. Majority of the students (97%) had computers and internet connection at home. When the frequency of computer usage was asked, it was found that 45% of them use their computers every day, 24% of them twice or three times a week. Besides, the results showed that 74% of them go online every day.

PASOC questions revealed that 90% of teachers were between 25-35 years old, 14 of them were English teachers, 2 of them were Turkish, 2 of them Math, 2 of them Social Studies and 1 of them was Science and Technology teacher. Majority of teachers go online for work purposes (43%), and 24% of them use internet for surfing on the net.

Also the course designer was interviewed in order to get more information about the aim of the course, design of the instruction, content and materials, and details about the course.

3. Description of ASOC

Within the institution ASOCs were undertaken for supporting the face-to-face lessons through the learning management system (LMS). They were mainly based on revision of the topics that are presented at school in face-to-face lessons. They included five main subjects; Math, Science, Turkish, Social Studies and English. ASOCs were mostly implemented after school when the students arrived at home. The teachers who taught in these lessons waited at school till the students were ready. They had their lessons synchronously with the help of an IT staff in a classroom which had a camera, smart board and a computer. Adobe Connect was used to conduct

these online lessons. The material was projected on the smart board and the teacher used the smart board. The students could see the teacher, smart board screen and the chatting area and/or the voting part. The students wrote their questions, answers or comments in the chat area if it was permitted.

A group of teachers for the target grade level came together and decided on the students' needs. They defined the problematic areas to be revised in e-etudes and one or a couple of teachers were assigned with creating the resources. Usually, the topic was revised briefly in the beginning of the lesson then questions were presented. The questions were multiple-choice questions since they were more proper for these type of courses. The lessons and resources were planned just before the lessons sometimes a week before sometimes a night before. The interaction level of the lessons varied according to the size of the classes.

Some lessons were planned for big groups and around 800-1000 students participated in these lessons. The chat area was closed and the students could only use the voting area to answer the questions. The lesson material was designed as a test document and the students could answer by choosing the correct option. The teacher gave feedback to the whole group after the result of voting. These types of sessions were preferred to reduce the workload of the teachers and to save time and effort.

4. Data Collection Instruments and Procedures

Table 1. Data collection procedures for each research question

Research Questions	Participants	Type of Data	Data collection procedures
RQ1. Perceptions of students in after school online lessons	4 groups of students (three to five randomly chosen students in each group) 4 individual students	Qualitative	Interview Observation
	204 students	Quantitative Qualitative	Survey Open ended questions
RQ2. Perceptions of teachers in after school online lessons	5 teachers Course Designer	Qualitative	Interview Observation
	21 teachers	Quantitative Qualitative	Survey Open ended questions

The observation form, interview and survey questions were adapted from the other research studies (Chew, 2011; Çetiz, 2006; Picciano, 2002; Pinto, 2014; Richardson, 2003; Kudrik, 2009; Lin, Chan & Hsiao, 2011; Yang & Cornelius, 2004). The observation form, interview and survey were categorized mainly in six groups; a) Design of instruction, content, resources; b) Course technology and support; c) Students' participation, interaction and collaboration; d) Feedback, assessment and evaluation; e) The attitudes of students and teachers towards ASOC; f) Students' ideas on teachers / teachers' ideas on students. The survey included 49 items with 5-point Likert-type scale to indicate their perceptions ranging from (strongly agree to strongly disagree).

As Zohrabi (2003) stated, to ensure the content validity the research instruments and the data might be reviewed by the experts in the field of research. Therefore, three experts in the field of educational technology analyzed the questions, gave feedback on each question, and some necessary changes were made before conducting the instruments to a sample of students to make sure if the items are understood and spelled correctly. In order to strengthen the internal validity of a research, the researcher should try to collect data through various methods such as observations, interviews and questionnaires (Merriam 1995; Zohrabi, 2003). The researcher used three different

methods to collect data and checked the validity by comparing the results of the data collected through these data collection tools. Zohrabi (2003) mentioned in a study that repeated observations in long-term period can enhance the validity of research. In order to get detailed information, different classes should be observed. In this study, different student groups, different lessons, and different teachers were observed throughout the year. According to Cronbach alpha, the reliability score of the survey was found .776. Therefore the survey was considered as reliable to use in the study.

The lessons were observed synchronously. The researcher observed two different groups of students from 6th and 7th grades in five different subject lessons' e-etudes and the sessions were recorded (8 hours of ASOC observation) and analyzed with a structured observation form with six domains.

5. Data Analysis Procedures

Quantitative data were collected from the surveys answered by the students and teachers. This research includes descriptive data analysis and provides necessary data collected from a group of individuals. The percentages, mean scores and standard deviation of the results were calculated. For analyzing the data in the questionnaires, the questions were categorized according to the criteria in research questions.

For qualitative data analyses, firstly the interviews were transcribed word by word from the recording. Also the final part of the survey asking the ideas and recommendations of students and teachers on e-etudes were coded and analyzed. After the researcher read the data to overview the common opinions about e-etudes, the themes were identified which were similar to the categories defined in research questions. Finally, the perceptions of students and teachers were derived and findings were added with coded names in the results section.

Results

In this section, the quantitative results of the survey were given within the tables first, complementing with the qualitative results of the interviews later. The results were discussed in the next section.

1. Students' opinions on ASOC

Table 1. Students' perceptions of ASOC (N=204)

Statements	SA	A	N	D	SDA	M	SD
I love e-etudes.	14%	20%	23%	12%	29%	3.2	1.431
I attend e-etudes voluntarily without any pressure.	**23%**	**34%**	17%	9%	14%	2.5	1.345
E-etudes are fun.	12%	9%	25%	**18%**	**35**	3.5	1.368
My achievement has increased after e-etudes.	**10%**	**10%**	31%	24%	23%	3.4	1.237
E-etudes should continue.	25%	21%	21%	**9%**	**22**	2.8	1.480
I prefer not having e-etudes.	**18%**	**12%**	24%	20%	22%	3.1	1.412
There should be more e-etudes.	15%	8%	19%	**19%**	**37**	3.5	1.444
I recommend these e-etudes to my friends.	15%	17%	23%	**12%**	**30**	3.2	1.448
I prefer e-etudes to face-to-face lessons.	24%	7%	12%	**17%**	**38**	3.3	1.619
E-etudes motivate me towards my lessons at school.	18%	12%	20%	**23%**	**24**	3.2	1.426

E-etudes have no influence on my success in face-to-face lessons.	**8%**	**12%**	33%	20%	24%	3.4	1.218
Having synchronous lessons engages me.	**22%**	**26%**	21%	15%	13%	2.7	1.340
I prefer lecturing videos to e-etudes.	**30**	**16%**	14%	12%	25%	2.8	1.595
There is no difference between the lecturing videos and e-etudes.	9%	7%	22%	**18%**	**42**	3.7	1.329
I don't mind whether e-etude lessons synchronous or not.	14%	13%	13%	**16%**	**41**	3.5	1.495
My parents encourage me to attend these e-etudes.	**42%**	**30%**	11%	7%	8%	2.1	1.264
My teachers encourage me to attend these e-etudes.	**46%**	**26%**	12%	6%	8%	2.0	1.253
Sometimes I pay attention to something unrelated during an e-etude.	**30**	**22%**	12%	16%	16%	2.6	1.481

**SA: Strongly Agree A: Agree N: Neutral D: Disagree SDA: Strongly Disagree*

In addition to quantitative data collected through PASOCS, the interview responses, students' opinions and recommendations in the final part of PASOCS show that the students find the lessons boring. The students mentioned that sometimes they pay attention to something unrelated such as watching TV or video, playing games or doing homework during these e-etude lessons. They stated that the face-to-face lessons are better, more enjoyable and effective for their learning. They think that they have assignments for school and spend too much time at school. They added that their teachers and parents sometimes force them instead of encouraging them. The majority stated that they prefer lecturing videos uploaded to LMS.

2. Students' perceptions of the design of instruction, content and resources of ASOC

Table 2. Perceptions of the design of instruction, content and resources of e-etudes (N=204)

Statements	SA	A	N	D	SDA	M	SD
I would like to learn the objectives of e-etudes beforehand.	**48%**	**28%**	14%	2%	5%	1.88	1.111
My teachers give information about the content and objectives of the e-etudes beforehand.	**19%**	**32%**	25%	10%	12%	2.63	1.257
The content of e-etudes matches the content of face-to-face lessons.	**37%**	**34%**	17%	5%	4%	2.04	1.085
I think the activities done in e-etudes are fun.	10%	8%	24%	**19%**	**36%**	3.63	1.342
I get bored in e-etudes.	**33%**	**14%**	25%	16%	10%	2.57	1.368
The activities in e-etudes are useful for my learning.	**28%**	**39%**	20%	5%	6%	2.22	1.112
The level of the activities is proper for my level.	**48%**	**37%**	8%	2%	3%	1.75	.957
The resources used in e-etudes are helpful for my learning.	**30%**	**28%**	21%	7%	11%	2.40	1.311
I have difficulties in understanding the content of e-etudes.	3%	3%	13%	**22%**	**58%**	4.30	1.012
I am not able to answer the questions and have difficulties in doing exercises in e-etudes.	6%	4%	8%	**25%**	**54%**	4.17	1.178

Based on the qualitative results on the same research question, some of the students stated that ASOCs are helpful in their learning. They appreciate that they can make revisions in these lessons. They believe that these lessons support face-to-face lessons. On the other hand they believe that these lessons are not enjoyable enough which demotivates them. However, they stated that there are only multiple choice questions and the resources are not interesting. Also, they stated that they want to ask questions to the teachers when they do not understand but this is not possible because of excessive number of students.

3. Students' perceptions of the interaction, participation, and collaboration in ASOC

Table 3. Perceptions of students on participation, interaction and collaboration in e-etudes (N=204)

Statements	SA	A	N	D	SDA	M	SD
I can ask questions to my teachers.	11%	13%	12%	**17%**	**44%**	3.70	1.440
I like interacting with my friends.	**26%**	**20%**	17%	11%	23%	2.84	1.517
I talk with my friends about the lesson during e-etudes.	16%	10%	15%	**22%**	**33%**	3.46	1.470
There should be more interaction.	**43%**	**15%**	20%	8%	12%	2.32	1.414
The other students in e-etudes influence me in a positive way.	**30%**	**19%**	26%	8%	14%	2.59	1.387
E-etudes should be in smaller groups.	**44%**	**11%**	17%	8%	18%	2.46	1.555
I would like to ask more questions to my teachers.	**44%**	**14%**	16%	9%	15%	2.38	1.499

In line with the survey results, the qualitative data collected through interviews, the final part of the survey and observations show that the interaction level is low in these lessons. The students complain about not being able to ask questions to the teachers and they think that the time spent for each question is not enough. As a result, they do not understand some questions in the lessons. They also state that the other students write too much in the chat area and the teachers cannot see their answers because of unnecessary comments. All of them believe that if the lessons could be done with fewer students, it would be much more effective.

"I think the lessons should be in smaller groups because everybody writes at the same time and I cannot understand the question and miss the lesson. The chat area should be closed." (7th grade student Betul, Mart 2015)

Observation notes of the researcher are parallel with the students' perceptions. It was observed that the student-teacher interaction is low while student-student interaction is considerably high. However, this student-student interaction is not related with the lesson and these unnecessary discussions among the students block the answers of other students who really want to participate in the lesson.

4. Students' perceptions of the feedback, assessment, and evaluation of these lessons

Table 4. Perceptions of students about feedback and assessment in e-etudes (N=204)

Statements	SA	A	N	D	SDA	M	SD
I get feedback about my performance from my teachers.	8%	13%	33%	**11%**	**33%**	3.47	1.314
The teachers assess my performance after the lesson.	12%	18%	23%	**12%**	**33%**	3.34	1.424
The teachers praise me.	10%	11%	38%	**14%**	**25%**	3.33	1.264
The teachers do not comment on my performance.	**45%**	**13%**	22%	9%	9%	2.24	1.362
I prefer receiving more feedback about my performance.	**33%**	**12%**	23%	8%	22%	2.73	1.539

Correspondent with the survey results, in the interviews the students mentioned that they could not get immediate and effective feedback from the teachers. It was also observed that there is no assignment or quiz given to the students to assess their learning at the end of ASOC.

5. Students' perceptions of the course technology and support

All of the students mentioned that the software used (Adobe Connect) is a user-friendly program. They did not have any problems about the program during e-etude lessons. On the other hand, they mentioned that they have some problems because of excessive number of users logged in the sessions at the same time. Screen freezes, voice interrupts, slow access speed or connection problems are the most listed problems and these are discouraging for the students. When it is asked how they solve these problems, they mentioned about the Help button but they also added that they cannot get response from there. If they cannot manage to solve the technical problems they face, they log out the session. The students can report their problems to the Deputy Head after e-etude and the problem is informed to the IT department the following day.

6. Teachers' perceptions of ASOC

Table 6. Teachers' attitudes towards e-etude lessons (N=21)

Statements	SA	A	N	D	SDA	M	SD
I like e-etudes.	**23%**	**38%**	19%	9%	9%	2.43	1.248
I have e-etude lessons voluntarily without any pressure.	4%	23%	19%	**33%**	**19%**	3.38	1.203
E-etudes are fun.	**23%**	**28%**	19%	14%	14%	2.67	1.390
Students' achievement has increased after e-etudes.	9%	28%	**47%**	9%	4%	2.71	.956
E-etudes should continue.	**9%**	**47%**	28%	0%	14%	2.62	1.161
I prefer not having e-etudes.	14%	9%	28%	**38%**	**9%**	3.19	1.209
There should be more e-etudes.	9%	9%	33%	**28%**	**19%**	3.38	1.203
I recommend these e-etudes to my colleagues.	**9%**	**33%**	28%	19%	9%	2.86	1.153
I prefer e-etudes to face-to-face lessons.	0%	9%	9%	**23%**	**57%**	4.29	1.007
E-etudes motivate the students to the lessons at school.	0%	28%	**38%**	19%	14%	3.19	1.030
E-etudes have no influence on the students' success in face-to-face lessons.	0%	14%	19%	**42%**	**23%**	3.76	.995
We may have online lecturing videos instead of e-etudes.	**23%**	**33%**	23%	19%	0%	2.38	1.071
Having synchronous lessons engages my students.	**9%**	**61%**	23%	4%	0%	2.24	.700
I encourage my students to attend e-etude lessons.	**47%**	**38%**	9%	4%	0%	1.71	.845
Etudes that we have at school after lessons are better than e-etudes.	**42%**	**38%**	4%	14%	0%	1.90	1.044
I prefer e-etudes to etudes we have at school.	9%	4%	14%	**42%**	**28%**	3.76	1.221

In relation to the survey results, teachers' perceptions were investigated through interviews as well. Most of the teachers believe that various teaching approaches should be used in education and using technology engages the students. Hence, they believe that synchronous online lessons are useful for students. They also added that it is better to have more technology in face-to-face lessons.

Additionally, the course designer also stated that the main aim of these lessons is offering various opportunities to the students for learning and integrating technology into learning. He thinks that the activities done in face-to-face lessons are not enough for effective learning. They need to be enhanced with supportive activities such as e-etude lessons. On contrary, the

teachers stated that they do not have interaction and eye contact with their students. Thus, they believe that face-to-face lessons are more effective and their preference compared to ASOC.

"I prefer having face-to-face lessons to e-etudes because I cannot have eye contact with the students in e-etude lessons. I can assess the students better in face-to-face lessons." (Math teacher Nur, Mart 2015)

All of them complained about the excessive number of the students in ASOC. The participation is considerably high that they cannot answer the students' questions properly. In lower grades, students do not take these lessons as serious as the older students. Therefore, they believe that these lessons should be provided to older students in smaller groups.

"The lower grade students want to have fun. They want to chat with their friends. If we have older students in smaller groups they can be more conscious and the lessons can be more useful." (Social sciences teacher Ferhat, March 2015)

On one hand, some of the teachers stated that they would recommend e-etude lessons to their colleagues and would like them to continue because there are many advantages of these etudes. First of all, they mentioned that they do not have any classroom management problems and there is less distraction in e-etude lessons than face-to-face lessons so that the students can follow the lessons better. They also believe that e-etude lessons are undeniable support for students' success and they reinforce the learning substantially. On the other hand, some of them believe that these lessons do not have any effects on students' learning and success. They stated that they would not recommend these lessons to their colleagues and they think that neither students nor teachers need these lessons. The main reason behind this idea was the planning of these e-etude lessons and materials and having these lessons are extra burden for teachers. They added that lecturing videos uploaded to LMS are great help for students and enough for reinforcing the learning.

7. Teachers' perceptions of design of instruction, content and resources of ASOC

Table 7. Teachers' perceptions of the design of instruction, content and resources of e-etudes (N=21)

Statements	SA	A	N	D	SDA	M	SD
I give information about the content and objectives of the e-etudes to my students.	42%	28%	14%	14%	0%	2.00	1.095
The content of e-etudes matches the content of face-to-face lessons.	57%	23%	9%	9%	0%	1.71	1.007
The students have fun with the activities done in e-etudes.	28%	28%	14%	28 %	0%	2.43	1.207
The activities in e-etudes are useful for students.	38%	33%	19%	9%	0%	2.00	1.000
The level of the activities is proper for the students.	61%	23%	9%	4%	0%	1.57	.870
The resources used in e-etudes are helpful for students.	57%	23%	9%	9%	0%	1.71	1.007

In addition to results showed in the table, the interview results, comments part of the survey and observation notes are in line with the survey results. The teachers mentioned that they cannot present a new topic since all of the students do not take part in these e-etude lessons. As a result, most of the time the topics presented at school are revised in ASOC. They said that content of ASOC match with the content of face-to-face lessons. The majority of the teachers mentioned that they took part in lesson planning process. According to the teachers and course designer, the objectives and outcomes are defined by a group of teachers before planning the lessons by taking the students' needs into account.

The teachers complained about the difficulty of preparing questions for e-etudes. It is easier for teachers to create and give feedback with multiple-choice questions. They also mentioned that the activities or questions designed for e-etudes are proper for the objectives but they are not enjoyable. They recommended using more visuals to raise students' interest. Some of them believe that the lessons and resources should be more planned and prepared at the beginning of the year.

8. Teachers' perceptions of participation, interaction and collaboration in ASOC lessons

Table 8. Perceptions of teachers on participation, interaction and collaboration in e-etudes (N=21)

Statements	SA	A	N	D	SDA	M	SD
I can answer the students' questions during e-etudes.	33%	14%	14%	23%	14%	2.71	1.521
Students can interact with each other during e-etudes.	28%	19%	14%	23%	14%	2.76	1.480
Students' attendance and participation are high.	23%	38%	19%	19%	0%	2.33	1.065
Students should be able to ask questions during e-etudes.	47%	33%	14%	4%	0 %	1.76	.889
Students should be able to have interaction with each others.	9%	23%	14%	19%	33%	3.43	1.434
The more interaction the students have the more motivated they are.	9%	33%	28%	14%	14%	2.90	1.221
E-etudes should be in smaller groups.	66%	9%	9%	4%	9%	1.81	1.365

Similar to the students, teachers also think that the interaction and collaboration level is low in e-etude lessons. However, all of the teachers think that the attendance level is considerably high. The course designer verifies this by stating majority of the target group attend these lessons. He also added that the younger they are, the more they attend. The number of students who take part in one e-etude session is around 80-100. This number makes it impossible to interact with the students individually. They think that all of the students should be able to ask and answer questions during these lessons. The teachers and course designer believe that with fewer students they can have more interaction.

"If the students do not participate in the lesson then it is like watching a video for them. There is no difference between the lecturing videos and e-etudes for these students." (The Course Designer, March 2015)

9. Teachers' perceptions of the feedback, assessment and evaluation of ASOC

Table 9. Perceptions of teachers about feedback and assessment in e-etudes (N=21)

Statements	SA	A	N	D	SDA	M	SD
I give feedback to my students during e-etudes.	33%	33%	0%	4%	3%	2.48	1.504
I can assess my students' performance during or after these lessons.	28%	14%	19%	19%	19%	2.86	1.526
I would like to give more feedback to my students during these lessons.	52%	33%	4%	9%	0%	1.71	.956

In addition to the survey results, teachers' perceptions of feedback, assessment and evaluation were investigated through interview questions and observations. All of the teachers think that they cannot give enough feedback to the students and assess their performance with such a large class. Some teachers mentioned that they try to use the students' names while checking the answers and praise them with their names and they believe that this affects students' motivation positively.

"The students like hearing their names in e-etudes. I used some of the students' names when they give the right answers and they got motivated. The following day they came to school and thanked to me for telling their names." (English Teacher Demet, March 2015)

3.10 Teachers' perceptions of the course technology and support of ASOC lessons

They all mentioned that the program used, Adobe Connect, was easy to use. They stated that they did not get any training for online learning before these lessons and some had a brief

explanation about the software right before the lessons by IT staff. The course designer verified that the teachers and students did not need any training for using this program. Some teachers commented that it was difficult to both write on the board and look at the camera or answer the questions of students. They all experienced some technical problems such as screen freezes, voice interrupts and internet connection. When the teachers have such problems, they get immediate help from someone from IT department who is in the same classroom with the teacher.

Discussions and Conclusions

1. The students' (RQ1) and teachers' (RQ2) general perceptions of ASOC

The research questions examine students' and teachers' perceptions within specific conceptual groups: (1) the design of the course, its content and resources; (2) participation, interaction and collaboration; (3) feedback, assessment and evaluations; (4) the course technology and support.

1.1 Voluntary participation. As Zeidler (2014) wrote, students' willingness is crucial to learning and, in this study, despite the students saying that they did not like the ASOC lessons, it was clear that they attended the lessons voluntarily, albeit with the encouragement of their teachers and parents. Some students did report that their parents or teachers forced them to participate, but the majority of them said that they were not under any pressure. In line with the students' responses, the teachers also stated that the students take the lessons voluntarily and the teachers did not force the students to participate, but encouraging them. Nearly 60% of the students responded that they take the courses voluntarily and according to the course's designer, this was enough to consider the course successful.

It was also mentioned in Koutropoulos, Gallagher, Abajian, Waard, Hogue, Keskin, and Rodriguez's study (2012) that one of the main structures of online courses is the voluntary participation and this affects learning in a positive way. As Cull, Reed and Kirk (2010) mentioned in their study that online learning environments require self-motivation, self discipline, effective time management, self-directed work, organization and prioritization of effort. Also in interviews high-achiever students mentioned that they took these e-etude lessons for the sake of their own achievements. As a result of these we can assume that these students take their learning serious and they try to attend all ASOCs.

Also, Chen and Lou (2013) concluded in their study that one of the negative aspects of blended learning environments is overwork for the teachers. While the teachers stay late at school for ASOCs, the students wait at home and they can have rest till the lesson starts. As a result working overtime for ASOCs made teachers less willing to have these lessons. As it is mentioned in Alebaikan and Troudi's study (2009), finding a suitable time for both students and teachers is one of the most challenging facets of blended learning.

1.2 Variety in education. As it was discussed in Watson's study (2011), teachers think that integrating technology is a good way to diversify learning activities, and they are willing to use any technology to attract students' interest and to support their learning more. In interview questions asked to the teachers and students it was clear that they accepted these lessons as a variety in education.

1.3 Unfamiliarity and difficulty of adaptation. In contrast with Gagnon (2014), the majority of both the students and the teachers preferred traditional face-to-face lessons to the online lessons, and the students did not want to have more such e-etude lessons. The students also generally stated that they preferred the teachers in their face-to-face lessons. This was because they were used to spending more time with their teachers in the traditional learning environment and, when they had different teachers in their e-etude lessons, unfamiliarity of the teacher became an issue.

Since these lessons were proceeded in line with face-to-face lessons, ASOC could be considered as a blended course. As it was mentioned by Caravias (2014) and Marsh (2014) blended learning environments were considered as learning environments which improve students' engagement, individualize the learning and meet students' needs and different learning styles. However, in this study, students' needs and learning styles were not considered well enough for blended learning environment. In the meantime this might have caused a decrease in the motivation and engagement. As it was mentioned in Naudi's study (2004) the students get motivated more when they think that they need these lessons. This can be ensured with detailed needs analysis and with an attentive content and resource planning.

The teachers who gave lectures in these lessons were not trained or experienced in online teaching. We can accept them inexperienced in online teaching environments. As it was stated in Redmon's study (2011) the teachers feel themselves less comfortable in online lessons since they are used to teaching in face-to-face lessons and this leads them prefer face-to-face lessons to online lessons. Alebaikan and Troudi (2009) claim that one of the biggest challenges in blended learning is the adaption of this learning environment in traditional schools and it is clearly seen in this study.

1.4 Synchronous learning environment. Although students did not want to continue ASOC lessons, they did like taking synchronous online lessons, because it was somthing new for them and chatting with their friends during the lesson engaged them. In contrast to Pallilonis and Filak's study (2009), the participants in this study emphasized that the lecturing videos uploaded to LMS were less boring. Similary in this study, the results revealed both for the students and teachers, lecturing videos were better for their students' learning because they were at their own pace. According to Chen, Barneth and Stephens (2013), one of the biggest advantages of online courses is accessibility and flexibility, the students can attend these lessons whenever they want and this enourages them more.

2. Students' (RQ1.1) and teachers (RQ2.1) perceptions of the design of instruction, content, and the resources of the ASOC

2.1 Needs analysis. The results of the survey and the interview question responses showed that students wished to know the lesson objectives before the lessons themselves. However, it was seen in the results and observations that students were not informed about the lesson objectives beforehand. The students said that they want to participate in a lesson if the lesson objectives match their needs. If these lessons were more planned, if the administration was more devoted and if the teachers were more motivated, it would be possible to have some considerable positive outcomes. According to Naudi (2004), an effective instructional design includes creating motivating and engaging activities to make learners participate more. As it was stated in Brooke's article (2015) the students get bored easily when they think that the online lessons are not in line with their needs. Since there was no detailed students' needs analysis before designing the instruction, this was likely to happen. Also the fact that there hadn't been any effective instructional design damaged the quality of resources. As Caravias (2014) also mentioned, the lesson objectives should be considered carefully and the teachers should decide how to apply the technologies, approaches and resources that will work best for their students' needs. ASOCs can be beneficial for practicing topics only if they are targeted, oriented and well planned in accordance with the students' needs. However, they should be more attractive and feature more interesting resources.

2.2 Quality of Content and Resources. As Kotzer and Elran (2012) mentioned in their study that designing and undertaking online courses require high demands on design, skills and enough time. Similarly as it was found in the Yang and Cornelius study (2004), nearly all of the students did not see the lessons are fun and recommended having more enjoyable activities. As Lochard (2010) stated that joy is one of the key elements in education and it is important for cognitive development. The commentary of both the course designer and of the teachers included the point that the lessons should each have a scenario in order to draw the students' interest. Using only presentation type of material is not a good mode of either teaching or learning (Drew, 2007). The researcher also observed that the activities were not varied. The teachers also mentioned that if these materials had been more enjoyable it might have raised students' interest more and the lessons would have become more effective which might stop students doing something else during ASOC.

3. Students' (RQ1.2) and teachers (RQ2.2) perceptions of participation, interaction and collaboration in ASOC

3.1 Lack of interaction. It was clearly shown through the surveys, interviews and observations that student-teacher interactions were not satisfactory. As it was revealed in Gillani, Yasseri, Eynon and Hjorth study (2014) in online courses it is difficult to keep the interaction level high. Similar to the study conducted by Ya Ni (2013), the teachers said that with a higher interaction level they would be able to engage their students more easily (Posey, Burgess, Eason & Jones, 2010).

3.2 Number of students. As a matter of fact, the participation level was quite high, most of the students were extremely willing to write their questions and answers, but due to the number of the

students partaking in these lessons, they were either unable to ask questions or the teachers were unable to see their answers. When the students were thus prevented from asking questions or receiving answers, they couldn't understand the topic in depth and their motivation and understanding decreased. An empirical research study carried out by Bandiera, Larcinese, and Rasul (2010) revealed that when the number of students increases the achievement of students decreases.

Similar to this study, in Sher's study (2009), students like sharing their learning experiences with their friends and a feeling of belonging to a learning community existed amongst the students. However, there were also some students who chatted about unrelated subjects, which created a problem for teachers, students and for the technical support team. As Hrastinski (2008) mentioned, synchronous lessons engage students more since they can communicate with their peers and teachers as if they are in face-to-face lessons but if the class size is big, it can be a distraction.

Having no interaction with teachers in terms of asking about the content, no feedback about their performance are challenging issues with big group of students, therefore, smaller number of groups with more interactive environment along with instant feedback is suggested for this target audience. If there is only one single class of 20 to 24 students, ASOCs may not have such problems, the teachers can pay more attention to their students and the interaction levels may increase (Arzt, 2011).

4. Students' (RQ1.3) and teachers' (RQ2.3) perceptions of feedback and assessment in ASOC

4.1 Lack of immediate and individual feedback. High number of students in ASOC prevented teachers from giving immediate and effective feedback to their students which resulted with low level of interaction. As Poe and Stassen (2002) mentioned, students get engaged more when they get immediate feedback from the teachers. The students wanted to receive feedback, but most of the time the teachers were unable to supply the feedback desired. The main reason for this was simply that they did not see and catch the students' answers in the chat area. The teachers thought that effective and varied types of feedback were crucial to learning (Hatziapostolou & Paraskakis, 2012). However, the same teachers felt that it was nearly impossible to give feedback individually when there were too many students. Furthermore, the students wanted to hear the teachers' comments about their success, and they would like to be praised more. Although the teachers claimed that they assessed the students' performance, the students thought the opposite. It is concluded that higher levels of interaction and a more effective assessment system are crucial for the success of such courses.

4.2 More than one task at a time. Another reason of this can be; only one teacher cannot manage everything at the same time such as lecturing, checking the chat area, answering the questions, giving immediate feedback. According to Samuels (2014) when people multitask, it often takes them twice as long to complete a task, and they do it half as well. Teachers need to multitask during these online lessons and as Rekart (2011) stated the brain is designed to focus on one single task at a time. Since the teachers both tried to teach and followed the students' questions/answers from the chat area they could not fully concentrate on the comments written.

5. Students' (RQ1.4) and teachers (RQ2.4) perceptions of the course technology and support

As it was revealed in study of Zumor, Refaail, Eddin, and Al-Rahman (2013), technical problems are the most challenging obstacles that must be overcome in online learning environments and synchronous courses (Posey, Burgess, Eason, & Jones, 2010), it is obvious that these problems discourage students. In ASOCs, both the students and teachers experienced technical problems including the screen freezing, the voice interrupt or internet connection problems, all similar to the problems faced by participants in Gedera's study (2014). Subsequently, they complained about not receiving any help from the IT department during these lessons. It was observed, however, that since there were so many students logged into the system from their home, it was nearly impossible for the IT staff to assist them during these sessions. They could only help the teachers when the teachers experienced a technical problem. Consequently, the teachers were satisfied with the help provided, and they did not have any complaints about the course's technical support. Therefore, technical support should be provided to the students as well, to prevent students' discouragement. Nevertheless, similar with the results of Pina's study (2012), the students and the teachers enjoy using the program and see it as completely easy-to-use.

Summary

This study sought to investigate how students and teachers perceive an ASOC run at their school. Both the students and the teachers describe the course as tedious, and majority of them think that ASOC is not an effective way of learning. The major reasons for this perception are the lack of time, the extra burdens for both students and teachers in their busy lives, inadequate interaction and feedback because of the excessive number of students in the sessions, the dull lesson content, only a single form of educational resource (lecturing with presentation), the lack of proper scheduling and planning, and some minor technical problems.

On the other hand, their general response is that the course is useful as a learning resource although they are not fun or they have difficulties in understanding. The reasons for this perception are having an opportunity to revise and practice at home, an advantageous form of support for the traditional learning environment, taking a part in a learning community including their peers and teachers, the reliable resources used and, lastly, using various modes of technology-integrated teaching and learning environments. However, not being able to ask questions and get response is a major challenge for students. The results of this study enrich and extend our existing inferences about blended and online learning environments for middle school students. We are in the process of transition to more blended learning environments but we should do it correctly especially for younger students not to estrange them from online learning.

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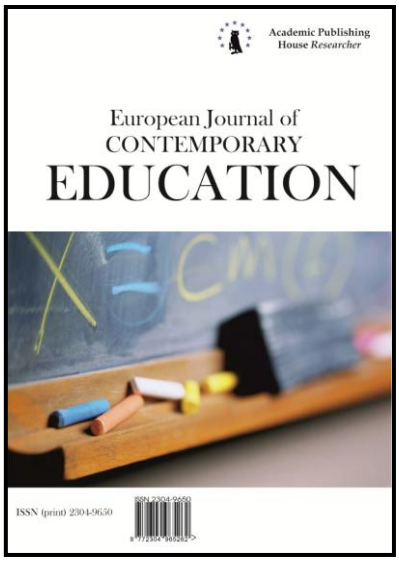

The Perception on Fundamentals of Online Courses: A Case on Prospective Instructional Designers

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Abstract

This study focuses on prospective instructional designers' perception toward creating online courses including which elements are essential for developing such platforms. The study is significant for revealing what the prospective instructional designers focus on while they design certain learning opportunities. The participants of the study were the "Computer Education and Instructional Technology (CEIT)" students from a university in Turkey (n=133) ranging from freshman to senior grades. Since the study aimed to obtain data to determine specific characteristics of a group, a non-experimental survey research design was employed. The participants were asked to assess the importance of fifteen online course elements (such as texts and videos). Afterwards, the participants were provided with seventeen sentences to reveal their thorough perceptions toward designing online courses. The study identified that the participants value feedback mechanism (M=4.69) at the most. The participants believed that the type of web browsers (M=4.50), the course login system (M=4.48), emailing tools (M=4.42), texts (M=4.32) and pictures (M=4.22) are fundamental elements of any online course. The study revealed that prospective instructional designers for online platforms were furnished themselves with the essence of offering online instructional activities. In this study as an example of gender related study, the significant differences on study items were found between males and females participants in terms of their perceptions on online courses. The results showed that voice mechanism was more important for female participants than male and female participants were logically-oriented and visual learners' during the entire online session.

Keywords: Distance education, Online course, Instructional design, Online tools, Student perception.

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Introduction

In parallel to the latest developments in Information and Communication Technologies, online platforms are getting indispensably vital for many sectors, including business, education, and health. Therefore the design and development issues regarding to online learning platforms are becoming an important concern for many stakeholders in these sectors. Whenever and wherever access to the online platforms offers an opportunity for lifelong learning including formal and non-formal settings.

Utilization of online instruction has been increasing in the universities from all over the world (Kiviniemi, 2014; Porter, Graham, Spring & Welch, 2014). Within this framework, there are many different tools to offer instruction, such as Massive Online Open Courses (MOOCs), mobile applications, multimedia software (including a wide range of tools, such as tutorials), or learning management systems such as Moodle, Sakai or Blackboard (McCutcheon, Lohan, Traynor, & Martin, 2015).

Many scholars noted that online courses have been getting explosively popular over the last few years. Online courses are widespread in many countries due to their advantages such as; allowing users the flexibility of operating outside of the constraints of time and place, minimizing the educational costs, destroying the time barrier for learners, creating personal learning environments and the possibility of providing a world class education to anyone with a broadband connection (Gilbert, 2015; Bolliger & Halupa, 2012; Revere & Kovach, 2011; Oliver, Kellogg, Townsend, & Brady, 2010; Tsai, 2010; Wang, & Chen, 2011; Nguyen, 2015). Moreover, changes in the nature of students, innovations in information and communication technologies, and the deficiency in the number of offline higher education institutions have increased the registration rate to online courses (Akdemir, 2011).

Lawton, et al. (2012) remarked that online education is not only important for formal school settings but also indispensable for workplaces where the workers must be lifelong learners and increase their current skills and abilities. Therefore, designing online courses is extremely important for business industry as well (Revere & Kovach, 2011).

The more attention to online courses increases rapidly, the more developers of such systems concentrate on their online platforms. Many researchers, designers or developers are offering suggestions for increasing the quality of the online courses. For instance, Alblehai (2011) provides a long list of recommendations on creating an effective online learning environment. He states that online courses should offer external links to other learning resources, animation presentations and other visual aids including self-assessment or course-assessment tools for measuring the level of learning and put a balance between learning and the tools used for learning. In the Academic Partnerships Report (2014), the answer question "How can instructional design, learning materials, and course presentation contribute to quality online learning?" was expressed in a very good way. According to the report, the following four key design principles were summarized: i) consistent layout and design; ii) clear organization and presentation of information; iii) consistent and easy-to-use navigation; and iv) aesthetically pleasing design and graphics.

There are many institutions offering online courses for different age groups in different subject matters. On the other hand, there is an ongoing dispute on the effectiveness of these online courses (Tsai, 2010). Fabry (2009) gathers the problems about designing online education under two major branches: insufficient pedagogical and technological knowledge regarding with the online education tools and insufficient knowledge about student centered learning regarding increasing the learning outcomes. Fabry notes that using multiple online tools does not guarantee effective learning outcomes.

Similar to Fabry' work (2009), Abdous and He (2008) criticized the management of online course design and development processes, and summarized the adverse effects of insufficient management as poor online course quality and delays in course offerings.

Fabry (2009) pointed out the importance of conducting research on online education "in order to create instructionally sound courses, research-based principles need to be applied" (p.255). For example, Lawton, et al. (2012) conducted a study on realizing how different online course designs affect the learning outcomes. They concluded that providing feedback mechanism is the most essential and common feature of all kinds of online courses. Moreover, their study showed that different designs directly affect the learning outcomes of any online courses.

Alblehai (2011) conducted several interviews with ten teachers on revealing their perceptions toward designing online education and underlying the factors affecting its success. Alblehai concludes that teachers wanted to be a part of designing and developing processes for online courses. Alblehai strongly emphasizes that in the transition from traditional education to online education, the ideas and attitudes of teachers about e-learning play an essential role. Therefore, it is vital to understand the current positions of teachers before moving toward hybrid or online education in any institution.

Although there is a sufficient amount of literature on developing online courses, there are few studies on what prospective instructional designers consider about online course design (Power, 2008). While designing online courses, it is important for teachers to realize online learners' characteristics and the tools for addressing their needs (Oliver, Kellogg, Townsend, & Brady, 2010). Wang and Chen (2011) recommend more studies on instructors' three-dimensional proposition for improving the following aspects online courses' quality: pedagogy, technical knowledge and design skills. Revere and Kovach (2011) highlight that teachers and students should be integrated into design processes.

Both the features of online learners and their effects on predefined learning outcomes are the major concerns for researchers. In that sense, many researchers have conducted studies with different methods (such as qualitative or quantitative) in order to delineate online learners' features affecting positive results on online instructional settings. Comprehensively, these research studies concentrate on different subject matter areas, including schooling levels, class sizes, course durations, demographics (age, gender and the online courses registered), and sample sizes. Results yielded that these listed features have the effect on online learning success criterion. For instance, different studies revealed that there is a significant gender difference in online learning perception reflecting on learning outcomes (Tsai & Tsai, 2010; Johnson, 2011; González-Gómez, Guardiola, Rodríguez, & Alonso, 2012; Ashong & Commander, 2012).

This study focuses on understanding the effect of gender and online course experiences (including the schooling year) regarding their perceptions of online courses. In addition, this study aims to delineate the perceptions of prospective instructional designers on developing online courses. Therefore, the following research questions have been developed for this study:

1. What are the demographics and online course experiences of the participants?
2. Which tools are valued more by the participants for designing online courses?
3. What are the perceptions of the participants in designing online courses?
4. Is there any significant difference between gender (male/female) regarding the online course tools and the perceptions?
5. Is there any significant difference among years of the study (freshman, sophomore, junior and senior) regarding the online course tools and the perceptions?

Methodology

This part consists of information regarding the study methodology; the participants and sampling, the study instruments, the research design, and how the data are analyzed.

1. Participants

The study participants were the "Computer Education and Instructional Technology (CEIT)" students from a private university in Turkey (n=133). The Department of Computer Education and Instructional Technology, which is a four-year undergraduate program, is a multidisciplinary department that brings together the field of education with computer technologies and instructional technologies. In the CEIT program, through courses such as programming (C++, Java), multimedia development (Flash, Actionscript), graphic design (Photoshop, Fireworks, Freehand, Illustrator, InDesign), 3d design and modeling (3ds Max) and Internet-based application development (Dreamweaver, HTML, Javascript, CSS, AJAX, PHP), students gain technical knowledge and skills to develop computer-based applications, and they consolidate this knowledge by developing pedagogical applications in instructional technologies courses. As a prospective instructional designer, students, who gain knowledge about operating systems, network topology and management, database, and computer hardware during their education, can work as programmers, web designers or system experts upon graduation. During their four years of education, students develop applications such as pedagogical animations, pedagogical software,

pedagogical websites and a course management system after they acquire theoretical knowledge and practical experience in the following areas: pedagogical design, computer-based educational environment development, online course development and visual design. The students, who have the ability to evaluate the applications on the market from pedagogical and design perspectives, can work as educational specialists, educational technicians or instructional designers for individuals of all ages in different types of educational institutions and companies. In this study, the participants whose ages range from 19 to 30 years with an average of 23 were purposefully selected for the study due to the following reasons: (i) the participants had knowledge about designing, developing and implementation of the tools utilized on offering online courses, (ii) the participants were becoming familiar with the design of both offline and online instructional settings, and (iii) the participants would be assigned jobs on offering and managing online courses. Table 1 presents the participant' information regarding their grades (the year of the study), gender (female or male) and online course experiences.

As shown in Table 1, although participant students in the first grade level (N=20) have no experience in online course development, they have experienced two online courses and they have perceptions on this subject. The second grade students (N=34) have experienced one course in online course development and they have experienced three online courses in total. Furthermore, it is observed that in the following grade levels, the students have adequate experience in online courses.

Table 1. The Demographics and Credit Information by Quoted (#) Participant

Grade	Gender		Total	Online Course Experience		Total # of Online credits (Taken and Developing)
	Male	Female		Taken Online Course/# of credits	Developing Online Course/# of credits	
1	9	11	20	2 course/6	-	6
2	17	17	34	3 course/9	1 course/4	13
3	15	21	36	7 course/23	3 course/12	35
4	18	25	43	9 course/29	5 course/18	47
Total	59	74	133	9 course/29	5 course/18	47

2. Instrumentation and Design of the Study

Since the study aimed to obtain data to determine specific characteristics of a group, a non-experimental survey research design was employed. First, the participants were asked to assess the importance of fifteen online course elements (such as texts, videos, discussions, whiteboard) on a five level Likert-type scale (from "not important" to "very important"). Afterwards, the participants were provided with seventeen sentences for revealing their thorough perceptions toward designing online courses on a five level Likert scale from "totally agree" to "totally disagree". The questionnaire was administered to the CEIT and data were obtained from different classes on a voluntary basis.

Findings/Results

The participants' ranking on the importance of the distance learning tools for a course was tabulated in Table 2 (n=133). The Cronbach's alpha reliability coefficient was calculated as 0.69 with the 15 items and 133 participants showing that the instrument was reliable enough for a survey.

The study identified that the participants value feedback mechanism (M=4.69) the most. Subsequent to feedback offer, the participants believed that the type of web browsers (M=4.50), the course login system (M=4.48), emailing tools (M=4.42), texts (M=4.32) and pictures (M=4.22) are fundamental elements of online courses.

Table 2. Online course elements and participants' mean scores

Online Course Elements	Min.	Max.	M.	S.D.
Feedback mechanism	3.00	5.00	4.69	0.56
Web Browser	2.00	5.00	4.50	0.65
Login system	2.00	5.00	4.48	0.69
Emailing	3.00	5.00	4.42	0.63
Texts	2.00	5.00	4.32	0.68
Pictures	2.00	5.00	4.22	0.66
Video Conferencing	2.00	5.00	4.03	0.82
Videos	2.00	5.00	4.00	0.77
Exam	1.00	5.00	3.97	0.90
Forum	1.00	5.00	3.96	0.96
Voice Conferencing	1.00	5.00	3.93	0.84
Voices	2.00	5.00	3.91	0.80
Customizable Interface	1.00	5.00	3.73	0.98
Whiteboard	1.00	5.00	3.70	0.91
Chat	1.00	5.00	3.67	0.97

Table 3. Items and mean scores on designing online course elements

No	Item	Min.	Max.	M.	S.D.
14	The pages should be loaded easily.	2.00	5.00	4.69	0.55
10	The students should easily communicate with the instructor online.	3.00	5.00	4.64	0.57
6	The course should be fully functional.	3.00	5.00	4.64	0.59
13	The course should use language well.	2.00	5.00	4.63	0.56
2	Help option should be presented during the entire online session.	3.00	5.00	4.63	0.52
7	The course materials should be parallel to the nature of the course.	3.00	5.00	4.59	0.53
3	A course syllabus should be presented no later than the first class.	2.00	5.00	4.57	0.63
4	Online materials should be attractive.	3.00	5.00	4.57	0.58
9	Online materials should be presented logically.	2.00	5.00	4.54	0.60
12	The online course should be interesting.	3.00	5.00	4.48	0.65
16	Design and realization of offering exams online must be taken into particular consideration.	2.00	5.00	4.41	0.60
8	The online materials should be presented in such a way that it is well-matched with different learning styles.	2.00	5.00	4.36	0.69
15	Whenever it is appropriate, external professionals should be invited to the online course.	2.00	5.00	4.31	0.67
11	The course learners should be able to access to the entire classroom via organized forum discussions.	2.00	5.00	4.27	0.64
5	The online course should offer external websites for its learners.	2.00	5.00	4.24	0.68
17	The course should provide statistics about the learners' login times and the total time they spent on the system.	1.00	5.00	4.02	0.88
1	A course introduction should always be online.	1.00	5.00	3.82	0.92

Additionally, the participants' mean scores on their thorough perceptions toward designing online courses on a five level Likert scale from "totally agree" to "totally disagree" were tabulated in

Table 3 (n=133). The items were listed from the highest to lowest mean scores. The Cronbach's alpha (reliability coefficient) was calculated as 0.83 with the 17 items and 133 participants which shows the instrument was reliable.

From the Table 3, the participants reported that the online course pages should be loaded easily (M=4.69) so that the whenever and wherever access feature should always be available for the users. Similar to feedback issue, the participants reported that online students should easily communicate with the instructor online (M=4.64). Additionally, the entire course should be fully functional (M=4.64) and should use language well (M=4.63). The participants also reported that the "Help" option should be presented during the entire online session (M=4.63) where there is geographical distance in the nature of online platforms. The lowest mean score focused on the existence of an instructor in an online course (M=3.82).

Subsequent to previous statistics, an independent sample t-test was conducted in the data set to determine whether or not gender makes a difference on the study items. Table 4 demonstrates that eleven items significantly differ on gender variable. It reveals that mean scores of female participants are significantly higher than male participants'.

Table 4. The independent sample t-test on items

Item No: Item description	Gender	n	M	S.D.	t	p
Voice (as an online course elements)	Female	74	4.08	0.75	2.680	0.008
	Male	59	3.71	0.83		
2: Help option should be presented during the entire online session.	Female	74	4.74	0.46	2.607	0.010
	Male	59	4.50	0.56		
4: Online materials should be attractive.	Female	74	4.66	0.53	2.041	0.043
	Male	59	4.45	0.62		
9: Online materials should be presented logically.	Female	74	4.67	0.52	2.927	0.004
	Male	59	4.37	0.66		
10: The students should easily communicate with the instructor online.	Female	74	4.74	0.49	2.183	0.031
	Male	59	4.52	0.65		
13: The course should use language well.	Female	74	4.78	0.41	3.417	0.001
	Male	59	4.45	0.67		
14: The pages should be loaded easily.	Female	74	4.79	0.40	2.515	0.013
	Male	59	4.55	0.67		
16: To design and realization of offering exams online must be taken into particular consideration.	Female	74	4.52	0.52	2.471	0.015
	Male	59	4.27	0.66		

Furthermore, the data set was checked for significant differences in accordance with grade variable by the one-way ANOVA test. As Table 5 shows, four course elements (chat, exam, feedback mechanism and login system) and four survey items (3, 6, 8, and 17) differed in grade variable. Follow-up tests were performed on the main effect of four levels of students' grades (1:freshman, 2:sophomore, 3:junior and 4:senior) on the survey items to find out which level(s) differ(s) significantly among the group. Results of the Levene's test of equality of error variances were significant; from these results it could be concluded that group variances of the dependent variable were not homogeneous. Hence, by assuming unequal variances among groups (according to the Creswell, 2013), Dunnett's C test was used for follow-up testing as illustrated in Table 5.

Table 5. The one way ANOVA test on differences among groups in different levels of study

Item	Grade	1	2	3	4	n	M	S.D	F	p
Chat	1	---				20	3.40	1.14	4.395	0.006
	2	NS	---			34	3.29	1.03		
	3	NS	NS	---		36	3.80	0.74		
	4	NS	*	NS	---	43	4.00	0.89		

Item	Grade	1	2	3	4	n	M	S.D	F	p
Exam	1	NS				20	3.15	1.13	8.647	0.000
	2	*	---			34	4.11	0.72		
	3	*	NS	---		36	4.30	0.70		
	4	*	NS	NS	---	43	3.97	0.85		
Feedback Mechanism	1	---				20	4.15	0.74	8.625	0.000
	2	*	---			34	4.73	0.56		
	3	*	NS	---		36	4.83	0.37		
	4	*	NS	NS	---	43	4.79	0.46		
Login System	1	---				20	4.05	0.60	8.556	0.000
	2	*	---			34	4.23	0.78		
	3	*	NS	---		36	4.61	0.68		
	4	*	NS	NS	---	43	4.79	0.46		
3	1	---				20	4.10	0.91	5.224	0.002
	2	*	---			34	4.67	0.47		
	3	*	NS	---		36	4.72	0.51		
	4	*	NS	NS	---	43	4.60	0.58		
6	1	---				20	4.30	0.73	3.116	0.029
	2	NS	---			34	4.64	0.64		
	3	*	NS	---		36	4.77	0.48		
	4	NS	NS	NS	---	43	4.69	0.51		
8	1	---				20	4.30	0.65	5.265	0.002
	2	NS	---			34	4.02	0.79		
	3	NS	*	---		36	4.63	0.54		
	4	NS	NS	NS	---	43	4.44	0.62		
17	1	---				20	3.55	1.19	4.809	0.003
	2	NS	---			34	3.79	0.84		
	3	NS	NS	---		36	4.16	0.77		
	4	NS	*	NS	---	43	4.30	0.70		

Note. Dashes indicate that cell value is zero. NS = non-significant differences between pairs of means, while an asterisks (*) =significance using the Dunnett's C procedure.

As a general finding from Table 5, it discloses that as the students promote to upper grades in their studies: sensitivity and knowledge regarding the importance of certain elements for online courses were significantly stimulated.

Discussion and conclusion

The study participants were both the students who were learning online course design, development and evaluation processes and prospective online course designers who will implement what they have learnt in their participated classes. As a result, the participants appreciated the importance of feedback mechanism which is one of the essential elements within the learning and teaching cycle. As students, they wanted to learn about their personal progress in the form of feedback which reflected their personal learning history in the form of further "what-to-do" point. Bolliger and Halupa (2012) also found that the providing tools for timely feedback is essential for learners as well as designing online courses which motivate and encourage the learners within the course.

Moreover, the participants also value the importance of basic literacy elements, texts and pictures. Oliver, Kellogg, Townsend, and Brady (2010) emphasize that the use of texts and pictures is essential for non-traditional online courses, especially for younger students. Therefore, it is good to reveal that prospective instructional designers pay attention to the basics of instructional message design.

The participants also appreciated the existence and the functionality of forum based discussions within the online courses. As Revere and Kovach (2011) pointed out forum discussions

are important for online students to keep their engagement with learning process and peer interactions. The participants gave the least mean score to the chat tool which is synchronous two-way communication tool. Although Revere and Kovach (2011) stated that the chat tool is much more preferable than discussion tools (as they prevent the delays in messaging), these study participants preferred the forum discussions more than instant messaging tool; chat. The participants of this study might think that responding with more elaboration is much better and safer than responding immediately.

Additionally, it appears that the participants were also knowledgeable about technological side of the online course as they rated web browsers and login systems as the most important elements of online courses. These two elements are highly important to provide the "whenever and wherever access" feature of online courses. Moreover, the login systems are important for many aspects of offering online courses, such as keeping students' progress, providing confidentiality of shared data on the system.

The participants also pay attention to the functionality of the online courses. For instance, according to the participants, the online course pages should be loaded easily so it provides the maintenance of whenever and wherever access feature of online courses. Similarly, in order to support functionality of the system, the participants pointed that the "help" option should be visible all the time.

In addition to functionality, the participants consider the significance of the two-way communication where they stated that online students should easily communicate with the instructor online via different course elements. Similar to the results of Bolliger's and Halupa's study (2012), the participants paid specific consideration to the interactions with their classmates and course instructors. The two-way communication is extremely vital for learners who are geographically distant to each other. Therefore, the designers must offer interaction tools as much as they can for the learners.

On the other hand, the lowest mean score focused on the existence of an instructor in an online course. This contradictory finding shows that the participants were aware that it is impossible to make an instructor available online all the time. As Akdemir (2011) specified, the participants realized that teaching online is very challenging. That problem could be overcome by the existence of asynchronous online elements within the course context.

The study showed that the prospective instructional designers for online platforms were furnished themselves with the essence of offering online instructional activities. In other words, the online course designers are able to develop well-designed courses for their learners. This is a vital situation which offers better opportunities for the online instruction in general. As Oliver, Kellogg, Townsend, and Brady (2010) emphasized, online course designers, as the case in this study, must be knowledgeable about both the technological aspects (such as the tools, their functionalities and drawbacks) and the pedagogical aspects (such as advantages of different tools for learning and the online learners' characteristics) of online instruction.

There are also conflicting findings among the items. For instance; the participants strongly agree that the students should easily communicate with the instructor online, whereas the chat tool or video conferencing had lower mean scores than other course elements. Similarly, customizable interface which is an important element for addressing different users' needs and expectations has lower mean scores; yet, the participants declared that the online materials should be presented in such a way that they are well-matched with different learning styles. These conflicting results might appear because of lack of real online experiences in which the participants will realize the importance of these elements for an effective online course.

In this study, as an example of gender related in study, the significant differences on study items were found between males and females participants in their perceptions on online courses. As an online course element, we found significant differences in only voice mechanism (Table 4). This result indicated that voice mechanism was more important for female participants than male. Similarly, Ching & Hsu (2015) found that females preferred audio discussion more than males did, and more females reported that audio discussion strengthened their connection with peers. In addition, as we predicted, female students seem to experience more voice in online environments, and this contributes in turn to greater perceived learning for females as compared to male students. In addition, some significant differences between designing online course elements items and the gender variable were found in this research. Specifically, female participants in this

study reported a more positive view than male participants in these facets: help option during online session; attractive, logically located and easily loaded materials with well language; easily communicate with instructor; students have opportunities to solve course related exam by online. These results were in line with previous research showing that females are more communication-oriented in an online environment, seeking interaction with others (Tsai & Tsai, 2010). From social a cognitive psychology perspective, gender differences seem to be important in help-seeking and supportive behaviours (Wester, Christianson, Vogel, & Wei, 2007; Jeff, 2011). An empirical study found that females are more willing to seek help for their problems in online environments than male (Lehdonvirta, Nagashima, Lehdonvirta & Baba, 2012). Koohang, Paliszkiewicz, and Nord (2015) asserted that a vital element in the success of online learning environments is instructional design with the incorporation of usability properties such as simplicity, recognition, comfort, user friendliness, control, navigability, load time, visual appearance, consistency, well-organized materials, understandability, and relevancy to the online learning courseware. In our study, some of these usability properties such as attractiveness (related to the visual appearance), logically located and easily loaded materials with well language (related to the control, navigability, load time well-organized) examined that female participants' scores differed from male participants' in a positive way during the entire online session. These results demonstrate that female participants have logically-oriented and visual learners' characteristics. On the other hand, female participants showed a tendency toward visual and sequential styles during the entire online session.

As a recommendation, the instructors should offer real case studies or experiences to their learners so that the learners could realize the implementation of theoretical knowledge gained through the instructional activities.

Some limitations of this study must be noted here. First, the study was conducted at one university. Moreover, since this study only focused on the quantitative data through self-reporting data gathering, it requires to be replicated for collecting more in-depth knowledge with qualitative methods. Moreover, enhancing the sample to other contexts will assist to comprehend the current study phenomenon.

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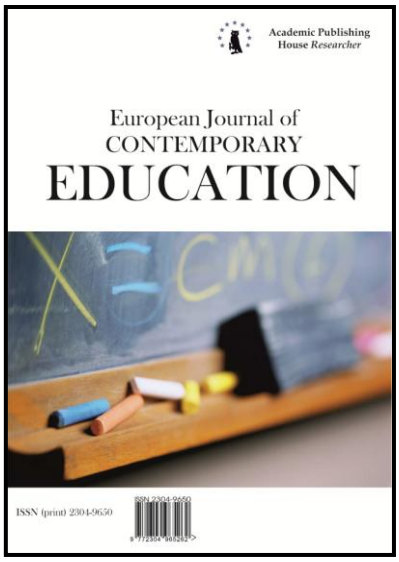

Preferences and Attitudes for Using Interactive Whiteboards in Different Courses and Learning

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Abstract

The purpose of the study is to investigate teachers' and students' considerations, preferences, attitudes and awareness related to using Interactive Whiteboards in 7-12 grades and different courses, and learning. 1013 students from elementary and secondary schools and 65 teachers from different schools were selected to take questionnaire for defining their preferences and awareness for using IWBs in teaching and learning processes. Descriptive statistical analyses were used to investigate whether there were differences between students' and teachers' views based on the survey items. The tests of research questions generated discussion and conclusions were given at the end of the study.

Keywords: Interactive Whiteboard (IWB), preferences of teachers' and students', IWB variables, teaching and learning in 7-12 grades and courses.

Introduction

Computers and new technologies have been used extensively to teach students with different learning and cognitive styles since the beginning of 1970s (Alessi & Trollip, 1991; Gagne', Wager & Rojas 1981; İpek, 1995, 2001, 2010, 2011; Mechling, Gast & Krupa, 2007; Aydin, Dogan & Kınay, 2013). Information and communication technologies have become unavoidable for teachers and students (Sirin and Caglayan, 2013; Ozyurt, 2012). Recent improvements in instructional strategies have led to discussions about the effect of their teaching strategies and tools. These dimensions have been used and discussed as important design factors for message design, screen design and text design in instructional process as well as interface design in high quality instructional software.

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An interactive whiteboard (IWB) is a large interactive display connected to a computer and projector. Using IWBs requires a framework for understanding its characteristics that define users' success and performance in different perspectives (Sözcü & İpek, 2012). All preferences for IWBs are to be integrated with instructional software, e-learning tools and instructional strategies. Awareness of IWBs as an instructional tool to improve teaching and learning process provides new rules and opportunities for using visual literacy and other types of literacy concepts, which can be defined as new literacy, including media, knowledge, readability, computer, and financial, digital literacy (Altun, 2005, İpek, 2007). The contents of literacy should be included and well-defined in programming process to teach and present effectively any content for users of IWBs.

Both students and teachers generally perceive IWBs as positive additions to their classrooms. Research has revealed that IWBs do not only increase students' motivation to study but also help teachers become more efficient in teaching due to time saved during group activities (Glover, Miller, Averis & Door, 2005; Digregorio & Sobel-Lojeski, 2010; Smith, Hardman & Higgins, 2006; Marzano & Haystead, 2009; Aytaç, 2012). Use of IWBs can increase the interactive potential between teachers and students along with active student involvement and motivation (Essig, 2011). Thus growing prevalence of interactive learning tools such as the interactive whiteboard requires that the close relationship between technology and pedagogy be understood (Glover; Miller; Averis, & Door, 2005).

Glover and his colleagues (2007) report that the starting point for such fresh outlook on pedagogy is teacher awareness and implementation of interactivity. Integrating technology, pedagogy or instructional approach and learning styles can be defined as instructional variables for using IWBs (Sözcü & İpek, 2012). Teachers also indicate two variables for pedagogical approach including preparation time for lessons and students' individual learning skills (Digregorio & Sobel-Lojeski, 2010; Schuck & Kearney, 2007). In addition, teachers should learn to teach actively, by including a wide range of media and instructional materials such as video, audio-visuals, graphics, animations, text and print materials (Şimşek, 2012).

There are several studies on the use of IWBs for educational purposes. One of the first studies that showed effects of IWB on achievement indicates no significant differences between schools that use IWBs and those that do not (Higgins, Beauchamp, & Miller, (2007). In addition, no difference was found on test scores in mathematics and sciences between IWB and non-IWB classrooms (Schuck & Kearney, 2007), nor did IWBs have an impact on student performance (Higgins et al. 2007). On the other hand, Lewin, Somekh, and Steadman (2008) indicate that positive gains were considered in literacy, mathematics, and science for students aged 7-12. These results were related to lesson time that students had been taught using an IWB. Interactive teaching helps higher achievement; motivation is another variable for learning and achievement. In general, IWBs had a positive effect on motivation (Armstrong et al, 2005; Becher & Lee, 2009; Glover et al. 2007; Hall & Higgins, 2005; Lewin et al. 2008; Schuck & Kearney, 2007; Wall, Higgins, & Smith, 2005; Wood & Asfield, 2008). However there is not enough research considering motivation directly as psychological and pedagogical variables for IWB use (Sözcü & İpek, 2012). On the other hand, it is important to remember that technology can enhance students' achievement if IWBs are used effectively and its materials are well created as well as multimedia learning.

Isman, Abanmy, Hussein, & Al Saadany (2012) found that Saudi teachers at secondary schools held a positive attitude toward using interactive whiteboards in classes. Bruce, McPherson, Sabeti, & Flynn (2011) studied when and how IWBs were used as effective tools in teaching mathematics. The researchers observed that students participated in classes more actively. Dhinsa and Emran (2011) conducted a research study on how a constructivist approach supported by IWB helped decrease gender difference in chemistry classes. Gender difference was found to be increased when organic chemistry was thought through conventional teaching methodology, while it was decreased when a constructivist approach supported by IWB was used. Deaney et. al. (2009) concluded that thinking skills could be developed through IWB technology. The results of Erduran and Tataroğlu's 2009 study on science and math teachers revealed that use of interactive boards had a positive impact on the learning environment, student attention and student participation (Erduran & Tataroğlu, 2009). In an earlier experimental study by Weimer (2001), students' attitudes towards a class project were measured and the results showed that the students in the class with the smart board had greater motivation.

There is still little research into IWB effects on the different work places and areas based on different view of approaches (Baran, 2010; Bennett & Lockyer, 2008). The research topics are different with instructional variables which include using IWBs in geology (Ateş, 2010), integrating IWBs in classrooms (Bennett & Lockyer, 2008; Jewitt, Moss, & Cardini, 2007; Lewin et al. 2008; Shi et al., 2003; Xu & Moloney, 2011), learning collaborative activity (Mercer, Warwick, Kersher & Staarman, 2010), and effecting attitudes and contributions (Adıgüzel, Gürbulak & Sarıçayır, 2011; Baydaş, Esgice, Kalafat & Göktaş, 2011; Digregorio & Sobel-Lojeski, 2010; Ekici, 2008; Kaya & Aydın, 2011; Mathews-Aydinli & Elaziz, 2010; Sherton & Pagett, 2007; Zengin, Kırılmazkaya & Keçeci, 2011). In addition, using IWB and its applications are to be indicated as a vital topic for teaching and learning in classrooms.

This paper identifies different preferences, attitudes and awareness of students and teachers for using IWBs efficiently. Nowadays, teachers teach different courses in their schools which are named as private, public and other type of secondary schools consequently. So the courses are here defined as math, science, social studies, languages and others including art, drawing and music for students. Teachers teach various courses such as sciences, arts and languages at different schools. For this, all variables related to using IWB are considered and discussed in the paper.

Research

Purpose of the Study

The purpose of the study is to investigate considerations regarding on preferences, attitudes and awareness of teachers' and students' for using Interactive Whiteboards (IWBs) in 7-12 grades classes for different courses and learning. The aims of our study are to investigate the effects of IWBs on

- Student preferences about and attitudes toward different courses.
- Teacher preferences about and attitudes toward different courses.

Methods

Participants:

The research used a descriptive statistics and its analysis approach to explore the basic context, and awareness and preferences of the participants as students and teachers. Sixty-five elementary and secondary school teachers who teach at different grades and 1013 students attending those schools in Istanbul participated in the study.

Table 1. IWBs use of students' and teachers' related to different grades and ages

	N	Male	Female	6-14 ages	15-19 ages	Elementary	High
Teachers	65	37	28	-	-	37	28
Students	1013	532	481	504	508	440	573

The demographics information and its variables for teachers and students related to IWB learning variables are used in data analysis and discussion findings. This study deals with different courses and IWB learning variables such as instructional-pedagogical, psychological and technological items related to attitudes and preferences.

Gathering Data

The paper used two data collection tools, which are described below: a survey for students and a survey for teachers. And its reliability and validity has been considered in high scores as r=.80 and rx=.64. In addition to these activities, expert view is used to indicate its validity and reliability as well as pilot work with twenty five students randomly selected from all grades and types of schools.

Teacher Survey

A questionnaire was administered to 65 teachers at the different levels of classrooms and schools at the end of Spring and Fall semester 2011. The questionnaire consisted of two parts

including general information items for teachers and their experience in using IWBs and 33 statements with Likert-scale response and ranking general attitudes and preferences of teachers' related the IWB. Part one includes the following subjects with fourteen (14) items in details such as time of experiences, types of teaching school, using the IWB, computer literacy, and using characteristics of IWB.

Student Survey

A questionnaire was administrated to a thousand and thirteen (1013) students at the different grades and schools at the end of the fall semester 2011. The questionnaire consisted of two parts including eight (8) general information items for students' opinions of using IWB and 24 statements with Likert-scale response options and ranking preferences of students' reflections related the IWB.

"Student Interactive White Board Survey" developed by Aytaç ve Sezgül (2012) was conducted on 202 students. Because teacher form of the scale didn't have enough sample size to be able to make factor analysis, validity and reliability analyses were made on student form. Validity and reliability analyses were applied on 300 students which was ten times higher than the number of items (24). The performance provided high reliability with questionnaire and indicated enough validity as well.

Firstly, explanatory factor analysis was conducted for all items as a part of principal component analysis. The value of KMO sample adequacy was found as .911 and the approximate chi-square value of Barlett Sphericity test was found as 3067.54 ($p<.05$). It was observed that common variances were above .38 and all the items were gathered under single factor. This single factor with eigenvalue of 8.146 explains 33.942% of total variance. At the same time, break point on the screen plot was examined and it was seen that the scale showed a single-factor structure also on the break point. The factor loads of items under single factor changed between.34 and .79. According to Büyüköztürk (2002), this finding shows that the scale has a general factor. The fact that the variance caused by the first factor before rotation was above 30% is considered to be another proof for a general factor (p. 126). Therefore, it is concluded that the scale has a single-factor structure.

The reliability coefficient calculated for the whole scale was found as .80. It is seen that an item that could be removed from the scale will not cause any important increase in Cronbach alpha value.

Analysis of Data

For this purpose, objectives as indicated will be reviewed to explain preferences for each item. The survey items except for beginning parts are formed as a five–point Likert scale, with the alternatives labeled from 'Strongly disagree (1), to 'Strongly Agree' (5). To avoid halo effect, several questions were phrased negatively. Analysis of data is intended to explain main problem and sub research problems as follows. All ranges in five-point Likert scale were calculated according to this rule from 5 to 1 scale. We made decisions for differences in attitudes and preferences between students and teachers and for differences between grade levels and courses. And then we classified learning and teaching variables in using IWBs according to a framework created by Sözcü and İpek (2012).

Findings

After the responses were analyzed, research questions were investigated to clarify all responses based on survey which consists of several parts. For the research, questions named as instructional, psychological and technological items were defined and then students' and teachers' attitudes and preferences related to those items were evaluated. All findings were presented to explain and discuss rest of questions in Tables from 2 to 7.

Students' attitudes and preferences toward the use of IWBs

It can be seen that the participants in the study generally have positive attitudes towards IWB use. It is stated that use of IWB gives students new opportunities in the class, facilitates their comprehension of the lessons and makes the lessons more entertaining. We can conclude that IWBs generally have positive contributions to students' success. This is the case in other studies,

too (Dhinsa & Emran, 2011; Bruce et. Al., 2011; Erduran & Tataroğlu, 2009; Isman et al., 2012; Weimer, 2001).

There were some results for using IWB based on students'gender, grades and courses and learning as well. 47% of the students were aged 15-19 and 53% were between 6-14. The number of girls was slightly larger than that of boys (respectively 53% & 47%). Elementary school students (grades 1-8) made up 47 % of the sample and the rest was high school students in grades 9-12., 69% of students responded that they had used IWBs before, whereas 29% responded they had not. 50% of the students in the former group had been using IWBs more than three years, and 73% used them more than eleven hours in a week. IWBs were preferred in courses as visuals (12%), numerical (41%), verbal (17%), foreign language (7%) and all of them (23%). Several items in the student questionnaire aimed to investigate the participants' preferences toward the use of IWBs in terms of perceived effect on learning as instructional-pedagogical, psychological and technological variables (see Tables 1, 2, 3, 4 and 8).

Table 2. Students' attitudes and preferences about the use of IWBs and learning (Instructional-Pedagogical)

		SD	D	NI	A	SA	Mean	STD
Q3- I cannot learn enough when IWB used in class because of the crowd.	F	396	289	163	74	91	2.19	1.27
	%	39.1	28.5	16.1	7.3	9.0		
Q4- I can easily present my presentations and contents using IWB	F	73	55	124	347	414	3,96	1.18
	%	7.2	5.4	12.2	34.3	40.9		
Q12- My teacher is lecturing too fast with IWB, I cannot keep up.	F	330	256	180	142	105	2.44	134
	%	32.6	25.3	17.8	14.0	10.4		
Q15- My knowledge does not become permanent when IWB used in lessons	F	385	277	191	78	82	2.21	1.25
	%	38	27.3	18.9	7.7	8.1		
Q17- My teachers use IWB effectively in lessons.	F	55	31	130	343	454	4.10	1.08
	%	5.4	3.1	12.8	33.9	44.8		
Q19- Without IWB the course would be more difficult to understand	F	157	130	250	237	239	3.27	1.36
	%	15.5	12.8	24.7	23.4	23.6		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Table 3. Students' attitudes and preferences about the use of IWBs and learning (Psychological)

		SD	D	NI	A	SA	Mean	STD
Q5- I like lessons withthe IWB	F	53	44	95	329	492	4.15	1.10
	%	5.2	4.3	9.4	32.5	48.6		
Q13- I'm not interested in the contents presented using the IWB	F	398	250	152	114	99	2.28	1.34
	%	39.3	24.7	15.0	11.3	9.8		
Q16- Using IWB increases collaboration and communication among students.	F	165	156	294	190	208	3.12	1.34
	%	16.3	15.4	29.0	18.8	20.5		
Q21- My teacher encourages us to use IWB.	F	135	100	267	272	239	3.38	1.30
	%	13.3	9.9	26.4	26.9	23.6		
Q24- I like to use an IWB in front of the class.	F	129	92	150	228	414	3.70	1.41
	%	12.7	9.1	14.8	22.5	40.9		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Table 4. Students' attitudes and preferences about the use of IWBs and learning (Technological)

		SD	D	NI	A	SA	Mean	STD
Q8- Having an IWB in my classroom encourages me to use computer and Internet	F	167	133	200	215	298	3.34	1.43
	%	16.5	13.1	19.7	21.2	29.4		
Q-9- My teacher doesn't use IWB effectively in lessons.	F	637	192	66	66	52	1.72	1.16
	%	62.9	19.0	6.5	6.5	5.1		
Q20- My teacher usually shows the content which is prepared by himself/herself on the IWB	F	59	77	133	349	395	3.93	1.16
	%	5.8	7.6	13.1	34.5	39.0		
Q23- I find opportunity to learn from different sources using IWB.	F	82	66	165	326	374	3.83	1.22
	%	8.1	6.5	16.3	32.2	36.9		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Teachers' attitudes and preferences toward the use of IWBs

The first part of the survey dealt with general information about teachers' background knowledge of IWBs and the frequency and purpose of their use in the different courses. Thirty-six teachers were working in private schools and 29 teachers were in public schools. Teachers with 3-12 years of experience preferred using IWBs in their schools. 69% of the teachers reported that they had training in using IWBs and they used IWBs more than 11 hours a week. More than half of the teachers (56%) stated that they used IWBs before in their classes. Teachers used IWBs in their classes as verbal (26%), numerical (30%), visual (10%), foreign language (18%), and all of them (16%). For using IWBs, teachers effectively use in math (25%), Turkish (19%), foreign language (17%), science (6%), biology (6%), social studies (5%), history (5%), geography (5%), drawing and art (3%), chemistry (3%), and physics course (3%) as well. More than one-third of the teachers (38%) also used IWBs for more than three years and 70% used them in every class. A majority of them (78%) preferred and recommended using IWBs. Teachers used IWBs for purposes such as presenting their own materials (18%), writing (20%), saving documents (10%), connecting to the internet (12%), presenting materials prepared by students (7%), watching movies (6%), presenting audio-visuals (8%), presenting business software and educational materials (3%), drawing background plans (6%) and communicating with students (2%), as can be seen in Tables 5 to 8.

Table 5. Teachers' attitudes and preferences about the use of IWBs and learning (Instructional-Pedagogical)

		SD	D	NI	A	SA	Mean	STD
Q1- Using IWB in teaching-learning process increases students' academic performance.	F	1	4	3	42	15	4.06	0.73
	%	1.5	6.2	4.6	64.7	23.1		
Q3- Presentations and explanations are more effective when I use IWB.	F	1	2	4	33	25	4.27	0.72
	%	1.5	3.0	6.2	50.8	38.5		
Q10-Students prefer teaching with IWB	F	2	2	8	36	17	4.08	0.72
	%	3.0	3.0	12.4	55.4	26.2		
Q15- Classroom management is more difficult when using IWB	F	18	36	5	5	1	2.00	0.90
	%	27.7	55.4	7.7	7.7	1.5		
Q26- Use of IWB addresses to students' individual differences	F	2	7	18	30	8	3.54	0.95
	%	3.1	10.8	27.7	46.2	12.3		
Q30-Training for IWBs is good enough	F	2	21	17	19	6	3.09	1.05
	%	3.1	32.3	26.2	29.2	9.2		
Q31-I prefer taking training with IWBs and see examples of application	F	1	5	12	37	10	3.77	0.86
	%	1.5	7.7	18.5	56.9	15.4		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Table 6. Teachers' attitudes towards and preferences for IWBs use and learning (Psychological)

		SD	D	NI	A	SA	Mean	STD
Q6-Students are more motivated when using IWB	F	0	4	8	39	14	3.97	0.77
	%	0.0	6.2	12.3	60.0	21.5		
Q7- Interaction with IWB (touching, responding to visual stimulus) leads to active learning	F	2	5	3	36	19	4.00	0.97
	%	3.1	7.7	4.6	55.4	29.2		
Q18-Students do not like using IWBs	F	17	33	7	6	3	2.13	1.01
	%	26.2	50.8	10.8	9.2	3.0		
Q25- Presentations in front of IWB enable students to express themselves and to use their body language more effectively	F	0	2	15	38	10	3.86	0.70
	%	0.0	3.1	23.1	58.5	15.4		
Q34- I believe that using IWB motivates learning	F	2	3	4	39	17	4.00	0.91
	%	3.1	4.6	6.2	60.0	26.2		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Table 7. Teachers' attitudes and preferences about the use of IWBs and learning (Technological)

		SD	D	NI	A	SA	Mean	STD
Q8-It is difficult for me to use IWB in the class	F	23	28	7	3	3	1.97	1.05
	%	39.9	43.8	10.9	4.7	4.7		
Q9-IWB supports and encourages modern teaching approaches and applications	F	1	5	4	35	20	4.05	0.91
	%	1.5	7.7	6.2	53.8	30.8		
Q13-I generally use IWB to use educational CDs related to the subject	F	10	23	11	18	3	2.71	1.17
	%	15.4	35.4	16.9	27.7	4.6		
Q16-Students use IWB for presentations	F	9	24	11	17	4	2.74	1.17
	%	13.8	36.9	16.9	26.2	6.2		
Q19-I am using IWB systematically	F	1	5	5	22	32	4.22	0.99
	%	1.5	7.7	7.7	33.8	49.2		
Q20-Using IWB needs more lesson preparation time	F	7	16	11	21	10	3.2	1.25
	%	10.8	24.6	16.9	32.3	15.4		
Q21-Using IWB, I can easily reach to different materials (blogs, wiki, websites) and present them to whole class	F	2	7	4	28	24	4.00	1.07
	%	3.1	10.8	6.2	43.1	36.9		
Q23-Student are not ready to use IWBs	F	12	30	11	10	2	2.38	1.05
	%	18.5	46.2	16.9	15.4	3.1		
Q24-I own lesson contents and programs neccessaryto use IWB effectively	F	1	7	11	30	16	3.82	0.98
	%	1.5	10.8	16.9	46.2	24.6		
Q27-Use of IWB helps students to use tools and applications of information technologies more effectively.	F	0	1	8	42	14	4.06	0.63
	%	0	1.5	12.3	64.6	21.5		
Q29-I can find subjects from internet sites	F	4	14	12	26	9	3.38	1.12
	%	6.2	21.6	18.5	40.0	13.9		
Q32-Technology teachers helpother teachers in using IWB	F	5	11	12	30	7	3.35	1.12
	%	7.7	16.9	18.5	46.2	10.8		
Q36-Colour agreement is good in IWBs	F	0	4	15	37	9	3.80	0.75
	%	0	6.2	23.1	56.9	14.3		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

Teachers' and students' attitudes and preferences toward the use of IWBs in courses

As a last point, teachers' and students' attitudes and preferences for using IWBs in different courses were evaluated. Based on Table 8, Turkish, social studies, and history were classsifed as verbal classes; science, chemistry, biology and phsyhics were categorized as science courses, and

finally, drawing, foreign language and others were named as visual courses. As a result, the results and findings were given in Table 1 and 8.

Table 8. IWBs preferences, attitudes and awareness of students' and teachers' related to different courses

	N	Turk.	Soc	Hist	Geo	Math	Scie	Che	Bio	Phsy	Draw	Frgn	Oth.	Total
		Verbal					Science				Visual			All
Teachers	F	12	3	3	3	18	4	2	4	2	2	11	1	65
		17				20					7	11	10	65
	%	18.9	4.6	4.6	4.6	27.7	6.2	3.1	6.2	3.1	3.1	16.9	1.3	
		26.2												
Students	F	145	94	79	69	238	86	54	76	45	38	79	12	1013
		168												
	%	14.1	9.3	6.2	6.3	25.6	8.5	5.3	7.3	4.4	3.8	7.8	1.2	
		16.6				41.0					12.6	6.6	23.2	

Discussion and future research

It is a widely accepted fact that improvements in computer technology develop people's skills, increase their fields of interest, and encourage active participation. Numerous internal and external factors affect students' success in class. One of the external factors is the effective and enjoyable use of teaching technologies. External factors are financial and administrative support, which includes creating a learning environment by providing sufficient hardware throughout the process of programming and material development as well as providing constant finance and staff.

If smart boards are expected to produce the desired results in teaching and learning, their full potential should be learned and exploited. The teacher should adapt this tool to the particular teaching methodologies and approaches she employs in class and thus make good use of the opportunities offered by the smart board. However, it is essential that readymade materials that guide teachers be available because not every teacher may be equipped enough to prepare them.

A review of the literature suggests that a more comprehensive framework is needed to understand the effects of IWBs in learning environments. Within this framework (see tables from 2 to 7), the following items are put forward: the contextual factors, instructional/pedagogical, psychological and technological variables, the processes that affect IWB use, learning outcomes and achievement.

In order for IWBs to have their greatest positive influence on student learning, a deeper understanding of learner characteristics and achievement along with interactive school culture is needed. The contextual factors provide changes with administrators, parents and students. Investment process is an important side both instructional and technical approaches as well as psychological approach which effect motivation, perception, self-confidence. Teachers need time to practice and develop materials. IWBs also have long term effects on learners (see tables 1, 2, 3, 4 and 8). These results are similar to those in previous studies (Digregorio & Sobel-Lojeski, 2010; Mathews-Aydinli & Elaziz, 2010, Higgins et al. 2007).

In this study, a sizeable sample of elementary and high schools students and teachers from Turkey were surveyed for their opinions and attitudes about the use of IWBs in the schools. Now, the work includes more than thousand participations and their attitudes about the use of IWBs. According to results, Turkish students and teachers in general like using IWBs. Teachers agree that using IWBS affects students' achievement; class management, interaction, practice and presentation of materials (see tables 1, 5, 6, 7 and 8). These results are the same as earlier ones (Armstrong et al, 2005; Glover et al, 2007; Hall & Higgins, 2005; Higgin et al, 2007; Mathews-Aydinlı & Elaziz, 2010). In addition, instructional variables and psychological variables such as motivation, enthusiasm and attention were found to be important dimensions in learning and

teaching with IWBs (Ateş, 2010; Bennett & Lockyer, 2008; Shi et al, 2003; Mercer et al, 2010). Students and teachers prefer using IWBs for the similar courses as well as previous studies (Ateş, 2010; Bennett & Lockyer, 2007; Adıgüzel et al., 2011).

In general, teachers and students use IWBs in numerical, verbal, visual and foreign language courses respectively as earlier studies. And they also prefer IWBs for using distance learning and as a new tool in their classes. IWBs were found available for contributions effectively using informatics technologies and learning technologies. Most of the students (79%) prefer and like using IWBs in classes and 73% of students found using IWBs interesting. A majority of students (49%) indicated that having IWBs encourages computer and internet use. As a result, future research should focus on the long term impacts of IWBs on instructional/pedagogical, psychological and technological variables as well as contextual facts to reach achievement and learning outcomes. Also more research should to be done into how IWBs impact different learner characteristics, grades and courses.

Conclusion

The findings of this study revealed that in Turkey both teachers and students have positive attitudes toward IWB use in schools. Students in all grades have positive attitudes in their classes for the use of IWBs. Students found the courses with IWB motivating and enjoyable. The study presents basic dimensions for creating and designing high quality materials for IWBs and all board of education around the world as well as in Turkey. It also conveys ideas and approaches for using IWBs in the future applications. Programmers, instructional designers and teachers will be able to easily understand the importance of the variables in and characteristics of approaches to using new learning technologies and developing high quality materials of IWBs. The study may indicate new research topics in experimental design to work on variables given on the framework for the future studies as well as using characteristics of IWBs in learning and teaching at different grade levels and courses. Future experimental studies may address IWB use in different levels and classes for multimedia learning and design.

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