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Secondary and High School Teachers' Perceptions Regarding Computer Games with Educational Features in Turkey

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ABSTRACT The purpose of this study is to investigate secondary and high school teacher perceptions about integrating educational computer games into their lessons. The participants consist of teachers who work at the 26 different secondary and high schools in Turkey. Two survey instruments were used to collect data from 581 participants. Data was analyzed using t-test, ANOVA test, Chi-square. Content analysis was also conducted to analyze the interview data. The findings revealed teachers who use educational games in their classes are more positive than the teachers who do not incorporate educational games in their lessons. Furthermore, secondary school teachers were more positive towards integrating educational games in their courses than high schools teachers. While teachers expressed their willing to use educational computer games in their courses, the negative aspects of computer games come to the fore according to the teacher perceptions.

INTRODUCTION

Technological innovations influence fields of science in both direct and indirect ways, changing the teaching and learning environments and transforming the traditional methods. Hence, the rapid development of Internet Communication Technologies (ICTs) skills usage of technologies in teaching has become inevitable (Baytak et al. 2012; Psycharis et al. 2013). One of the emerging educational technologies is educational computer game.

Educational computer games have been introduced to students and teachers as an innovative strategy for improving the quality of teaching. These games have brought a new dimension to education by supporting student-centered education, increasing student motivation and providing students the option to learn while having fun (Cankaya and Karamete 2009). Employing games in teaching and learning gained popularity in countries with high levels of socio-economic status also used in Turkey and have become the subject of scientific research. While reviewing research on computer games conducted in Turkey using keywords such as "educational computer games" and "computer games", the following themes were found: game development, developed the game's implementation of the control and experimental groups, the effect on students of educational games, impact on students of educational games developed by software companies. Table 1 shows categories /codes and the related educational computer game study which was conducted in Turkey. The categories of the research are "Negative effects of computer games", "Contributions of educational games in class", "Usability of educational games", "Effect of the attitude towards the games in class" and "Teachers' perceptions about educational games".

The effect of computer games on student success is as important as the teachers' perceptions about educational computer games. This study is based specifically on educational games. It is aimed to describe what features the educational games should have that contribute to development of teachers' perceptions. The purpose of this study is to measure and understand secondary and high school teacher perceptions about computer games. Additionally, the teachers' perceptions about the use educational games in their lesson were also examined. Considering introduction of educational games in the class-

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Table 1: Computer game research in Turkey

Category / Code	*Study references*
Negative effects of computer games	Kars (2010)
Contributions of educational games in class	
success	Kula (2005), Obut (2005), Yigit(2007), Ozturk (2007), Yagiz (2007), Sert (2009), Ural (2009)
motivation	Kula (2005), Ucgul (2007), Ural (2009)
cognitive learning goals	Ozturk (2007), Oz (2009)
affective learning goals	Ozturk (2007)
learning	Erkus (2008), Kula (2005)
permanent learning	Yigit (2007)
Usability of educational games	
preschool education	Coruh (2004)
engineering education	Gokdal (2008)
architecture education	Catak (2009)
Effect of the attitude towards the games in class	
mathematics	Cankaya (2007), Ozturk (2007)
Teachers' perceptions about educational games	Can (2003), Coruh (2004)

room and usage of them will performed by teachers and the teachers' experience, the importance of this research data occurs. The results obtained through this study are deemed of interest to educators, researchers and policy makers.

Game-based Learning

The game is well-known concept, which has a primary place in the early years of human life. This familiar activity usually leaves individuals with memories of positive, pleasant and fun experiences. Hands-on experience encourages the individual to play the game and individual acquires new knowledge during play, which refers the individual to experience simulated real life situations in a competitive way.

According to Gee (2003), a well-designed game will allow for higher order thinking as well as learning. He also states that theories of learning are embedded in games, therefore game play and learning are related each other and happens simultaneously (Gee 2003). Educational games are defined as "software that allows students to learn course topics or to develop problem-solving abilities by using game format" (Demirel et al. 2003:141). Video games provide students with experience in problem solving (Squire 2005). Squire et al. (2008) presented a game-based learning model in their study that can be applied to informal learning environments. Furthermore, research findings such as the ability of games to develop problem-solving skills revealed the benefit of educational games in educational setting. Students strive to solve the problem using different methods however game is so complex. Pivec et al. (2004) found in their study that students discover more than one method of solving the problems they face as they play the game. Recent improvements in ICTs have led many researchers to study computer games and their effects on student learning.

Teachers' Perceptions about Educational Computer Games

The development of educational games has prompted the use of computer games for educational purposes. This statement makes teachers' perceptions of educational computer games more important. Niederhauser and Stoddart (2001) examined relationships between teachers' instructional perspectives and their use of technology in instruction. Can and Cagiltay (2006) researched Turkish prospective teachers' perceptions regarding the use of computer games with educational features. Tufekci (2007) analyzed pre-service computer teachers' computer game playing habits. Kebritchi et al. (2009) worked with teachers to analyze websites supporting the use of instructional games in K-12 setting. Sardone and Devlin-Scherer (2009) researched the views of teacher candidates on digital games as learning tool. Sardone and Devlin-Scherer (2010) also examined pre-service teachers' responses to digital games for 21st-Century skills development. Tuzun and Ozdinc (2010) conducted a case study related to pre-service teachers' computer game playing characteristics and preferences. Ketelhut and Schifter (2010) studied

teacher professional development and game-based learning which required attention to multiple factors including teacher efficacy in using the software, pedagogical issues and school culture. Their research provides a theoretical model for successful technological implementation.

Purpose of the Study

The purpose of this study is to investigate secondary and high school teachers' perceptions of educational computer games and computer games. For this purpose, the following research questions are examined:

1. What are teachers' general perceptions about computer games and educational computer games?
2. Is there a significant difference in teacher perceptions about computer games and educational computer games based on the grade level of the teachers' class?
3. Is there a significant difference in teacher perceptions about computer games and educational computer games based on the teacher's years of teaching experience?
4. Is there a significant difference in teacher perceptions about computer games and educational computer games based on the gender of the teacher?
5. According to status of teachers to use computer games in lessons, is there significant difference in teacher perceptions about computer games and educational computer games?
6. What are the teachers' perceptions of educational computer games used in lessons?

METHODOLOGY

Participants

Non-random and a two-phase sampling method were used to select participants. In the first phase, five hundred teachers from twenty-six different schools, including thirteen secondary and thirteen high schools, participated in this study in Isparta / Turkey, by convenience sampling method. Secondly fifteen teachers were selected who uses educational computer games in their lesson, by a purposive sampling method for semi-structured interviews. For the first phase of sampling, demographic information about participants are given in Table 2. 225 female and 356 male teachers participated in surveys. 295 participants teach in secondary schools, 286 in high school. These teachers were placed in one of four groups, based on the number of years of professional experience each had completed: 1-10 years, 11-20 years, 21-30 years, 31 and above years.

Table 2: Demographic information of participants

Demographic information	*Frequency*	*%*
Gender		
Female	225	38.73
Male	356	61.27
Level of Education		
Secondary	295	50.77
High	286	49.23
Professional Experience		
1-10 years	119	20.48
11-20 years	240	41.31
21-30 years	170	29.26
31 and above years	52	8.95
Age		
21-25 ages	5	0.86
26-30 ages	64	11.02
31-35 ages	116	19.97
36-40 ages	118	20.31
41-45 ages	123	21.17
46 and above ages	155	26.68

Interviews were used to answer the research question, "What are the teachers' perceptions of educational computer games used in lessons?" In order to select a suitable sample for this research question, participants were selected who used educational computer games in lesson, by a purposive sampling method. Six female and nine male participants in the interview; nine of them work in secondary school and six of them work in high school. Four English teachers, four class teacher, two religion and ethics teacher, two geography, one math, one chemistry and one music teacher participated in the interview.

Procedures and Instruments

This study was designed as a survey research study. The data were gathered through a questionnaire (Can 2003) and a semi-structured interview schedule. The survey form was comprised of four main sections. The first section contained multiple-choice items in which teach-

ers were asked to provide demographic information such as gender, level of education, professional experience and age. Also teachers were asked to disclose their usage of educational games in the classroom setting. In other sections of the survey, teachers responded to questions about their general perceptions of computer games and educational computer games. Teachers were also asked about the effectiveness and usage preferences of computer games with educational features. A four–point Likert scale ranging from "strongly agree "to" strongly disagree measured their responses. Additionally, semi-structured interviews were conducted with the 15 participants, to reveal their rationale for usage of educational games in course, and their perceived alignment of educational games to the course and requirements. Interview sessions were recorded with the permission of the interviewees.

Data Analysis

Statistical and qualitative data analyses were the two primary data analysis phases of this research. The questionnaires were coded; next the data was entered into Statistical Package for the Social Sciences (SPSS). The descriptive data, was used to calculate frequencies and percentages. Also t-test, ANOVA test and Chi-square test were used for determining significant difference regarding demographic information, as well as the relationships between usage of educational games and demographic information. The content analysis method was used to analyze the qualitative data, as explained by Yildirim and Simsek (2000). Moreover, Miles and Huberman (1994) suggest that final inter-coder agreement should approach or exceed 90%, so this analysis was conducted then the result of analysis according to codes was 91%.

RESULTS

Teachers' Perceptions towards Computer Games

The survey's second section examines the arithmetic means and standard deviations of responses to reveal teachers' general perceptions regarding computer games with educational features. For the second part of the questionnaire, findings are shown in Table 3. When teachers' general perceptions regarding computer games with educational features are examined, "Playing violent games affect people negatively" (M=4.62, SD=0.77) and "Playing computer games leads to addiction" (M=4.27, SD=0.94) statements were responded to as strongly agree. According to teacher answers, negative characteristics of general computer games are emphasized. This case can be explained by the limited amount of educational games available to these teachers. While there are several educational games languages, very few have multi-language choices. Also teacher were not well informed about options for educational games.

In the third section of survey, teachers' perceptions on the effectiveness of educational games were investigated (see Table 4). Teachers responded to statements about the use of educational games in course. The responses included, "Computer games with educational features can be effective in learning when used as a

Table 3: Teachers' general perceptions towards computer games

		Mean	*SD*
8	Playing violent games affect people negatively.*	4.62	0.77
5	Playing computer games leads to addiction.*	4.27	0.94
9	Playing computer games affect the social life of the people negatively.*	3.83	1.12
1	Playing computer games requires too much engagement time.*	3.72	1.19
10	Playing computer games is a waste of time.*	3.64	1.15
4	Girls and boys prefer playing different types of computer games.	3.96	1.00
3	Playing computer games help developing some useful knowledge and skills.	3.12	1.06
6	Playing computer games stimulate curiosity in learning something.	3.02	1.07
7	When computer games are played with a group (friends, family), it helps development of social skills.	2.90	1.14
2	Playing computer games is suitable for every age group.	2.80	1.33
11	Playing computer games is an important leisure time activity.	2.79	1.27
12	Playing computer games is suitable for only children (element & secondlevel)	1.88	1.12

* Negative

Table 4: Teachers' perspective about usage of educational computer games in the course in terms of effectiveness

	Computer games with educational features	*Mean*	*SD*
13	can be effective in learning when used as a teaching aid in courses.	3.69	1.05
19	can be effective in learning when a goal is specified in a game.	3.48	1.05
22	can be effective in learning when they are based on realistic goals.	3.45	1.09
17	can be effective in learning when they provide cooperative learning environment.	3.40	1.02
18	can be effective in learning when they provide competitive learning environment.	3.39	1.06
20	can be effective in learning when students are allowed to choose their own goals in a game.	3.31	1.09
16	can be effective in learning when used as a main instructional tool in schools.	3.27	1.23
14	can be effective in learning when used as a reward in courses.	3.14	1.16
15	can be effective in learning when used to fill the free times of students in courses.	3.08	1.19
23	can be effective in learning when they are based on fantasy goals.	2.76	1.20
21	can be effective in learning when a goal is not specified in a game.	2.39	1.20

Table 5: Teachers' perceptions regarding educational computer games

	Computer games with educational features	*Mean*	*SD*
24	can be applicable to all grade levels.	3.56	1.14
26	can be used in accordance with the goals of schools' curriculum plans.	3.52	1.10
29	can help students fulfill cognitive learning goals which are defined in the schools' curriculum plans.	3.41	1.04
30	can help students fulfill psychomotor learning goals which are defined in the schools' curriculum plans.	3.41	1.05
31	can help students fulfill affective learning goals which are defined in the schools' curriculum plans.	3.39	1.10
25	can be applicable to all subject matters.	3.23	1.18
27	can be used without causing any problem with the schools' curriculum plans in terms of classroom management.	3.20	1.13
28	can be used in accordance with the goals of schools' curriculum plans.	3.18	1.13

teaching aid in courses." The response to this question yielded (M=3.69, SD=1.05). The statements "Computer games can be effective in learning when a goal is specified in a game." (M=3.48, SD=1.05), "Computer games can be effective in learning when they are based on realistic goals." (M=3.45, SD=1.09) and "Computer games can be effective in learning when they provide cooperative learning environment" (M=3.40, SD=1.02). These questions were answered as strongly agree.

In third section (see Table 5), the teachers' general perceptions of educational computer games with educational features were examined using the following statements: **"**Computer games with educational features can be applicable to all grade levels." (M=3.56, SD=1.14), "Computer games with educational features can be used in accordance with the goals of schools' curriculum plans." (M=3.52, SD=1.10), "Computer games with educational features can help students fulfill cognitive learning goals which are defined in the schools' curriculum plans." (M=3.41, SD=1.04) and "Computer games with educational features can help students fulfill psychomotor learning goals which are defined in the schools' curriculum plans." (M=3.41, SD=1.05) These questions were answered as strongly agree by the teachers.

Level of Teachers' Education

"Is there a significant difference in teacher perceptions about computer games and educational computer games based on the grade level of the teachers' class"? Was the second research question of the study? A t-test was performed according to grade level of the teachers' class. Fifteen significant differences were found which showed the secondary school teachers on average viewed the use of educational games in class more positive than high school teachers.

Professional Experience

For the comparison of teachers' perception about educational computer games based on the number of years of professional experience a

teacher had, an ANOVA Tukey HSD test was performed. Significant differences were found when questions were analyzed that revealed teachers with less professional experience were more support educational games. However, for the item, "Computer games with educational features can be used without causing any problem with the schools' curriculum plans in terms of classroom management" 31 and above years group was attended more the 1-10 groups ($F=4.04$, $p=0.00$).

Gender

When comparing gender differences, t-test was performed, which revealed male teachers had more positive views about educational games when compared to their female counterparts. Significant differences were found in questions about computer games from females more than male. The other positive meaning and significant differences found questions were analyzed male teachers' attendance was more than male.

Use Educational Computer Games in Lesson

When the teachers' perception about educational computer games based on usage in a course was examined, teachers who described themselves as educational computer games users were more positive about the utility of educational computer games in their course than non-users. In this study, participants reported usage percentages of educational computer games in their courses as 30.12% for secondary school teachers and 11.19% for secondary school teachers. Teachers who use educational games in their lesson emphasized the benefits of incorporating educational games into their classes. These benefits included; motivation, long-term retention, fun, visual aesthetics, effortless and individual learning. Motivation had a maximum frequency code amongst teacher with ($N=10$). Also requirements teachers needed to use educational games in their classes were found in the interview transcripts. The requirements included Internet access, projector, computer, technical information and the ability to judge the appropriateness of the game to match curricular needs. Internet access was the most frequently mentioned requirement ($N=13$), with many of the teachers requiring Internet access to use cloud based or online game. Teachers viewed themselves as technically unprepared for the computer usage skills needed for educational games. At times, teachers were unable to resolve some problems that could have been expressed from4 the computer. The participants had emphasized the necessity of increasing the amount of educational computer games that aligned with the curriculum. The teachers' perceptions of educational computer games by teachers that used educational computer games in lesson can be summarized as the following:

- Games were acquired from the Internet for free. Teachers obtain the games through their own efforts for use in their course;
- Benefits of using educational games were motivation, permanent learning, fun, visual aesthetics, effortless and individualized learning opportunities for students;
- Requirements teachers needed to use educational games in their classes were Internet access, projector, computers, technical information and the ability to judge the appropriateness of the game to match curricular needs.

DISCUSSION

In this study, when research questions are examined in the light of the statistical and descriptive findings of this study, teachers' perceptions about computer games were negative, therefore "Playing computer games affect the social life of the people negatively" and "Playing computer games is a waste of time" items were prominent. The questionnaire and interviews revealed educational computer games were considered an asset to courses. Studies emphasized that the prospective computer teachers who participated in research had positive perceptions regarding the use of computer games with educational features in education. Considering gender differences, male teachers have a more positive perspective on educational computer games than female colleagues. This finding is comparable to recent studies which highlights most prospective teachers are male gamers. The teachers' perception about educational computer games according to usage of educational computer games in the class was examined. Teachers who used educational computer games in their course more positive about

the potential of educational computer games than non-users. Also teacher who used educational games emphasized benefits of educational games were motivation, long-term retention, fun, visual aesthetics, effortless and individual learning, while requirements for educational games were Internet access, projector, computer, technical information and the ability to judge the appropriateness of the game to match curricular needs. In this research, motivation was the code most frequently repeated code in the category of benefits as a result of interviews; educational computer games were considered a positive impetus towards students' motivation.

CONCLUSION

In conclusion, while teachers address the negative aspects of computer games, they also recognize that educational computer games can be employed in lessons for the benefit of student learning. Furthermore, educational computer games can be effective when used as a teaching assistant in lessons. Secondary schools teachers appear more positive towards using educational games in their course than high schools teachers. Teachers who use educational games in their lessons are more positive toward the educational digital games than teacher who do not use gaming in their course. Teachers, who use educational games in their lesson, emphasized that there are benefits of educational games such as motivation, long-term learning, fun, visuals and individual learning.

RECOMMENDATIONS

The research and information obtained from this study yields the following recommendations:

- Teachers' preference should be considered in the design of educational computer games.
- Educational computer games should be designed as a teaching aid in courses.
- Teachers should be informed about game-based learning method.
- Teachers should be informed about current educational computer games.
- Educational computer games should be designed in accordance with schools' curriculum plans.
- Game library should be established for?
- Educators should be trained in educational games.

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