

Use of Commercial Games for Educational Purposes: Will Today's Teacher Candidates Use them in the Future?

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Abstract: The use of computer games in educational settings has been discussed by many educators. Herein, the opinions of teachers gain great importance because they are the ones who will use the games in classrooms. In this respect, this study was conducted to identify the opinions of prospective teachers who are the teachers of future on the use of games in classroom. After playing three commercial games (Quake, The Incredible Machine and Age of Empires), prospective teachers analyzed and evaluated them by focusing on their educational aspects. Results suggest that teachers may use some of the commercial games in learning/teaching process, however it necessitates teachers select the most appropriate ones to be used and be attentive in this selection process of the games for their courses.

Introduction

In the literature, there are many studies showing the benefits of computer games for children and adults in terms of providing motivation, developing skills and encouraging collaboration. The motivational power of games and their ability to encourage cooperation are felt to support the work of schools in developing independent but social individuals. According to a study conducted by Haugland (1992), 3-4 years old children using computers with supporting activities that reinforce objectives of the programs have significantly more developmental gains than children without computer experiences in terms of intelligence, long-term memory, problem solving skills, and verbal skills. Increased popularities of the computer games have brought by some new technologies such as 3D games, multiplayer games etc. It is believed that if properly used, computer games can be a valuable tool to produce effective learning environments for young adults (Papert 1998).

Designing an educational game based on the instructional context is the main challenge. Thinking effective edutainment and learning games, people struggle with the problem of how to embed the fun part into the learning context (Smith and Mann 2002). After investigating and comparing the educational games with the commercial ones, it is possible to say that many educational games are not liked by people – especially by children – as much as the commercial ones. An indicator for this assertion may be observing children while they are playing computer-games. Their preferences are mostly on commercial ones. Then two alternatives can be proposed: using commercial games within a related part of the curriculum or developing educational games similar to commercial ones.

The scope of this study is based on the former alternative. Since the commercial games are liked by children and games enhance their cognitive and motor skills, then we may get benefit from the appropriate ones in learning/teaching process. On this issue, opinions of teachers gain great importance, because they control the teaching/learning process and they are the decision makers on the use of games in classroom. Can (2003) emphasized the deficiency in the literature in terms of teachers' and teacher candidates' perspectives about the use of games in teaching/learning process. In this respect, the aim of this study is to identify the opinions of prospective teachers – the teachers of the future- in terms of using commercial computer games in school settings. In this respect the main research question of the study is: "What are the opinions of prospective teachers about the commercial-computer games in terms of their possibility to be used in teaching/learning process?"

Method

This study was conducted with 49 prospective teachers (14 female and 35 male). The study took place during the Spring semester of 2004/2005 academic year, and the data were collected based on the reports that students wrote in a required fourth year course: Design Development & Evaluation of Educational Software.

During the first week of the course, the students played three commercial computer games (Quake, Age of Empires, and The Incredible Machine) during the lab-session. Then, they were asked to write a report about their ideas on how to use similar games in learning/teaching process, in what grade and in which part of the curriculum. They

compared and contrasted three games on the base of the educational features that the games have. They also identified the advantages and disadvantages of the games. In addition, they compared single-player games with multiplayer games to determine their potential contributions to education.

During the second week of the course, the students again played the computer games during lab-sessions. For this week, they were asked to select one of those games and focus on the educational aspects of that particular game. Then, the students analyzed the game in depth, explored potential improvements to use the game in a course and examined its use in the suitable part of the curriculum and at a specific grade level.

Games – Quake, Age of Empires & The Incredible Machine

In the scope of this study, prospective teachers analyzed Quake III, Age of Empires, and The Incredible Machine to determine the dynamics and educational aspects of these games. Quake III have been one of the most popular action games. The main premise of Quake III is move, shoot, escape, and kill. When someone started to play the game, he/she is placed somewhere in the game, and there are many enemies wanting to kill him/her. It is possible to play this game collaboratively. There is no educational content or other feature within the game. In addition to these, violence rate of the game is too high when it is compared with other action games.

Age of Empires is one of the most popular strategy games including historical theme and features in the world. The game primarily covers European history from 1419 to 1820, and the player can choose different scenarios within this period. The player can choose any of the states in the game from Turks, to France, to Russian or others included in the game. The main strategy of the game is manipulating and managing a nation in terms of the military, technology, economy, diplomacy, colonization, etc.

Finally, The Incredible Machine is a puzzle game, in which the game player is supposed to solve problematic cases. The cases are established on the characteristics of machines' and are depended on cause-effect relationships. Each step has its own goal and it includes different machine parts. The player tries to integrate those parts so that a working system is constituted and therefore the goal is achieved.

Results

First Stage: Comparison of 3 Games

In the first part of the study, students were asked to examine the general effects of computer games on learning/teaching, and also to define possible advantages and disadvantages, and give some recommendations about the use of games in classroom. Moreover, they were asked to compare and contrast three commercial computer games based on some educational aspects. In this part, students' responses about the "*use of computer games in education*" will be examined under five main categories: "*advantages of games*", "*disadvantages of games*", "*recommendations*", "*multiplayer versus single-player games*", and "*comparison of the three games*".

Use of Computer Games in Education

The reflection reports that the prospective teachers (n=49) wrote was used as a data source. The prospective teachers wrote the reports in order to explain their opinions about the possible advantages and disadvantages of computer games in general. They made some recommendations on this issue as well. In addition, they compared and contrasted multiplayer games and single player games. Moreover, they examined three games in terms of their possibility to be used in educational contexts.

Advantages of Games: The mostly mentioned advantage of using computer games in education was the potential of games to increase motivation and to easily take attention of students to the lesson (n=23). According to other responses computer games are enjoyable and source of fun for students (n=15); they enhance students' cognitive skills (such as problem solving, decision making, plan & organization, critical thinking) (n=7); playing computer games improve students' abilities in terms of using mouse and keyboard (n=4); and lastly games are effective tools in teamwork (n=4).

Disadvantages of Games: In addition to the advantages of games to be used in educational context, the students mentioned the disadvantages as well. The mostly mentioned disadvantage of games is the probability of students' losing the real focus on the content and becoming wholly absorbed in games itself with getting far away from the real aim of the education (n=5); then the idea of games may cause addiction (n=3); students may spend too much time on playing computer games and not study enough for their lessons (n=3); and time required for game playing

may not be appropriate in educational context (n=3) (for example Age of Empires need too much time to finish which decreases its possible use in classroom). The remaining responses were about possible technical problems and insufficiency of computers in terms of processing the games; students' knowledge level of English may make them have difficulties since most of the games are in English and therefore may make irritating and boring game playing for them; complex structure of some computer games; and the possibility of games decreasing social relationships of students with the people around them.

Recommendations: The prospective teachers made recommendations in terms of using computer games in schools. They believe that computer games should be used as support material rather than the main tool (n=6); the adaptation of those games into the curriculum and lesson content should be made carefully by teachers (n=6); and the games should be designed for education rather than using the games in market for educational purposes (n=5). Other responses were about the fact that games should be used in the introduction part of the lessons to motivate students to the lesson (n=3); computer games should be used as assessment tool (n=3).

Multiplayer versus Single-Player Games: The students compared and contrasted multiplayer games with single-player games. The responses indicate that multiplayer games develop students' competition skills more than single-player games do (n=23); multiplayer games are more enjoyable for students because the opponent is a real person – most of the time a close friend – and therefore multiplayer games develop interaction among students, their communication skills and social characteristics, and places a good environment for teamwork (n=18); multiplayer games can be used for collaborative and cooperative learning (n=13); multiplayer games support more motivation than single-player games (n=9); and single-player games support individual learning and can be used for drill and practice (n=6).

Comparison of the Three Games

The responses that the prospective teachers gave for comparing the three games (Quake, The Incredible Machine, and Age of Empires) were examined. The responses show that The Incredible Machine can be used in education (n=39) and it helps the development of students' cognitive skills (n=32); Age of Empires can be used (n=35) and it improves students' cognitive skills (n=21) support cooperation (n=2) and competition (n=2) among students. Different from the other two games, Quake was held differently by the prospective teachers. Although some opinions of prospective teachers was for Quake can be used (n=7) most of them agreed that it is not appropriate to be used in educational settings (n=33). The reason why Quake should not be used was mostly based on its violent themes (n=30). In addition to this, 4 prospective teachers stated that the game does not support the cognitive development of students; however other participants said nothing about this issue. The reason given by the supporters of Quake was its ability to enhance reflexes (n=3); its possibility to improve students' abilities to use mouse and keyboard (n=12); and the fact that Quake improves cognitive skills of students (n=7). Although not quite strong with the responses came about Quake, there were responses for Age of Empires indicating that it is not appropriate to be used in education (n=7).

Second Stage: Detailed Investigation of the Games

In the second part of the study, students were asked to choose one of the games among the three (The Incredible Machine, Age of Empires and Quake III), and analyze it in detail based on the educational features of the game. Students' critics were investigated under five main categories for each game: "Advantages", "Disadvantages", "Educational Use", "Recommendations", and "Multiplayer Characteristics".

The Incredible Machine

Totally 23 out of 49 students selected for analyzing The Incredible Machine game. Although other games were selected by male students rather than female students, The Incredible Machine was selected almost equally of the students (13 female and 10 male).

Advantages: The Incredible Machine was selected as the most adaptable one to the educational system by the students. It has many features to be easily used in a classroom environment. The most commonly mentioned advantage of the game was that it develops students' learning skills such as decision making, analytical thinking, practical thinking, critical thinking, problem solving, and motor skills (n=21). Furthermore, the responses of the students indicate that The Incredible Machine can easily increase the motivation of the students (n=12), it enhances

creativity of students (n=10), it is a source of fun and curiosity for children (n=10), it supports user control (n=3) and lastly it improves children's ability of using mouse and keyboard (n=2).

Other advantages that students mentioned were about the characteristics of the game. Students emphasized especially user-friendly interface of the game in the scope of sound, shapes, and graphics used in the game (n=11), the help (n=7). Other responses were as following: the game provides more than one way to solve the problems therefore can expand the perspectives of children (n=9), the game advance in a step-by-step fashion (n=9) therefore provides a challenging environment for children (n=8), and the cases that the game presents are quite similar to real life situations (n=7).

Disadvantages: Disadvantages of the game were not mentioned by as many as the advantages that students mentioned. The responses indicate that the game does not have an effective help menu (n=3), good colors, sound/music (n=2), and a good scenario (n=1). Moreover, the students claimed that some of the cases are really hard to solve and the game suddenly becomes very difficult after a few steps are passed. They also stressed that even they had difficulties while they were playing, and this may be quite boring for the players of the game especially for children (n=2). Lastly, although the game has a multiplayer option, it just allows maximum two users, who can play one-by-one; which is something not as enjoyable as other multiplayer games (n=1).

Educational Use: The students reported their opinions about the appropriateness of the game to the curriculum and the grade level. According to the responses, The Incredible Machine can be used for physics and science courses (n=18), for mathematics (n=2), and for Biology (n=2). Although two of the responses claimed that the game is appropriate for any age level, others stated that it is appropriate for K12 classes (n=7), for secondary schools (n=7), and for higher education (n=5).

Recommendations: In addition to mentioning the advantages and disadvantages of the game, the students also made some recommendations. According to the responses, the help should be enhanced and be made more clear (n=7), new machines should be added (n=3), music and animation should be improved and be made more in quality (n=2).

Multiplayer Characteristics: As the last item, the students compared the game's multiplayer and single-player options. The responses state that, multiplayer game supports competition among children (n=4), therefore may increase motivation (n=3). In addition, the game gives the opportunity for collaboration among the children (n=2), support social interaction (n=1), and presents more challenging environment for children (n=1) if it is played in multiplayer way.

Age of Empires

Totally 14 out of 49 students analyzed Age of Empires. The number of males (n=12) who selected this game to investigate is much more than the females (n=2).

Advantages: Like The Incredible Machine, Age of Empires was reported by many students as one of the appropriate games to be used in classrooms. The mostly mentioned advantage of the game is its potential to improve children's learning skills such as problem solving, logical thinking and planning, reflective thinking, abstract thinking, critical thinking, cooperative skills (n=8). Other responses indicate that the game can enhance children's management skills because it teaches to plan, organize, and control a nation with all participants of it (n=5), the cases presented in the game are from real life history therefore it can be a good source of information (n=4), it increases motivation (n=4), supports challenge (n=4) and competition among the players (n=2).

Disadvantages: According to the students, violence and war is a dominant theme within the game, which may affect children in a negative way and may lead them think war and fighting is something normal. In addition, the game can trigger racism among the communities (n=2). On the other hand, some students complained that the game may be too complicated because players is supposed to learn many options before using it effectively, which can make the game difficult and boring for players having low level of cognitive skills (n=1) and make it difficult to play the game in a limited period of time (n=1).

Educational Use: Besides mentioning the game's appropriateness to be used for educational purposes, the students mentioned specifically the grade and the part of the curriculum in which the game can be used. According to responses, the game should be used for social science courses such as history and geography (n=10), and for English practice (n=1). Moreover, the game should be used in high school (n=7), in secondary school (n=2), and for K12 (n=2).

Recommendations: The recommendations that students made were related with fight. It should be replaced with more peaceful themes if wanted to be used for teaching/learning (n=4), to enhance the historical knowledge of children, more information about nations should be provided (n=3), graphics should be improved (n=1), and to prevent children considering war as something normal, the negative sides of war should be emphasized in the game (n=1).

Multiplayer Characteristics: Students' responses suggest that when played in a multiplayer option rather than single-player, the game support socialization (n=4), can be used in the scope of cooperative learning (n=3) and collaborative learning (n=2) and it supports competition (n=1).

Quake III

The last game which the students evaluated was Quake III. Totally 5 out of 42 students selected this game to investigate in respect of educational aspects. Although the other games (The Incredible Machine and Age of Empires) were selected by males and females, this game was only selected by males (n=5).

Advantages: The advantages of Quake that the students mentioned in their reports was especially based on the idea that the game increase motivation since it is a very popular game (n=3), it provides a 3-D environment similar to real life (n=2), it improves children's abilities to use mouse and keyboard because it necessitates them acting as fast as possible (n=2), the game is quite enjoyable and exciting one (n=2), it supports competition (n=1) and lastly enhance socialization, which can improve children's communication skills (n=1).

Disadvantages: Although the students mentioned they liked the game very much, the disadvantages that they stated point out the inappropriateness of the game in learning/teaching process. Responses stress that the game includes violence theme, which is quite critical issue especially for young children (n=4), the game is not appropriate for educational purposes (n=3), and therefore it is hard to integrate in teaching/learning process (n=1).

Educational Use and Recommendations: Students' responses pointed out that rather than using the game itself in learning/teaching process, the game engine can be used to develop an educational game or a game more appropriate to be used in teaching/learning process. Because of the dominant violence theme in the game, the game was considered as a one which is not appropriate to educational settings. Students suggested that if the violent themes are replaced with more peaceful ones; and if instructional components are added to the game; then it can be used for K12 and high school classes.

Multiplayer Characteristics: During the observations which were conducted at the first two weeks of laboratory sessions, it was determined that the students - especially males - like playing Quake with their friends in a multiplayer mode. This makes the game more enjoyable for them. About the multiplayer option of this game, students stated that it increase competition and challenge, enhances motivation.

Discussion and Conclusion

Designing effective computer games to be used in teaching/learning process is a challenge. The games designed based on educational purposes are not liked by students as much as the commercial ones. One question, then, arises: Can commercial games be used within teaching/learning process? This study was conducted in order to determine the opinions of prospective teachers on this issue. The prospective teachers were expected to criticize three commercial games based on their educational perspectives.

Improving and maintaining students' motivations to the lesson is a problematic issue and teachers spend too much effort to do this. The assertions that the prospective teachers made about the advantages of games show that commercial computer games, if considered appropriate to the context, can be used in order to motivate students since games are a source of fun for them. Regarding this issue, Pillay (2002) points out the potential influences of entertaining computer games on children's performances. He asserts that when children play computer games for fun, they gain structural information at the same time, and they may make use of those schemas later when necessary especially while they are working on a computer-based task. In addition, Squire (2005) claims that computer games may not have educational values but they at least can increase motivations of the learners. However, he adds that although computer games are motivating tools for children using commercial games in classrooms may lead to problems in terms of motivation because each learner has his/her own likes, dislikes, and/or preferences. Therefore, teachers undertake a critical role in this process. In this study, prospective teachers also emphasized the importance of selecting appropriate games for classroom usage. They also pointed out that, the use of inappropriate games in classroom may cause more harm than good.

In addition, the responses of prospective teachers point out students' mental skills and their abilities of using mouse and keyboard can be enhanced by using computer games in classroom. Subrahmanyam et al. (2001) claim that playing some computer games influence children's "spatial, iconic, and attentional skills used by the game" in a positive way (p.26). However, teachers should be careful enough in order to prevent students from losing the real focus to be learnt.

The prospective teachers focused mostly on the positive influences of using multiplayer games rather than single player games. The uniqueness of multiplayer games in terms of supporting social interaction among players may not

only eliminate students' being unsocial individuals but also be used to create collaborative and cooperative learning environments where students' individual and social characteristics are easily developed. Gokhale (1995) asserts that students' motivations and their critical thinking skills can be enhanced in collaborative learning environments. In these learning environments it is also possible to develop students' problem solving skills.

All three games used in the scope of the study were commercial and popular ones, however the approaches of prospective teachers to the games were quite different. Especially in terms of game preference, gender difference was very obvious. Female prospective teachers tended to select and play The Incredible Machine whereas males preferred to play Quake. Age of Empires was again selected mostly by male students. The use of computer games dominantly by males has been subject to many critics in the literature. Especially the ones including fight are not preferred by females but males. Likewise, studies in the literature claim that females like puzzle-like games most. So, the findings of this study verify the literature.

The Incredible Machine is considered as the most suitable one to the educational context followed by Age of Empires and Quake. Quake was the mostly criticized one since it includes violence, blood, and killing. Likewise, Age of Empires was criticized because it is established on the concept of war between nations. We can conclude that, teachers should be careful enough in examining the themes the games include. Many studies in the literature emphasize the potential negative influences of violent games on students' increased level of aggression (Subrahmanyam et al., 2001). Uhlmann and Swanson (2003) underline the risks of violence theme in games and suggest that children may learn aggressive behaviors automatically by playing violent computer games. Quake-like games are preferred mostly by children to play and are regarded as quite enjoyable ones, therefore they may be used to increase motivation and to enhance the students' mouse-keyboard usage skills. However, violent content that they include may cause more serious problems.

To sum up, we have found that suitable commercial computer games may be used by teachers in learning/teaching process. However, teachers have a responsibility to decide on the grade level and the part of the curriculum to which the game fits most. In addition, the themes that the games include should be investigated carefully to prevent negative influences surpass the positive ones. Games can also be used to provide students with collaborative and cooperative learning environments where students' individual and social skills can be enhanced.

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