

GRAPHIC STYLES APPEARANCE IN EDUCATIONAL GAMES TO ENHANCE MALAYSIAN STUDENTS LEARNING:

A Preliminary Study

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ABSTRACT

Research on educational games has resulted to the increase in understanding of visual design elements in game development. The effectiveness of the graphic styles presentation in an educational game also benefited students in their learning process. This paper is intended to make an initial survey and discuss how graphic styles, learning and student involvement are inexorably linked. Interviews and questionnaires were conducted to identify the importance of graphic elements needed to conduct in the development of educational games. 39 respondents were selected to participate in this preliminary study ranging from an expert in games from Universiti Malaysia Sabah (UMS), two game developers, a teacher with ICT background, two high schools teachers and 30 Form one students. Preliminary study have shown that the educational games research in Malaysia is still less pressing in visual design aspect especially in terms of graphic styles which can be implicated in educational games and to enhance Malaysian students learning.

Keywords:

Educational Game; Visual design; Graphic style; Learning

INTRODUCTION

Video game capabilities which provide feedback, set goals and easy to customize have shown that computer games is a potent learning tool (Griffiths, 2002). In fact, the children are easily drawn to movement and changes that take place on a computer screen. This leads to the use of appropriate computer games software in learning to develop children's reading abilities (Wright & Shade cited by Zurida et al, 2003). In line with the development of multimedia and computer-assisted learning approaches in education has bred a new genre of digital games for education or recognized as educational games, which look for the learning aim. (Watters, 2005; Hewett, 2009). Habitually, the ability of an educational game as the medium of education is indispensable to view in the design of educational games. However, most educational games produced is low quality and the lack of research on the design (Gredler, 200; Haworth and Sedig, 2011). According to Fisch (2005), produced a game for learning not just to spot the problems and expect the school children can acquire knowledge just like that, a good and effective education game strongly depends on the structural design in the game software development, which specifically involving the visual aspect (Deen. M, 2015; Egenfeldt-Nielsen et al, 2015; Felicia, 2009). In order to strengthen the use of educational games, understanding of the importance of quality visual design is a proactive effort to boost the admissibility of computer games for use in education and learning by students (Whitton, 2011). In "visual design" context, graphic styles is a general term that used to describe the illustrations in the game. The graphic style is the presentational aspects of the game environment that are seen by players. The graphic style is also the initiated to identify the game design in development by game designers (Rabin, 2010). Moreover, the presentation of the graphic styles is to address players "look & feel" about the game through the overall gaming experience. Indirectly, the visual presentation and the players have created a close relationship, which the concept of a graphic style can influence the emotional response of the player.

In fact, the visual style in video games has changed dramatically, starting with the first arcade video game titled "Computer Space" until now the computer games or game apps. Limitations encountered not preclude the game developers from venturing and experimenting to make visual styles that exist in video games nowadays. McLaughlin et al (2010) and Egenfeldt-Nielsen et al (2015) have found three basic categories of graphic style for visual representation : i) Abstract, ii) Stylized and iii) Realistic. The characteristics styles graphics to be used in video games has been described (see Table 1), comprising a simplified graphic style to a more realistic graphic style.

Table 1: Summary of graphic styles of different characteristics.

Styles	Characteristics
<i>Abstract</i>	<ul style="list-style-type: none"> • Symbolic forms. • Reducing the formal quality • Low in the level of detail • Flat Shadings
<i>Stylized</i>	<ul style="list-style-type: none"> • Identifiable forms (unrealistic proportions or juxtapositions of parts) • Quality is expressive • The level of detail can be composed from the lower to higher • Shading of curved surfaces or have a texture
<i>Realistic</i>	<ul style="list-style-type: none"> • Presentation style in photo-realistic modeling accurately the familiar objects. • Level of detail is high. • Realistic shadow casting, Light movement

As noted by Gulz and Haake(2006) presentation of graphic style is associated with artistic quality. Thus, the characteristics of each graphic style is determined based on detailed and complex properties of the style that appeal in game. The character in figure 1 refers to the each of the graphic style (shown in Figure 1). Therefore, a realistic representation have a highly detailed and consequently the stylized styles are presented with half a contour drawing, while the cartoon characters with very bare with a few lines is shows the abstract styles.



Figure 1. Description of 'Graphic Styles Appearance'.

Based on the figure above has shown that there are various features of graphic style in the game are categorized using different approaches to describe the characters and game environments to enhance immersion player. It also indicates that whether the characteristics graphic style is capable of affecting the players, especially to aid in learning. Rooney (2012) stated that graphical style impact the players to maintain interest and excitement. The visual quality design can influence the cognitive efforts of the students. Through the graphic styles quality , the level of game playable,

usable, and acceptable by the students can boost their skills in the specified learning subjects (Kirsh , 2005). The graphic style is a method to measure the extent of the influence of visual appearance is able to draw the attention and enhance the achievement of learning goals by a player. Therefore, exploring how the graphic style to increase the use of games for learning by the players and give an overview of the way in which the quality of the graphic style can affect the use of educational games is essential. Consequently, the study should be directed by the researcher to portray the potential benefits that can be derived from each graphics style (Abstract, Stylized and Realistic) specified in the application of learning.

LITERATURE REVIEWS

Whitton (2011) commented understanding the presentation of graphic styles that are relevant and significant in the game interface is required. Educational games is widely used for various learning subjects due to their ability to improve the attention and motivate students in addition to continuing to raise the learning effectiveness. However, the graphic style to be applied is another challenge that needs to be addressed to improve the performance and potential of educational games to enhance learning among adolescents. Therefore, follow-up with further studies are needed immediately. In Malaysia, the visual design factors is very important in the development and conductivity in educational games to bring support and interest from teens. Consequently, local research should trigger more erudition in the game of education, particularly in the graphic style aspects of the design and effectiveness of educational games among our Malaysian students (Roslina et al,2011;Osman and Bakar, 2012). More research and evidence needed to assess the relationship between the visual presentation of the game, perception and learning. Suitability representative of graphic style in the game interface in the learning context is required, especially a clear concept of the type of graphic style (high or low) can be implemented with a more robust and effective to encourage more students to pursue learning interests (McLaughlin et al, 2010:137; Whitton, 2014)

PROBLEMS STATEMENTS

An understanding and modification need to be enhanced in the approach to learning the game in accordance with current technological developments. Therefore, the application of learning in an educational game software should be able to draw the attention and concentration of the students first. In an effort to improve the educational game design, visual design is a key aspect that needs to be studied to constitute an interactive educational game. A noticeable difference between educational games and entertainment that is in terms of graphic display (Wilén-Daugenti, 2009:41; Doulamis et al, 2012: 99). The designers should consider how the graphic style in game software should be built. Necessity of players is not emphasized according to game designer or software developer favorite, but based on relevance learning content and player's perception. Thus, the design value of an educational game is determined by a graphic style display to be immersed the students learning experience (Asgari & Kaufman, 2011:534; Rice, 2007:258; Becta, 2006). The key issues need discussions about the representation of the graphic style in game interface, especially a clear conception of the type of style (high or low) to implement effective students learning. However, there is a lack of research findings and only little evidence on the relationship between visual appeal of games with learning and student perceptions (Whitton, 2014:174; Dickey, 2015:1). Hence, localized research is required to trigger more erudition in educational games, especially in the visual design aspect and efficacy of educational games among Malaysian teenager students (Roslina and Azizah, 2009:296)

METHODOLOGY

The study involved a group of students and a group of respondents comprises of game expert, game developers and teachers. In this paper, the data were gathered through: i) the questionnaire and ii) interviews. The first approach is executed to teenagers aged 13 years old, while the second approach,

which an interview session will be applied to the group of other respondents. A set of questionnaire was constructed and needs to be answered by the Form one students. The respondents are required to mark symbols (\surd) on squares that provided and write the relevant answers on the straight line. Questionnaires were used to identify a little bit background of the respondents. The purpose of the form was used to pick out the perceptual students' experience of the video games, elements that need to be amended, the appropriateness of educational games and the importance of design components to create educational games. The data obtained from the first method will be analyzed with descriptive statistics. A game expert, a game developers and three high school teachers will participate by conducting an interview session. Each session started with the items available questions and recording will be recorded with the consent of the respondents. 10 question items put forward are intended to identify their perceptions of the game and the importance of the graphic style in the game to a better understanding the experiences of among the teenagers.

FINDINGS

The findings are based on the a literature review and a preliminary investigation through interviews and questionnaires. The results of the initial investigation aimed to confirm the importance of educational games in learning; explains the importance of the graphic style in learning among teenagers; the issues of educational game design and evaluating the overall suitability quality of the graphic style that should implemented in educational games.

Interviews

An Expert Researcher in Autism Study

An expert from the Faculty of Computing and Informatics, UMS emphasized that the usefulness of the educational games is based on well blended combination of aesthetic value, social culture and psychological especially to motivate students to use the educational game. Undeniably, children and teenagers require extensive entertainment in their lives. Thus, the approach, features and style of presentation in the educational games is actually determining the impact of education on the youth. He agreed that the suitability of graphic styles presentation will influence the seriousness of the students to the educational games. Student involvement is basically depends on their motivation by using the right graphic styles in the educational game design. In different stages of the child life, they are starting to have some changes normally when they grow up. The teenager starting to have a different view of aesthetic value because they want to explore and want something that advanced. At this point, understand the key of graphic styles is needed, especially for them at the transition age. Normally, student performance depends on the immersion and motivation. Once motivation and immersion is achieved because of graphic style, then they will gain more knowledge and they retain and enjoy to enhance the progress of the performance. So the representation of the graphic styles will impact on these things. In other words, representation of graphic style is the main factor to impacts motivation and immersion and determine the effectiveness of educational games for enjoyment and student performance. He added representation graphic styles in the educational games is concerned requirement. Game developers and educators need to put a lot extra effort to make sure the aesthetic requirement of the demographic among the Malaysian students. In addition, educational games in Malaysia must be developed in conformity with the graphic style other than entertaining. Suitability graphic style that implements in educational games also needs to be explored following students' perceptions.

Game Developer

She agreed that a well designed graphic and gameplay is required. For example, a game must select and pick the necessary elements to make the game design is outstanding and captivating. The style of design is very much an influencing criteria to bind and engage the children to the game. Undeniably, the graphic style is the key criteria to commercialize the game. In addition,

understanding the presentation of the style is needed in advance for the successful commercialize the educational game. Back to square one, if the players loose interest due to an unsuitable design style, even a remarkable gameplay is useless. She added that, children are more visual than an adult, thus, understanding graphic style is required the needs of youth at age 13. In fact, Instead a research need be conducted on the level of quality in visual style require to engage a certain age group, Realistic Vs Toon. Hence, identify the average level of design quality needed or good enough to engage a certain age of group, that would cut down the development cost and time. Where the game can be sold at affordable prices.

Teacher with ICT Background

A teacher who have an ICT background agreed that educational games is important to improve student performance tandem with the technological developments and electronic products. The educational games are no longer foreign to students aged 13 years now.

Nevertheless, making an effective educational games and interactive to the teenagers is an important issue. This is because most of the educational games were still less meet the demand of the students. According to him, the presentation of graphic styles needs to be considered in the construction of educational games compared to the other elements. In particular, presentation graphics are capable effect on students' enjoyment, motivation and immersion. With this, would indirectly increase student' performance and cognition. Hence, the investigation of the suitability graphic styles in the educational games will have an important impact to the students, especially at the prefix stage of adolescence. Furthermore, the facilities and the support provided is still inadequate and must be further diversified. Thus, it is appropriate further investigation should be conducted to maximize the ability of educational games in terms of visual design aspects.

Two Secondary Teachers

Consistent with the goal provision of education at the 21st century and technology, they agree with the opinion that the educational games can improve children's learning, especially children or adolescents at the age of 13 years. This is because students who form one still entrenched play. Students at this stage need to be exposed in learning approach "learning through play" in order to adapt in the secondary school environment and thus to be able to give a deep impact on their learning strategies when they in the upper secondary level. However, the suitability of educational games in learning in Malaysia is still low level. Research and experiments on the effectiveness of educational games in the classroom need to be further improved particularly for the suits students. They also noted the role of graphics performance in the game have added the details and focusing by students in the teaching process. Accordingly, an appropriate graphic design is very important in order to easily attract the attention of students and motivate students in learning.

Questionnaire

A total of 30 students (14 male and 16 female) was selected as research respondent. The students selected from a local school, which located in Kota Kinabalu. The majority 93.3% of the students like to play video games. This indicates that the video games are no longer unfamiliar to today's teenagers. Table 3.1 shows the percentage of students frequent play video games.

Table 3.1 Percentage of students often play video games.

Often play video games	Percentage (%)
Every day	33.3
3 times a week	23.3
4-6 times a week	6.6
Once a week	10.0
2-3 times a month	10.0
Once a month	16.6

The result shows that, 33.3% students play video games every day, followed by 23.3% students play 3 times a week, while 16.6% play video games once a month. Based on the data obtained, it was found that 73.3% of students spent approximately 3 hours playing video games.

Table 3.2 shows the percentage of students feel when playing video games, 70.0% of students feel good while executing activities playing computer games. It showed that teenagers feeling happy while playing video games.

Table 3.2 Percentage of students feel when play video games.

Feel when play game	Percentage (%)
Good	70.0
Bored	13.3
Very good	16.6
No skilled	0.0

Although 66.6% of students indicated disagree that video games are educational, as yet more than 70.0% of students also prefer using video games as a tool to learn. Based on the feedback received, the use of educational games has a high potential among the students. Table 3.3 presents the percentage of different types of game played by students. Strategy game (43.3%) is the most popular game among the students, followed by the adventure game (16.6%).

Table 3.3 Percentage of students' choice of game genre.

Type of game	Percentage (%)
Adventure	16.6
Platform	6.6
Shooter	13.3
Sports	16.6
Strategy	43.3
Others	3.3

Furthermore, 53.3% students clarifies that one of the reasons they like to play video games is the presentation of the graphic, more than 63.3% students concerned with graphic elements in a game. In other word, the graphics have become a key factor for them to choose a game (see Table 3.4)

Table 3.4 Percentage of students' selected aspects of a game.

Aspect prefers in choosing a game	Percentage (%)
Graphic	53.3
Gameplay	20.0
Story	6.6
Interactive (feedback, function)	10.0
Value (mission, tasks, content)	10.0

In terms of educational games, question items 11, 12, 13 and 14 have been presented (see Table 3.5). The findings show 63.3% students answered "Yes" that stated they used to play educational games. More than 76.7% students agreed with the question item 12 that the graphics are applied in educational games seem less attractive. Analysis of question items 13 and 14, have found that 76.6% of students responding "Yes" to express graphic performance in the game will affect their interest. In addition, 80.0% students show that they have an interested in playing educational games in the future.

Table 3.5 Percentage of students' satisfaction of educational game.

	Percentage (%)	
	Yes	No
11. Have you ever played educational games	63.3	36.6
12. Do you think that educational games are less satisfactory in design (Graphic)	66.6	33.3
13. Do the graphics performance in the game will affect your interest	76.6	23.3
14. Would you be interested in playing educational games in the future	80.0	20.0

Mathematics does not seem interested by 60.0% overall students. Nevertheless, they (83.3%) have indicated a tendency to agree with the use of educational game to learning math in the future. Table 3.6 presents the element that conditions as important in the educational game education by students. From the results, a sum of 60.0% students is preferred Graphic, followed by 16.6% in Value (mission, tasks and content) and 13% more going to Interactive. The percentage of students' perception about the element need to be addressed in the educational game for learning mathematics are presented in Table 3.7.

Table 3.6 Percentage aspects would attract students play educational games

Aspect students play educational games	Percentage (%)
Graphic	60.0
Gameplay	3.3
Story	6.6
Interactive (feedback, function)	13.3
Value (mission, tasks, content)	16.6

Table 3.7 Percentage of important aspects in math educational game by students perception

Aspect needed in math educational games	Percentage (%)
Graphic	50.0
Gameplay	10.0
Story	3.3
Interactive (feedback, function)	16.6
Value (mission, tasks, content)	20.0

On average, the percentage of the graphic element was significantly higher than the gameplay and story, with 50.0% students dominance of graphic appearance, whereas gameplay and story with only 10.0% and 3.3 %. Generally, the findings in both tables have highlighted the fact that the function of graphics in a digital game is important, particularly to develop educational games in the maths subjects. In sum, the preliminary findings are to appraise the: (1) interest of students by the utilization of video games; (2) an understanding of the factors which need to be improved for attracting attention and further learning; (3) Potential of educational games used among teenagers to improve learning (4) the element that needs to be further evolved in the game design in order to raise students motivation and immersion thus increase learning mathematics. Overall, the students have replied positively to prefer using video games as learning tools. The analysis results of the study indicated the concept of decent graphics could increase attention and focus of the teenagers.

CONCLUSION

Consistent with the literature review and feedback from the respondents, this research is needed to explore the influence of graphic styles appearance to enhance Malaysian students motivation and learning process. Extension of this research, a detailed study will be carried out to examined the impact of the graphic style quality on students' performance, enjoyment, knowledge, motivation and immersion. The style of a graphic presentation of the game is also a part of the process of development of educational games. With this continued research, is able to understand the aspects of the graphic style in games design that meet the education context. The ability to understand the use of quality visual design can help designers determine the priority of the design and selection of different graphic styles to suit the learning.

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