Full Length Research

A Game Based Learning Approach to Improving Students Learning Achievements in Education

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The aim of this study was to explore the influence of applying a game based leaning approach to education. The quasi-experimental non equipment-control group design was adopted in a four-week learning activity. The participant included sixty-six students in two classes of an elementary school. One of the classes was assigned to be the experimental group and the other was the control group. The experimental group learned with computer games while the control group learned with the traditional teaching approach. The result showed that the learning achievement of the students in the experimental group was significantly better than that of the student in the control group. Similar results were obtained in terms of the learning interest of the students. Moreover, most of the students revealed quite positive attitudes toward the use of the game-based learning approach in terms of nutrition knowledge and learning attitudes.

Key words: Achievement, learning activity, student.

INTRODUCTION

With the fast development of information technology and rapid social change in the twenty first century, the growing economy, higher education level and progress of medicine is gradually turning people's attention to health concept and problems. Shaping health habits has become very important. Under Bakke, McBride and Spencer (2006) held in the view that healthy habits should be formed as early as possible. Therefore, to shape learners to have correct food and drink habits and establish a balanced diet, nutrition education needs be carried out in the early stage of school. The objective of health education is behavioral implementation, during which health concepts are acquired to form personal value. It is paramount in teaching to shape students values that can influence attitudes and behaviours.

Nutrition education has been recognized as a crucial factor in promoting good study. Researchers have indicated that studying habits not only influence the normal growth of students. Other researchers stated that education should be a kind of experience learning through which knowledge can be changed. School students spend a lot of time in school so the school environment can have a certain degree of influence on them. Educational knowledge and attitudes of the students who take related courses are better than those of students who do not take the course. Several research have also shown that the implementation of education is helpful in improving in a meantime, scholars have also indicated the difficulty of conducting effective learning activities since most students show low interest in Learning courses. Therefore, it becomes an important and challenging issue to educate children to foster in their learning habits in school.

Computer games developer have provided students interest in studying education-related courses, this studies attempt to investigate the influence of the game-based approach on education, improving attitudes and building the habits of students via a computer games provided.

In this research, the following issues are studied.

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i. The influence of the game-based learning approach on the students' leaning achievements in the education course.
ii. The influence of the game-based learning on students' learning attitudes toward the course.
iii. The influence of the game-based learning approach on students.
iv. Students' feedback regarding the game-based learning approach for education.

LITERATURE REVIEW

According to Alabi (2010) games have been recognized as being a good tool to promote learners to actively participate in learning activities. It is the best way to trigger students' learning motivation. In addition it has been reported that game-based learning approach might provide a good chance to stimulate children's abstract thinking during the process of cognitive development and further foster their higher order thinking abilities. Carbonaro et al. (2010) stated that computer games are able to boost motivation owing to some characteristics, such as adventure, challenges and freshness. Therefore, if teachers are able to apply computer games to teaching, students can not only have better learning achievement but also learn happily via these games. Several previous studies have demonstrated the ease of use and usefulness features of computer games by applying the game-based learning approach to a variety of learning activities (Alabi, 2010). Using computer game for learning in elementary school can increase their internal motivations and learning achievements of students. The learning motivation and learning achievements of the students can be increased and their competence and knowledge can be promoted. Another researcher also sees computer games, children are learning interests are effectively promoted and they are guided to actively improve their study habits.

There are several theories that are recognized as being relevant to the game-based learning approach, such as cognitive theory and situated theory. Cognitive theory emphasizes that learners should master basic skills to further acquire higher-level abilities while learning new things. It also emphasizes that learning processes are progressive and more from simplicity to complexity; moreover, games that are adopted need to stimulate students learning motivation and make learning more fun. Situated learning theory states that learners should enter learning scenarios of acquire knowledge. The knowledge that is actively explored in the scenario should not only be useful, but should also be analogical. Therefore establishing a rich learning scenario enables learners to gain practical problem-solving abilities via observation and behavioural exploration, and a well-designed game is able to provide such a learning scenario Cunca Lopex

and Martin Caceres (2010). Some researches believed that even the best teaching materials and techniques are not as good as having children learn happily via games.Compared with other media games are closer to the children's world and are easily accepted by them, game can help children develop problem-solving skills.

METHODOLOGY

Research design

This study adopted a quasi-experimental none equivalent-control group design. The independent variable was the different teaching media. The experimental group recommends education with computer game-based teaching, while the control group was taught with a multimedia power point. The dependent variable nutrition education was included in the nutrition education knowledge tests, the questionnaire students attitudes and the questionnaire on students habit to evaluate the learning achievement of the students, their knowledge test developed by Alabi (2006) was adopted. The test consisted of twenty items, each of which was awarded one point of the students gave the correct answer. Kuder-Richardson reliability of the test was 0.71, the item discrimination value were higher than 0.25 and the item difficulty values ranged from 0.4 to 0.8.To measure the students learning attitudes toward the nutrition course, the questionnaire developed by Ln (2004) was adopted. It consisted of twenty items on a five-point Likert scale. The Cronbach's values of the questionnaire was 0.85 showing good reliability in internal consistency. In the meantime, another questionnaire developed by Her (2004) was adopted to evaluate the food-and-drink habits of the students. It consisted of twenty items on a five-point Likert Scale. The Cronbach's value of this questionnaire was 0.85 showing good reliability in internal consistency.

The teaching activities were designed based student education and habits with multi-media power point. There were five games used in this study

RESULTS

Learning achievements: This study adopted the pretest scores of the Knowledge test as the covariate for analysis of covariance (ANCOVA) to avoid the influence of the pretest on Knowledge Learning. One assumption of ANCOVA is that the regression coefficient of each regression line needs to be homogeneous. The interaction effect between the independent variable and the covariate of the knowledge test was not significant (F = 1.93 P>.05) suggesting that the relationship between the covariate (the pre test scores) and the dependent variable (the post-test scores) was not different by the

Table 2. ANCOVA for the post-test results of the knowledge test.

Variable	Group	N	Mean	S.D.	Adjusted mean	Std Error	F
Post Test	Experimental group	33	16.94	2.38	17.39	.43	20.01**
	Control group	33	15.09	3.39	14.64	.43	

***P>.001

Table 2. ANCOVA result on the range of the attitudes toward the Education courses.

Variable	Group	N	Mean	S.D.	Adjusted mean	Std Error	F
Post Test	Experimental group	33	88.82	7.28	88.98	1.00	.19
	Control group	33	88.52	9.01	88.36	1.00	

Table 3. ANCOVA result on the rating for the students habit questionnaire

Variable	Group	N	Mean	S.D.	Adjusted mean	Std Error	F
Post Test	Experimental group	33	88.46	10.36	89.28	1.12	4.17*
	Control group	33	88.88	8.25	88.05	1.12	

*P<0.05

levels of the independent variable. Therefore, further ANCOVA analysis was appropriate.

Table 1 shows the descriptive data and ANCOVA for the results of the nutrition knowledge posttest. The influence of the pretest scores on the knowledge test was excluded and the learning achievements between the two groups were significantly different (F = 20.01, P<.001). The adjusted mean of the experimental group was 17.39 while that of the control group was 14.64, implying that the learning achievement of the experimental group was significantly higher than that of the control group, showing that computer game based instruction can effectively promote students' knowledge. The pretest scores of the questionnaire of attitudes were used as the covariate for ANCOVA. The interaction effect between the independent variable and the covariate of the questionnaire was not significant (F = 1.37, P = 0.25, P>0.05) suggesting that the relationship between the covariate (the pre-test scores) and the dependent variable (the post-test scores) was not different by the levels of the independent variables, therefore the ANCOVA could be further conducted (Table 2).

The learning achievement between the two groups were not significantly different (F = 19, P = .66, P>.05) after the influence of the knowledge pretest scores were excluded. The adjusted mean for the experimental group was 88.98 whereas the adjusted mean for the control group 88.36. The score of the experimental group was higher than that of the control group, but there was no significance between the two. Computer game-based instruction was not shown to enhance the attitude of the students any more than multimedia power point instruction.

Table 3 shows the descriptive data and ANCOVA for the posttest results of the student's habit questionnaire. The influence of the pretest scores of the students habit questionnaire was excluded and learning achievement between two groups were significantly different (F = 4.17, P = 0.05, P<0.05). The achievement of the experimental group was better than that of the control group, showing that computer game-based instruction can effectively enhance student habits.

An analysis was made to further compare the knowledge and attitude toward the education course and habits between genders after participating in this learning activity.

Table 4 shows the ANCOVA results on the post test scores of the attitudes and habits between the two genders by excluding the influence of corresponding pretest scores and pre-questionnaire rating. It was found that there is no significant difference between genders in terms of the three aspects applying that the game-based learning approach is helpful to both genders to improving their learning achievement and learning attitudes.

Conclusion

The study aims at investigating the achievements of the student in education via computer game-based learning and multimedia power point instruction. The experimental results reveal that computer game-based learning can improve the learning achievements and learning attitudes of students. Moreover it was found that the game-based

Table 4. ANCOVA results on the post test result of different genders.

Variable	Group	N	Mean	S.D.	Adjusted mean	Std Error	F
Knowledge Test	Male	17	17.47	2.00	17.29	.50	1.00
	Female	16	16.38	2.68	16.57	.51	
Attitude Questionnaire	Male	17	89.65	6.62	88.81	1.44	.80
	Female	16	87.94	8.05	88.83	1.49	
Habit Questionnaire	Male	17	87.29	11.97	87.97	1.89	.14
	Female	16	89.69	8.56	88.97	1.90	

learning approach is equally helpful to both male and female students in terms of knowledge learning attitude and habits. This finding is quite different from other research a difference between genders in using computers and networks. Longer experiments with larger samples to further investigate the effectiveness of the game-based learning approach nutrition education. It is expected that the innovation approach not only improves the students' knowledge, but also fosters their habits in their daily lives. This approach can be applied to other courses in the future. Moreover, as mobile and wireless communication technologies are becoming more popular, it has become an interesting and challenging issue to use mobile devices for conducting game-based learning activities in real-world learning environment so that the students can be situated in real-world scenarios with support or hints from the learning system.

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