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Game-based Learning Combined with the Somatosensory Operation of Effectiveness Evaluation - global warming science myths solving

Hsin-Chih Lai [a], Hung-Tzung Lee[b*]
[a] Hsin-Chih Lai, Department of Engineering & Management of Advanced Technology, CJCU
[b] Hung-Tzung Lee, Department of Information Management, CJCU
Tainan, Taiwan

*sunyboy8018@gmail.com

Abstract: Through this study, the role of today's popular somatosensory technology and the market widely used playing game combines topics related to global warming myth concept to design a scenario-based learning modules. The module of assisting learning used in this study can increase learners' motivation. In this study, a public Tainan were administered test, using a group of computer-assisted teaching people 232 people, the use of somatosensory assisted Instruction 192 people. Based on the data collected, the effectiveness of learning effectiveness was analyzed by using a series studies. That scientific knowledge through the study of the effectiveness of the results of the analysis has a significant learning outcomes, in satisfaction of a learner will want to re-use this module learn.

Keywords: Situated learning, Game-Based Learning, Somatosensory operation, RPG-game

1. Introduction

In recent years, many studies have pointed out that the game-based learning as a teaching aid can enhance learning interest and motivate learners. Since the birth of the Earth 4.6 billion years ago, continuous operation of the climate system, and greenhouse effect too. But since the Industrial Revolution, the burning of fossil fuels such as increased greenhouse gas emissions, nature of the greenhouse effect and therefore imbalance. To solve this problem, the must right to establish the concept of basic education from the start. So this study set to improve children on the idea of global warming, for example deviations game-based learning methods. In order to increase children's motivation in learning, in this study, particularly the operation mode into the game, the game developed by combining motion sensing operation to improve student interest in learning and motivation. The subjects of this study architecture chosen game Role-playing game (RPG) RPG presented in a way, on the one reason models currently on the market many games begin RPG presented in a way, on the other reason, through role-playing game presents a way you can let children feel as if combined with a game situation himself inside the game, in order to achieve the effect of situational learning.

2. Literature review

2.1 Digital games in learning

In recent years, for children, games, entertainment and recreation in addition to features, it also includes learning, training and even the cultural heritage features (Shi, 2006). Many studies have pointed out that the game is an easy way to learn to drive learners to enter the environment, which makes the course more interesting and people immersed in the joy of learning (Chao, 2006), The game allows learners through investment in teaching situation, continuing to maintain freshness and attention, so that course content can be successfully transmitted to learners, promote good communication between teachers and students and interaction, students are able to participate more actively in learning in order to achieve the goal of entertaining (Hong al., 2002). However, while there are also studies

mentioned game-based learning can be achieved following the teaching effect: (1) active learning; (2) increase interest in learning; (3) the individual experience of learning and knowledge; (4) to reduce the pressure of study; (5) creative thinking and learning; (6) remedial teaching (Li , 1999), Therefore, in the course of the game children try a variety of different games are played, and the development and creation of opportunities for exploration, students can experience the new behavior and unique way to express innovative ideas, so the game situation to expand children's creativity and imagination (Wu , 2001). So teaching the game-based learning, can enhance learning efficiency, to stimulate learners' interests and reduce the burden of courses (von Wangenheim & Shull, 2009). The game presents the way the market than the type of role-playing as the largest in recent years, many of the secondary educational learning tool also binds (Liu, 2010).

Compared to the general game mode of operation, somatosensory games more people into the game situation, and because the operation in the form of intuition allows users as experienced in the content of which (Lu et al., 2012).

Many who use a variety of teaching and learning-related knowledge and theory, and to consider all relevant factors affecting the learning process, the combination of theory and practice of teaching, teaching activities and planning process to become "instructional design." Including teaching activity planning, selection, preparation, practice and evaluation and other work in the hope that through the design and arrangement of the context of learning activities, so that students can actively participate in the learning process, to enhance learning. However, any teaching activities are required instructional design arrangements, teaching from the selected target analysis, analysis and choice of teaching strategies learners teaching content, these need to do before the formal teaching effective arrangements and Analysis (Tsai, 2010).

There are term teaching and research are important instructional design model proposed three main reasons. (1) teaching designed to assist educators to establish the direction of teaching, where the clear teaching objectives; (2) teaching designed to assist educators to establish evaluation goals, with the evaluation objectives, teaching and learners will be able to learn well aware goals; (3) teaching designed to provide a clear direction learners learn, help them towards the right goal (Mager, 1968).

2.1.1 Somatosensory Technology

In the past few years to bring to the people a lot of somatosensory operation of entertainment, and now the city also has an interview produced by different companies operating platform, which some studies have found the somatosensory platform can even integrate into a lesson in education for use in . Interim most typical example is Microsoft's Xbox360 Kinect platform(Evgenia Boutsika, 2014).

Kinect is a belonging to the NUI. It allows the user does not need to hold the remote control or worn props, direct use of physical manipulation. Kinect is also to be applied in many different areas. Compared with the traditional game props controlled manner, Kinect pluralism operation can not be replaced with a traditional game interaction, and allow the user into the game situation(Chao, Huang, Fang, & Chen,2012、Chun-Yen Chang, Yu-Ta Chien, Cheng-Yu Chiang, Ming-Chao Lin & Hsin-Chih Lai,2013).

Kinect as a teaching tool for e-learning can achieve said increase student motivation and interactivity. (1) It is instructive tool if interaction between teachers and students teaching material and good if it can create a pleasant learning environment in the classroom. (2) Its software can be modified, so the teaching of design has a large ductility(Hsu, 2011).

2.1.2 Role-playing game

Role-playing game is a player controls the protagonist activities fictional world of the game. Role-playing games to promote the overall story and narrative elements, the player character growth, complexity, and integration of replayability. There are also studies proposed role-playing game for learning complex problem solving, conflict resolution and other most helpful, when learners actually play a role, through its view, the problem and the solution will become easier (Raybourn, 2006), There is also a scholar pointed out role-playing game is a popular favorite game modes, it is applied to the user in the textbooks for secondary teaching can reach a certain get into (Buchanan, 2004).

2.1.3 Situated Learning

Situational awareness and situational teaching learning from the situation two theories (Brown, Collins & Dugid, 1988). But before these theories have been proposed, Schon (1987) pointed out that many specialized industry knowledge, technology can not fully be described in detail in words or language, it must be thoroughly integrated into the situation through personal observation, participation and learning to be harvested. For example, plumbers, formwork workers, butchers, midwives and other industries mostly by "mentoring" tradition, rarely teach these skills to implement in the formal education system, at the most to learn from books some basic common sense, but it can master these workers or in accordance with the formal theory of law to solve all kinds of skilled work incurable diseases, deducing reason is through "learning by doing, namely to reflect amendments wrong" model to be improved, down to ensure the long-term and technical personnel of a high degree of professionalism, which is situated learning success, and therefore we can say that the teaching situation implies for students to learn by doing and by doing so on two major connotations Reflection (Suchman, 1987).

2.1.4 Global warming misconception

Since the rise of the industrial revolution of the mid-18th century, science and technology has brought a great surprise to human society and assistance, creating immense prosperity of human society, but accompanied by excessive exploitation of natural environment and resources, resulting in many ecosystems on Earth the withered. Which is very huge influence than the human misuse of natural resources, resulting in increased global warming in recent years, all over the disaster of success, human nature and therefore bear the counterattack, so we are bound to make some coping methods (Wei et al., 1997).Research has integrated the reason scholars misconceptions generated, which can be divided into two parts, students and teachers, student section including inadequate subject knowledge, as well as improper cognition; teacher component includes, overemphasize talk, for students of myth lack of awareness and interest in causing heart teaching properly. However, the issue of global warming, its complex scientific concepts are also the cause of student misconceptions of (Cgen, 2002).

In this study, we are hoping that through this situation user interactive operating system to learn the correct corresponding knowledge, by somatosensory operation to improve learning motivation and learning effectiveness.

3. Method

3.1 Research framework

In game-based learning and contextual learning theory, and then learning content, learning tools, learning integration, and then through the somatosensory system allows users to play the protagonist of the game.(Fig. 1)

Teaching Content: a story and authenticity, so that students perform tasks more easily manipulated by somatosensory into the situation.

Learning tools: a combination of a sense of science and technology and role-playing game developed situational learning environment, the user can very natural control game characters through the body, and then with the story progresses, reach into the game and thinking realm.

Learning ways: through games-based learning approach, the integration of cognitive conflict strategy, the number of teaching materials for students through the guidance and the characters to interact with, and then the problem of self-discovery and exploration, and finally establish the correct perception and get rid of the original myth.

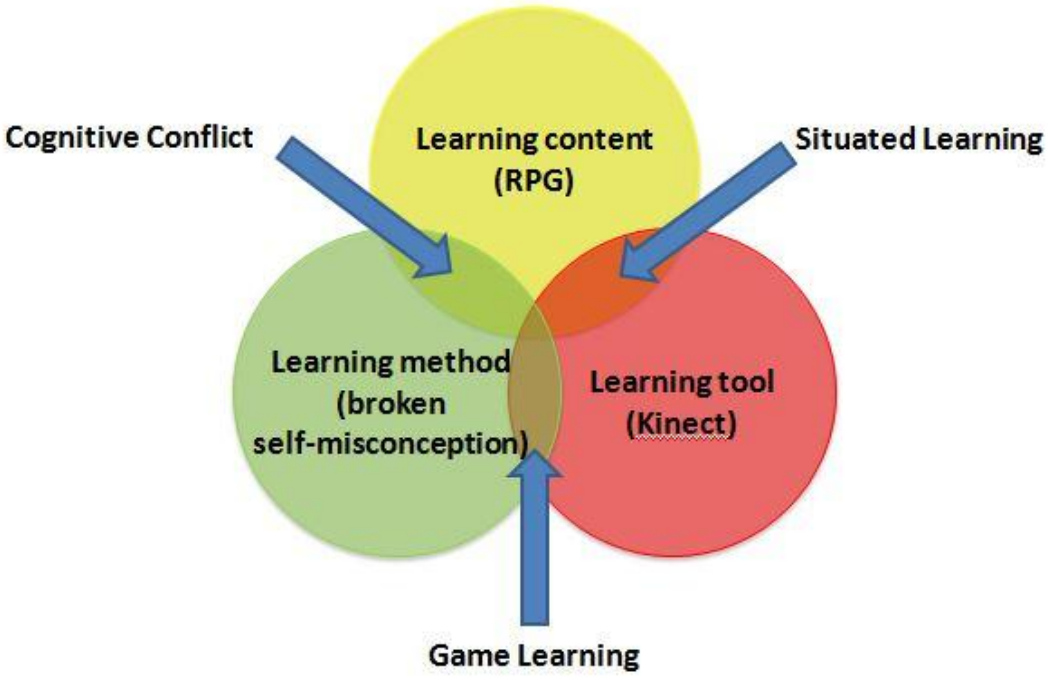

Fig. 1. research framework

4. Global Warming Misconception of material design

4.1 Learning material design

In this study, the use of cognitive conflict in teaching three steps: (1) understand the students had knowledge; (2) provide students with contradictory information; (3) the level measured before and after the assessment by the learner cognitive change. And adding a new concept to strengthen its correct new knowledge(Limón, 2001). First, when the pre-test before learning to understand the learner on the South, the Arctic ice melting will cause sea level rise if the original concept; then let learners game, with the game's story and dialogue, so that learners themselves after discovery south, the Arctic ice melt, will result in rising sea levels, finally provided the conflict, allowing learners to think for themselves; the end of the game, test, assess whether there is a change after cognition, whether myth is resolved, whether cognitive establishment; and finally to consolidate this concept, then teaching experiment movie, strengthen this perception. (Fig.2)

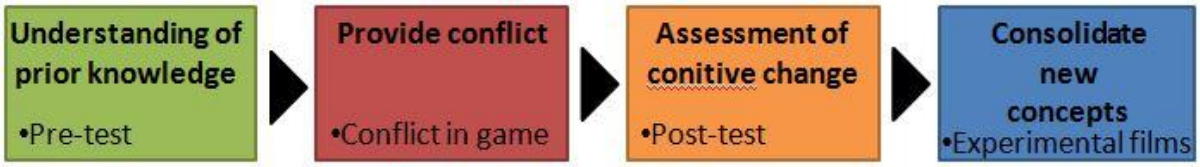

Fig. 2. Assessment of cognitive change.

4.2 Learning material design

The present study aims to design a concept to solve the global warming myth games. By KINECT body movements assisted learning, learners immersive. Including the Antarctic rescue penguins, polar bears in the Arctic rescue. Knowledge and education through the game screen conduction Antarctic, the Arctic ice melt will cause any kind of impact the Earth and the dialogue of knowledge to achieve the effect of learning (Fig.3). Action by the somatosensory technology and design aspects of running, jumping, climbing and direction of motion control to answer situational effect (Fig.4)

Fig.3. Knowledge of the game

Fig.4. Motion design

5. Results

This study used a quasi-experimental evaluation of the performance of the method, the samples were divided into experimental group and control group test, the total number of samples to 424 people (192 in the experimental group and the control group 232), statistical analysis through the pre / post-test questionnaire descriptive of the learning effectiveness and satisfaction differences.

According to the description of the statistical data analysis showed that: In some experimental group pre-test, the relevant scientific knowledge analysis results: (1) which is part of the Arctic ice correct rate of 62%, (2) the Antarctic ice sheet is the kind of answer below rate of 49%, (3) the Arctic ice melting sea-level rise will result in correct rate of 19.8%, (4) whether the Antarctic ice melting will cause sea level rise correct rate of 64.6%. In part to test the experimental group, the relevant scientific knowledge analysis results are: (1) which is part of the Arctic ice correct rate was 91.7%, (2) the Antarctic ice sheet is the correct rate which belong 47.4%, (3) Arctic ice melting will result in rising sea levels correct rate of 83.9%, (4) whether the Antarctic ice melting will cause sea level rise correct rate of 82.3%. (Table.1)

Pre-group portion of the test, the relevant scientific knowledge analysis results: (1) what kind of Arctic ice correct rate below 56%, (2) the Antarctic ice sheet is the correct rate which belong 46.1%, (3) the Arctic ice melting sea-level rise will result in correct rate of 15.1%, (4) whether the Antarctic ice melting will cause sea level rise correct rate of 56.5%. Section, relevant scientific knowledge to analyze the results of the control group tested were: (1) which is part of the Arctic ice correct rate 90.1%, (2) the Antarctic ice sheet is the correct rate which belong 54.3%, (3) the Arctic ice melting sea-level rise will result in correct rate 61.2%, (4) whether the Antarctic ice melting will cause sea level rise correct rate of 79.7%. (Table.2)

Part of the satisfaction of the experimental groups: (1) This type of game the most appropriate time to less than 7 minutes 76%, (2)like the picture of the game 66.1%, (3) Like the game's sound 77.6%, (4) like the game content 46.9%, (5) like during conversations 59.9%, (6) mode of operation like somatosensory 32.8% (7) during the game smoothly 45.3%, (8) the process of running, jumping percent fun 54.7, (9) during the game interesting 52.6%, (10) this game impressed me 52.6%, (11) the same form, different content, but also want to play 53.6%.

Part satisfaction of the control group: (1) This type of game the most appropriate time to less than 7 minutes 80.6%, (2) love the game screen 41.8%, (3) Like the game's sound 20.3%, (4)like the content of the game 64.2%, (5) like during conversations 47.4%, (6)during the game interesting 97.9%,(7) I was impressed by this game 95.2%, (8) the same form, different content, but also want to play 97.4%.

Title	Pre-test	Posttest
What kind of ice belong Arctic	62%	91.7%
What kind of ice belong Antarctic	49%	47.4%
Arctic ice melting will result sea-level rise	19.8%	83.9%
Antarctic ice melting will result sea-level rise	64.6%	82.3%

Table.1. Experiment group scientific knowledge quiz results

Title	Pre-test	Posttest
What kind of ice belong Arctic	56%	90.1%
What kind of ice belong Antarctic	46.1%	54.3%
Arctic ice melting will result sea-level rise	15.1%	61.2%
Antarctic ice melting will result sea-level rise	56.5%	79.7%

Table.2. Control group scientific knowledge quiz results

6. Conclusion

This study developed a combined KINECT somatosensory operation and role-playing game RPG character situational somatosensory type-learning modules, teaching joined the misconceptions of the scientific basis of global warming, through experimental analysis proved that this learning module has good the study results, the results are as follows:

1. Looking at the results of the entire study of scientific knowledge shows that, regardless of the experimental group or a control group in the Antarctic, the Arctic is part of what the ice, rising sea levels will result in melted through measured before and after a significant improvement can be seen. In addition to the South Pole is the effect of the experimental group after learning what kind of ice did not reach the expected results belong, after analysis speculate, because the dialogue knowledge of the contents of long Antarctic ice, causing the participants a chance to fully absorb it into the next chapter of relations.
2. This game is yet another special feature is that it mirrors the concept of cash is the most popular role-playing surface, which allows users to integrate in situations near and this sets learning module allows learners to experience the ice melt layer may have any effect, so that learners learn to play in the process of knowledge.
3. The performance of this study learning modules and then the user satisfaction, the whole matter can be obtained through the analysis of the results in the experimental group or the control group, of which the learners will want to experience the learning mode again.
4. Finally, in terms of scientific knowledge or obtained through the test results that, scientific knowledge that learners are in school and in the media network. So this results also show that school students conducting a correct concept and newspapers, the media, the Internet dial bulk messages must pass rigorous police caution not to cause misunderstanding shot will of the public.

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