VISOLE: An Example of Hybrid Learning

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Abstract. In this paper, we discussed the VISOLE learning mode, which is a hybrid learning that combined the game-based learning and the traditional learning. Briefly speaking, the VISOLE approach is composed of 3 phases in which students have to (Phase 1) preliminarily acquire some high-level knowledge in specific subject domains through teachers' scaffolding; (Phase 2) actively participate as game characters in a game-based virtual interactive environment to construct knowledge and skills through their near real-life gameplay experiences; (Phase 3) reflect and generalize their game-based learning experiences through teachers' debriefing. During the design and develop process of the VISOLE, we paid close attention to the guiding function of teachers, and emphasized the subject position of students. Under the present research, we empirically found that most students were much more motivated during this learning process, and enhanced their knowledge, intellectual and non-intellectual skills. Therefore, VISOLE is a valuable learning mode worthy of promotion.

Keywords: Hybrid Learning, Blended Learning, Blending Learning, Educational Game, VISOLE.

1 Introduction

Since the 1990s, the applications of e_Learning in the field of education have been accelerated, which pushes forward reforms in education and generates many novel educational thoughts and ideas. People, however, begin to reflect the limitation and issues of e_Learning, and consider that the role of e_Learning should not be exaggerated and different problems should be solved by using different approaches [1]. By the reflection on e_Learning, the great importance has been attached to the Hybrid Learning (or Blended Learning, or Blending Learning) in the industry, for example, the e-Learning and the traditional face-to-face teaching mode are combined and enhance strong points and avoid weaknesses so as to achieve a better result in the learning.

Actually, hybrid learning is not to simply combine e-Learning and traditional teaching modes, but an in-depth integration according to their characteristics. Therefore,

people proposed varieties of combination modes from various angles, and put forward a great deal of designs and application principles for the hybrid learning (e.g., [2][3][4]).

In this paper, we will discuss the VISOLE learning mode, which is a hybrid learning that combines the game-based learning and the traditional learning.

2   Two Important Ideas of Hybrid Learning

Hybrid learning, in short, is a learning mode that combines the advantages of both the traditional learning and the e-Learning. The mode allows teachers to lead the learning process by guiding, illuminating and monitoring the students and the students, who actually learn in the process, to fully demonstrate their initiative, vigor and creativity [5].

According to the the definition and some scholoars' suggestions (e.g., [1][2][4][5]), two important ideads are very important to hybrid learning.

2.1   Highlight on the Combination of the Guiding Function of Teachers and the Subject Position of Students

Along with the rapid development of multimedia network technologies in 1990s, e-Learning has become very popular in many places all over the world. At the same time, constructivist learning theory has aroused attention around the globe and is becoming the basis of a revolution in traditional educational practice. According to some constructivism scholars, knowledge is not taught by teachers, but acquired by learners with the help of others (including teachers and fellow learners) based on necessary educational materials through meaning construction [6].

The constructivist theory vigorously promotes the change in education from traditional teacher-oriented mode to the student-oriented mode (e.g., [7]). Such change is of great significance in inspiring learning motives in students, fostering their self-learning abilities and cultivating creative talents. However, when too much emphasis is put on the subject position of students, the guidance provided by teachers may be ignored, e.g., in some classes teachers let students study totally by themselves without any guidance or help. This may result in unsatisfactory effect [5].

Hybrid learning aims at combining the advantages of e-Learning and traditional face-to-face learning, it shall elicit the initiative, enthusiasm and innovation of students, the ones who actually learn in the learning process, while having teachers take the lead in guiding, illuminating and monitoring the students in the learning process. In short, in the learning process the highlight should be put on the combination of the guiding function of teachers and the subject position of students [1].

2.2   Focus on Deep Hybrids

Though hybrid learning is commonly regarded as a quite effective learning mode, the fact is that we seldom see successful case of hybrid learning. The usual hybrid strategies are either too simple to achieve the expected effect or too complicated to implement.

According to some scholars' suggestions (e.g., [5][8]), hybrid learning is not the simple mixture of online learning and offline learning, but the hybrids on deeper layers. For example, classroom teaching is given while after-class discussion is held online. Such hybrid can achieve certain effect, yet it's still too narrow and the the hybrids in deeper layers are needed.

Moreover, according to Driscoll [2], hybrid learning should include four aspects. *1. To combine or mix modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal. 2. To combine various pedagogical approaches (e.g., constructivism, behaviorism, cognitivism) to produce an optimal learning outcome with or without instructional technology. 3. To combine any form of instructional technology (e.g., videotape, CD-ROM, web-based training, film) with face-to-face instructor-led training.4. To mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working.* Briefly speaking, in order to achive the leanring target, hybrid leanring should combine multiple learning modes, technologies, and learning theories.

In fact, Valdez [9] also states that "*Like chemistry, blended learning is about combining elements to create a desired reaction. However, both practices are not simply about the inclusion of elements but about how the elements are combined. The execution of the formula – by combining the right elements at the right time – creates the desired reaction.*" This would imply us that the sequence of mixing the elements is as important as the elements itself in order to meet the desired outcome. Therefore, hybrid learning means the right person provides the right things to learn by using the right method through the right media.

3   A New Game-Based Learning Paradigm: VISOLE

In recent years, computer games have been the most pervasive entertainment in China and all over the word. In 2003, the sale of the video games was almost $16.9 billion across the world [10]. In China, the sale of the online games was almost RMB$6.5 billion in 2005 [11]. All the data showed that the computer games have been a maturing medium and industry, and games have been an important part of our culture as a whole (e.g., [12]).

Because computer games have been an important part of most students' leisure lives, some educators worry that the sex and violence in the games will influence them (e.g.,[13]). Nevertheless, many educators argue that games can be applied into education (e.g., [14]). They think the games can 'Make Learning Fun' (e.g., [15]) and can make 'Learning through Doing' (e.g., [16]), thus can enhance the student's Problem Solving, Collaborative and other skills (e.g., [17]).

During the last decades, lots of educational games have been developed and used in the classroom or outside the classroom, and many studies on the computer games in education have been done, such as CGE [18], MUVEE [19], and Game To Teach [20]. All the studies have shown that the games can arouse the students' intrinsic motivation, and improve the students' basic skills such as eye-hand coordination, problem solving skills, collaborative skills, and other skills (e.g., [21]). In addition,

the games can facilitate the affective learning, active learning, situated learning, and collaborative learning (e.g. [22] [14]).

In order to explorer the educational potential of the educational games, Lee and Lee [23] has proposed a new Game-based Learning Paradigm--VISOLE (Virtual Interactive Student-Oriented Learning Environment), which aims to help students learn from near real-life experiences and social constructions of knowledge.

3.1   What's VISOLE?

VISOLE [23] is a learning mode that uses the virtual game environment to facilitate learning. The web-based game environment is a simulation of the real world where students participate as "citizens" and take part in shaping the development of the virtual world. It provides a platform for participants to apply the theoretical knowledge to solve problems in a near-real environment, as well as to develop high-level skills for communication and problem solving in addition to subject knowledge. VISOLE is usually divided into three stages [24]:

Stage 1: Scaffolding Learning

The first part of VISOLE is the scaffolding stage, where students are guided to learn different concepts in a series of formal lessons. In this stage, teachers act as facilitators to guide learners to construct the knowledge based on the reading materials provided and other authentic information on the Web.

Stage 2: Game-based Learning

In the second part, a virtual Game-based environment with near-real simulation is provided to students. In this stage, students are free to explore in the environment, to initiate changes, to solve problems arouse by players in the same environment, or any other activities that might happen in real environment. During this stage, students are expected to learn independently. However, teachers again act as facilitators in extracting scenarios and assist students in-group discussions and promote Reflection and Debriefing.

Stage 3: Debriefing and Reflection

In the last part, teachers play a more important role. They help students to reflect and debrief all the learning process and explain the representative scenarios and evaluate each group and each student.

Some educators (e.g., [25]) argue that simply using a simulation does not ensure that learners can generate the kinds of understandings that educators might desire. In order to solve the problem, some researchers (e.g, [26]) suggested that reflection and debriefing during or after the playing was the most effective approach.

In VISOLE, every group must submit a reflective journal every day after the playing. When the whole game is finished, every group must submit a group debriefing report and everyone must submit a personal debriefing report.

3.2   An Example of VISOLE – FARMTASIA

FARMTASIA [24] is the first series of educational resources that has been developed under the VISOLE framework, which involves the subject domains of geography, biology, natural environment and hazard, government, economics, production system and technology. In this one, the interdisciplinary context deployed in the VISOLE game is a farming system in which the students need to acquire knowledge and skills in cultivation, horticulture, pasturage and husbandry. In order for the teacher to easily review the students' activities in the farm and to more conveniently extract scenarios for conducting case studies in the class debriefing meetings, an innovative student game-play logging system and "replay" function [27] are implemented into the game system. Figure 1 shows the main screen shot of the game.

Fig. 1. Screen shots of FARMTASIA

3.3   Empirical Study of VISOLE

After finished the development of Farmtasia, we conducted an empirical study in Hong Kong [28], 254 high school students and about 28 teachers took part in the study. In this study, a mix of qualitative and quantitative methods was employed for data collection and analysis, including the knowledge pre- and post-tests, generic-skill test, perception survey, in-depth interviews as well as artifacts of students' reflective journals, reports and game-playing records. All of these intensively focused on investigating students' and teachers' perceptions, students' learning motivation, behaviors, effectiveness with respect to the VISOLE approach and researching the design strategies for situated educational games.

In the research, most of the findings were positive in general. For example, Students' perceptions on learning with VISOLE were collected through a self-developed questionnaire with 5-point likert scale. Table 1 shows the summary on students' general impression of system. As shown in table 1, the satisfaction percentage of all questions exceeded 50% and the satisfaction percentage of this learning activity achieved 72.8%. So the students were quite positive towards VISOLE.

Table 1. Students' General Impression on Learning with VISOLE

Questions	Strongly Agree(%)	Agree(%)	Neutral (%)	Disagree(%)	Strongly Disagree(%)
I am very satisfied with this learning activity.	15.5	57.3	23.5	2.3	1.4
I am very satisfied with this game.	12.7	49.8	23.0	8.0	6.6
I am very satisfied with the assistant materials and the support.	10.4	40.1	35.8	10.4	3.3
I am very satisfied with my achievement.	9.9	41.3	36.6	8.0	4.2

In addition, according to the result of pre-and post-tests for measuring students' advancement on the subject-specific knowledge and multi-disciplinary application, the average mark of the post-test was 13.7% higher than the average mark of the pre-test (p-value<0.001). Actually, the level of difficulty of the pre- and post-tests was the same. Each of them was composed of 25 multiple-choice questions, 15 true-or-false questions and 2 open-ended short questions.

On the other hand, it could tell from the qualitative evidence collected through, such as the observations and interviews that the participating teachers were quite positive towards the multi-disciplinary and constructivist learning paradigm of VI-SOLE. They also highlighted that it was a good motivational approach, especially for the students with less learning motive. A teacher made the following reflective argument –

> *Every year I need to teach the topic of agriculture which is a part of the geography curriculum. My students hate this topic very much, they call "agriculture" as "uglyculture" … they perceive it is the most boring topic in the curriculum. In fact, this is understandable as agriculture is so far away in their life, especially in Hong Kong … I really want to adopt VISOLE and use FARMTASIA to help my teaching next year. I want to let my students know agriculture is not that boring and in fact can be very interesting and challenging. I would like them to learn constructively and authentically …..*

Some teachers were amazed some passive-learning students became active learners in the VISOLE process –

> *They actively questioned me some knowledge that seemed very vital for playing the game. I told them that they should look for the answer in the Knowledge Manual by themselves. They said they had done but nothing related could be found. Then I asked them to look it up from the Internet, they said they had done too ……. This is the first time that they have been so active in participating in a learning activity ……*

4   VISOLE and Hybrid Learning

In the foregoing paragraphs we discuss two important ideas in hybrid learning and give a brief introduction to our VISOLE research project. In this section we'll discuss in detail how the two important ideas work in VISOLE project.

4.1   Highlight on the Combination of the Guiding Function of Teachers and the Subject Position of Students

VISOLE is indeed a "student-oriented" learning mode. Students should arrange the study hours by themselves, play the games themselves, find and solve problems in the games by themselves, analyze the problems by themselves and write reflection reports. However, besides emphasising the subject position of students, we still put emphasis on the guiding function of teachers, and teachers are required to take the following actions in the games and out of the games [29]:

1. Guide and help students to learn related knowledge

In VISOLE, though students are expected to learn related knowledge spontaneously, teachers as intellectual constructor and helper still should guide and help students to learn. For example, in the scaffolding learning stage, teachers should guide students to learn the related knowledge from Knowledge Handbook, the Internet and libraries. Of course, the teachers do not teach the knowledge by explaining everything in detail as they usually do in traditional teaching process.

2. Encourage students in the learning process

Teachers should encourage students to learn in the whole learning process.

Activities of competition and cooperation, including resource competition, market competition, game championship, environmental protection, etc., are provided in the farm, and teachers should encourage the competitions and cooperation. It is also the teachers' responsibility to prevent unfair competition and maintain team-work spirit among students.

Communication is important to guarantee cooperation in the learning process. When a game is in progress, the students should be encouraged to communication with students in other teams, teachers and experts. Student discussions in online forums should also be encouraged.

3. Guide and help students to debrief and reflect

Many researchers regard it most effective to improve the learning effect by debriefing and reflecting the game experience during the games or after the games [25][26]. The role of teaches is very important in this aspect. During the games, they should check the student performances with the "Replay" function [27] of the system and give suggestions to typical scenarios, e.g., when a teacher sees a student planting wheat in December, the teacher should remind him / her to look up the game manual. During the learning process, teachers should lead students to debrief their performances and write reflective journals in their BLOGs; reflective journals on typical experiences should be picked out by the teachers for comment or explanation; after the games, the teachers should guide the students in writing debriefing reports to help them get

firmer grasp of the knowledge they've learnt and be able to apply the knowledge they've learnt in virtual worlds to the realities.

Generally speaking, teachers are not getting less works in VISOLE, but more works and more complicated works.

4.2 Focus on Deep Hybrids

It has been stated already that hybrid learning is not the simple mixture of online learning and offline learning, but hybrids on deeper layers. In VISOLE, hybrids on deeper layers are shown in the follows aspects:

Firstly, the hybrid embodies at the combination of online leanring and offline learning. In "Scaffolding Learning" stage and "Debriefing and Reflection" stage, teachers shall organize students to learn related knowledge in class and arrange their debriefing and reflection in class, on the contrary, the "Game-based Learning" is done online and students may choose any time appropriate to them to log into the games.

Secondly, the hybrid includes multiple learning modes, technologies, and leanring theories. For example, a student may listen to his teacher in class to learn related knowledge, or learn such knowledge from an online Knowledge Handbook or Internet resources such as Wikipedia, he may also use library resources to learn the knowledge. As for cooperation in learning, students may discuss their experiences face-to-face in class, or in BBS of the official game website, or in their BLOGs. As for debriefing and reflection, teachers can guide students in their debriefing and reflection in class and students also need to write debriefing and reflective journals in their BLOG; after the games, students still need to write complete debriefing reports. In fact, the result of the empirical study of VISOLE [28] really showed that VISOLE can promote the active learning, situated learning, collaborative learning and problem-based learning.

Thirdly, maybe the most important, the hybrid embodies at the combination of "learning" and "practice", which focuses on applying what students learn to realities and how far they achieve in practice. This is just the very advantage of educational games. The games usually provide "almost real" virtual environments, in which players play the roles in the games, find problems, analyze problems and solve problems. In this process the players learn related knowledge as well as advanced skills including how to solve a problem, how to cooperate and how to cultivate innovation.

VISOLE also provides an "almost real" farm for students, the geographical, climate and economic models in VISOLE are built based on actual data, students need to decide, based on different situations, what and when to plant, when to harvest, what and how many animals to raise, etc. During the process, the students can apply what they've learnt in the scaffolding learning process to practice so as to check how far their study has achieved.

In fact, in an interview after the experiment [28], many students and teachers expressed that it is a learning mode which enables students to properly apply what they've learnt to the reality and helps students to have deeper understanding of the knowledge:

> *When a teacher teaches you something, you will probably forget it soon after the teacher finishes; now you have to use it to pass scenario after scenario, so you'll have an basic idea on what*

> *the thing can do, unlike in class, you will not feel confused* (Student A).
>
>   *Such learning mode helps you to fully digest what you've learnt* (Student B).

In a word, we tried to combine multiple learning modes, leanring theories, and technologies to achieve the learning targets.

5   Discussion and Conclusion

This paper discusses how the guiding function of teachers is emphasized and how hybrids deeper layers are implemented in VISOLE. From the experiment result [28], we can see VISOLE does help to motive students in learning process, encourages them to actively study things by themselves, to cooperate with each other and to do in depth researches. Such learning mode also helps them to make progress in dealing with knowledge, skills, emotions and values.

However, such hybrid of game-based learning and traditional learning does have problems of its own. For example, how to motive as many student as possible? How to converts their desire to recreate into study motive? How to improve learning efficiency in games? How to improve the advanced abilities of students more effectively? How to arrange the working hours of teachers? And so on.

In addition, the FARMTASIA we discussed above are used for elementary education, however, such learning mode also has a future in higher education. For example, Peking University has developed a complete course of "Decision Making Simulation" based on BUSIMU, a software application simulating company competition. This course creates a virtual environment for MBA students to practice their skills in company decision making. During the learning process, a team of 4 - 5 students forms a "company", in which a student may play the role of production manager, sales manager, etc. The students make decisions concerning production, marketing, human resources, and capital operation and development strategies based on the information provided by the software application on market environment, company condition and competitors, and they compete with other teams. The scores are given to the students based on the performance of their company after a number of simulations. Advanced educational management game, in which a student major in education management can run a virtual university, is also available.

To sum up, hybrid learning which combines game-based learning and traditional learning is a learning mode worth paying attention to, worth further researches and worth spreading.

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