Computer-supported Collaborative Learning System in Teaching E-commerce

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Abstract

This paper describes on a successful experience of using a computer-support collaborative learning system in teaching e-commerce. We created a teaching and learning environment for 39 local secondary schools to introduce the subject of e-commerce using the computer-support collaborative learning system which enable students to be more knowledgeable and better skilled in the subject of e-commerce. We focus here on the practical implications of the project-based learning approach for the teaching and learning of introductory e-commerce from the perspective of the business context. Evaluation results indicate that this approach to teaching is very promising. Both our own experience and student evaluations indicate that students like it and are interested in the approach of learning by doing. Finally, the paper puts forward four propositions that can guide hypothesis generation for future research.

Keywords: E-commerce education, Collaborative learning, Project-based teamwork game.

1 Introduction

As e-commerce technologies mature, more and more business transactions will be conducted and completed on the Internet. Moreover, the development of E-commerce depends on the familiarity and trust of users (Gefen, 2000; Gefen & Straub, 2000). It is suggested that the E-commerce education should be started as early as possible so that student can broaden their horizons and explore the E-world. E-commerce education should therefore be further publicised and extended to secondary schools. However, a survey conducted on business education at secondary and postsecondary levels indicated that the infusion of e-commerce topics into existing curricula is insufficient preparation for roles in companies where e-commerce is an integral part of everyday operations (Morrison & Oladunjoye, 2000). The situation is even worse in Hong Kong secondary schools. Although their computer literacy courses now often include IT skills as part of the curriculum, there is no specific coverage of e-commerce.

E-commerce is business, as well as technologically oriented with coverage of multiple disciplines required, most of which are discussed by university-level education rather than at school. The subject of e-commerce is new not only to students but also teachers in secondary schools, making its teaching in that context difficult and challenging. Traditional face-to-face approaches may not be very efficient, and more importantly, may not be able to stimulate the student's interest. Instead of relying on secondary school teachers to be capable of handling all the tasks involved, the teaching process can be deconstructed into a series of separate processes that can be provided or supported by tertiary institution teachers and IT professionals. To promote and accelerate the understanding of e-commerce in secondary schools, the Hong Kong Special Administrative Region (HKSAR) government has funded teaching projects that focus on teaching e-commerce in secondary schools using non-traditional approaches. In consequence, a number of website design competitions for secondary students have been run which have focused either on the value of the content or the attractiveness of the web page, but have overlooked the importance of practicability and applicability. As a result, a computer-supported collaborative learning (CSCL) system that allows interactions and collaboration can then be developed to facilitate the teaching and learning environments of e-commerce.

To teach e-commerce students, Dhamija, Heller and Hoffman (1999) have provided a Web-based market system by which participants may experience buying and selling goods and services electronically. In this study, we have tackled the problem by adopting a game-based teaching approach, for the following reasons. Firstly, it is essentially an open learning setting. "In the open learning settings the learners are able and encouraged to work at their own rate. It allows the learning environment to be freed of some of the more traditional constraints of

education and makes learning more learner-centred." (Forsyth et al.,1999). Secondly, it provides flexibility for students from different backgrounds and with different previous exposure to e-commerce to collaborate and learn at their own pace. Thirdly, it is a very important factor for motivating secondary school learners, game-based learning is more enjoyable than traditional learning (Ebner & Holzinger, 2007). The setting of the game is similar to a project, where students have to work as a member of a group as well as being self-directed. Game-based learning is a similar way of constructing and teaching courses to problem-based learning (PBL), wherein specific problem scenarios are placed within a context as stimulus and focus for student activity (Boud & Feletti, 1991; Pearson, 2006). PBL requires that "students work co-operatively in a small group, usually with the assistance of a tutor and with access to other resources, to: (a) clarify the problem; (b) identify learning needs to address the problem; (c) undertake individual reading/study; and, (d) apply newly acquired insights and understandings to re-address the problem"(Pearson, 2006).

In the following sections, we will set out the rationale and the detailed design of our project-based learning approach. We will start our discussion by briefly describing the CSCL in teaching and learning of e-commerce.

2 Computer-support Collaborative Learning System in Teaching and Learning of E-commerce

CSCL is an emerging field of research and practice in learning, aiming at enhancing the quality of learning. It uses synchronous and asynchronous software, text-based, audio-based or video-based communication tools, as well as shared workspaces to improve learning and instruction in various areas of education (Dillenbourg & Fischer, 2007).

In the past, although there were a number of studies investigate the acceptance, efficiency and effectiveness of CSCL in education (Collazos et. al., 2007; El-Bishouty, Ogata & Yano, 2007; Kreijnsa, Kirschner & Jochems, 2003; Teoa et. al,, 2003; Monahan, McArdle & Bertolotto, 2008; Zaiane & Luo, 2001), the studies did not focus on specific groups such as secondary school. Many of them found a postive effect of CSCL on the learning environment.

CSCL environments are a learning medium. They can be described as a context where the computer facilitates interactions between learners for the acquisition of knowledge, skills and attitudes (Dillenbourg, 1999; Kaye, 1992). CSCL allows computers to enhance the interactions between learners (Dillenbourg, 1999). In addition, in order to enhance students' learning processes, it supports collaboration between them (Kerijns et al., 2003). With the shared goal of the positive construction of knowledge, learners work together in this environment to accomplish a task (Dewiyanti et al., 2007). Because CSCL combines collaborative learning with the use of information and communications technology, a variety of educational, social and motivational benefits have been suggested. We believe that CSCL is an effective platform to facilitate school teachers to introduce the subject of e-commerce to the students.

With collaborative learning, learning by the students is emphasized and student-centrism becomes the dominant characteristic of the environment in our developed CSCL system. Students, as active participants in their own learning processes, learn to solve problems and work collaboratively with their peers. Where peers play a fundamental and crucial role in encouraging learning, such learning takes place in a constructive, authentic context and is a social, collaborative activity. In order to create knowledge and meaning together with peers, listening to others and considering their viewpoints, as well as articulating one's own perspective, is required. Student-centric learning can be cultivated in such an environment, as collaborative activities enhance students' engagement and involvement with their team or other peers, as well as with the instructor in teaching and learning of e-commerce. Based on these arguments, the following proposition is posited:

Proposition 1: The CSCL can operationalize a constructive e-commerce teaching and learning environment

2.1 Group Project-based Learning

Facing increasing demands in the world of business, a profound approach to learning also exemplifies imaginative and adaptive skills, encompassing a wide sphere of interests. Student should be able to focus their attention on the overall meaning or message of a given learning context. In project-based learning, they are provided with numerous opportunities to relate ideas to each other and construct their own meanings (Ma, 1994). This learning environment will stimulate students to reveal their ideas and arguments without any fear of the negative consequences, such as being penalized or ridiculed, that may result in real life (Dewiyanti et al., 2007). In a CSCL environment, students have the opportunity to take a degree of control of their own learning (that is, when moving from the teacher-led to the student-led model) and to be active learners who are not only picking up new information but also connecting and integrating it with their previous knowledge to obtain a higher level of understanding.

Group-oriented learning processes are involved through a positive motivational and effective cognitive aspect. Teamwork in learning extends the centre of "metacognitive activity" by initiating a level of cognitive expectation beyond the individual (Alavi, 1994). Jones (1994) also proposes the framework of the "constructivist learning environment" using group practices as activity contexts. Groups may lend themselves well to computer mediated communication and the designs will intrinsically support collaboration and mutual communication about learning. Therefore, we assume group-based learning among team members provides an environment to help the students to learn the subject of e-commerce. The following sub-proposition is posited.

Proposition 1a: The CSCL can operationalize a constructive e-commerce teaching and learning environment by inducing Group Project-based Learning

2.2 Student Involvement/Participation

The degree and quality of participation in CSCL may be generally higher than in the traditional classroom (Weinberger & Fischer, 2006). Text-based CSCL such as e-mail, forum and chat (Kreijins, Kirchner & Jochems, 2003), using parallel discussion among peers and facilitators, may support participation. Learners can elaborate upon and express their ideas and contributions without disruptions from "co-present peers", which may result in longer and more elaborate or sophisticated outcomes (Kern, 1995). A few recent studies also suggested that the adoption of information communication technology would improve the result of learning second language (Blake, 2000; González-Bueno, 1998; Warschauer, Turbee & Roberts, 1996).

The constructivists generally assert that knowledge is actively constructed by individuals, and that social interactions with others also play an important role in the construction process (Perkins, 1999; Wen et al., 2004). Researchers, in the field of educational technology, have also applied the constructivist theory to Internet-based or Web-based instruction (e.g., Tsai, 2001a; Yakimovicz & Murphy, 1995). CSCLs, incorporating active exploration within a virtual (pre-designed) environment, are extensively used by constructivists for two reasons (Rieber, 1992). Firstly, they provide an authentic context in which learners can explore and experiment, allowing them to construct their own mental models, in this case, e-commerce models. Secondly, the interactivity inherent in this context allows learners to see instant results and feedback as they create models or test their theories about the modelled concepts (Rieber, 1992) which is important the context of in e-business. Therefore, the following proposition is posited.

Proposition 1b: The CSCL can operationalize a constructive e-commerce teaching and learning environment by inducing student involvement or participation.

2.3 The Development of the Teamwork Game

We believe that the following issues must be properly addressed in the design of such a project-based teamwork game: (1) Which e-commerce concepts should be covered, and to what extent? (2) What IT knowledge and skills should the game enable students to acquire? (3) What are the most effective media for teaching students about each aspect?

Firstly, the e-commerce concepts covered in this game included Internet marketing concepts, website design, development and evaluation and security. The students were also expected to have a basic understanding of the typical components and operations of an e-commerce website.

Secondly, the necessary IT knowledge and skills included preparing a simple HTML file and creating a simple web graphic. More in-depth discussion of IT technologies was considered too difficult for secondary students and is not required to learn the e-commerce concepts.

Finally, the Internet is a new channel for the delivery of non-printed teaching materials that can be accessed by students at any time. They can learn from the online courseware at their own pace; they can also practice their IT skills and perform transactions in the controlled e-shop environment. Students could also obtain additional support from their team-members and teacher, and from our specially arranged consultation session.

In summary, the teamwork game approach in this project was a mix of multiple teaching paradigms including:

- "Self-directed learning" – through the courseware, mainly used in order to introduce students to fundamental e-commerce concepts.
- "Coaching and collaboration" – the team was coached by a teacher and students have to collaborate to complete the game.
- "Learning support" – an additional consultation session was provided to help students solve technical problems.
- "Practical exercise" – students had to write a proposal, build up the e-shop, evaluate the outcome and review the business as well as the learning experience. A virtual shopping mall was developed within which students were to set up their e-shop. This environment narrowed down the IT skills required so that students could focus on learning the key knowledge and skills.
- "Personal involvement" – students were given virtual money so that they could use the e-shop. This allowed them to experience buying on the Internet and also learn from others' experience of doing so.
- "Peer and professional evaluation" – students were asked to perform peer evaluation according to set guidelines. They also learned how to evaluate e-commerce websites through the exercise. Professional judges came from industrial and academic backgrounds and provided objective evaluation and feedback.

These teaching devices were logically integrated in the game in successive stages. Looking into the details of the game in the following sections can reveal them.

2.4 Collaboration and Cooperation in the E-commerce Project-based Teamwork Game

We believe that most secondary school teachers and students have little knowledge or concept of e-commerce. This means that students would require additional support to complete our project-based teamwork game. Louvieris and Lockwood (2002) suggest that the traditional role of the teacher should be deconstructed into a series of separate individual capabilities supported by appropriate IT infrastructure, with the different tasks within the teaching and learning process handled by "best in class" experts. The teamwork game enabled secondary school teachers to collaborate with tertiary institution teachers and IT professionals to teach students on new subject areas in which they may not themselves have been trained. Each contributed to different elements of the teaching and learning process of the game. Figure 1 illustrates how the teaching and learning processes of the teamwork game were supported by area experts.

The learning outcomes were established by us (that is to say, tertiary institution teachers). We also provided the

content, and the Web-based teaching and game playing platform was developed by IT professionals from the university. To improve business students' skill in e-commerce, either the amount of cooperative learning must be increased or some formal instruction must be introduced (Susser & Ariga, 2006). In addition to face-to-face teaching and learning, the Internet provides an alternative channel for students to learn as well as to collaborate and cooperate with their classmates and teachers, anytime and anywhere. Different teaching and learning activities could be conducted either face-to-face, on the Internet, or both. The web-based teamwork game utilized both channels to improve the collaboration and cooperation of students and teachers. Figure 2 summarizes the teamwork activities involved and how the Internet can mix with face-to-face learning for each teaching paradigm. For the CSCL system to achieve successful in teaching and learning performance of e-commerce, it must be willing to collaborate and cooperate in teamwork. Thus the following proposition is posited:

Proposition 2: The CSCL can foster teaching and learning performance by facilitating collaboration and cooperation in team work.

2.5 Details of the Project

"Project-based Teamwork Game in e-commerce" was proposed by the Department of Management and Marketing of The Hong Kong Polytechnic University, and funded by the Quality Education Fund (QEF), HKSAR, China. The project aimed to promote the concept of "learning by doing" via a project-based e-commerce game and to encourage schools to make use of this type of learning to nurture various abilities, knowledge, skills and learning attitudes in students. The project enabled students to enjoy learning via the project-based game, to enhance their effectiveness in communication, to develop a spirit of teamwork and to develop their creativity in the PBL environment. Students were required to develop a simplified, yet realistic, e-shop that would address the e-commerce educational needs of small and medium sized business proprietors. The idea of this exercise was to provide an integrated learning experience, including the e-business proposal, e-shop development and writing of the final debriefing report.

The educational goals of this project were as follows:

- To promote e-commerce education in secondary schools;
- To encourage non-textbook learning of e-commerce concepts through action learning and game playing;
- To design and develop a Web-based courseware product in order to facilitate schoolteachers and students to work through the game on the Internet. This included e-business planning, building a virtual e-shop and e-business evaluation.

To achieve these goals, the game must be well designed and developed and should be fully thought out. Initially, schoolteachers and students in nine pilot secondary schools showed interest in the project. Eventually, the targets were extended to all Hong Kong senior students and teachers with an interest. Before starting the competition, a meeting was held involving eight pilot school teachers and project team members at which we demonstrated the interface and the functions of the competition website; discussed the schedule of the competition period; and talked through the rules of the game.

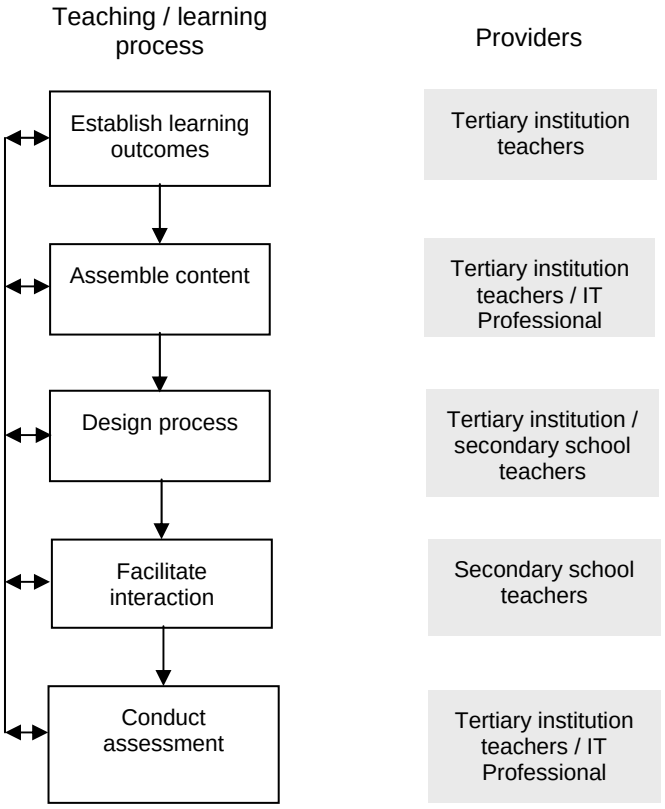

Figure 1: Providers of teaching and learning processes in the game

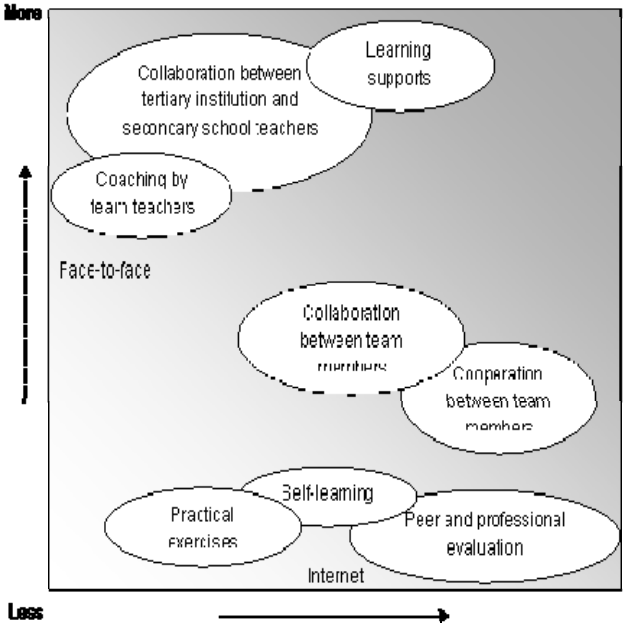

Figure 2: Web-based teamwork teaching and learning environment

As well as this, we provided a workshop introducing the details of the competition. Invitation letters were sent to all secondary schools in Hong Kong. The workshop was divided into four sessions. Session one introduced the details of the game; the second session presented the e-commerce concept and the procedure of the e-shop development; the third guided users through the systems on the competition Web-site; and the final segment was a question and answer session. A free flow of ideas and creativity was encouraged during both the meeting and workshop. Also, the latest technology and IT news was introduced to all teachers and members.

Interactive online tutorials, including the history and development of e-commerce and the use of Flash and Dreamweaver, were provided to all participants to enable them to acquire some basic knowledge of e-commerce and the skills required for the e-shop development. In addition, we provided a helpdesk service to team members. Through an online booking system, students could make an appointment to consult our tutor. The tutor would answer technical questions, such as how to use Flash and Dreamweaver to design and develop the e-shop, how to use the e-shop platform, e-commerce and e-marketing knowledge, and so on.

Furthermore, a series of meetings with teachers and team members were conducted during the e-shop development stage. In these meetings, we demonstrated the teaching materials to teachers and discussed student feedback.

Since the peer evaluation was conducted using an inbuilt online evaluation system (OES), judges and participants were able to leave comments on the system. After the peer evaluation, team members could access the OES to review others' comments on their work. The judges indicated the weakest and strongest performers in terms of the e-shop content and debriefing report.

In open learning, courseware is the key device by which to provide a flexible learning environment for students. Essentially, we developed some interactive, self-learning courseware, which may be briefly described as follows:

- Introduction to e-commerce;
- E-commerce Development;
- Online E-commerce Software Development Tutorial.

2.5.1 Introduction to E-commerce

Firstly, we introduced the basic concept of e-commerce to the students, beginning with the topics of "What is e-commerce?", the characteristics of the Internet and the World Wide Web, and finishing with a discussion of the advantages and disadvantages of e-commerce.

2.5.2 E-commerce Development

This section aimed to introduce the development life cycle of e-commerce and can be outlined in Figure 3.

2.5.3 Online E-commerce Software Development Tutorial

We provided an online tutorial using Macromedia Dreamweaver and Macromedia Flash. These were chosen as the tools for e-commerce development because of their ease of use and suitability for secondary students' learning.

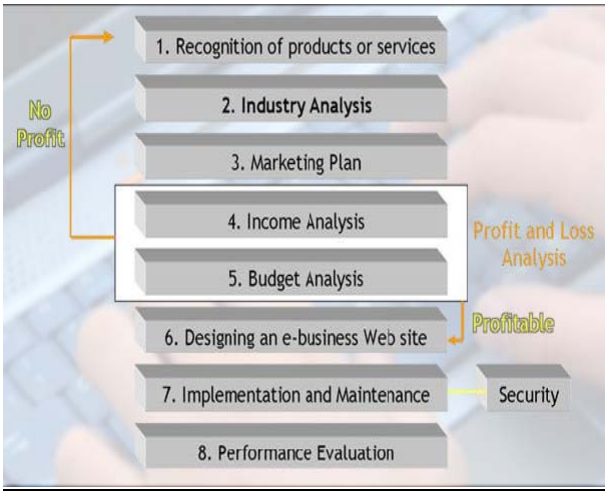

Figure 3: Online e-commerce software development tutorial

2.6 System Overview

We designed and developed a virtual shopping mall as a platform for the students to build their e-shops. Figure 4 depicts the basic architecture of the competition website. The shopping mall consisted of several floors:

The main (first) page of the website displayed the ground floor of the shopping mall (see Figure 5). An elevator was located at the left hand screen of the screen, which allowed the user to visit different floors. In addition, a counter recorded the number of visitors accessing the competition website. There was a menu at the right hand side, which provided general information about the competition, courseware, helpdesk services and final evaluation.

All e-shops were located between the first and highest floors. The senior and junior groups' e-shops were divided across different floors, with the latter located at lower and the former at higher floors. A floor plan was designed and placed within each floor. To enter the e-shop, users could either select from the right hand side menu or click the target shop number on the floor plan (see Figure 6).

2.7 The Competition Process

The competition of the game was divided into the following five phases.

2.7.1 Phase I - Registration

Participants could join the competition only as a team. Each team consisted of at least two and no more than six students from secondary schools in Hong Kong. No more than two teams from each school in each section (that is, junior and senior) were permitted. Each team member had to be from the same school and each team was required to have one leader who helped form the team and acted as a contact point between its members and the organizer.

As well as this, students were required to find at least one advisor (that is, a schoolteacher) to be allowed to join in. The role of the advisors, as coaches, was to guide their team through the competition. Most teams chose teachers

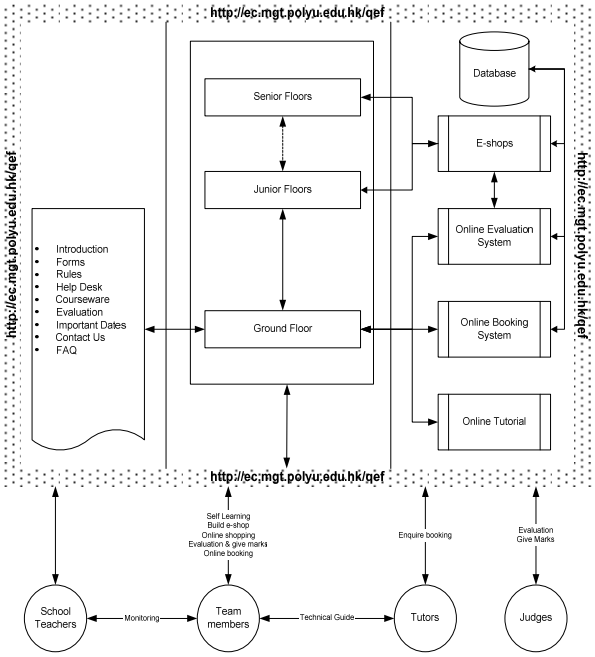

Figure 4: Project-based teamwork game - e-commerce website architecture

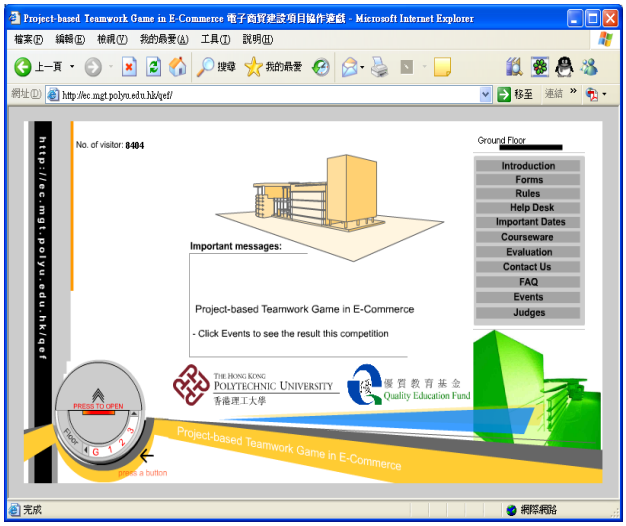

Figure 5: Ground floor of the virtual shopping mall

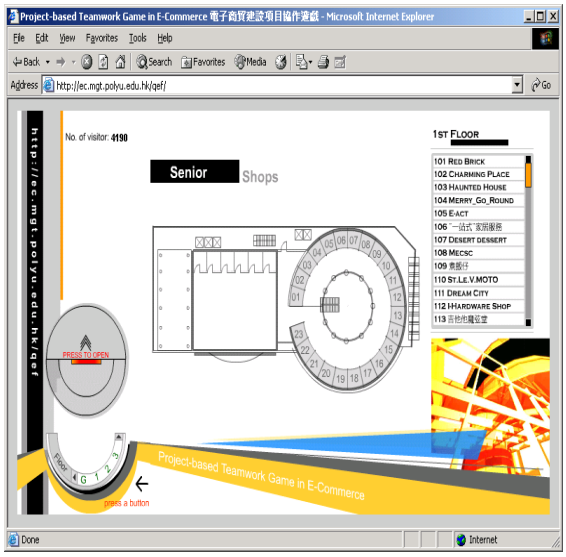

Figure 6: First floor of virtual shopping mall

of either Computer Studies or Business and Economics as their guides. In the early stages, these teachers provided valuable suggestions to the students as to how they should sell in their e-shops and how to write a business plan.

Each team was asked to submit a registration form declaring their intent to participate. Once their registration had been accepted, they were allocated a set of user IDs and passwords to access the competition server. A workshop was conducted to introduce the competition and the concept of e-commerce to the participants, and to demonstrate the competition website.

2.7.2 Phase II - Simple Business Plan

Each team was required to propose a business plan outlining the product line, targets and operation of the business; and to forecast their profitability. A template was provided so that students would know what should be included in a business proposal. Students had to collaborate and apply what they had learned through self-learning in order to do this successfully.

2.7.3 Phase III (E-shop Content)

Each team then built their e-shops using a template provided on the competition server. There was no need to build the shopping cart or checkout process and so on. Participants were only required to upload three main items to the competition server, namely (a) images of their products and services with a description; (b) a Flash logo to represent their shop; and (c) a Flash banner to promote it. This allowed students to practise their IT skills.

Learning support was provided. During this period, if participants encountered any problems related to building the e-shop, a face-to-face helpdesk service was available. Participants were able to make an appointment with the tutors through an online booking system.

2.7.4 Phase IV - Online Shopping

Each team member, acting as a customer, was encouraged to visit other e-shops and buy their products/services, so as to obtain some first-hand experience of Internet purchasing. This is not something a secondary school student would normally have done before in real life.

2.7.5 Phase V - Report Submission and e-shop Evaluation

Students were asked to follow a set of guidelines to write a debriefing report as a conclusion to the competition. At the same time, each team was asked to evaluate other e-shops and give them marks that would form part of their final results, using the OES. As well as this, the debriefing report and the e-shops were evaluated by professional judges (either industrial or academic experts). This provided further valuable information for assessing the students' levels of achievement.

2.8 Assessment Criteria

The judging process was the major vehicle for assessing students' ability to apply their subject-specific knowledge and understanding. Two parties (participants and judges) were involved in the assessment, both using the online evaluation system (OES). The OES had been designed and developed to enable students and judges to give marks

based on listed assessment criteria by clicking on one of the number in the scale (0 = “no evidence provided”, 1 = “inadequate”, 2 = “barely adequate”, 3 = “satisfactory”, 4 = “good” and 5= “excellent”). Refer to Figure 7 for the screen layout for part of the OES.

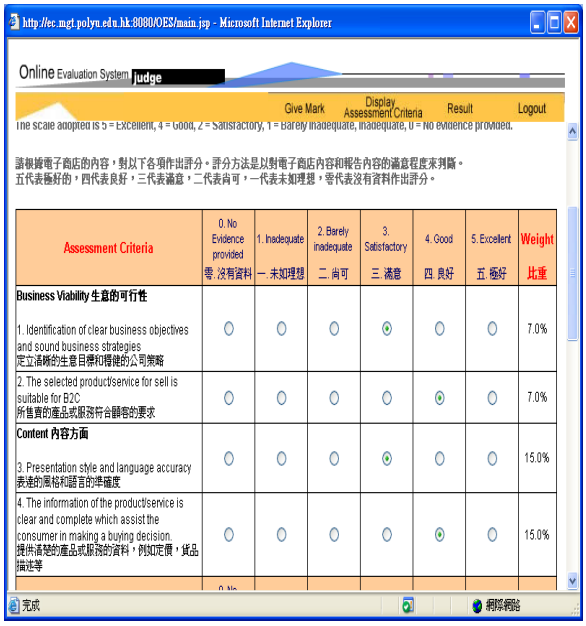

Figure 7: Online Evaluation System

Participants were also invited to assign a score for other team’s e-shops content to form part of the final competition results. A total of seven judges from different areas (including a legislative councillor, university professor, chairman of the Hong Kong Association for Computer Education, IT director and the managing director of a private company) were involved, all of whom had a special interest in, and strong knowledge of, IT or e-commerce. At least two judges evaluated each team’s e-shop content and debriefing report.

There were four major assessment criteria for evaluating the content of the e-shops:

- Business viability: Identification of clear business objectives and sound business strategies. The selected product/service was suitable for B2C.
- Content: Presentation style and language accuracy. The information on the product/service was clear and complete which would assist the consumer in making a buying decision.
- Creativity: Demonstration of originality and creativity. Innovation and level of differentiation from competitors.
- Design: The product/service categories were classified logically. The product/service description, images, banner, and logo were visually attractive. Reasonable download times for client.

Hard copies of the debriefing reports were mailed to the judges but they could also view them online via the OES. There were two major assessment criteria for evaluating the debriefing reports:

- Report on e-shop setup: Content should cover the review of marketing strategy (4Ps), presentation of sales reports and suggestions for e-shop enhancement. Overall, the report should be presented in a clearly logical and sequential form.
- Report on learning experience/enhancement of knowledge: Students should specify what they have learnt, compare the e-mall with other e-malls on the Internet and suggest further development of the game. Again, this content should be well organized.

3 Feedback of Project-based Teamwork Game on Secondary Schools

Secondary school teachers and students were strongly appreciative of the online multimedia courseware. These teaching materials included the concept of, and how to develop, e-commerce together with an animated, step by step beginner’s learning guide to e-commerce development tools such as Flash and Dreamweaver. The e-shop platform allowed students to participate without having to have strong programming skills. Teachers could also make use of this platform to teach e-commerce concepts using a teamwork game. We will now discuss the impact of the project on students, school teachers and participating schools.

3.1 Learning of Students

Feedback was collected and analysed from students at the end of the competition. The direct impact of the project on students’ learning included:

- Broadening students’ horizons. As most of the students did not have a concept of e-commerce at the beginning, the opportunity to learn about this using non-textbook means – that is to say, learning by doing via the project-based e-commerce game – could be a very effective pedagogy for broadening students’ horizons in non-school curriculum subjects.

> “We strongly appreciated the workshop because it’s not just about the competition; it also provides us with a chance to learn more about the fast growing world of e-commerce which will help broaden our horizons”. Quoted from e-shop 206

- Increasing students’ sense of achievement. Most of the participating teams successfully completed the development of their e-shops. Students were extremely happy to see what had been sold from their own e-shop.

> “This competition helps us to develop analytical skills since we have to make a financial analysis to interpret of the firm’s performance. Moreover, this game allows us to develop our creativity, which is essential in the fast-changing world nowadays”. “The game helps us to equip ourselves for the future commercial world”. Quoted from e-shop 213

- Fostering students’ development of their potential and specific abilities. Students demonstrated their ability to use website development tools such as MS FrontPage and Flash in their e-shop development.

"We have learnt many business concepts and knowledge and gained many IT skills during the competition". "The competition is not just about IT skills, but also contains a lot of reading, learning, thinking, and English writing. It is very different from other competitions that we had joined before, but somehow, we enjoyed doing this project very much and have gained a deep insight to the real business world". Quoted from e-shop 302

"Before joining this project, we were not interested in knowing how to use the software like Flash, because it is quite difficult for us. After doing this project, we know that we are capable of mastering it. Our technical skills have greatly improved after this project. We have also learnt to understand what marketing is and how to write amazing and persuasive descriptions for products to attract buyers. How to co-ordinate with the group members so as to optimize the results". Quoted from e-shop 205

- Equipping students with a variety of learning approaches. We provided a workshop to introduce the details of the competition and the fundamental concept of e-commerce. We also developed courseware including online tutorials for the development of the e-commerce site and the use of Flash and Dreamweaver to support the e-shop development. A peer evaluation was adopted as a learning approach.
- Training students to better meet social demands. One of the our reasons for choosing the software packages MS FrontPage and Flash was that no prior programming experience was necessary to use them and it would be easy for participants to pick them up, developing skills which would subsequently be marketable in the information system/e-commerce workplace. Apart from sharpening their computer skills, other business concepts like economics and marketing were introduced to students through their submission of the business plan. For example, students needed to decide what to sell and analyse the demand and supply of the products/services provided, as well as developing a pricing strategy, incoming analysis and budget analysis.
- Cultivating students' team spirit. As students were required to join the competition as a team, a strong sense of commitment, cooperation and responsibility was built up among members.

4 Conclusions

This paper has described a collaborative project between school and university educators. We successfully introduced e-commerce as a subject to improve teaching and learning within the participating secondary schools, focusing on key aspects of introducing the concept and the underpinning skills and knowledge, by developing and running an e-business via the e-shop simulation. We adopted a project-based learning approach by working on tasks and integrated projects that simulated a business environment, thereby enabling students to learn how to solve real-life e-commerce problems. Throughout the project, students not only had the opportunity to reaffirm the skills, knowledge, concepts and attitudes they had already acquired but also to develop a strong teamwork spirit and develop their creativity. The project requires students to learn some IT technical skills (such as HTML, Flash computing skills). We encountered difficulty to let some junior groups (Forms 1 -3) of school students to learn how to create objects moving in more sophisticated ways using Flash. Another difficulty encountered was that we cannot provide frequent updates in the self-learning IT teaching materials due to limited resources. This project has been characterized by schools volunteering to supervise the students to participate. We believe that this type of project-based teamwork game enables secondary students to apply their learning, enhance their effectiveness in communication, develop their creativity and stimulate their interest in entrepreneurship. It also motivates students to improve their IT skills, gain in confidence and stimulate their desire to learn and achieve.

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