Commercial Development of eLearning Materials for Science and Mathematics Subjects in Hong Kong: Preliminary Evaluation

Au-yuen ENG and Irene hung-man LAM, The Hong Kong Institute of Education, 10 Lo Ping Road, Tai Po, N.T., HONG KONG

Email: yyeyeung@ied.edu.hk and icmlam@ied.edu.hk

Abstract: The recent education reform in Hong Kong has led to a greater demand for e-learning materials in schools and so it is important to identify an appropriate approach for commercial development of effective e-Learning materials. Working with an e-Learning provider company for evaluation of its pilot implementation in 3 schools, our preliminary findings reveal various kinds of difficulties to be overcome before e-Learning can be seamlessly integrated with formal school curriculum.

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The provision of quality and sufficient resources for interactive self-learning is one of the main objectives on the strategy on Information and Communications Technology (ICT) in education in Hong Kong. In 2008, the Hong Kong Government has launched The Third Strategy on IT in Education: Right Technology at the Right Time for the Right Task so as to further integrate ICT and implement e-Learning (Education Bureau, 2008). This strategy built upon prior strategies that empowered learners and teachers with IT, enhanced educational leaders to integrate IT in schools and provide necessary IT infrastructure and training to teachers etc.

As the New Senior Secondary Curriculum (NSS) was being put into practice in Hong Kong in September 2009 with the aim of re-aligning the senior secondary and university education system with Mainland China and SA, the Science and Mathematics Key Learning Areas, curriculum structures and the assessment requirements have been substantially revised (Lee, Lam and yeung, 2010). Since then e-Learning has become a popular alternative learning platform, more textbook publishers have started to provide electronic resources in addition to printed textbooks. Concurrently, there is an emerging number of commercial companies that concentrate on providing e-Learning resources. One of them requested for our professional service to objectively assess the quality of their e-Learning materials and so this provides a good opportunity for us to conduct research on the effectiveness of students e-Learning, the feasibility and difficulties of implementation, and the attitude and receptivity of teachers and students towards the use of e-Learning materials (see, e.g. Ardito et al., 2006 and  zkan, & Koseler, 2009) in addition to regular teaching in school.

Methodology

The e-Learning provider company involved in the present study has been developing a bank of self-learning materials in science and Mathematics subjects, i.e. Physics, Chemistry, Biology and Mathematics, in an online learning system with an aim to not only help student to develop the basic key concepts of the topics that will be taught in the next lessons but also enable them learn the whole subject syllabus by themselves.

There are around 100 learning objects (Ls) to be developed for each subject in accordance with the official curriculum and assessment guide of the NSS. A variety of multimedia content such as movie, animation and simulations, guided exercises and assessments are employed to assist students in achieving the learning outcomes of various topics. Our project team which consists of both subject experts and science maths teacher educators was consigned with a research contract to carry out the relevant evaluation. We continually provide advice on the evaluation of the learning system, as well as the practice on school-based test-bed study. The theoretical framework for the present study is based on the self regulated learning theory which consists of three components: metacognitive awareness, strategies used and motivational control (Bruning & Bruning, 2004). Many studies evidenced that student who engages in effective planning generally do better (Boekaerts et al., 2000). For development of the evaluation instrument, experienced secondary school teachers are invited to design multiple-choice (M) questions for evaluation of students learning effectiveness as based on the public examination papers and project team members serve as consultants to monitor the quality and standards of those M questions. Other research tools (in form of questionnaire for pre and post surveys and interview guidelines) are specifically developed for collecting both quantitative and qualitative data from students and teachers who participated in the school-based test-bed study. Three secondary schools voluntarily participated in the study.

After negotiation with the company, the effectiveness of the learning system is evaluated by the students’ scores after undergoing up to 3 close-loop learning processes. There are 10 M questions for each of the 20 Ls selected for the pilot test and students are required to attain a score of 80 or above in each L. Those who fail to achieve 80 will be asked to study the Ls again and then re-take another M test (of similar questions with different answers). Each student will have a total of 3 attempts to study each L. If less than 80 of the students achieve scores of 80, the relevant L will be revised by the e-Learning developer.
The qualitative data obtained from the semi-structured interview is used for triangulation with the quantitative data, as well as to provide further insights into the self-regulated learning strategies used. Also, some selected test-bed cases are video-recorded for analysis of instruction and students' attitudes towards different self-regulated strategies. At the final stage of the project, both the school teachers and our project team members will be interviewed (using a pre-designed interview instrument) to collect their view and feedback on the feasibility, difficulties, receptivity and attitudes towards this kind of teaching and learning approach in their respective subjects.

Preliminary Findings and Discussion

This study is being implemented in the classroom or computer room with a total of about 400 students (at S4 or S5, i.e. Grade 10 or 11) from three different secondary schools. During August to October 2011, around 200 students participated in the first round test and a total of 24 Ls were developed for testing in the four subjects. A pre-test questionnaire survey was administered to the participating students before their e-learning lesson. The specifically developed questionnaire included 5 parts, to wit (1) personal particulars and ICT facilities at home, (2) students' past experience of e-learning, (3) interest towards science-maths subject and metacognitive abilities, (4) subject's general learning strategies, and (5) student's subject-specific learning strategies. From Part (1), our initial findings indicate that over 90% of students possess desktop PC at home (plus around 40% with notebook and 10% with netbook computers) while 3 quarters of them have broadband Internet access and around a half with wireless Internet access at home. This provides a very favorable context and environment for widespread implementation of e-learning in Hong Kong. For subsequent parts, there are around 50 questions using the 5-point Likert scale (with 1 for strongly disagree and 5 for strongly agree). For example, on asking the students' perception of e-Learning in the three, most of them have not developed a regular practice to use e-Learning material while many of them know about the meaning of e-Learning.

Qualitative results are based on the observation as conducted by the student helpers, project team members and subject teachers in schools. It was reported that rather few students read Ls before completing the Ls test. Instead, most of them tended to read the M questions and then search for the answers from the L content. Some students even took less than 4 minutes to finish a L test which consists of 10 M questions, the results were below average with scores of 20 to 30 for all 3 available attempts. The helpers also noticed that students who score below average often do other things such as surfing the net and playing online games while studying Ls. Subject teachers argued that text-book maybe more interesting than e-Learning materials. They pointed out that the instruction of the systems is unclear and the students' learning diversity should require different time allocation for their test. It is also important to provide feedback to students after attempting the M test. Some students found many L of certain subjects like Mathematics boring as they were even less attractive than traditional text-books and so the Ls and e-Learning system should better be revamped to include more innovative and interactive content. Moreover they found that the content of Ls were not consistent in length as some required students half an hour to study whereas some took them an hour. Hence they suggested the developer to take into account of the amount content for each L during the design consideration. The result of first round test revealed a rather disappointing evaluation result for the learning effectiveness of those Ls because most students could not get a satisfactory score, especially for the Mathematics subject. However, those preliminary findings could hopefully help the developer make a critical reflection on their pedagogical design of the Ls and substantially refine them for the second and third rounds of testing before they could be put into the commercial market for adoption/purchase by teachers and students.

References


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