

School-Based Planning for Technology Enhanced Learning in the Knowledge Society

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Abstract: A school-based planning for technology enhanced learning (TEL) in both the traditional school curriculum and the development of the Twenty-first Century Knowledge is considered crucial for school education in Hong Kong. This study aimed to analyze the status quo and provide recommendations on the planning for TEL. Focus group discussion and case study were conducted to collect views of school practitioners on the need and areas of school-based planning for TEL. Results of the study showed that schools in Hong Kong recognized the importance of the Twenty-first Century Knowledge in school education, and asserted the adoption of TEL for delivering traditional curriculum and fostering the Twenty-first Century Knowledge. In this regard, three recommendations in response to the roles of IT on enhancing school education in the twenty-first century are made. They are the use of information technology for fostering independent inquiry learning, the promotion of self-regulated learning involving the use of digital resources, and the use of digital student learning records for encouraging assessment for learning.

Keywords: independent inquiry learning, school-based planning, self-regulated learning, technology enhanced learning, Twenty-first Century Knowledge

1. Introduction

The emerging digital culture coupled with the trends in economic globalization and the need to develop a knowledge society since the end of the twentieth century have driven the thrust for people to master information processing skills in addition to information technology (IT) skills for their activities in everyday life. In this regard, students in the twenty-first century have to possess four types of the Twenty-first Century Knowledge ([1]). The first one is the ability to use IT to access, manage, integrate, evaluate, and create information in order to function in a knowledge society. The second one is the ability to manage complexities, make decisions, tackle problems, and undergo reasoning effectively with the use of IT. The third one is the ability to use IT for interpersonal communication and interactive collaboration with the demonstration of personal, social and civic responsibilities. The fourth one is the ability to make strategic plans, select suitable tools, and produce relevant and high-quality products with the use of IT in the pursuit of daily life aspects.

Researchers have suggested that technology is crucial in enhancing both the learning of traditional school curriculum and the development of the Twenty-first Century Knowledge ([1], [2], [3], [4] & [5]). Technology enhanced learning (TEL) refers to education that is enhanced and improved with the support of technology. During the learning process learners are provided with IT tools and digital resources in order to improve the efficiency and effectiveness of the learning practices ([2] & [3]). Previous studies have suggested that IT plays three crucial roles in fostering learning in the

Twenty-first century. Firstly, IT acts as a driver for the promotion of learning. It catapults learners into a global knowledge society which requires a high level of IT proficiency for the success of daily pursuits. Secondly, IT acts as a bridge to high academic achievement. It serves as a bridge to more engaged, relevant, meaningful, and personalized learning — all of which can lead to higher academic achievement. Thirdly, IT acts as a platform for informed decision making and accountability. It provides a platform for using timely, meaningful data to shape learning opportunities and make informed decisions ([1], [4], & [5]). To equip our younger generation to cope with the ever-changing needs of the knowledge society, students should be provided with opportunities to develop the Twenty-first Century Knowledge with the use of IT in their learning process. To this end, schools, as an important learning place for students, should develop and implement a school-based plan for the successful establishment of a school environment favorable for TEL according to their individual needs ([6], [7] & [8]).

2. Background of the Study

With the aim of empowering schools in Hong Kong with greater autonomy to develop and implement a tailor-made plan for the promotion of TEL in response to the emerging knowledge society at the school level, the government of Hong Kong has made strategies to prepare local schools for such a pursuit. In 1998, the government announced the first strategic document, *Information Technology for Learning in a New Era: Five-year Strategy – 1998/99 to 2002/03*, which led to a solid foundation of hardware infrastructure and a huge pool of IT-literate teachers and students for the development of TEL at the school level ([9]). In 2004, the government issued the second strategic document entitled *Empowering Learning and Teaching with Information Technology*, which laid a foundation of professional knowledge of teachers and school principals about the integration of IT into learning and teaching ([10]). In 2007, the government issued a consultation document for the upcoming strategic document entitled *Right Technology at the Right Time for the Right Task*, in which one of the actions aims to assist schools to develop and implement school-based plans for the development of TEL ([11]). To investigate the readiness of schools in Hong Kong to develop and implement school-based plan for promoting TEL in the knowledge society, this study aimed to analyze the current situation of and provide inspiring recommendations on the planning for TEL at the school level in Hong Kong. There were two research questions in this study:

- (1) How do the school practitioners perceive the status of the Twenty-first Century Knowledge in the planning for school-based development in response to the emerging knowledge society?
- (2) How do the school practitioners perceive the use of IT in enhancing teaching, learning and assessment of school education?

3. Research Methodology

Two methods were adopted in this study for the collection of opinions from relevant school practitioners about the above two research questions, namely focus group discussion, and case study. The first method was focus group discussion. Focus group discussion is a common qualitative research method, which is in the form of face-to-face interview with a small and fairly homogeneous group, for capturing real-life data that in this study are concerns about school-based planning for TEL in the knowledge society ([12]). Six sessions of focus group discussion, of each composed of participants from secondary, primary, or

special school sector, were conducted to collect perceptions of school practitioners, including school principals and teaching staff taking charge of TEL. A series of guiding questions was designed to stimulate participants to share their views on current situation, discuss their concerns about existing problems, and suggest their needs for the future development of school-based plans for TEL. Two sampling approaches were adopted in this study to select representative participants for the focus group discussions. For the selection of participants from the primary and secondary school sectors, 40 primary schools and 40 secondary schools were randomly selected among all of the 635 primary schools and all of the 565 secondary schools, respectively, in Hong Kong. For the selection of participants from the special school sector, ten special schools were selected by the Expert Group of this study among all of the 60 special schools in Hong Kong so that a wide coverage of different types of special schools could be selected. A total of 43 schools participated in the focus group discussions. The collected data were summarized by analyzing the content of excerpts from the transcripts of the discussions. Table 1 shows the demographic data of the focus group discussions.

Table 1: The demographic data of the focus group discussions

Focus group categories	No. of focus groups	No. of invited schools (y)	No. of participating schools (x)	Response rate (x/y)
Primary school sector	2	40	18	45%
Secondary school sector	3	40	20	50%
Special school sector	1	10	5	50%
Total:	6	90	43	48%

To further gain insights into the level of agreement about the school-based planning for TEL in the knowledge society, a questionnaire which consisted of eight questions was developed to collect quantitative data from participants in the focus group discussions. A total of 43 questionnaires were distributed to all of the participants in the focus group discussions. A total of 35 questionnaires were returned for a response rate of 81.40 percent. The Cronbach's Alpha Reliability coefficient of the questionnaire survey is 0.79.

The second method was case study. Case study is a common qualitative research method in which a single individual or example is studied through extensive data collection ([12]). To gain insights into the actual practices in the school-based planning for TEL in the knowledge society, five case studies were conducted to collect qualitative data on the past experience, current practices and existing challenges in relation to the school-based development of TEL in the real school environment in Hong Kong. By purposive sampling ([12]), different types of local schools, which were judged to be average in the development of TEL at the school level, were selected among the three school sectors in local school education system. A total of five schools, including two primary schools, two secondary schools and one special school, were invited to participate in the case studies. Table 2 shows the demographic data of the case studies.

There was a twofold step in the exercise of case studies. First, a review of school homepages and school reports was conducted to obtain a preliminary view on the development of TEL in the respective invited schools. Second, a semi-structured interview, with the provision of a set of interview guidelines, was conducted with the school principal and teaching staff who took charge of school-based development of TEL, in the respective invited schools. The collected data were summarized by analyzing the content of school reports on the school homepages and the excerpts from the transcripts of the interviews.

Table 2: The demographic data of the case studies

Partner School	Sector	Interviewees	Duration (minutes)
1	Secondary	Principal, Academic Leader, Teacher coordinating IT	105
2	Primary	Principal, Vice-principal, Teacher coordinating IT	105
3	Special	Principal, Academic Leader, Teacher coordinating IT	120
4	Primary	Principal, 2 Teachers coordinating IT	120
5	Secondary	Principal	145

4. Results and Discussions

4.1 Recognition of the Importance of the Twenty-first Century Knowledge

The study results show that the school practitioners have a positive perception of the status of the Twenty-first Century Knowledge in the planning for school-based development in response to the emerging knowledge society. In the questionnaire survey, the mean rating of the question item on the level of agreement about the driving force of the Twenty-first Century Knowledge in promoting school-based IT in education development was 4.06 (S.D. = 0.59), on a five-point Likert scale with the value “5” indicating the strongest agreement adopted in the rating process. This indicates that the respondents highly recognized the importance of the Twenty-first Century Knowledge in the development of TEL at the school level, though a dispersion of such view was found among the respondents as the value of the standard deviation shown. The findings of the focus group discussions and case studies also concur with that of the questionnaire survey. The participants of the focus group discussions and case studies generally asserted the driving force of the Twenty-first Century Knowledge in promoting school-based development of TEL, despite a number of them further expressed their concern about the diverse perception of the notion “Twenty-first Century Knowledge” among the school community.

4.2 Concerns about the Promotion of TEL in the Knowledge Society

The study results reveal that the school practitioners have a positive perception of the influence of the use of IT in enhancing student learning. In the questionnaire survey, the mean rating of the question item on the level of agreement about the rationale of IT in education for improving quality of education was 4.03 (S.D. = 0.38), on a five-point Likert scale with the value “5” indicating the strongest agreement adopted in the rating process. This reflects that most of the respondents agreed or strongly agreed that the use of IT in school education was to enhance the quality of teaching and learning. In the focus group discussions and case studies, the participating schools also indicated that they believed the effectiveness of TEL. The participating schools considered that the use of IT in school education could ultimately enhance the efficiency and effectiveness of teaching and learning. They thus had made school-based initiatives in TEL for various dimensions of school work related to teaching and learning. Table 3 summarizes some of the major initiatives made by the participating schools in this study for promoting school-based development of TEL.

Table 3: Major initiatives made by the participating schools for promoting school-based development of TEL

Dimension	Major initiative
Teaching	<ul style="list-style-type: none"> - Provided IT facilities and digital resources for teaching - Encouraged teachers to integrate the use of IT tools and digital resources into curriculum delivery - Provided opportunities for teacher professional development on integrating IT into teaching and learning
Learning	<ul style="list-style-type: none"> - Provided IT facilities and digital resources for learning - Provided support on the development of necessary knowledge of and proper attitude toward using IT for learning - Encouraged students to use IT tools and digital resources for the classroom learning of subject knowledge under various learning approaches - Established award schemes for promoting the use of digital resources in self-regulated learning
Assessment	<ul style="list-style-type: none"> - Developed school-based electronic systems for recording student learning performance - Developed school-based electronic systems for storing the portfolio of behavioral characteristics of students

Firstly, nearly all participating schools in this study reflected that they had implanted the use of IT in classroom teaching to improve the quality of teaching. Three methods were mainly adopted by the participating schools in this aspect. First, the participating schools had provided teachers with IT facilities, such as a set of projector, visualizer and desktop computer with Internet connectivity, in each general classroom, and digital resources, such as subject specific e-learning platforms for key subjects, for classroom instruction. Second, the participating schools had encouraged teachers to adopt the IT facilities and digital resources available in their schools for classroom instruction. The participants from the secondary school sector added that their schools required teachers to capitalize on the use of IT for the delivery of key subjects in the New Senior Secondary (NSS) curriculum such as Liberal Studies. Third, the participating schools had encouraged teachers to take part in teacher professional development activities related to IT in education. The participating schools pointed out that the topics of such professional development activities covered not only the technical knowledge about the IT resources available in their schools, but also the effective practices for the pedagogical integration of such IT resources.

Secondly, the participating schools promoted students to embed the use of IT in subject learning for improving the quality of learning outcomes. Three methods were mainly adopted by the participating schools in this aspect. The first method was the provision of necessary resources for the use of IT. The participating schools had provided students with the basic computing equipment in computer rooms, and digital resources, such as subject-specific e-learning platforms, for classroom learning. The second method was the provision of essential knowledge about the use of IT. Apart from requiring students to attend certain number of lessons for the computer-related subjects per week to acquire technical knowledge and application skills related to the use of IT, some of the participating schools had provided support on the development of the proper attitude toward the use of IT for learning purposes because they were aware of the latent problems concerning the improper use of IT for processing information. The third method was the provision of application opportunities for the use of IT. The participating schools had encouraged students to use IT for knowledge acquisition, in particular for the key subjects, within the class time by arranging classroom learning activities involving the use of IT under various learning approaches such as project-based learning approach. Some participating schools

had also established award schemes to reward students who actively conducted self-regulated learning with the use of e-learning platforms provided by their schools.

Thirdly, the participating schools integrated the use of IT into learning assessment with the ultimate goal of improving the quality of learning outcomes. The participating schools in the special school sector had subscribed or developed two types of school-based electronic systems in this aspect: the electronic assessment platform for evaluating student performance in terms of academic achievement; and the online student portfolio for storing the record of behavioral characteristics, cases on improper behaviors and measures for effective rectification. These participating schools stressed that this initiative was one of the key concerns in the school-based plan for TEL in their schools because such school-based electronic systems facilitated teachers to design teaching plan for individual students with special educational needs at the next learning stage based on the assessment data. The special schools considered that this could, in turn, be helpful to enhance the learning of students with special educational needs. One participating school from the secondary school sector also indicated that the school was developing such a school-based assessment platform, though the school fully understood the great challenges of extensively collecting assessment data of students in mainstream schools with large volume of curriculum contents for evaluation.

5. Recommendations

This section offers recommendations in three areas of school-based planning based on the study results, namely the use of IT for fostering independent inquiry learning, the promotion of self-regulated learning involving the use of digital resources, and the use of digital student learning records for encouraging assessment for learning.

5.1 The Use of Information Technology for Fostering Independent Inquiry Learning

One of the ultimate goals of the education for fostering the Twenty-first Century Knowledge is to inculcate students with the ability to conduct individual inquiry learning through the proper use of IT ([5]). The essential qualities that entail individual inquiry learning include the necessary knowledge about and the proper attitude toward using IT for information processing. By requiring students to work on a study report under their own selected theme, the school education in Hong Kong has made the development of the capability of independent inquiry learning as an integral part of cross-disciplinary curricula at three levels: the senior primary level in the subject General Studies; the junior secondary level in the subject Integrated Humanities; and the senior secondary level in the subject Liberal Studies ([13] & [14]). Based on the study results, schools in Hong Kong have the potential to take advantage of the use of IT in the delivery of these curricula to inculcate the capability of independent inquiry learning. Schools in Hong Kong are ready to encourage students to make use of IT tools for processing information and completing learning tasks. In this regard, schools are recommended to plan for the use of IT for fostering independent inquiry learning. Schools may consider making strategic integration of the use of IT into respective curricula, according to the learning stages of students, in order to develop capability of independent inquiry learning. In light of the need for teacher supervision in the process of individual inquiry, which is not spontaneous to student learning, schools should prepare teachers for the ready provision of encouragement to and guidance on the individual inquiry learning involving the use of IT through teacher professional development activities.

5.2 The Promotion of Self-Regulated Learning Involving the Use of Digital Resources

Self-regulated learning involving the use of digital resources is another important approach for learning the traditional school curriculum and developing the Twenty-first Century Knowledge ([15]). From the study results, schools in all the three sectors in the local school education system have made considerable investment in the procurement of digital resources for promoting self-regulated learning of school curriculum. Although some schools are unable to actively promote self-regulated learning because of the digital divide problem among students in their schools, such schools put effort into the satisfactory provision of school IT infrastructure with the aim of building a foundation for allowing every student to conduct self-regulated learning activities inside campus beyond class schedule. Teachers consider that the integration of the use of IT into self-regulated learning has a positive impact on the student learning because students are given supplementary resources to deepen the learning of individual subjects beyond normal class schedule. In this regard, schools are recommended to plan for the promotion of self-regulated learning involving the use of digital resources. Schools may consider providing more facilities, opportunities and incentives for students to conduct self-regulated learning for individual subjects. More of a concern, professional development of teachers on guiding students to gain from self-regulated learning should be carefully planned.

5.3 The Use of Digital Student Learning Records for Encouraging Assessment for Learning

By keeping records of student learning outcomes, IT can facilitate assessment for learning ([16]). According to the study results, schools in Hong Kong realize the potential of the use of digital records of assessment data to enhance student learning. There is a particularly remarkable achievement in the special school sector because they exhibit an imperative need to minutely record the individual learning status of students with special educational needs in order to foster personalized learning. In light of the encouraging experience in the special school sector, mainstream schools are recommended to plan for the use of digital student learning records for promoting assessment for learning, though it is understandable that such work is challenging and time-consuming at the current stage because of the larger learning scope and the faster learning progress, comparing with that of students in the special schools, of students in the mainstream schools. Mainstream schools may consider a trial on recording assessment data on a specific scope of the school curriculum under a digital approach at the preliminary stage. Such initiative can help to establish a foundation for the building of student model so as to automate the learning path of students at the next stage based on the assessment data.

6. Conclusion

The goal of this study is to inspire schools in Hong Kong to develop and implement school-based plan for promoting TEL in the knowledge society. Three recommendations are suggested for providing insights into the school-based planning for TEL. In view of the role of IT as a driver for the promotion of learning, schools are recommended to plan for the use of IT for fostering independent inquiry learning. Considering the role of IT as a bridge to high academic achievement, schools are recommended to plan for the promotion of self-regulated learning involving the use of digital resources. In light of the role of IT as a

platform for informed decision making and accountability, schools are recommended to plan for the use of digital student learning records for promoting assessment for learning. Based on the data garnered in this study, a resource pack, which consists of a model roadmap, a sampled action plan, templates with user guides and exemplars, on the planning for TEL has been developed to support such a planning for all of the schools in Hong Kong. It is anticipated that school-based planning for TEL is the greatest synergy for enhancing the quality of school education in response to the emerging knowledge society.

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