Strategic Dimension Two
Program: Curriculum, Assessment, and Practicum

An effective and robust pre-service teacher education program will prepare teachers with the necessary ICT and pedagogical competencies to integrate ICT for teaching, learning and administration in schools (Mims, Polly, Shepherd, & Inan, 2006). The pre-service teacher education program is the second strategic dimension of the toolkit and it includes 11 strategic foci under three components of the program: curriculum, assessment and practicum.

Curriculum
- Instructional analysis (tasks, learners, context)
- Linkages of courses/units
- Pedagogical approaches
- Modelling
- Meaningful use of ICT

Assessment
- Linkages to curriculum
- Mode of assessment - Balance between process and product (validity, reliability, comprehensiveness, administration)
- Authenticity of assessment tasks

Practicum
- Linkages to curriculum and assessment
- Support in schools (mentor teachers, coordinating teachers, access to ICT & resources, student readiness, supervisors, principals)
- Expectation of ICT use in teaching and learning in schools

Curriculum

Instructional Analysis (Tasks, Learners, Context)

Education researchers have identified a range of variables that promote or inhibit pre-service teachers' use of ICT during their practicum or field experience. These variables may be broadly classified as contextual or learner-related. Contextual variables that influence pre-service teachers use of ICT includes access to technology, time and workload, support from mentoring teachers etc (Dexter & Riedel, 2003; Hadyn & Barton, 2007; Brinkerhoff, 2006). Learner-related variables include attitude towards computer, experience in using computers, epistemological and pedagogical beliefs, self-efficacy and level of computer skills (Angeli & Valanides, 2005; Teo, Lee & Chai, 2008; Drent & Meelissen, 2008; Ertmer, 2005; Jimoyiannis & Komis, 2007; Paraskeva et al., 2008; Swain, 2006). These studies inform teacher educators about the learner characteristics and contextual conditions that need to be considered in the design of the pre-service teacher curriculum.

Understanding how these variables relate to the target population of pre-service teachers constitutes part of the instructional analyses. While it is clear that it will not be possible to investigate all the above variables, some information about the context and learners' characteristics are essential. Ministries of education may have spelled out the basic ICT competencies that teachers should have and such contextual information is obviously important for the design of the course.

The level of ICT competencies that pre-service teachers possess is one of the learners' characteristics that teacher educators have to take into account in the curriculum design since the pedagogical use of ICT is dependent on teachers' ICT competencies. According to their review of 33 "Preparing Tomorrow's Teachers to Use Technology (PT3)" projects in the United States, Mims and his colleagues (2006) report that most TEIs organise optional ICT competencies workshops for the pre-service teachers, mentor teachers and teacher educators. These workshop sessions typically include presentation software, movie editing tools, mind-mapping software, electronic portfolio, and digital imaging tools. Although pre-service teachers do enter TEIs with better ICT competencies nowadays, Steketee (2005) argues that such workshops are necessary.

Markauskaite's (2007) survey of pre-service teachers in the University of Sydney reveals that they may have acquired basic ICT competencies such as word processing and e-mailing but may lack more advanced ICT competencies such as the production of multimedia and web-based resources. Lee, Chai, Teo and Chen (2008) survey of Singaporean pre-service teachers reveals similar trend in terms of the pre-service teachers ICT competencies. Given that pre-service teachers may have different level of competencies in using ICT, it is necessary for TEIs to conduct further analyses of the pre-service teachers' ICT competencies and differentiate its courses to cater to different learning needs. There are questionnaires that may be adapted to serve this purpose (for example, see Anderson & Maninger, 2007; Collier, Weinburgh, & Rivera, 2004; Markauskaite, 2007; Lee et al, 2008).

Task analysis refers to the analysis of how an expert performs his/her job (Seels & Glasgow, 1998). In the context of designing the pre-service teacher curriculum, teacher educators have to observe how exemplary teachers use ICT effectively in schools. The observations are usually followed by interviews to understand how these teachers plan and use ICT. Through task analysis, the teacher educators derive a set of competencies (e.g. classroom management skills) and processes (e.g. planning processes) that informs the design of the curriculum. However, this assumes that teacher educators have the opportunity to observe and interview teachers with expertise in integrating ICT. For TEIs that are just starting its ICT in education's journey, consulting existing body of knowledge through literature review may be a more viable option.

Given the myriad of variables, pre-service teacher education programs are unlikely to be the sole determinant of whether and how beginning teachers use ICT in schools. However, as Anderson and Maninger (2007) point out, the role that TEI may assume is to provide an effective program that builds the foundation for the development of pre-service teachers' competencies towards the use of ICT in schools. Instructional analysis ensures that the curriculum provides this foundation.

Linkages of Courses/Units

One common criticism of pre-service teacher education programs is that courses/units in the program are not linked and hence, lacks coherency (Darling-Hammond, Hammerness, Grossman, Rust, & Shulman, 2005). It is therefore important that the curriculum is designed with adequate awareness of the general scheme of progression for the pre-service teachers. Without such awareness, course content may be repetitive or appear disconnected to the pre-service teachers. Given the general realization among teacher educators that a single course is unlikely to equip the teachers with the necessary competencies for the integration of ICT, it is

important that courses are linked so that they build-on one another and support the pre-service teachers to progress beyond the mastery of basic ICT competencies. Drenoyianni (2004) describes how ICT competencies among pre-service teachers have been developed in their four year program in Greece. In year 1, there is a course that focuses on ICT literacy competencies. In year 2, another course focuses on the pedagogical dimension of ICT use in schools. In year 2 and 3, ICT is also integrated into subject methods courses. ICT courses that are integrated with content teaching and/or method courses is an common approach to further enhance pre-service teachers' competencies in connecting the ICT competencies with subject matter learning (Angeli & Valanides, 2005; Lisowski, Lisowski, & Nicolia, 2006).

Pedagogical Approaches

Pre-service teachers in most countries have to go through at least one introductory educational technology course. The pedagogical approaches for such introductory courses have shifted away from a transmission-based skill training approach towards a more problem-based learning constructivist approach. However, most introductory educational technology courses adopt a combination of both approaches based on the objectives of the activities. Anderson and Maninger (2007, p.155) examine one such course in Texas, United States:

> Participants were enrolled in a one-semester course designed to meet the Texas Technology Application Standards for Beginning Teachers (Texas State Board for Educator Certification, 2003). The course provided an introduction to using educational technology for professional productivity and instructional purposes. It covered classroom application of a wide variety of software programs, including word processing, spreadsheet, database, presentation, paint, draw, desktop publishing, graphic organizer, Internet, and instructional software. Students also learned about instructional approaches such as cooperative learning, constructivism, and direct instruction, as well as issues such as copyright and censorship. Instructional methods included discussions, demonstrations, group work, and hands-on practice. An online course management system provided access to assignments, quizzes, threaded discussions, and links to Internet resources. Students participated in field work that allowed them to observe, interact with, and/or tutor individuals who were learning with computers. The final course project was an electronic portfolio.

Based on their report, the course is designed according to external standards set by the state education authority. Whether or not this constitutes adequate instructional analysis for course design is questionable. Other forms of instructional analysis such as learner analysis and task analysis are not reported. To assess the outcomes of the course, the authors adapt a 54 items self-report questionnaire that measures pre-service teacher's abilities, self-efficacy, value beliefs and intention to use ICT. The pre-post tests results reveal significant positive outcomes in all measured dimensions. Other studies that have adopted such pedagogical approaches also reported very similar outcomes (Goktas, Yildirim, & Yildirim, 2008; Wong et al., 2003).

Drenoyianni (2004) and Markauskaite (2007) suggest that one way to cater for both ICT competencies and pedagogy development is to structure the educational technology course within a broad problem-solving approach. Within this approach, pre-service teachers analyze students' needs, plan for ICT supported activities, identify and develop resources, adapt and

configure the ICT environments, implement and manage the learning activities, and evaluate and reflect on the ICT-mediated lessons. An example of such a course is conducted in the National Institute of Education in Singapore. The course is focus on pedagogical reasoning and the design of constructivist-based learning units (Lim & Chan, 2007). The teaching of ICT competencies in the course is opportunistic and just-in-time. For example, if the teacher educator discovers that a group of pre-service teachers who are trained to be language teacher do not know how to use the Review functions of Microsoft Word, the teacher educator may perform a short demonstration and perhaps use the function to provide formative feedback to students' draft. Similarly, in the preparation of the constructivist-based learning unit, basic ICT competencies such as embedding object in Powerpoint presentation are introduced as needed. The final product of the course is usually a Powerpoint package created by two to three pre-service teachers. The Powerpoint package aims to initiate student-centred learning activities using various ICT tools (see http://eduweb.nie.edu.sg/microlessons/samples.htm). The course is constructivist in orientation and the pre-service teachers are also tasked to examine case studies of exemplary use of ICT and discuss issues and implications face-to-face and online. Lee and colleagues (2008) report that the pre-service teachers perceive statistically significant gains in their ICT and pedagogical competencies as a result of the course.

To accommodate the developmental needs for ICT competencies and pedagogy of integrating ICT within the limited teaching time of pre-service teacher education program is a key challenge for the design of curriculum. A few TEIs in the United States have administered basic ICT competencies performance tests to address the enormous range of ICT competencies among pre-service teachers. In Bowling Green State University, the college of education implements an ICT competencies assessment that requires pre-service teachers to produce an artefact that "use word-processing, spreadsheet, presentation, and graphics software applications, and integrate Internet and file management expertise" (Banister & Vannatta, 2006, p. 213). To help the pre-service teachers to undertake the assessment tasks, the university set up online tutorials, video tutorials, student ICT support centre and offers individual tutoring on demand.

Modelling

The effectiveness of modelling as a teaching strategy has long been established by the work of Albert Bandura (1986). The essence of modelling lies in practicing what one preaches. When teacher educators regularly model the use of ICT in their pre-service teacher education classes, they expose pre-service teachers to various innovative ways of using ICT for teaching and learning (Steketee, 2006). It may then foster deep changes in their beliefs about the educational value of integrating ICT. Modelling addresses the problems of pre-service teachers' inability to envision how ICT may be used in the classrooms (Dexter, Doering, & Riedel, 2006). Examples of explicit modelling by teacher educators in the use of ICT are reported by Dexter and colleagues (2006) and Lock (2007). Dexter and his colleagues (2006) describe a TEI-wide approach of content-area specific ICT preparation. The approach engages teams of education technologists, in-service teachers as teaching fellows, method and content teacher educators to construct and adapt resources so that the pre-service teachers may experience teaching and learning in which the use of ICT are integrated. Analysis of pre-service teachers' performance reveals that they are able to generate many potentially fruitful ideas for future ICT integration that enhance students' learning.

Lock (2007) describes her effort to integrate the use of ICT in the University of Calgary for a semester long course. The course adopts an inquiry-based approach and the pre-service teachers are assigned to investigate factors influencing the learning of English as a Second Language for students. Through the consolidation, exploration and elaboration phases of the inquiry, pre-service teachers have to use a variety of ICT tools to support their learning and reflection. They have to write reading synopsis, select digital images from the Internet, construct multimedia presentation (Web pages or Powerpoint files), and collaborate through ICT. Some of these competencies are taught to the pre-service teachers by the author. Throughout the inquiry, the pre-service teachers work in teams. Lock claims that the course constitutes meaningful learning for her students.

A common theme that emerges from the above examples is that engaging pre-service teachers to learn in a way they should support their students' learning is desirable. To achieve that, teacher educators have to model the use of ICT across various contexts and contents. At the same time, it may develop the dispositions required to facilitate group-based, constructivist-oriented student-centred learning supported by ICT that many educational reforms are aiming to achieve.

Meaningful use of ICT

Meaningful use of ICT in classrooms is dependent on the notion of integration. For pre-service teachers to integrate ICT, Angeli and Valanides (2005) advocate that there is a need for them to develop a body of knowledge that is termed ICT-related pedagogical content knowledge (PCK). The following quote explains their notion of ICT-related PCK:

> ICT-related PCK constitutes a special amalgam of several sources of teachers' knowledge base including pedagogical knowledge, subject area knowledge, knowledge of students, knowledge of environmental context, and ICT knowledge. ICT knowledge is defined as knowing how to operate a computer, knowing how to use a multitude of tools/software, and about their affordances. ICT-related PCK is the form of knowledge that makes a teacher competent to teach with ICT and can be described as the ways in which knowledge about tools and their affordances, pedagogy, content, learners, and context are synthesized into an understanding of how particular topics can be taught with ICT, for specific learners, in specific contexts, and in ways that signify the added value of ICT.
>
> (Angeli & Valanides, 2005, p. 294)

Meaningful use of ICT is therefore about using appropriate functions offered by a particular ICT application to enhance students' learning. The idea that pre-service teachers have to match appropriate affordances of ICT to facilitate and enhance students' learning of subject matter knowledge is rather commonly reported in literature (Jonassen et al., 2008; Lim & Chai, 2008). Loveless (2008) expresses similar beliefs and explains that teachers need to integrate the subject knowledge with the affordances of ICT through didactic analysis. Her research indicates that when there are weak didactic relations between the content and the use of ICT, ICT can become a tool for fun activity with no clear learning objectives. Chai and Lee (2006; p.81) have provided a list of common affordances of ICT and how it may promote meaningful use of ICT as follow:

• 24 hours /7 days a week access to vast information sources → Anywhere/anytime learning

• Connection to peers/ experts → diverse perspectives, idea improvement (reconstruction)
• Multiple forms of knowledge representation → many ways to represent understanding by learners, engaging learners from different learning styles
• Speedy computation/ search → learners focusing on higher order learning such as pattern recognition, hypotheses testing while the computers record, compute and etc
• Revise-ability→ encouraging revisions and multiple pass on information
• Constructive, manipulative→ learners can construct different models of understanding
• Programmability→ Learners can build functional models and simulation for further tests
• Monitor actions through log files→ learners can review their learning paths
• Multiple versions of artefacts→ learners can compare them for reflective learning
• Recorded online interactions→ Learner can visualize experts or more advanced peers' thinking
• Asynchronous communication→Learners have time to reflect, many-to-many communication

Depending on the content and the learner characteristics, meaningful use of ICT may manifest in many different ways. For example, to help students to build their structural knowledge about a discipline, a teacher can task students to build concept maps using concept mapping ICT tools. Such tools are easily revisable and students may create and link as many maps as they think are necessary. Another example is teachers who feel that their students are not articulating their thoughts or engaging in serious discussion may consider employing asynchronous discussion forum. Numerous studies have document the benefits of discussion forum in giving students more time to think about issues and ensuring equal chance of participation (Chai & Khine, 2006; Scardamalia & Bereiter, 2006).

Assessment

Designing assessment is an integral part of the ICT curriculum development task. Well-designed assessment tasks are pivotal in engaging students in the learning process. Assessment practices ranging from standardized performance tests to e-portfolio have been employed for the evaluation of pre-service teachers' competencies in integrating ICT into classrooms. There are four areas of assessment: teachers' ICT competencies, attitude and beliefs towards use of ICT, pedagogical reasoning and actual use of ICT in classrooms (Haydn & Barton, 2007). These may be evaluated with project/artifacts analysis, surveys, short argumentative or reflective papers and classroom observations. All these may be documented in an electronic portfolio (Graham et al., 2004). We describe a few cases below to illustrate three strategic foci that teacher educators may focus upon in the design of assessment.

Linkages to Curriculum

Assessments that are not linked to the curriculum are not valid forms of assessment. In some traditional instructional design systems, assessments are developed before the development of the curriculum (see Seels & Glasgow,1998). Angeli (2005) describes a science education method course that incorporates an Instructional System Design (ISD) model to guide pre-service teachers in designing ICT integrated lessons. She documents a case of how pedagogical contents are developed alongside a set of authentic assessment criteria that is linked to the curriculum. Figure 1 shows the ISD model.

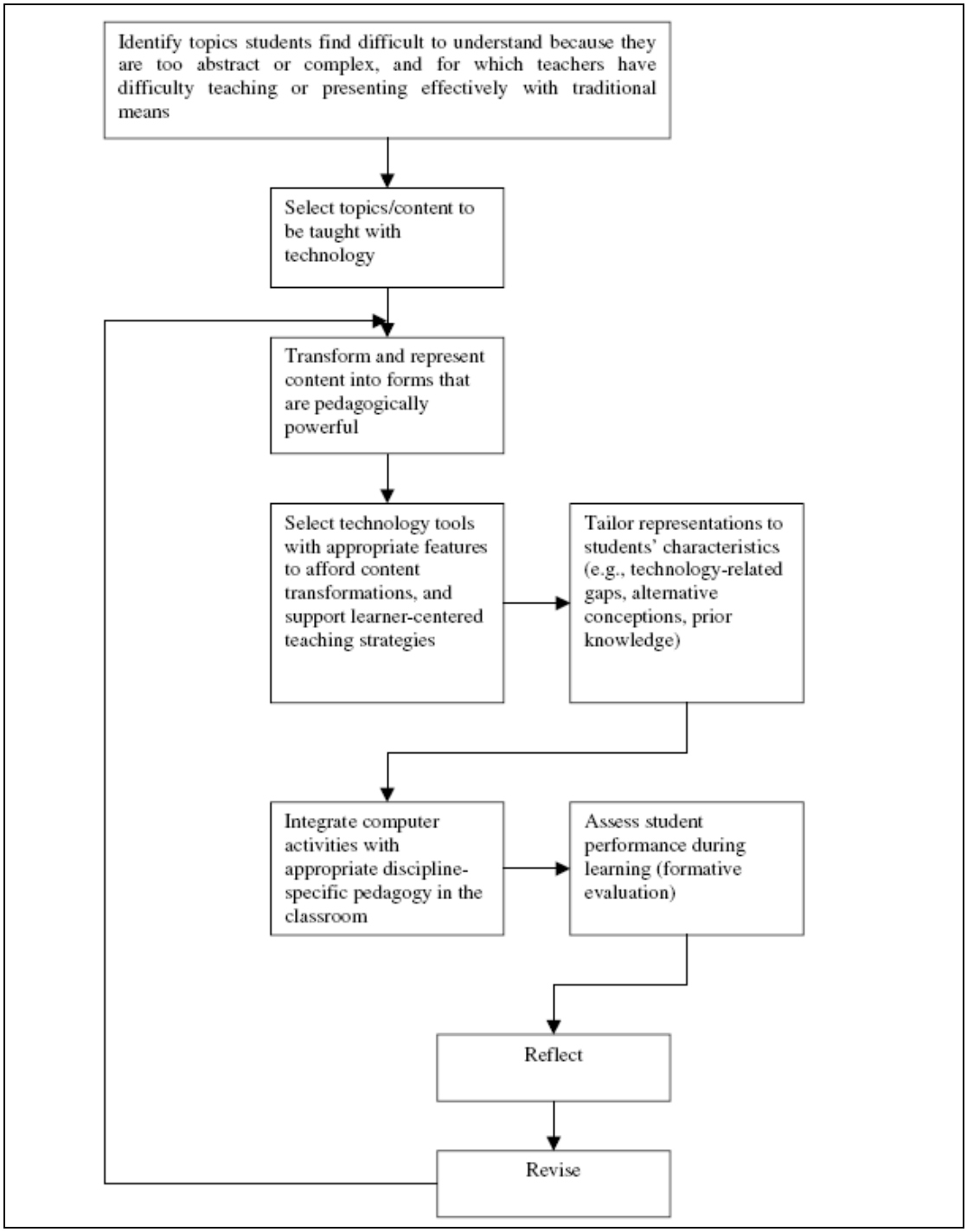

Figure 1: An ISD model for integrating ICT in method courses. (Angeli, 2005, p. 386)

Two groups of pre-service teachers were involved in this experimental course design. The first group used multimedia authoring tools entitled Hyperstudio and Multimedia Builder while the second group used a modelling tool entitled ModellingSpace. For both groups, the teacher educators modelled a series of ICT integrated lessons employing the specific tools that the pre-service teachers have to learn to use. After the lesson, the teacher educators explained the pedagogical reasoning behind the design of the modelled lesson. ICT competencies training were provided for the respective software. The pre-service teachers

were then tasked to design constructivist learning unit following the process illustrated in Figure 1, with the teacher educators facilitating the design processes. They were evaluated based on four dimensions of ICT-related PCK which included a) selection of appropriate topic, b) use appropriate technology-supported representation to transform the content, c) use technology to support teaching strategies, d) integrate computer-based activities with appropriate pedagogy. In this case, the evaluation is tightly coupled with the processes that are employed in the curriculum.

Mode of Assessment: Balance between Process and Product

Park and Ertmer (2007) report on their use of problem-based learning approach for an introductory educational technology course. It provides a good example of the multiple modes of assessment that are arguably balance in terms of process and product. At the start of the course, the pre-service teachers were challenged by a trigger problem of applying for a new teaching position that require the candidate to demonstrate their ability to integrate ICT for learning through a portfolio. The teachers then plan draft lessons for specific groups of learners, detailing the resources and assessment methods to be employed. These drafts allow the teacher learning to be tracked over time. The following quote documents how the pre-service teachers advance through the course and the various mode of assessment employed.

> During the semester, students watched digital video cases of exemplary technology integration in K-12 classrooms, including interviews with teachers. After watching the digital video cases, students discussed classroom problems and the strengths and weaknesses of the solutions. Also, each group created artifacts related to the skills, knowledge, and attitudes required to succeed as technology using teachers in their content areas. In addition, students submitted reflections with each artifact as well as a final course reflection describing their PBL group experience.
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> Each small group created a digital portfolio to apply for the new positions in the school district. There were three main artifacts in each digital portfolio: 1) an artifact to demonstrate skills (e.g., digital curriculum vitae), 2) an artifact to demonstrate knowledge (e.g., lesson plans integrating technology), and 3) an artifact to highlight attitudes toward technology (e.g., an essay of teaching philosophy). At the end of the semester, each group made presentations to an interview panel composed of school administrators (including those who appeared in the initial video case) and content experts (e.g., professors and instructors in the College of Education). After each presentation, the interview panel asked questions about the candidates' portfolios.
>
> (Park & Ertmer, 2007, p. 251)

Park and Ertmer's (2007) work illustrate how multiple forms of assessment are integrated and balanced in the curriculum for the evaluation of both the process and product of integrating ICT for classroom learning.

Authenticity of Assessment Tasks

Setting authentic assessment tasks help pre-service teachers to focus on acquiring the necessary competencies and dispositions for the integration of ICT in the real world. Both Angeli (2005) and Park and Ertmer's (2007) design of assessment are considered as authentic as the competencies required to complete the tasks are the same competencies that teachers need in school settings. However, one may argue that the authenticity of the assessment may

be further enhanced by the conduct of the actual lessons. The actual conduct of lesson requires a different set of competencies than those involved in preparing the lessons. This issue will be discussed further in the strategic dimension of practicum (see next section).

There are some forms of assessment that may not be authentic from the teacher educators and teachers' perspective. For example, to achieve the Qualified Teacher Status in United Kingdom, pre-service teachers are required to take tests to demonstrate that they possess adequate ICT competencies (for detail, see http://www.tda.gov.uk/skillstests/ict.aspx). However, while this approach ensures that teachers have acquired basic ICT literacy, Haydn and Barton's (2007) research study indicates that this approach is neither welcomed by pre-service teachers nor their mentors. It is being perceived as irrelevant and unhelpful for purposeful integration of ICT. This approach to training the pre-service teachers is more akin to the traditional skill acquisition approach. It is unlikely that this approach may cultivate teachers who have the dispositions and competencies to facilitate active, collaborative and constructive learning among students with technology.

Practicum

Practicum or field experience has been viewed as an important component of teacher education as it provides an authentic learning environment for pre-service teachers to make sense of theoretical knowledge and practice the skills they acquire (Dexter & Riedel, 2003; Sime & Priestley, 2005). It is therefore common for TEIs to encourage pre-service teachers to use ICT and reflect on its use in classroom. For the field placement to enhance pre-service teachers' competencies to use ICT in classrooms, the following three strategic foci have to be taken into account.

Linkages to Curriculum and Assessment

Benson and her colleagues (2004) report that the pre-service teachers from their TEI are required to use the multimedia materials they have developed during the twelve weeks educational technology course in their three weeks teaching practice. The practicum is thus directly linked to the curriculum. This seems to help the pre-service teachers to feel more prepared for the actual use of ICT. However, not many studies have reported such a clear link between TEI-based educational technology course and practicum. One necessary condition to foster such link is that the pre-service teachers need to know who and what they are going to teach before the commencement of practicum.

Dawson (2006) points out that it is not the field experience but the reflection upon the experiences that are essential for the teachers' development. Reflection may become another activity for pre-service teachers to complete if they are not scaffolded appropriately. This is especially true when the pre-service teachers feel that they are overwhelmed with the need to acquire a host of new skills during teaching practice (Hadyn & Barton, 2007). Dawson (2006) attempts to address the short coming of field-based experiences through "teacher inquiry". It requires the pre-service teachers to identify question of wonderment, plan data collection, analyze data and take action. It is akin to action research. Dawson claims that the outcomes of this intervention include pre-service teachers being more acquainted with the complexities of the use of ICT in classroom and being more focused on students' learning. However, the research also indicates that pre-service teachers are more likely to use ICT to support and enhance traditional teaching. Few pre-service teachers are able to use ICT to provide a rich context for student-centred activities that facilitate higher order learning.

In summary, literature that report linkages between educational technology courses and practicum generally testifies that such efforts enhance the pre-service teachers' competencies in using ICT. However, important conditions are needed to support such linkages. This will be discussed next.

Support in Schools

The effectiveness of promoting the use of ICT during practicum is dependent on the university supervisor and the mentor teacher's support and adequate access to ICT (Dexter & Riedel, 2003; Brown & Warschauer, 2006). Without these, the practicum may inhibit ICT integration. For example, a pre-service teacher may be required to show evidence of integrating ICT into their portfolio. However, he/she may encounter problems such as limited access to ICT laboratory or the mentor teacher does not believe in ICT. These conditions may add burden to the pre-service teachers in fulfilling the requirement and cause frustration for the pre-service teacher. It is therefore important to consider whether there are adequate supporting conditions before deciding on ICT integration as part of the practicum assessment. On the other hand, when contextual conditions are favourable, pre-service teachers are likely to gain confidence in using ICT. Pope, Hare and Howard (2005) reported that when the mentor teachers demonstrate the use of ICT, the pre-service teachers' use of ICT in classroom is also higher during practicum. Lisowski and colleagues (2006) and Brown and Warschauer (2006) made similar observation about how the attitude of the mentor teachers can influence the pre-service teachers positively. However, there are not many mentor teachers in schools who are able to provide such modelling. Recognising the importance of the mentor teachers and supervisors as role models, TEIs are starting to provide additional training for the mentor teachers and the university supervisors.

Other forms of support include setting up online communities to enhance mutual support and reduce the sense of isolation among pre-service teachers. Sime and Priestley (2005) analyse the online discussion of pre-service teachers about the ICT practices they have observed in schools during their observational placement. This may be a meaningful activity that supports pre-service teachers to think deeper about the theory they have learnt in university and the actual practices in schools. Sime and Priestley (2005) report that the pre-service teachers are able to discern the role of ICT in changing teaching and learning and they are also able to adopt a critical stance towards ICT. Providing laptops for the pre-service teachers or mentor teachers is another form of support (Basham, Palla, & Pianfetti, 2005). These measures are beneficial for the pre-service teachers' professional development.

Expectation of ICT Use in Teaching and Learning in Schools

Many educators have reported the positive effects of engaging pre-service teachers to use ICT during practicum (Benson et al., 2004; Lisowki et al., 2006). Among the literature, Brush and his colleagues' (2003) report of their field-based model seems to be most radical. In their model, the pre-service teachers are required to design, implement and review ICT integrated lessons during their practicum. They are supported by graduate students who design and deliver ICT integrated lessons using specific software for specific subject. After experiencing learning through the modelled ICT integrated lessons, the pre-service teachers critique the lessons and design their own lessons with just-in-time support from the graduate students. (These graduate students are in-service or experienced teachers.) The pre-service teachers then implement the lesson and complete a written reflection discussing the strengths and

weaknesses of the experience. The effects of this model are generally positive in terms of enhancing the pre-service teachers' attitude and skills towards using ICT in classrooms. It should be noted that this model is successful because of the strong emphasis on authentic learning through placement by the TEI.

Despite the above-mentioned benefits, there are still many pre-service teachers who are not given much opportunity to use ICT in classrooms (Pope et al., 2005). This may be due to the fact that teacher educators and teacher colleges recognise that sufficient supporting conditions do not exist. Brown and Warschauer (2006) observe that there is still limited expertise in schools for the proficient use of ICT for teaching and learning. However, it seems clear that TEIs may establish some expectations of ICT use during practicum. This may be a strategic thrust for TEIs to help raise the standards of ICT among its graduates.