Teacher Training on Technology-Enhanced Instruction - A Holistic Approach

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ABSTRACT

In this paper, we describe our efforts in providing a holistic environment for our trainee teachers at the National Institute of Education (Singapore) to ‘learn by experiencing and doing’ about using technology in classroom instruction. In our deliberate attempt to move away from lecturing and teaching of discrete IT skills, we modeled various strategies that are built upon established learning theories and pedagogies. These instructional strategies include direct instruction, self-directed learning, group work, computer-mediated communication, and constructivist learning. Through these processes, our trainees also experienced the use of computers as a tool for administration, presentation, tutoring, and cognitive processing. Results from a post-module evaluation survey indicated that majority of the trainees reacted positively towards the module and that the instructional objectives of the module were achieved.

Keywords
Teacher training, Technology-enhanced instruction, Instructional strategies, Experiential learning

Information Technology and Singapore Education

As we move into the 21st century, we find ourselves in an era of rapid changes. One pivotal factor that drives and supports these changes is information technology (IT). With advances in IT, information is now created and disseminated at an unprecedented speed, which brings about a consequential increase in the intensity of global competition. The Singapore government realizes the importance of IT for the survival of the country and it has implemented the Singapore IT2000 Masterplan to transform the country into an intelligent island so as to enhance the country’s competitiveness and to enhance the quality of life for the people through the exploitation of information technology (Infocomm Development Authority of Singapore, 1997).
The education service is one of the most strategic factors for the success of the Singapore IT2000 Masterplan, as it is responsible for nurturing the youngsters who will contribute to all aspects of nation building in the future. The Ministry of Education (MOE) launched the Masterplan for IT in Education in 1997. MOE injected S$2 billion (SS1.78≈US$1.00) to put IT into all Singapore schools so as to enhance teaching and learning. Curriculum changes as a result of this plan include IT being integrated into all subject areas and a target of 30 percent of the curriculum time being eventually spent on hands-on use of the computer in teaching and learning (Ministry of Education, 1997a).

To implement the IT Masterplan, teachers need to be competent in the use of IT for instruction. MOE devised a five-year plan of training to impart the necessary skills to all in-service teachers in Singapore schools. Being the only teacher training institution in Singapore, the National Institute of Education (NIE) is responsible of preparing preservice teachers in the use of IT in classroom instruction. To reach such a goal, NIE adopted a two-pronged approach: infusing IT into the teaching and learning of curriculum subjects and providing a core module for all trainees specifically on the integration of IT in teaching and learning. In the following sections of the paper, we documented our efforts in the design and implementation of the core module.

### Instructional Framework

The module “Introduction to Instructional Technology” is one of the compulsory core modules for all preservice teachers in a two-year Diploma in Education program. In 2001, about 870 trainee teachers in the Diploma program took the module during their second semester in the program. To enable better interactions among the trainees and tutors, small tutorial classes of about 20 students were formed. To facilitate coordination, Blackboard®, a learning management system, was used as single-point access for announcements, discussions, and the dissemination of instructional materials to both students and tutors.

The main objectives of the module were in line with that of MOE’s IT Masterplan. More specifically, we envisioned that our trainee teachers would be able to (1) identify and evaluate existing IT resources; (2) adapt and integrate IT resources in instruction for effective learning; (3) design and create IT-based materials for effective instruction; (4) implement IT-based lessons with basic IT skills; and (5) evaluate the effectiveness of IT-based instruction. With these objectives in mind, weekly tutorial activities were planned that required the trainee teachers to apply the necessary knowledge and skills.

The module was delivered via two modes: face-to-face and online. Out of the nine-week sessions, six were face-to-face sessions and three were online activity and discussion sessions. Throughout the module, we tried to intertwine pedagogy with IT competency skills so that “technology can be used to help redefine and enrich existing models of teaching” (Kent & McNergney, 1999, p.36).

The main reference book for the module was a textbook written by the past and present faculty members who taught this module. Titled *Integrating Technology into Teaching and Learning - Concepts and Applications* (Williams, 2000), the textbook presents a fair coverage of applications of instructional technology in teaching and learning. The face-to-face tutorials provided opportunities for instructors and students to discuss the content knowledge, to practice the skills through hands-on activities, to do group work and to conduct peer evaluation.

Since this module is about the use of IT in instruction, we modeled the use of IT by designating three sessions for online activities and discussions through the use of Blackboard®. For instance, the students were provided resources to apply what they had learned about visual design to the critique of some PowerPoint slides. They were also provided with a platform to discuss issues related to IT-based classroom management. Finally, the students use online activities to learn new concepts of using IT in instruction and to share experiences beyond the curriculum time.

### Instructional Strategies

In order to provide our trainee teachers with a holistic learning experience, our instructional strategy is based on two principles: (1) demonstration of multiple pedagogical approaches, and (2) learning by doing and experiencing instead of merely talking about it. Our belief is that the trainees should learn IT-based instructional pedagogy along with computer competency skills, and tasks should serve as the focus of learning activities. Instead of reducing the module to teaching of IT skills, we modeled various pedagogical roles of IT in instruction and provided opportunities for the trainees to experience them. In other words, we let our trainee
teachers immerse themselves in a technology-enhanced instructional environment to learn about different roles of IT in instruction. Every week the trainees were given a concrete task to complete (e.g. evaluate a website), and they were required to present a product as evidence of their learning. The assessment was based on an electronic portfolio of the trainee’s work throughout the module rather than quizzes or examinations that assess trainees’ ability to write about their knowledge. Details of our instructional strategies are described below.

**Direct Instruction**

We used direct instruction for “procedural knowledge needed to perform simple and complex skills and for declarative knowledge that is well structured and can be taught in a step-by-step fashion.” (Arends, 1998, p.256). For instance, one of the module objectives is to “adapt and integrate IT resources in instructions to enhance learning”. The trainees were expected to know general guidelines in evaluating and selecting CD-ROMs or web-based material in teaching, and be able to integrate the chosen piece into instruction. Prior to entering the programme, many trainees had some practical experience of conducting computer-based lessons (CBL) either during their teaching practice or their relief teaching. Immediately prior to the commencement of the module, all the trainees attempted to evaluate a CBL lesson (discussed below). During the face-to-face sessions, we used direct instruction to convey declarative knowledge on writing learning objectives and CBL integration strategies. A simplified version of behaviorism and cognitivism was also introduced relating to the reading of a chapter in the textbook.

However, being able to remember the guidelines does not necessarily mean that the trainees could actually evaluate and select appropriate resources for intended learners in specific instructional situations. To demonstrate their understanding, the trainees needed to conduct an evaluation of a CD-ROM or web-based material using the guidelines provided. To further demonstrate that they could use the chosen resource in teaching, they prepared a lesson plan integrating the chosen piece of IT resource in a specifically defined lesson.

**Self-directed Learning**

We believe that it is the mutual responsibility of both instructors and trainees to achieve the module objectives. It was made clear from the very beginning that the trainees were expected to take responsibility for what happened in the learning process. Our emphasis on the involvement of the trainees in the learning process began with a self-diagnosis of learning needs.

Prior to taking the module, all the trainees spent four weeks on teaching practice in schools. We required the trainees to plan and conduct a computer-based lesson (CBL) during their teaching practice. The trainees submitted their lesson plans together with a self-reflection at the first meeting of the module. In the reflection, the trainees described their experiences of conducting CBL lessons and analyzed the causes of success or failure. They were also encouraged to make suggestions on how a CBL lesson could be more effective. Such self-diagnosis helped the trainees to analyze their learning needs. Our emphasis on their reflections helped the trainees to understand our philosophy, that is, learning is an internal process and “those methods and techniques which involve the individual most deeply in self-directed inquiry will produce the greatest learning” (Knowles, 1980, p.56). Such an experience also helped the trainees to engage in reflective practice, an essential component for bringing understanding to the complex nature of classrooms (Zeichner & Liston, 1996).

**Group work**

Research studies have repeatedly reported evidence on the importance of collaborative work by teachers. Liberman (1986) points out that teachers working together provide greater opportunities for reflection and collegial interaction. A five-year study by Gove and Kennedy-Calloway (1992) demonstrates how collaborative action research helped teachers improve instruction and achieve a greater sense of empowerment. Learning theorists claim that when learning is situated in meaningful contexts requiring collaborative processing, learners tend to remember the information better (Brown, Collins & Duguid, 1989; Cognition and Technology Group at Vanderbilt, 1991). We believe that learning can be more effective through sharing and interacting with others and active participation in online and classroom discussions could enrich the trainees’ learning experience.

One of the major assignments for the trainee teachers is to construct microLESSONS® (2001). The microLESSONS® project is a joint development and research project between NIE and Ednovation (an
educational software company). MicroLESSONS®, as the name implies, are small units of student-centered learning activities with specific learning objectives. One of the main features is that it relies on teachers, who are most familiar with the curriculum, as developers of learning units. To facilitate the development of MicroLESSONS®, we chose to use a simple hypermedia - Microsoft PowerPoint.

In completing the MicroLESSONS® project, the trainees used one online session to engage in collaborative learning. Working in pairs, the trainees brainstormed ideas of their MicroLESSONS®. They then posted their ideas (objectives, context of instruction, activities and tools) on the online discussion board. Each trainee was required to review and respond to two draft proposals posted online. Typical comments included: (1) whether the learning objectives were appropriate and whether they promoted higher order thinking; (2) whether the tasks (learning activities) were appropriate; (3) whether the problem context (scenario) was clear, motivating and authentic and (4) whether the resource support was appropriate and sufficient. Through such an exercise, the trainees negotiated the strategies and shared ideas in designing instructional activities.

As the trainees completed their MicroLESSONS®, we used one face-to-face session for the trainees to view and critique the MicroLESSONS® created by their peers. To do so, each pair uploaded their MicroLESSONS® onto one workstation. After this was done, the whole class moved around from station to station with a peer assessment guideline. The peer assessment did not contribute to the final grade, but it provided the trainees a medium to understand the assessment criteria and to learn from one another.

**Computer-Mediated Communication**

The central intent of teacher professionalism, according to Furlong et al. (2000, p.6), is to “construct a new generation of teachers with different forms of knowledge, different skills and different professional values.” One of the skills to be acquired by the new generation of teachers is computer-mediated communication. As a method to engage trainee teachers in sustained and substantive discussion, electronic discussion group (EDG) via computer has shown promises in teacher education (Aylward & MacKinnon, 1999; Cannon, 1996; Harrington & Hathaway, 1994; Harrington & Quinn-Leering, 1994).

Many of our trainees came to us with the experiences of online chatting and emailing. For these trainees, technical skill was not a problem. However, using computer-mediated communication for learning and professional development was new to them. Thus, the challenge for us instructors was to design relevant tasks that could motivate the trainees to engage in meaningful learning activities. For instance, we had one online session on critiquing visual design. The trainees accessed two PowerPoint presentations used for Science and Math lessons respectively. The trainees compared the uses of audio, graphics, colors and text by applying what they had read in one textbook chapter to their critique.

**Constructivist Learning**

The constructivist approach to teaching and learning is gradually being accepted by educators in Singapore. “Teaching, from a constructivist perspective, is not viewed as telling or transmitting fixed truths to trainees but rather as providing trainees with relevant experiences and subsequent opportunities for dialogue so meaning can evolve and be constructed” (Arends, 1998, p.5).

Our attempt to introduce the trainees to constructivist learning was to engage them in activities that required them to learn a strategy of using IT for constructivist learning. During one face-to-face session, the trainees were provided with a tutorial program titled Designing MicroLESSONS® created by one of the instructors using Microsoft PowerPoint. The PowerPoint presentation used examples to illustrate what constructivist learning was and how such learning activities could be developed using PowerPoint. The presentation was installed in all computer stations. The trainees went through the presentation on their own or with a partner. They could discuss with their tutors or peers while viewing, and they could also went back and forth to review certain parts when they wanted to. At the end of the session, the trainees had an idea about the basic features and theoretical underpinnings of MicroLESSONS®. They were able to draft their MicroLESSONS® proposals with a statement of learning objectives, a description of authentic contexts, the design of meaningful and the challenging activities, and identification of supporting tools and resources. The experience of designing and creating MicroLESSONS® provided our trainees with an opportunity to get a better understanding of the philology of constructivism, and learn necessary IT skills at the same time.
Learning through Experience

We have described our multiple pedagogical approaches, through which the tutors played more explicit roles in instructing, demonstrating, and providing feedback and guidance. Implicit in our instruction, we wanted to provide the trainees a holistic experience of the various roles of IT instruction so that they could learn through experience, instead of talking about it.

Computer As an Administrative Tool

Before the commencement of the module, the trainees were asked to sign up for their tutorial groups via online web-based registration, saving them time and effort to register physically. The results of groupings were also announced through the Web. It was a stark contrast to previous practice of physical registration, which was stressful for both the trainees and the module coordinator.

A learning management system, Blackboard\textsuperscript{\textregistered}, was used to aid administration of the module. For the trainees, Blackboard\textsuperscript{\textregistered} provides a single-point access to important announcements and supporting materials. They could read the module schedule, prepare for the tutorial sessions, communicate with instructors and course-mates, and download instructional materials. In addition to the trainees’ site, a separate website was set up for the instructors functioning as a tool to enhance consistency of practice among tutors. From this site, the tutors could receive lesson plans and instructional materials in advance.

Computer As a Presentation Tool

Using the computer as a presentation tool is perhaps one of the most common applications of IT in instruction. During our direct instruction, multimedia presentations were commonly used, including instructor-prepared Microsoft PowerPoint slides, Web-based materials and video clips on CD-ROMs. Each tutor’s computer was linked to a video/data projector for projection onto a large white-matte screen.

As computer-based presentation is an important skill for classroom teachers, we dedicated one tutorial session on visual design in addition to our constant demonstrations. The trainees learned basic visual design principles and tried to apply the theories learned by designing a few PowerPoint slides. The slides were then shared with and critiqued by fellow trainees.

Computer As a Tutor

Using the computer as a tutor (Taylor, 1980) is primarily based on the cognitivist theory of learning. This mode of instruction uses the computer to mimic the instructor in providing information, structuring learning activities, and in providing guidance and feedback. The Ministry of Education provides schools with funds to purchase instructional software, as well as information about software relevant to the local curriculum (Ministry of Education, 1997b). It is thus important to impart to our trainees the necessary skills to harness the existing IT resources in classroom instruction.

As mentioned under the constructivist learning approach, the trainees went through a program to learn about MicroLESSONS\textsuperscript{\textregistered}. It was a demonstration of the use of the computer as a tutor, with embedded worksheet to engage the learners in higher order thinking. The tutors then provided feedback through follow-up discussion. Through this, we illustrated how tutorial programs can be implemented with necessary scaffolding to engage the trainees in thinking.

Computer As a Cognitive Tool

The above examples of using the computer as an administrative or presentation tool helps to enhance productivity and efficiency of work. Moving beyond using computers as efficiency tools, we also used the computer as a cognitive tool (Kommers, Jonassen & Mayes, 1992) or mindtool (Jonassen, 2000). It is different from using the computer as a tutor, as it involves active construction of an artifact, in the form of computer-based product, by the learners. The computer becomes a mediating tool, facilitating the learners in the process of
generating ideas and representing knowledge. Through this approach, the learners will assume a more active role in learning; actively searching and analyzing information in order to complete the task instead of depending on the teacher to feed the information. The learner might also be more motivated, taking ownership in constructing his or her knowledge.

As a follow-up activity of the MicroLESSONS® tutorial, we asked the trainees to create their own MicroLESSONS®. The trainee teachers had to create a constructivist instructional unit on a topic of their specialization using Microsoft PowerPoint and other programs of their choice. For instance, one group of trainees created a module on Time Management for primary school students. They presented the scenario of a pupil, Ali, having problems with time management, and assigned their pupils the task of helping Ali to plan a time management schedule. A Microsoft Excel spreadsheet was given as a template to support the pupils in creating the schedule. Microsoft programs were chosen as they are readily available in schools and are easy to use, thus reducing the learning curve and allowing the trainees to focus their efforts on thinking about pedagogical design.

In summary, we provided a holistic learning environment by modeling various pedagogies of IT-based instruction; we also provided opportunities for our trainee teachers to experience different roles of IT in teaching and learning. But how successful were our instructional strategies? An end-of-module online evaluation yielded some evidence on the effectiveness of our strategies.

**Trainees’ Feedback**

To obtain feedback about the module, an evaluation survey consisting of 24 positively worded statements, was conducted at the last face-to-face tutorial session. Using Blackboard® system, the survey was administered online and a system-generated report was obtained. There were 595 valid returns obtained out of 840 trainee teachers, a response rate of about 70%.

The first five statements examined in general, the usefulness and sufficiency of various aspects of the module (Table 1). The feedback was very positive, with more than 70% of the respondents indicating positive response (Agree or Strongly Agree) to the statements. It is especially encouraging to have more than 90% of respondents indicating that the knowledge and skills learned were useful, and the module had exposed them to multiple approaches and new perspectives on the use of IT in instruction.

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>% respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>1</td>
<td>The knowledge and skills I learned in this module are useful.</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>The amount of content covered is appropriate.</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>There are sufficient hands-on activities.</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>The course exposed me to new perspectives on the use of IT in teaching.</td>
<td>26</td>
</tr>
<tr>
<td>5</td>
<td>The course exposed me to different instructional approaches on the use of IT in teaching.</td>
<td>19</td>
</tr>
</tbody>
</table>

*Table 1. Feedback on usefulness of the module in general*  

Statements 6 to 10 were constructed to measure the affective outcomes: the trainees’ feeling about the module and their skills (Table 2). More than 70% of respondents enjoyed the module, and more importantly, they agreed that they were confident and motivated to use IT for instruction. More than 60% of respondents felt that the workload was manageable and the online session was helpful.
<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>% respondents</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>On the whole, the course is enjoyable.</td>
<td>11</td>
<td>60</td>
<td>16</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I feel confident to conduct IT-based lessons in schools.</td>
<td>12</td>
<td>67</td>
<td>8</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I am motivated to use IT in teaching.</td>
<td>14</td>
<td>66</td>
<td>8</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I can handle the amount of work in this module.</td>
<td>6</td>
<td>59</td>
<td>23</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The online sessions are helpful.</td>
<td>10</td>
<td>54</td>
<td>21</td>
<td>5</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Feedback on trainee’s satisfaction of the module

As mentioned in the description of our instructional framework, five main instructional objectives were set. Statements 11 to 15 were constructed to obtain feedback of the extent to which these objectives were achieved (Table 3). With 85% or more respondents agreeing to each statement, the result is a strong positive indicator of the respondents’ feelings about their competency in IT-based instruction.

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>% respondents</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>I am able to identify and evaluate IT resources.</td>
<td>8</td>
<td>84</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I can adapt and integrate IT resources in my instruction.</td>
<td>7</td>
<td>83</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I can design and create IT based materials for instruction.</td>
<td>13</td>
<td>77</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I have the basic IT skills to conduct IT-based lessons.</td>
<td>23</td>
<td>74</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I can evaluate the effectiveness of IT-based lessons.</td>
<td>6</td>
<td>78</td>
<td>4</td>
<td>0</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Feedback on trainee’s feelings about achieving the module objectives

Since imparting in our trainee teachers the knowledge and skills of IT-based instruction was our main agenda, we further examined the effectiveness of the module by asking respondents to reflect and compare their skills and knowledge before and after taking the module. The results (Table 4) show a much larger percentage of respondents indicating a positive (good or excellent) self-assessment of skills and knowledge after the module.

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>% respondents</th>
<th>Excellent</th>
<th>Good</th>
<th>Normal</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before the module, I think my computer competency was</td>
<td>3</td>
<td>26</td>
<td>55</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>After the course, I think my computer competency is</td>
<td>9</td>
<td>60</td>
<td>29</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Before the module, my knowledge in IT-based teaching was</td>
<td>1</td>
<td>16</td>
<td>60</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>After the module, my knowledge in IT-based teaching is</td>
<td>7</td>
<td>64</td>
<td>29</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Trainee’s self-assessment of skills and knowledge before and after the module

With 85% or more of agreement, the responses to statements 16 to 18 reflect that the support given to the trainees in terms of online module information dissemination and communication was good (Table 5). More than 65% of the respondents agreed that access to computer facilities in the institution was sufficient. Given that the institution had just moved into a new campus barely two months before the module commenced and there was ongoing work to furnish and equip the computer laboratories, this figure is expected to increase in subsequent years.
<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>% respondents</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>The course website contains useful information.</td>
<td></td>
<td>11</td>
<td>74</td>
<td>9</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>Blackboard is a useful medium for discussion.</td>
<td></td>
<td>23</td>
<td>63</td>
<td>6</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>18</td>
<td>I have easy access to the course information.</td>
<td></td>
<td>15</td>
<td>70</td>
<td>11</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>The computer laboratories are sufficiently equipped for me to complete assignments.</td>
<td></td>
<td>9</td>
<td>59</td>
<td>21</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>I have sufficient access to use the computer facilities in NIE.</td>
<td></td>
<td>7</td>
<td>58</td>
<td>25</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5. Feedback on facilities and online support

Conclusion

To successfully integrate IT into teaching and learning in schools is a challenging task that hinges on a lot of factors, including effective teacher training. Darling-Hammond (1994) describes the new paradigm of teacher learning as a place in which opportunities are provided for “learning by teaching, learning by doing and learning by collaborating.” In our attempt to avoid reducing such training into teaching of discrete IT skills, or merely talking about it through lectures, we presented an approach that modeled various pedagogies, including direct instruction, self-directed learning, group work, computer-mediated communication, and constructivist learning. We also provided a holistic technology-enhanced environment, for the trainees to experience the use of the computer as an administrative tool, as a presentation tool, as a tutor, and as a cognitive tool. These strategies are built upon theories and studies of learning, as well as the use of IT in education. The results of the trainees’ evaluation of the module indicated a generally positive reaction to the module and the perception that the instructional objectives have been achieved. These are encouraging indicators of the effectiveness of our instructional strategies, which we will build upon for further improvement in the subsequent delivery of the module.

References


