Training the Trainers in the *Essentials of Online Learning*

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Introduction

The use of information and communications technology in education is transforming learning and teaching practices in significant ways. For instance, as a result of the utilization of computer mediated communications technology with multimedia courseware, electronic libraries and databases, a whole new kind of educational experience is emerging, namely *e-learning* or *networked learning* (Rosenberg, 2001; Steeples, & Jones, 2002). E-Learning refers to the use of networked information and communciations technology to leverage the core processes of learning and teaching namely; subject matter representation, activation of learning and engagement of students with that subject matter content, encouragement of socialization and interaction between and among students, assessment of learning outcomes, and provision of feedback to students.

Affordances and opportunities offered by information and communications technology (ICT) are also causing educators and educational providers to rethink and reengineer the nature of their conventional educational practices (Gibson, 1977; Turvey, 1992). A significant product of this reengineering includes a shift in the roles of teachers from being "providers and deliverers of subject matter content" to becoming "moderators and facilitators of learning" within student-centered approaches to learning. Some of these approaches include "computer supported collaborative learning" (Koschmann, 1996; McConnell, 2000), “computer-supported problem based learning (Koschmann, Kelson, Feltovich, & Barrows, 1996), and "distributed problem based learning" (Koschmann, 2002).

These approaches to learning and teaching are closely associated with a growing interest among educators and educational technologists in the capabilities of information and communications technology for *leveraging* the learning and teaching transaction. Educators are enthusiastic about how they can use information and communications technology to improve their teaching activities which include the engagement of students with the subject matter content, activation of learning, assessment of learning outcomes and provision of feedback to their students. Educational technology researchers, on the other hand, are inquisitive about the influences of ICT on the achievement of content specific, as well as generic learning outcomes, and the processes of learning, including students' approaches to study, their motivation for learning and engagement with the subject matter content.

This paper is an attempt to address that interest, and that enthusiasm of educators and educational technologists. It is not so much about the tools and technologies for elearning, but about how networked information and communications technology can be used to leverage the core processes of learning and teaching towards the achievement of a rich and productive elearning environment. As such, the disussion in this paper is organized around these core processes of learning and teaching namely *subject matter content representation, activation of learning and engagement of students with that subject matter content, encouragement of socialization and interaction between and among students, assessment of learning outcomes,* and *provision of feedback* to students. Together these contributions show how the opportunities that information and communications technology afford, can be used creatively to leverage the entire elearning and teaching transaction, and individually they show how these opportunities can be used to leverage particular activities in the transaction.

Subject Matter Content Representation

Every learning and teaching transaction incorporates a defined body of content which may be in the form of a set of facts, principles, procedures, skills or attitudes in which a group of targeted learners are expected to demonstrate competency. Quite often this body of subject matter content is organized according to themes or by topics. While this is an expedient, and at times, a useful way of organizing the selected body of subject matter, constructivist

thinkers argue that this approach is not the only way, and certainly not a very meaningful way of representing content (Schank, 1997; Schank, & Cleary, 1995; Cognition and Technology Group at Vanderbuilt, 1990, 1993). They suggest that focusing attention on the facts, principles and procedures runs the risk of rote learning, and learning for short-term gains such as passing of impending examinations. There have been in fact long standing and very strong arguments put forth in favor of building and orchestrating learning environments which immerse learners in authentic learning experiences where facts, principles, procedures are embedded in activities, and engagement in this experience leads to the development of desirable competencies (Dewey, 1933, 1938; Piaget, 1952; Brown, Collins, & Duguid, 1989). These learning experiences are designed not so much to instruct as to provide the contexts wherein understanding and insight can be uniquely cultivated. They serve as "micro worlds and incubators for knowledge" within which learners are able to deal with complex concepts in tangible and concrete ways (Papert, 1993, p. 120), and where subject matter knowledge is allowed to evolve through the processes of exploring, inquiring, and constructing representations and/or artifacts (Hannafin & Land, 1997).

eLearning environments which combine the power of computer mediated communications technology, multimedia, electronic libraries, and databases, offer tremendous opportunities for representing subject matter content in a non-linear hypertext format. Hypertext is a term used generically in this paper to refer to nonlinear presentation of subject matter content. The basic building blocks of hypertext documents are nodes and links. Nodes are pieces of information that may be as small as a picture or as large as an article. Links allow the users to navigate between the associated nodes. The way in which each user chooses to move between the nodes is unique. There are two basic types of links: referential and organizational. Referential links simply direct a user from node to node. Organizational links communicate the type of relationship that exists between the nodes (Jonassen, 1991).

Hypertext is at the core of what is widely known as Cognitive Flexibility Theory (Spiro & Jehng, 1990). Straightforward, linear instruction in the form of tutorials, lectures, and many other formats will, according to cognitive flexibility theory, fail to accomplish important educational objectives in part because of oversimplification of the material presented. According to cognitive flexibility theory, the way students are taught is a significant influence on the type of cognitive structures they create and the way they store and structure

knowledge they acquire determines to a great extent how flexible they will be when they must use that knowledge. Encouraging cognitive flexibility requires a flexible teaching environment. Information must be presented in a variety of ways. Flexible instructional methods help students learn the contours and complexity of the material they are studying, and it helps them work with that content from several different perspectives.

Information and communications technology, with appropriate supporting material, is well-suited for ebabling flexible instruction. It can provide the variability needed to present ill-structured knowledge domains and to help students explore more than one perspective on a topic or issue. For example, hypertext systems provide a nonlinear, multi-dimensional medium in which to present complex subject matter that conventional systems (such as textbooks, lectures, etc.) lack. It is important, however, to keep in mind that conventional approaches may be very successful in the teaching of well-structured, simple subject matter. When the information is not simple and well structured, the power of ICT and the format of hypertext support a more flexible approach to instruction that some have called random access instruction (Spiro, et al., 1992). This allows the learner to access information as needed in any order pertinent to his or her needs.

Activation of Learning

Activation of learning and engagement of students with the subject matter content involves selective use of learning strategies to advance learning and enhance learning capability. Technology-enhanced student-centered learning environments do not, necessarily lead to learning efficiency or effectiveness. Indeed for some learners, such open-ended learning environments can be quite daunting, posing a real threat to their success and motivation to learn. While creating opportunities for learning, these open-ended learning environments also create demands on learners for new skills in managing complex information, and higher order cognitive processes. Being successful in such learning environments requires learners to possess the ability to organize, evaluate, and monitor the progress of their learning. Not all learners possess these skills, and have to be taught how to take advantage of the opportunities that technology-enhanced and open-ended learning environments afford (see Weinstein & Mayer, 1986; Jonassen, 1988).

A great deal of work has been done in supporting students' learning with various types of technologies in open and flexible educational settings (see for example, Bates, 1990, Collis, 1996, and Khan, 1997). These authors survey several technologies including: print, radio, audio-cassettes and the telephone, computer-based applications such as electronic databases and CD-ROMs, computer-mediated communication technologies including e-mail, computer conferencing, bulletin boards, electronic document exchange and transfer, audio and video conferencing, broadcast television, and the Internet. Many of these technologies are remarkably well suited for content delivery such as electronic databases and CD-ROMs. Many are especially suitable for engendering and supporting communication such as orbiting satellites for audio and video conferencing, computer-mediated communication for synchronous and asynchronous communication, and radio and television for mass communication. The Internet is able to support a variety of these functions including content delivery and communication.

While this is so, technologies for scaffolding student learning activity in open, distance, and flexible learning environments, both at the individual and the collaborative level are seriously lacking. Many of the fore-mentioned existing technologies are ideal vehicles for content delivery and supporting communication, but in themselves, they are lacking in the capability to "scaffold" student learning activity. A "learning scaffold" is best described as a "transitional support strategy or mechanism" which is put in place to guide student learning in desirable directions, or to enable the development of desirable cognitive skills in students. The expectation is that when the scaffolding (i.e., the transitional support strategy) is removed from the learning context, the targeted skills become part of a learner's repertoire of learning skills. Information and communciations technology affordances offer great promise in this regard to online learning.

Supporting Interaction and **Socialization**

There is evidence that social climate and the influence of peers is positively correlated with a range of learning outcomes (see Slavin, 1990; 1994). However, unstructured social contact and communication alone is not enough. Formal mechanisms such as cooperative and

collaborative learning practices have to be integrated into the teaching and learning transaction in order to benefit student learning in any significant way.

Students in open, distance and flexible learning environments who often work independently with self-instructional study materials, need help with organization and management of resources as well as the skills to critically reflect on information gathered independently and/or collaboratively. A considerable amount of work has gone on in supporting student learning with various types of cognitive tools and strategies in face-to-face technology-enhanced learning environments (see for example, Gordin, Edelson, & Gomez, 1996; Scardamalia, & Bereiter, 1994). Very little exists in the area of "cognitive support tools" for supporting student learning in open, distance and flexible technology-enhanced learning environments. Existing software-based cognitive tools provide support to students for learning in *face-to-face educational settings* where other forms of advisement and support are also available (see Scardamalia, & Bereiter, 1991; Schauble, Raghaven, & Glaser, 1993). These support tools help students organize arguments for presentation and also guide students in the cognitive processes associated with learning. They are however, less effective in *open, distance and flexible educational settings* where learners do not have access to additional advisement and support.

Work on developing scaffolds for student learning activity in open and flexible learning environments is built upon existing work on supporting student learning with various types of learning and study strategies (see for instance the works of Weinstein & Mayer, 1986; Schon, 1987, 1991; Candy, 1991; Schmeck, 1988). Weinstein and Mayer (1986) suggest that the development of learning strategies (for example *learning how to learn*) can influence learner characteristics. They argue that employing these strategies and methods can help with the cognitive process, which in turn affects learning outcomes. These authors have identified several categories of learning strategies, namely *rehearsal, elaboration, organizational, self-monitoring and motivational* strategies. These strategies provide a pedagogically sound framework for supporting *"learning how to learn"*, and it is suggested in this paper that they can also be used to guide work on scaffolding student learning in open, distance and flexible technology enhanced learning environments.

As part of our work on the design and development of open, distance and flexible technology-enhanced learning environments, we have been exploring both, the pedagogical designs and the technical architecture of a variety of these types of learning supports. Some examples of these are *comparison frames* to view content elements in relation to each other, *clusters* for organizing information or data by themes, *modeling and simulations* for exploring dynamic processes, and *chronological traces* for providing students with representations of their own actions. *Comparison frames* (an instance of an *elaboration* strategy) are particularly useful in areas such as medical and the biological sciences where open, distance and flexible learners are often faced with the lack of or no access to laboratories and equipment. Learners in such settings can observe cells and images of anatomical parts on a CD or the Web to determine unique characteristics and/or abnormalities without being disadvantaged due to a lack of access to laboratory facilities. *Clustering* (an instance of an *organizational* strategy) is useful for organizing data or information to draw out and represent meaningful relationships among them. *Interactive modeling and simulation* (instances of *elaboration* and *self-monitoring* strategies) are useful approaches to support tutorials in applied domains such as in mathematics as well as in the natural sciences. As part of this, concrete dynamic models with which the student can interact and experiment are used to represent abstract concepts. *Chronological traces* (an instance of *organizational and self-monitoring* strategies) allow students to observe their own actions and problem-solving behavior after they have reached a solution, and compare it with other solutions.

Assessing Learning Outcomes

A wide range of strategies may be applied to assess learner performance. The choice of these strategies will vary according to the intended learning outcomes and the learning tasks that have been prescribed. Assessing learning outcomes is concerned with determining whether or not learners have acquired the desired type or level of capability, and whether learners have benefited from the educational experience (i.e., if they have achieved the intended learning outcomes, and if their performance has changed in any way). A measure of learning outcomes requires learners to complete tasks, which demonstrate the extent to which they have achieved the standards specified in the learning outcomes. In order to ascertain the most realistic and valid assessment of performance, these tasks have to be as authentic as possible,

or as similar to on-the-job conditions. Methods of assessment can be classified as either criterion or norm-referenced (Grondlund, 1985). A norm-referenced measure compares a learner's performance with that of other learners in the cohort. A criterion-referenced measure, on the other hand, is targeted at the criteria specified in the learning outcome. Criterion-referenced measures require learners to demonstrate presence of learned capabilities at specific criterion levels.

Providing Feedback

Any learning and teaching transaction which views learning as a process of mutual influence between learners and their instructional resources must involve feedback, for without feedback any meaningful mutual influence is impossible. From a review of research on the effects of feedback generally, Kulhavy (1977) described four conditions of feedback namely: feedback is most potent when it corrects errors; the error-correcting action of feedback is more effective when it follows a response about which the student felt relatively certain; the effectiveness of feedback is enhanced if it is delivered after the learner has made a response; and feedback is more effective, when its availability in advance of learner response is controlled. Feedback is also distinguishable according to its content, which is identifiable by *load* (i.e., the amount of information given in the feedback from simple correct-incorrect responses to fuller explanations); *form* (i.e., the structural similarity between information in the feedback compared to that in the instructional presentation); and *type* of information (i.e., whether the feedback restated information from the original task, referred to information given elsewhere in the instruction, or provided new information). Furthermore, feedback may differ according to its intention, which refers to whether the feedback was designed to inform learners about the quality and accuracy of their responses, or it happened to be an incidental consequence of the instructional environment (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991). Intentional feedback can be delivered in a variety of ways. It may be delivered via direct interpersonal communication between instructor and learners, and also through mediated forms such as with innovative use of ICT (Schimmel, 1983). In any event, intentional feedback is highly specific and directly related to the performance of the task. Feedback differs according to its target. Some feedback may be primarily designed to influence affective learning capacities such as motivation. Others are designed to influence

the achievement of specific subject matter knowledge. Most commonly though, feedback is targeted at indicating how learners are performing specified tasks, and if they are correctly applying the learned principles and procedures.

Course Outline

The foregoing fundamental principles of elearning have been used to develop a ten-week online training course on the *"Essentials of eLearning"*. This course is a product of the collaboration of the Centre for Distance Education at Carl von Ossietzky University of Oldenburg (Germany), the Graduate School of the University of Maryland University College (USA), in assocation with NOKIA Human Resource Development Staff (see Figure 1). The course team responsible for the development and offer of the course comprises an international team of experts drawn from Australia, USA, and Germany.

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Figure 1: Essentials of e-Learning Solutions

Essentials of e-Learning Solutions

Duration of Study	Critical Content Covered	Questions and Issues for Your Individual Learning Log (Ask the Experts)	Critical Resources and Reading Material
Week 1	**Start-Up and Orientation** • Learning about the environment. • Getting to know the participants.	• Learning to use the technology. • Log-in, passwords, navigation etc. • What is the learning log and how do I use it?	• Instructions etc. available online. • Structure of the Learning Log.
Week 2	**Performance Problem and Learning Solution Analysis** • HR performance problem analysis. • Identification of e-learning as the preferred solution.	• What is the performance problem? • What is my learning goal and what are my expected learning outcomes? • Why is e-learning considered as the most appropriate solution for the identified performance problem?	• Organization's strategic plans and goals regarding HR and work performance. • Resource and enrichment material on the specific performance problem identified for this learning activity.
Weeks 3	**Designing e-Learning Solutions** • Selection of e-Learning media. • Pedagogical foundations of e-learning. • Examples of good practice.	• What is e-learning, what are its attributes? • What are the unique considerations of designing instruction for e learning? • What pedagogical models are particularly suited for e-learning solutions?	• Reading material on e-learning, its attributes, and suitability for the identified performance problem. • Reading material, which summarizes the pedagogical foundations of e-learning.
Weeks 4	**Subject matter representation** • Enabling flexible access to conent	• How can e-learning technology help present subject matter content?	• Reading material on resource based learning, hypertext and hypermedia.
Week 5	**Activation of learning** • Developing learning capability	• How can e-learning technology help engage students?	• Reading material cognitive flexibility theory.
Week 6	**Supporting interation and socilization** • Building a community of learrners	• How can e-learning technology help encourage interaction between and among students?	• Reading material on computer supported collaborative learning (CSCL).
Week 7	**Assessing learning outcomes** • Makins assessment more authentic	• How can e-learning technology hlep assess learning outcomes?	• Reading material on innovative approaches to assessment online.
Week 8	**Providing feedback** • Providing meannigful feedback.	• How can e-learning technology help rpovide feedback to students?	• Reading material on innovative approaches to providing feedback online.
Week 9-10	**e-Moderation and Provision of Support** • Strategies for supporting learners. • Proven approaches and steps in the process.	• What is meant by "e-moderation"? • What does e-moderation involve, and why is it so important? • What are the strategies and steps in the process?	• Reading material that describes e-moderation, highlights the steps in the process, and also discusses some powerful e-moderating strategies.