The Metamorphosis of eLearning

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BACKGROUND It would seem from listening to educationalists discussing their eLearning preparations that the approach to online learning has undergone some kind of mystical transformation. From all accounts, unless learning materials are online they should be thrown out with the bath water (so to speak). However, listening to novice learners talking about their experiences with Web-based learning products, it is pretty apparent there is quite a considerable gap in their expectations relating to what they feel technology is capable of doing, and what is actually occurring. The task ahead for courseware designers is to fill this gap (Bush, 2002). Appropriate leadership is required to realize the rich potential that techno-educational materials can provide (Maddux, 2002).

It would seem that a common fault with much of the discourse on eLearning to date is that it remains limited to the human-computer interaction (HCI) aspects. Unfortunately, this tendency narrows the focus of the debate, leaving out one of the most important issues relating to courseware development: the original instructional design principles. It is essential to look beyond software/hardware management and deal with the difficulties relating to maintaining the integrity of the learning activities per se. A common fault with current courseware designers is that they are not learning from past mistakes (Salomon, 2002). Of particular importance is to deal effectively with the information that is central to each particular eLearning event. This paper will acknowledge the need to differentiate the learning event as between training and knowledge management.

The discussion path of this paper takes the reader through a progression of technological concepts, beginning with a brief examination of some of the commonly held beliefs about eLearning, to identify a significant gap in expectations experienced with Web-based courseware by so many novice learners today (Quigley, 2002). Learning integrity is then raised as another vexing issue; do Web-based courseware designers deal effectively with the information that is central to each learning event? Finally, the paper suggests holistic strengths of eLearning in terms of experiential learning events, with an emphasis placed on the positive social aspects of community learning.

STATUS QUO Many different voices are now heard in the literature; confusion abounds especially in relation to the eLearning environment (Preece, 1994; Miller, 2000; Schank, 2002). Firstly, there is the operational aspect of dealing with the implementation of successful

Web-based courseware (Flicker, 2002). On the one hand, despite widespread use and growing popularity of eLearning, computer-based instruction (CBI) is still on trial (Gibbons & Fairweather, 1998). While Webcasts can effectively transmit training events to many distributed learners, offering a comprehensive range of tools like discussion boards, conferencing, screen sharing, and white-board demonstrations (Horton, 2000), where is the common ground? What can we be sure of? Secondly, there are the theoretical aspects of the eLearning context, which are almost as confusing as the previously mentioned operational elements. While there are no instances emerging from pure research dealing directly with eLearning, some researchers agree on the importance of the constructivism and social cognition (Hung & Nichani, 2001); there is the equal but opposite view that knowledge can be engineered through intelligent agents (Lopez, 2001).

There is an emergent literature on the topic of CBI and designing online learning systems (Gery, 1987; Horton, 2000; Khan, 2001). Nevertheless it will only be through targeted research that it will be known with any certainty whether Web-based learning gives rise to a new type of learning dissonance. It has been proposed that converged theoretical paradigms that underpin particular digitised or context-mediated learning systems are forcing learners into new ways of thinking (McKay, 2000a). In a sense, the combination of theoretical perspective and electronic communications technology fosters a mentality that Web-based learning will supply a learning-on-demand or a just-in-time approach.

The Web-based learning environment should be about providing open, flexible, and distributed learning environments (Laurillard, 1993). However, without adequate learning management processes embedded within the courseware, this type of distributed learning experience will remain just that—distributed (McKay & Martin, 2002).

EXPECTATIONS This paper is describing the gap in a novice learner's expectations in these terms: Students report dissatisfaction in eLearning platforms because learning online does not provide them with an ability to manipulate and directly interact with the materials (see http://www.othermedia.com/blog). Credibility checks of the courseware designer are often difficult to locate in online learning sites. This surely does not engender a sense of comfort for the student. Furthermore, there is a distinct lack of certification processes to reassure students that the eLearning materials have undergone sufficient quality testing. One such Website providing training for this type of certification testing can be found at http://www.brainbench.com; unfortunately these programmes do not extend to online and/or computer-based educational materials.

Online educational programmes can however ignite a learner's imagination. In some cases research shows that students who have participated in online learning at higher levels than in their more traditional classroom sessions record the highest levels of perceived learning (Fredericksen, et al., 2000). However, this experimental research also reveals that in the absence of a structured classroom environment, courseware developers need to be aware of the expectation that learners will take a more active role in

their own learning. As a consequence, the instructional strategies adopted for online education must be made crystal clear to the learner and facilitator alike. Web-based courseware designers must assume nothing; all types of questions from learners should be anticipated and answered by the facilitator in a friendly, non-judgmental manner.

On the surface, technological access to learning facilitation appears to offer increased benefits. There is an assumption that in Web-based courseware the students and instructors are somehow brought together (Quigley, 2002). To cope with techno-instruction, higher-order skill sets are required on the part of the students, including: knowing how to update personal skills when required by the instructional media, ability to use a range of thinking skills, transfer collaborative learning in the real-world into the classroom environment, and a willingness to engage in agile and flexible learning models (Cadena, Smith, & Shelley, 2002).

However, most of the instructional material on offer today is text-based, with an emphasis on asynchronous discussion forums, where questions and answers are posted online for all participants to view and become involved. While this type of learning experience may have its place in techno-pedagogy, it can become extremely frustrating for a novice learner wishing more immediate feedback.

It would appear that learners have been tempted by the possibility to engage in a more visual instructional environment than commonly offered by the traditional approach to classroom experiences. The eLearning community is currently demanding more from technology than can be delivered (Quigley, 2002). Shimmering on the horizon are things like the teleportation of a facilitator, providing a life-sized representation of a facilitator complete with the ability to eye-ball participants, with life-like body language responses. Sadly, this type of learning context will not be available for the majority of learners. Costs are immense; ISDN and broadband networks are needed for successful implementation. Clearly, enhanced techno-learning environments such as this will remain beyond the reach of most individuals for quite some time to come.

Herein lies a dilemma for those taking up the development of content for a new eLearning project or embarking on a venture to convert existing instructional materials represented in a traditional text-based orientation to a Web-based learning programme. Courseware designers need to have their feet planted firmly on the ground. While dealing with the temptation of installing these new technologies, they also need to keep abreast of the emerging strategies from the instructional science paradigm. One advantage of the push towards increasing the uptake of eLearning is the growing awareness for sound instructional design principles (Gibbons & Fairweather, 1998).

LEARNING INTEGRITY There can be no doubt that the Web-based environment is highly visual, and appears to lend itself towards graphical simulations. Consequently, novice-courseware designers may be tempted to over-utilize the visual nature of CBI materials (Ausburn & Ausburn, 1983). A difficulty with this misconception is that most individuals are not necessarily visually literate (McNamara, 1988; McKay, 2000b). This

position has not really altered much with the advent of multimedia.

Courseware design is complex. To facilitate eLearning, the representation of the subject matter or learning content should be uppermost in the development of new eLearning materials (or conversion of existing non-Web-based learning components). Sadly, often this is not the case (Merrill, 2000, 2002). A number of models to support eLearning are emerging through the literature:

Coalition for self-learning (Miller, 2000). A number of different self-organizing models are emerging through this merger of like minds, identified as a social phenomenon. In many cases the instigators have never met face-to-face. The most prominent feature of these models is the emphasis given to the importance for lifelong learning.

Learning by doing (Schank, 2002). The corporate sector are caught in the dilemma where profit margins dictate their training model decisions (Flicker, 2002). Therefore their programme evaluation rules are often preset according to time, cost, and availability of resources.

Hypertext and hypermedia systems (Preece, 1994). The idea behind this approach is to provide a navigation tool through predetermined Websites. The primary context of these types of eLearning models is to deliver a meta-database resource. The concept is not new; it was identified over fifty years ago, long before the advent of Web technology.

Collaborative and situated learning models (Preece, 1994). These models reflect very different characteristics. In the first instance, there is an emphasis placed on the encouragement towards social interaction in the assumption that learning and conceptual change will occur. Whereas the latter recognises that learning/instruction must occur in the form of a type of experiential learning or apprenticeship. For example, hairdressers are required to undergo a substantial work experience component of their study to qualify. These two distinctly different models do have a common thread; they both rely upon the community knowledge (Preece, 1994), sometimes referred to as professional practice being shared (collaborative learning).

To understand how complex the eLearning environment has become, it is helpful to consider the suggestion from cognitive psychology that mental models consist of two major components: knowledge structures and mental operations (Merrill, 1994). Therefore, careful analysis of the learning content is required to establish a comprehensive instructional structure to identify and support the external representation of knowledge (the knowledge object) and the required internal representation (designed to encourage correct mental models) (Merrill, 2000, 2002).

As a consequence of this distinction, attention must turn towards the age-old pursuit of knowing how to look at the different aspects of knowledge itself. However, this part of the discussion is just the tip of the proverbial iceberg. Knowledge features in a myriad of formats across a wide range of literatures, and is heavily contextual. This contextual dimension extends not just to the subject or professional context or to specific organisational settings, but also to individual circumstances. One

person's knowledge may be another person's information. Before fully understanding how to define types of knowledge, it is necessary to differentiate between the basic concepts of information and knowledge. One definition that involves both concepts holds that information is a flow of messages, while knowledge is created and organized by the very flow of that information, anchored on the commitment and beliefs of its holder (Nonaka, 1994). Indeed this distinction between information and knowledge continues to be a feature of the relevant literatures (McKay & Martin, 2002).

Knowledge, however, has been identified by the instructional science paradigm as concrete or declarative (knowing the specific facts and rules), and abstract or procedural (knowing how to apply declarative knowledge in new situations) (Gagne, 1985). More recently, it was proposed that there was enough evidence from linguistics and psychology to conclude that people construed many concepts in terms of metaphor; and called for more research to see if, when, and how certain concepts were metaphorically represented (Gibbs, 1996). While defining knowledge acquisition strategies through Web-mediated learning/instructional environments, things become quite complex. There can be no doubt that introducing multimedia in education and training per se brings forward additional variables for educational researchers to unravel (audio, colour, and movement). This richness of Web-related media however should not lessen the requirement for sound instructional design.

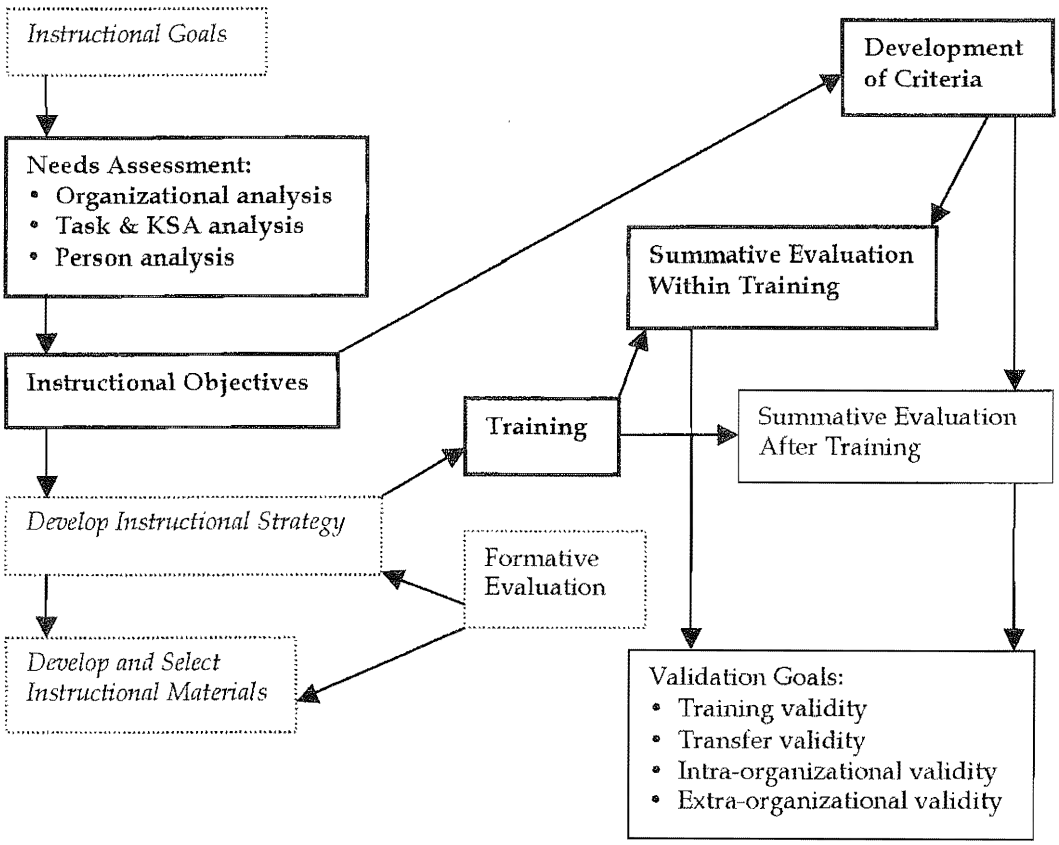
Researchers have refined their attitude towards the relationship between knowledge and learning since the 1960s. For instance, a comprehensive schema acts as a basis for classifying types of learning: "Knowledge is 'information stored'—it is something an individual possesses. Either he has it, or he has not—a go/no-go quality. Individuals differ in the quantity of knowledge that they possess" (Romiszowski, 1981, p. 267).

Training and Knowledge Management

The whole notion of eLearning is being questioned (Reeves, 2002). To improve the existing gap in novice expectations of eLearning products, it is important to clarify the special type of learning event positioned between training and knowledge management. It is proposed that unless courseware designers are able to differentiate the difference, their instructional models will not be effective.

For that reason, to understand the definition of training as an instructional process, it is necessary to draw on two classic models (Kraiger, 1995–1996): Dick and Carey's instructional design (ID) model (1990) and Goldstein's industrial/organizational (I/O) model (1993).

Figure 1: A training process model: Hybrid of two classic models (Kraiger, 1995-1996)



Instructional goals: The function of goal analysis is to define the indefinable. The instructional goal can be presented as an umbrella statement. Difficult as it may be at times, it is possible to describe the essential elements of abstract states. This means to identify and describe the main performances that go to make up the meaning of the goal (Mager, 1988). For online learning these instructional goals may be thinly veiled at best, or completely missing.

Needs assessment: The instructional design process will commence with an identified gap between what is and what should be. Typically when needs assessments are conducted, instruments should be developed to collect data from the learners. It is vital that the learner's opinions are taken into account (Dick & Carey, 1990).

Instructional objectives: Sometimes referred to as performance objectives that detail what the learner can be expected to be able to do when they complete a unit of instruction. Dick and Carey describe three components of an objective. The first describes the skill or behaviour identified in the instructional analysis. The second is the description of the conditions that will prevail while a learner carries out the task (use of extra

technology permitted, etc.). The third describes the criteria that is to be used to evaluate the learner's performance on the objective; this may be expressed for instance with a range of acceptable answers or behaviours.

Instructional strategy: Instructional design strategies involve the arrangement of content elements and other information to facilitate learning. Although there are strategies that may inhibit learning (loading complete textbooks onto a Website!), there are a number of exciting strategies upon which the eLearning environment can draw. Technology provides the courseware designer with many opportunities to include instructional strategies, which involve the mixing of generality-examples (those which depict a given concept to be learned well) with example-poor or non-example concepts (specially devised to mark incorrectness) (Merrill, 1994).

Development of criteria: In specifying an instructional objective, the criteria used for judging acceptable performance of the skill in question should also be identified. Special attention should be given to the nature of the task to be performed. For instance: how many times the task should be performed, how many correct items to be completed, and similar mastery statements.

Training: An effective training programme is one in which individuals will learn relevant knowledge, develop associated skills, and possess an attitude to perform particular tasks (Gagne, 1985); along with this is an expectation they will also be capable of transferring these trained tasks to the work situation or to transfer the newly learned skill to a different environment.

Summative evaluation within training: This is intended to provide a grade (Lefrancois, 1991), and is usually conducted during the training event. Often the result of the summative evaluation is provided to the learner as a feedback mechanism to generate an improved performance.

Summative evaluation after training: The notion of conducting this type of evaluation is to provide the organizational stakeholders feedback as to (cost) effectiveness of the training session and/or of participant skill development rates (Kraiger, 1995–1996).

Formative evaluation: Essentially this type of evaluation is to provide a diagnostic tool of the training process. Formative evaluations are usually conducted after the completion of the instructional event (Lefrancois, 1991).

Validation goals: This component is included in this model to emphasize the importance of decision-making to the evaluation process. This inclusion provides a clear set of objectives concerning whether learning during transfer should generalize and, moreover, to what extent and how it may be applied in real-world contexts (Kraiger, 1995–1996).

Even within the instructional science paradigm there are differing voices. Figure 1 illustrates these differences representing the combination of both the Dick and Carey and the Goldstein models. Notice the bolded textual boxes represent common elements; while the italicised boxes indicate Dick and Carey's, the unaffected textual boxes depict the Goldstein I/O model. Although both models recognize the importance of conducting the primary

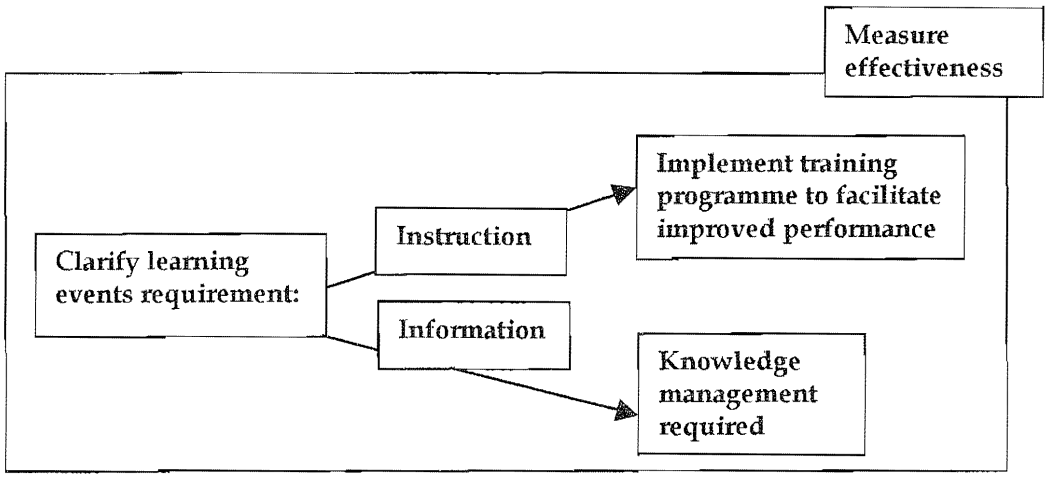
steps in the instructional process, each model advocates quite different ways to carry out that step. The essence of this approach to training can be seen in the emphasis placed on the commitment of available resources, and that the organizational context is stable, at least until the training is implemented (Kraiger, 1995-1996).

When preparing Web-based instructional materials, it would seem that many novice courseware designers proceed without the benefit of really defining the type of learning needed (Rosenberg, 2001). For instance, whether instruction is required for upgrading skills/performance, or whether there is simply a need to disseminate information (see Figure 2).

A major portion of material written about eLearning does not make this distinction clear enough. Perhaps the confusion relates to the linguistic effects of distributed cognition (Salomon, 1993) that has occurred over time. Because of this, there is a real risk of losing the richness of the eLearning phenomenon if our comprehension is deferred to the literal translation. In other words, anything that is online (computerized) and involves digital technology, or can be described as electronic delivery of learning experience, will be considered eLearning. Consequently, if courseware designers misjudge the perils of distributed cognition in relation to eLearning, their courseware will reflect nothing more than an electronic version of the printed version.

Instead there should be considerable discussion on the wider translation of the term "eLearning." One author describes eLearning in terms of the need to differentiate the learning event as between training and knowledge management (Rosenberg, 2001). Furthermore, enduring courseware should entail instructional strategies that are clear on the *why to do it*, and not just the *how*.

Figure 2: Online training vs. knowledge management



To this effect any learning requiring instruction belongs within the training domain, while informational requirements require a knowledge management approach. Courseware designers should, first, examine the learning goals and expected performance outcomes; and, secondly, decide on an instructional strategy to achieve the instructional objectives. The last but not at all the least important element of an effective eLearning event is the measurement strategy that must be installed to measure the effectiveness of the event. The challenge, however, is to identify and distinguish between the need for instruction (online training) and information (knowledge management), and to understand how they work in tandem (Rosenberg, 2001).

EXPANDED HORIZONS

The most exciting aspect of eLearning surely is not found in the plethora of Web-based training programmes installed for common use (Moe, 1999), nor is it the capacity for the global information revolution; it is more to do with opportunities for completely new ways of thinking (Miller, 2000). Never before in the history of mankind has there been such an enriching opportunity. The real excitement surrounding eLearning is more to do with the capacity for encouraging networks of learning, through collaborative experiential learning events (Bhattacharya, 2000; Garner, 2001; McKay, 2001; Kommers, 2001; Okamoto, Kayama, & Cristea, 2001). This learning can take various forms, from vocational and formal, to the less formal where individuals learn through their work places (Wheeler, 2001), or the learning which takes place in everyday experiences.

Moreover, eLearning places collaborative experiential learning in the foreground of human endeavour (McKay, 2001). Not so long ago students placed limited value on social functions with either fellow students or academic staff (Kember, 1995). Experiential learning events describe the process of lifelong learning, which for some individuals is endless; surely the eLearning environment adds to this quest. Finally, the social aspects of community learning are enhanced by the sense that the notion of community is not necessarily forced on an individual. Rather within the eLearning environment an individual can participate as an extended family member where caring, belonging, and deep association link family members with the world outside of it, making life not only possible, but enjoyable (Ellis, 2000).

CONCLUSION

This discussion paper progressed through eLearning concepts, briefly examining some of the commonly held beliefs about Web-based instruction. An expectation gap was identified with learners' attitudes over what they feel technology should deliver, and what the reality currently is (Quigley, 2002). Learning integrity was raised as a crucial instructional design issue, leading on to an acknowledgement that eLearning designers should address the different types of learning requirements, namely training and information management. Holistic strengths of eLearning were discussed in brief, in terms of collaborative experiential learning events and the social aspects of community learning. The final word must be to propose that successful Web-based courseware designers need to think outside their square, to blend learning opportunities into collaborative interactive

opportunities that draw on the richness of offline socialization and non-technocratic life events.

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