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# Trends in Online Learning and Their Implications for Schools

Cher Ping Lim

The field of online learning is an ever-improving art and science. There are many lessons that schools can learn from the online learning industry. Over the last five years, the industry has learned to separate technology from methodology and to channel more resources into instructional designs and approaches. Every few months, a new trend hits the online learning industry in corporations around the world. This article aims to place three interrelated trends (reusable learning objects, blended learning, and instructional design) in online learning within the context of schools and their implications for schools. These implications include the need for schools to coordinate and collaborate in the creation of learning objects; to adopt a learning management system that searches distributed catalogues of learning objects; to acquaint teachers with instructional design principles; to redefine the roles of students and teachers; and to reassess the curriculum and mode of assessment.

In the history of mankind, technology has always been an agent of change. Major technological innovations, such as photography, the electric light, locomotives, and movies, have resulted in entire paradigm shifts. They have made sweeping changes in the way people work and play. The Internet has already changed the way people communicate and do business, and more recently, it is poised to bring about a paradigm shift in the way people learn. Important changes are now taking place in the way educational materials are designed, developed, and delivered to those who wish to learn. A recent headline in CNET News stated "E-learning companies continue to be teachers' pets on Wall Street, even during the economic downturn that has slapped failing grades on other technology start-

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ups" (Konrad, 2001). In fact, it is reported that the online learning industry in the United States is expected to grow from \$6.3 billion in 2001 to more than \$23 billion in 2004, due to two main thrusts: cost-effectiveness and the growing demand for continued professional development. Such reports make us wonder: When will online learning become awesome in schools?

The field of online learning is an ever-improving art and science. There are many lessons that schools can learn from the online learning industry. Over the last five years, the industry has learned to separate technology from methodology and to channel more resources into instructional designs and approaches. Every few months, a new trend hits the online learning industry in corporations around the world. This article aims to place these new trends in online learning within the context of schools. We have to be aware that the value of online learning does not result solely from the technologies, but rather, it depends considerably on the instructional approaches adopted. The discussion in this article provides "food for thought," as it sensitizes us to the implications of the new trends in online learning for schools. However, based on one's own experiences, the reader will have to build the connections of whether and how the discussion fits the situation in which he or she works.

## What Is Online Learning?

Before discussing new trends in online learning, it is appropriate to explore the characteristics of online learning, and establish what it is in the context of schools. The following four characteristics of online learning are first identified and discussed:

- Online learning is about the learning processes mediated by network technologies.
- Online learning is about making possible successful knowledge management to leverage the intellectual capital of the learning environment.
- Online learning is about harnessing the strengths and addressing the weaknesses of network technologies to create a conducive learning environment.
- Online learning is about providing interactions among the students and their communities to build and share knowledge. (Lim, 2001a)

## Mediation of Learning by Network Technologies

There is a need to separate technologies from pedagogies. For decades, educators, administrators, and researchers have been lured into the fantasy that radio, television, videotapes, etc., were going to take over the human instructor or other traditional media. In 1922, Thomas Edison predicted that the motion picture was likely to supplant the use of textbooks. As we know,

such optimistic predictions were shattered by subsequent media-comparison studies that failed to prove that any one medium was superior to another. Everything depended on the *context* of how the medium was used. Online learning in schools must then be about *learning processes mediated by network technologies*.

### Successful Knowledge Management

Even if online learning is considered as a process, it is easy and inaccurate to confine one's perception of online learning to giving students greater access to more up-to-the-millisecond information, faster, more conveniently and attractively. A simple declaration by M. David Merrill (1996) about the inadequacies of online learning that "information is not instruction" was quoted by *Training* magazine as "the most profound statement uttered in the learning community in the last 10 years" (Kruse, 2000).

With so much information, schools need to guide students to search for and synthesize information, and make meaning from large bodies of diverse information. Craig (1996, p. 8) warned us, "let me remind you that information is not knowledge, knowledge is not wisdom, and wisdom is not foresight. Each grows out of each other, and we need them all." Online learning, then, must be about making possible successful knowledge management to leverage the intellectual capital of the entire learning environment—online or face-to-face.

### Harnessing the Strengths and Addressing the Weaknesses of Network Technologies

All too often, online learning courses have attempted to replace traditional learning and teaching media without much thought given to their underlying pedagogical principles. For example, from lecturing in an auditorium to a videotaped lecture streamed via Internet, everything else is held constant. Or from carrying out a simple experiment that makes use of easily-accessible tools to the same experiment carried out with computer simulations resulting in the loss of authenticity. Without considering the lesson objectives, learners' needs, and the strengths and weaknesses of each medium, online learning courses may adversely affect the learning experiences of students, rather than being helpful. Online learning, then, must be about harnessing the strengths and addressing the weaknesses of network technologies to create a conducive learning environment.

### Interactions Among Learners and Their Communities to Build and Share Knowledge

Many online modules tend to emphasize the interactions between the computer and the learner. These interactivities are often seen as control over pace, choice of activities, and sequences, and may not

necessarily bring about learning. The learning of an individual student is the outcome of the interactions with his or her community. This community consists of classmates and schoolmates, teachers, school administrators, peers, parents, etc. Such interactions promote the creation of lifelong learners who collaborate with other students and teachers within the online learning context to build and share knowledge. The interactions may be synchronous or asynchronous, where students and their learning communities can assemble virtually, across time and space, to engage in and extend the powerful dialogue of learning. Online learning must then be about providing the interactions among the students and their communities to build and share knowledge.

### Questions/Issues

The discussion so far has established what online learning is and what it must be about. It raises some questions and issues for schools to think about when they integrate online learning components into the curriculum:

- Does the online component emphasize using the network technologies to mediate the learning process?
- Does the online component focus on knowledge management rather than information provision?
- Does the online component harness the strengths and address the weaknesses of network technologies?
- Does the online component provide interactions among students and their communities?

### Trends in Online Learning

With a conceptual anchor of what online learning is and the issues involved, let us move on to explore current trends in online learning. In this article, three of these interrelated trends and their implications for schools are explored and discussed:

- Reusable learning objects
- Blended learning
- Importance of instructional design

### Reusable Learning Objects

Learning objects may be termed as "instructional objects," "educational objects," "knowledge objects," "intelligent objects," or "data objects." In this article, learning objects are defined as any digital resources that can be reused to mediate learning. Gerard (1969, pp. 29–30) in a surprisingly visionary statement early in the history of computer-based instruction, describes how "curricular units can be made smaller and combined, like standardized Meccano [mechanical building set] parts, into a great variety of particular programs custom-made for each learner." Thirty years later, the practicality of this idea is becoming apparent.

This trend leads to the next-generation of instruc-

tional design, development, and delivery, due to its potential for reusability, adaptability, generativity, and scalability. Reusability is the fundamental idea behind learning objects: small instructional Web-based components are reused in different learning contexts. Adaptability refers to the individualization of instruction, where the online learning system makes decisions about the nature of the subsequent events (linking to instructional objects) to be used in the student's learning, based on a set of response-dependent rules. Generativity refers to the ability of the online learning system to create instructional messages and interactions by combining reusable instructional objects and interaction elements, rather than by storing pre-composed messages and interaction logics (Gibbons, Nelson, & Richards, 2000). Scalability refers to lower development costs, where online learning systems make use of learning objects through a number of mechanisms: "reusability, standardized connectivity, modularity to optimize transmission from central stores, and standardized manufacture" (Gibbons *et al.*, 2000, p. 11).

The rationale for the use of reusable learning objects in learning is well justified by tracing the process of teachers preparing lessons. When teachers first gain access to instructional materials, they often break the materials down into their constituent parts. They then reassemble these parts in ways that support their individual instructional goals (Reigeluth & Nelson, 1997). If teachers received instructional resources as individual components, this initial step of decomposition could be bypassed, potentially shortening course development time and affording collaboration among teachers. Moreover, they offer prescriptive, dynamic learning for students within their time frame for learning.

A metaphor can be used to communicate this basic idea and put a familiar face on this trend. The metaphor most commonly used is LEGO, i.e., creating small pieces of instruction that can be assembled (stacked together) into some larger instructional structure (castle) and reused in other instructional structures (spaceship, for example.). But this metaphor makes assumptions that (1) any LEGO block is combinable with any other LEGO block, (2) LEGO blocks can be assembled in any manner you choose, and (3) LEGO blocks are so much fun and so simple that even children can put them together.

However, these assumptions do not hold in the instructional design of online learning. It is naïve and simplistic to assume that each and every learning object is compatible (or combinable) with every other learning object. It also assumes that anyone should be able to open a box of learning objects and have fun assembling them with their three-year-old. There is then a need to use a different metaphor, of atoms: (1) not every atom is combinable with every other atom;

(2) atoms can only be assembled in certain structures prescribed by their own internal structure; and (3) some training is required in order to assemble atoms.

Each atom is made up of smaller bits (neutrons, protons, electrons) that are combined in a particular manner. The structure of the combination determines what other structures the combination is compatible with. That is, a learning object may be combined into structures that promote one learning object's combination with a second, while the same structure prevents the first object's combination with a third. Therefore, it is obvious at this point that a person without understanding of instructional design has no more hope of successfully combining learning objects into instruction than a person without an understanding of chemistry has of successfully forming a crystal. The issue of instructional design will be tackled later in this article.

Some examples of reusable learning objects include simulation-based objects using applets, video-based objects, and text-based ones. Below are some Web-links for the different types of reusable learning objects:

- <http://www.learnactivity.com/html/rlo.htm>—simulation-based objects for exploring right-angled triangle, Ohm's law, and probability.
- <http://eduWeb.nie.edu.sg/istream/Video/ITinSchool/Sec/SecVideoS1.htm>—a video-based object for demonstrating the management of a computer-based lesson.
- <http://eduWeb.nie.edu.sg/programme/pgdes/ped513/Session%205/Science%20Lesson%20Plan.doc>—a text-based object of a computer-based science lesson plan on the transfer of heat.

The size of reusable learning objects poses a trade-off between the possible benefits of reuse and the expense of cataloguing. In order to ensure that these objects are searchable, there is a need to consider their metadata, i.e., 'data about data,' the descriptive information about a resource. It allows one to locate the item very quickly without investigating all the individual items through which one is searching. Most metadata created include title, author, subject, topic, version, and format. It may consist of filling out a form of 20 odd fields, such as "Semantics Density." However, there is a need to focus more on the instructional design information, such as objectives, target audience, approaches, types of multimedia elements, etc., to support the decision-making process (Schatz, 2000). This again reinforces the earlier discussion that instructional design must play a larger role in the applications of learning objects, if they are to succeed in mediating learning.

### Blended Learning

"In a recent review of several corporate e-learning strategies, we were struck by the absence of the mention of the classroom....There are key ways in

which technology can extend the footprint and impact of the classroom. And there are similar needs to leverage classrooms, in old and new formats, to extend the power of Web-delivered training and learning resources. Caution!!!” (Masie, 2001). The idea here is that instructional designers should review a learning program, chunk it into modules, and determine the best medium to deliver those modules to the learner. They may include:

- Traditional classroom or lab setting
- Reading assignments
- CD-ROM
- Stand-alone online learning
- Asynchronous online learning
- Synchronous online learning

Blended learning is not a new concept in education, especially distance learning. For the last three decades, traditional distance education programs have been using face-to-face seminars to augment individual distance learning components that provide materials and support to learners at a distance. This iterative process of coming together for brief periods and then working individually has provided an effective learning environment (Richardson *et al.*, 1987; Scanlon & O’Shea, 1992). The introduction of Internet technologies has been a positive leap in the mediation of such blended learning experiences, both in school-based and distance education (Bonk & King, 1998; Ragan, 1998). However, in order to apply the concept of blended learning successfully with online learning components, there is a need to consider the strengths and weaknesses of both face-to-face learning and online learning.

Face-to-face learning allows for maximum interaction and collaboration among the students, and between the teacher and students (Bloom, 1984). These intensive intellectual participations by the teacher and students promote the guided construction of knowledge that is the very essence of the learning process based on Vygotskian and Deweyan traditions. Besides the guidance of students in knowledge construction, face-to-face learning offers an adaptive environment. The teacher may diagnose and treat misconceptions, and build on the unique characteristics of individual students to inform further actions (Driver, Asoko, Leach, Mortimer, & Scott, 1994). Moreover, students may make contribution to other students’ learning processes by providing hints, advice, feedback, correction, evaluation, and encouragement (Lim, 2001b). Although online learning may provide an interactive and adaptive learning environment mediated via asynchronous and synchronous communication tools, it can never duplicate such an environment to the same degree as that provided by face-to-face learning.

The main selling point of online learning is its anywhere/anytime nature, wherein it is possible for

students to access online courses anywhere and at any time. This provides opportunities for students to engage in active and independent learning. In contrast to face-to-face learning, online learning allows students to learn at their own pace and to make decisions about what sections to study and what learning paths to follow based on their learning styles. This may empower them to take responsibility for their own learning processes. This assumes, of course, that the learners are able and willing to do so, which is not a valid assumption with some students.

The asynchronicity of online communications allows students opportunities to reflect on the topics or issues discussed. Reflection encompasses processes such as integrating and accommodating new information, planning immediate and long-term goals, evaluating current actions against feedback and goals, and relating all of these to the structure of the whole (Gagné & Driscoll, 1988). Discussion boards/forums, e-mail discussions, and file-sharing provide these opportunities, which may be lacking in many face-to-face learning environments.

It is only with the understanding of the strengths and weaknesses of face-to-face and online learning that the potential of blended learning is optimized. It keeps educators clear of the pitfall of adapting methodologies to fit the available Internet technologies, at the expense of effective pedagogical practices. However, understanding the strengths and weaknesses of each medium is only the necessary condition for successful blended learning. A good foundation in instructional design is the sufficient condition. In order to design instruction, teachers need to understand and apply basic instructional design principles to take up the opportunities and address the limitations of each medium.

### **Importance of Instructional Design**

The discussion of the two trends has emphasized the importance of a sound underlying instructional design. Like any other instructional technology or approach, reusable learning objects and blended learning must participate in a principled partnership with instructional design theories if they are to be effective in mediating learning. Instructional design theory is a set of prescriptions for determining appropriate instructional strategies to enable learners to acquire instructional goals (Merrill, 1996). Therefore, instructional design theories provide guidance in developing and using the learning objects, and adopting and blending the mediums for a given set of learning objectives based on needs analyses.

Although there is a difference between instructional design theories and learning theories, good instructional design starts with an understanding of how people learn—from behaviorism to social constructivism. Instructional design combines an understanding

of learners with an analysis of the desired learning outcomes in order to develop an instructional strategy. By doing so, it is possible to link the practices of instructional designers with new design constructs implied by current views of instruction that are shifting toward student-centered, situated, problem-based, and model-centered learning experiences.

A generic instructional design process consists of five phases: Analysis, Design, Development, Implementation, and Evaluation. These phases are not discrete ones, but rather, they overlap with one another. For example, formative evaluation is carried out alongside the analysis, design, development, and implementation phases. The analysis phase is the foundation of the instructional design process, as it identifies and analyzes whom the learners are, what is to be learned, when learning will occur, and where the learning will take place. The design phase is driven by the products of the analysis phase and ends in a model or blueprint of the learning program for future development. This blueprint includes entry behaviors, learning objectives, learning steps, performance tests, and structure and sequence of the program (Reigeluth, 1983).

The development phase then elaborates and builds on the learning objectives that are produced in the design phase, and the end result is the completed learning program. The implementation phase includes a management plan for the conduct of the learning program and the conduct of the program itself. The evaluation phase is ongoing throughout the entire instructional design process. That is, it is performed during the analysis, design, development, and implementation phases. The process determines the value and effectiveness of a learning program. It uses assessment and validation tools to provide data for the evaluation (Reigeluth, 1983).

This five-phase process provides a guide for how to achieve the goals of the learning program. It is situational rather than universal, and practitioners are expected to generate their own design theories for their own situations to attain a given goal in a learning program. When practitioners generate their own theories, especially working in collaboration with the theorists, the dichotomy between theory and practice is addressed (Wilson, 1997, p. 23). With an understanding of the instructional design process and how the different theoretical perspectives of instructional design offer different types of tools for facilitating different types of learning, practitioners of online learning may then take up the opportunities provided by current trends and their online learning tools.

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### Implications for Schools

The impact of these trends on schools will be in line with the paradigm of "advancement of all"—on helping everyone to reach their potential. These include a shift

from standardization of learning programs to customization of programs to meet individual learners' needs; a change in roles of learners from passive to active, where there is shared initiative, control, and responsibility in the learning environment; and a reconceptualization of learning activities from decontextualized to authentic and meaningful. This paradigm shift toward learner-centeredness and constructivism brings about important implications for schools:

- More coordination and collaboration among schools is required in the creation of learning objects. These learning objects will be template-based, and created in smaller chunks and reusable formats to be shared among schools.
- Schools have to adopt learning management systems that search vast local or distributed catalogs of learning objects. This will require authoring tools that operate across platforms to build learning systems.
- Teachers need to be acquainted with basic instructional design principles. In order to combine and contextualize learning objects in their online components, and to complement these components with face-to-face ones, teachers must be grounded in sound instructional design principles.
- The roles of students and teachers will have to be redefined. Students will no longer be treated as passive receivers but active learners who are accountable for personal progress and time management. Teachers will no longer control via adult status, but by appropriation and negotiation. Such a shift in paradigm ensures the openness of the teachers and students to present trends in online learning, and hence, will bring about a more successful integration of online learning in schools (Lim, in press).
- The curriculum and mode of assessment have to be reassessed. The curriculum and mode of assessment have to be consistent with the new paradigm. Design and development of projects that engage students in higher-order thinking skills will be encouraged with an emphasis on the process of design and development.

The implications that have been discussed may be overwhelming, but as Papert (1987, p. 26) claims, "...if the role of computer is so slight that the rest (other variables operating in the learning environment) can be kept constant, it will also be too slight for much to come out of it." The changes need not be made overnight. There is a need to gradually create a scaffolding structure where the changes are incrementally felt and the existing ways of doing things are addressed. It is only then that we will be able to optimize the potential of network technologies for learning. □

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