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The ideal online course

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Abstract
This paper addresses many of the key issues facing designers of web-based university level courses. Drawing from experience in distance education and web-based design, we develop a set of key components to be addressed when creating an 'ideal' online course. Such an analysis forces a consideration of what constitutes good online teaching as well as good use of the technologies that are more and more present in our instructional environments.

Introduction

Web-based instruction is a popular new form of education being adopted at all levels of schooling and it is generating a great deal of interest in the instructional technology R&D community (Kahn, 1997, 1998; Hackbarth, 1997). Creating successful online courses remains a tricky proposition at this time, however. It is easy for experienced instructional designers to recognize good courses on the Web: it is also evident that many online courses lack basic design consideration and that the web is simply being used as a medium for the delivery of instruction created within another framework. Such transposition from one medium to another may have some value in reaching certain outreach goals, but it also runs serious risks of diluting the original instruction and possibly rendering it ineffective.

In this paper, we begin to build a set of recommendations for the creation of web-based courses and we begin to face some of the issues that arise in such an undertaking. We consider the full spectrum of design, including both content and technology elements. Content elements are basic instructional design elements, such as objectives and other components found in traditional instructional design (see for instance Dick and Carey,

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1996). Technology elements are those elements of course infrastructure which support learning, such as audio conferencing, internet chat, web pages, etc.

To focus our effort, we are trying to explicate the ideal online course. The first question to arise is 'Is there an ideal?' There is of course no single ideal; rather, we can expect many forms of "ideal." We acknowledge outright that this is merely our conception of what the ideal might be, based on our necessarily limited experiences. Together we have several years of experience in online education. Dr Duchastel has been involved in distance education since the early 1970s when he joined the Institute of Educational Technology at the British Open University. He participated in the development of a doctoral program offered at a distance in the field of instructional technology. Dr Carr-Chellman has taught or researched web-based degree programs for the past three years and is a relative newcomer to the field. Together we can represent a spectrum of experiences and a balance of hopeful criticism. Others are likely to have their own conceptions of the ideal, and this of course invites dialogue, debate, and further refinements, and is, in the end, a prime means of advancing the field of online instruction. We base our "ideal" on current thinking in instructional technology (Jonassen, 1996; Moore and Kearsley, 1996; Collis, 1996). In the future, as component technologies evolve and become ever more integrated within an easy-to-use general technology such as the web, other possibilities will present themselves and the view of what is ideal will shift. Vision, technology and theory are necessarily bound and evolve together over time.

What is an online course?

An online course is one which is primarily internet based (or intranet based, within an organization). Specifically, we are dealing in this paper with web-based courses even though other components may be involved (indeed, many forms of mixed approaches exist). Our primary focus is on the ideal use of the world wide web as the main communication tool within the course. We are interested in helping others take best advantage of the web in terms of exploiting the advantages the media affords. It is useful to note, therefore, that other yet un-integrated media (e.g. email) are considered here, for it seems only a question of time before integration of all components takes place within the web: the latter then becoming the general medium for communication through digital means.

Online courses require an accessible but fairly sophisticated computer infrastructure (unlike traditional distance education in the text-based mode) to ensure that all communications occur without mishap. For instance, servers that can offer streaming for audio and video resources may be beneficial in many circumstances. Online courses should thus make the most of the opportunities afforded by the web.

Why online courses?

An interesting quote from a recent article in Forbes magazine justly sets the context for online education within the tradition of distance education:

"Detroit makes luxury cars and stripped-down economy cars, four-wheel drives and sport convertibles. College Inc. makes only one expensive model—with leather seats and air-conditioning. Technology is changing that." (Forbes—June 16, 1997, p.84)

Distance education is seen as an important answer to the professional development needs of large masses of the population. As the Forbes writer aptly stated, not everyone today needs or can afford a traditional residential university experience. Instead, we must take students today where they are (often already engaged in the workforce) and work with them in ways that take best advantage of their available time, energies and interests.

In addition, with the recent advent of web-based design tools, the economies of scale commonly used to justify distance education expenses are brought sharply into alignment with university and student budgets. The entry level costs into these newer forms of outreach education are continuing to be reduced yearly (see Daniel, 1996, for an analysis of this situation), making it feasible for all institutions or even individual professors to enter the online education world.

We see a situation evolving in which traditional distance education institutions are going online with many of their courses. A prime example of this trend is the British Open University, one of the venerable contemporary distance education institutions. Thus, traditional collegial institutions are expanding beyond university boundaries (both conceptually and geographically) to begin distance education initiatives, and established distance education institutions are using the technologies to better reach their constituencies. Because of these expansions, it is important to design carefully distance education courses which take best advantage of the available technologies.

Distance education has quite naturally had a tradition of delivery of instruction at a distance. However, given today's emphasis on access to information via the web, that tradition is likely to be uprooted. We are essentially headed towards a paradigm of "learning without distance." In fact, we need to ban the term "delivery system" in any discussion of distance education or online instruction, and go instead with conceptual frameworks that emphasize student-initiated access; thus, terms such as "organize instruction" or "create learning materials" are more appropriate in thinking about online instruction. The new online paradigm calls not so much for providing instruction at a distance, as for making available learning resources and instructional activities to students. This holds true wherever the students are (just down the street or on another continent) and whenever the students need the resources and activities. This is not dissimilar to the move toward just-in-time learning in training environments within corporate America. In fact, it is being at the right place at the right time that we need now to consider as the ideal of distance education.

One implication of the paradigm shift that we are witnessing is that distance education, as we have known it, will disappear. In its place, we will see a tremendous growth in what is becoming known as distributed learning (Bates, 1995), or flexible learning (Stacey, 1995). An illustration of the merging of the boundaries between distance education and presential (face-to-face) instruction is seen at Deacon University in Australia ((http://www.deakin.edu.au/), where portions of the instruction are presential and portions are available online. The very distinction between online instruction and

presential instruction is blurring. Distance education of the traditional kind (e.g. paper-based correspondence courses) may continue to be extremely useful in countries where the computer infrastructure is not yet sophisticated enough to support online instruction. But there will come a time when institutions in these developing countries may leapfrog into such an infrastructure and fully exploit the potential of the new technologies.

One of the major conflicts in online teaching today mirrors the current conflict in residential instruction—behaviorist or constructivist? Teacher or student centered? From our experiences, both orientations can reach success within online teaching and learning and there is probably not an easy answer to this debate. Because this debate is currently based on epistemological beliefs, it is our feeling that designers and instructors need to choose for themselves the best mixture of behaviorist and constructivist learning experiences for their online courses. In fact, the debate itself could be the topic for another discussion of online learning. As we see the current situation, the vast majority of online learning materials, particularly those translated directly from residential lecture notes, are behaviorist in nature. Creating constructivist or student-based courses online presents a host of obstacles that may challenge the economies of scale within universities interested in the web as a revenue generator. However, we see bright promise for student-centered and constructivist learning models in the future of online education as the need is seen in particular contexts for more interaction around student and negotiated learning. In what follows, a decidedly student-centered environment emerges from our recommendations.

Technologies involved in an ideal online course

It is not enough to simply transpose traditional courses to the new medium of the web in order to create an online institution. This will not take best advantage of the opportunities of the web. There are many unfortunate instances on the web where such transposition leads to a stilted use of this medium for instructional purposes. It needs to be recognized that online education is a specific medium in its own right and thus, it will have its own design considerations for effective instruction.

The current technologies involved in the ideal online course are many. They include web-based textual materials such as study guides (these provide essential elements of traditional course syllabi), discussion forums—both synchronous (live, real-time) and asynchronous (distributed in time), email, and voice communication through either internet audio streaming, or traditional telephony. It is important to remember that not all elements of an online course need, or probably should be, physically available online. In most cases, a traditional textbook is appropriately provided for the student to study throughout a course. Other elements, such as images and video segments, are appropriate in many areas of instruction, but not all.

The ideal online course

We describe in this section our conception of the elements of an ideal online course. Naturally, guidelines associated with the ideal online course, or any ideal course for

that matter, are only useful insofar as they are upheld by continuous quality assurance procedures. Most universities have departments associated with online education either through continuing education or distance education divisions. These departments can be tasked with the important job of following rigorous design guidelines and assuring that all online offerings are of high quality. Our experience has suggested that in some cases, more attention has been paid to promotion and advertising than to quality assurance in some online degree programs. However, explicit attention to quality assurance procedures may help to mitigate this situation. Such attention will increase quality, but may also increase costs.

The study guide

Perhaps the central element of an online course is the online study guide. The study guide is the student's main reference to the content, structure, and activities associated with the online course. The essence of an online course is the organization of learning activities that enable the student to reach certain learning outcomes. It is important to note here that the traditional delivery of instruction receives much less attention in online courses than in the traditional context of higher education residential courses. We are moving, here, toward a more student-centered, and activity-based learning environment design. The study guide must include the traditional elements of good instructional design, in particular a clear description of the instructional aims and learning objectives of the course. These latter are expressed in student learning terms, as opposed to content coverage. The study guide also includes the list of learning resources, such as textbook chapters to read, associated articles to consult, supplementary readings, and web sites of interest outside those referenced within the course itself. The study guide will, of course, include the assignments or projects the students are to tackle, along with a clear indication of the quality elements making up the assessment criteria.

The online study guide, while similar to a traditional course syllabus, is in many ways quite different. Online study guides must provide a level of detail that is sufficient to enable the learner to proceed without substantial further personal interaction or clarification from the instructor. Naturally, instructor assistance is made available throughout the ideal online course; however, to the extent that independent learning is both the means and an important goal of instruction, clear descriptions and directions are imperative within the online study guide. There are many examples of online study guides available on the internet. One example is our own course on instructional design [http:www.fcae.nova.edu/~duchaste/id.html].

No online textbook

The ideal online course should generally not have the primary learning resources online. The great disadvantage of online text materials lies in the poor interface the computer screen offers for reading, as compared to the usual interface of the textbook, which will have, presumably, been carefully designed for use as a text (Jonassen, 1982). It is, in fact, much easier for students to study from a traditional textbook than it is for them to roam through online textual materials of any length. In addition, portability of traditional textbooks makes them very attractive resources for students who are

being asked to spend much of their time online with other learning experiences. Perhaps one of the few cases for online textual materials is to provide the students with access to the most recent work in the field which may not yet have been published or incorporated into traditional textbooks.

There may be an advantage for some mini-lectures online, either in audio or video format, for purposes of identification with the instructor and general orientation to the subject. However, as a general rule, the active nature of online learning precludes large amounts of text via lecture notes, or lecture transcripts from being put online. If audio or video lectures are used within a course, it is essential that they remain minimal (in the form of audio- or video-clips), as opposed to lengthy lectures. Their purpose is not specifically to convey information in the form of content to be learned, but instead to enhance the student's identification with the course, motivation to learn, and sense of instructor personality at a distance. Their usage involves a totally different function than that found in a traditional university lecture, and therefore takes on a different form altogether.

Assignments

The ideal online course is centered on the set of student tasks (projects, assignments) that constitute the learning experiences that the students will engage in, either independently or collaboratively, in order for them to master the objectives of the course. We are moving here to a mode of learning that is less dependent on the acquisition of information or content coverage via lectures, and more dependent on the application and use of such information in real world settings wherever possible. Two dimensions are central to this shift. The first is the importance of authenticity in the tasks we assign students, so as to optimize their involvement and engagement with the subject matter (Jonassen *et al.*, 1995; Wilson, 1996). This level of authenticity is necessary to sustain interest and activity on the part of the online student, who faces the disadvantage of not having the sustaining social interaction found in traditional instructional settings. The second dimension involves a focus on searching for relevant information pertinent to one's learning goals within the wide range of possibilities offered not only by the course materials themselves, but also through the wealth of information and learning resources available on the internet.

In fact, our online education enables a much more open and less restricted form of instruction in terms of the specific learning outcomes to be achieved within the course than was previously possible (Duchastel, 1997). An online university course should provide the students with the broad goals that are to be attained, while leaving them with substantial latitude and initiative to pursue their own goals. This can lead to a diversity of learning outcomes across students who are pursuing their individual interests, all within the context of the common course. This emphasis on tasks to be accomplished as the primary structuring element within the course is aligned with the recent trend in instructional design toward problem-based learning environments and toward the general goals pursued within that instructional design framework (Savery and Duffy, 1996).

One crucial element related to assignments is the timely provision of feedback to the students—both to help them refine their learning, for instance by correcting misconceptions as they are developing, and to provide overall guidance and structure to their continuing study activities. Feedback, in particularly timely feedback, can be an important time workload issue for the instructor or mentor teaching online. There is no doubt that online instruction is more time intensive and requires more continuous attention in order to provide timely responses to student needs than does traditional presential instruction. This also challenges the economies of scale associated with traditional administrator understandings of online education. Because work is intensified, faculty loads must be totally reconsidered in this new form of education. There is no simple guideline for this process, but is something to be carefully considered and studied in order to free the instructor to truly teach the ideal online course.

Examples online

One potentially very useful element for students in the accomplishment of their learning tasks is the availability of prior student's work online. This provides currently enrolled students with an indication not only of the level of effort required, but also of the standards of quality work that the instructor expects in the accomplishment of these tasks. Good instructional design practices warrant the availability of a range of student work, if at all possible, so as to provide very clear indication of what is both acceptable and less acceptable. It is, of course, very important to maintain anonymity of sources of online examples, particularly in the case where an online course will be open to anyone accessing the web.

Another facet of online examples is the encouragement to current students to post their current assignments online so as to make these available to their course peers. This encourages students to learn from the current experiences of their fellow students in refining their own work. This also encourages critical exchange at a high level of intellectual discourse regarding the relative merits of particular approaches and results. Of course there may be disadvantages to this approach, including undue reliance on peer student work in the development of an individual student's assignment, or a narrowing of creative options in the initial stages of one's work. The open nature of online examples will also encourage collaboration as students post their work along the way, but may frustrate students who prefer more competitive learning modes. On the whole, it would appear that the advantages of online examples outweigh the disadvantages.

Course communications

Asynchronous interchanges

In the framework of distance education generally, there are three types of communication patterns that need to be considered: student-content interaction, student-instructor interaction, student-student interaction (Moore and Kearsley, 1996). Recent experience in distance education has led to the general view that there is a benefit in facilitating the student-student interaction in order to reduce the emphasis on student-instructor interaction, thus rendering the course feasible for larger numbers of students

(Tinker, 1997). The principal way of encouraging student-student dialogue in the pursuit of learning is the availability of online forums, where the entire learning community can participate in an intellectual exchange profitable to all. These forums are known by many different names such as online conference boards, web discussion boards, bulletin boards, online conferences and so on. In essence, they provide a communication medium to pursue discussion of individual topics relevant to the objectives of the course.

These discussions are asynchronous and typically threaded. Such dialogues lead to the formation of true learning communities, within which adult students share their real world experiences and learning outcomes, thereby profiting all participants within the conference. Students in fact, learn as much from one another's experiences as they may from textbooks and instructor-provided information. This is particularly true for online courses which typically appeal to adult students actively engaged in full-time work. Sharing these situations with peers, gaining their insights, and thinking through specific problems offers both students and their peers uniquely powerful learning opportunities.

Synchronous interchanges

The great advantage of asynchronous interchange lies in the fact that students may participate in a very flexible manner and on their own terms. In synchronous interchanges, students participate in real time conversations through audio conferencing, internet chats, and, potentially, via video conferencing. Because of the real time nature of these interchanges, there may be greater social pressure for conformity in participation. The advantages of synchronous interchanges include a more direct sense of collegial interaction, immediate resolution to questions posed, and possibly a strong contribution to the team building required to sustain future student interactions. The synchronous mode is particularly appropriate for the inclusion of motivating guest lectures in specific content areas.

Email communication

The traditional email function is extremely useful for student-instructor communication, for instance with respect to assignments, progress, feedback, and administration. Also peer collaboration on projects can be accomplished largely through student-student communication via email. In this respect, the emergence of collaborative software such as shared white boards and other web-based collaborative tools shows much promise for enhancing these student-student interchanges. Another promising development lies in the potential of email technologies toward multimedia possibilities such as voicemail and videomail. Computer based telephony is another promising technology for the facilitation of peer interaction in online courses. We encourage instructors to consider all of these evolving technologies as potential ways to increase student-student interactions.

Interactive skill building

Currently, the web provides mainly for an information search and acquisition mode of learning, as far as autonomous learning materials are concerned. However, with the

development of new software technologies such as Java and other computer languages, the potential for guided interactive web sessions (such as are found in traditional CBT) becomes feasible. In some cases, this sort of more traditional, narrow learning experience is important to build certain skills (such as would be built in a traditional computer lab, or in a chemistry lab, for instance). While this mode of instruction is particularly important in the area of skill building, it must not be misused in the more general area of intellectual development, as is found to be the case with a number of traditional CBT products. Our pedagogical approach should be one that emphasizes intellectual dialogue for all conceptual and advanced intellectual skills development, dialogue developed through means described previously, and that sees a more limited role for guided interactive sessions targeted at specialized or lower level cognitive and psychomotor skills. Our thinking in this respect, is aligned with current conceptions of constructivist learning.

Theoretical bases

In this section, we shall examine the underlying theoretical bases for our ideal online course. This is an issue because of the lack of consensus in the field at the present time regarding what constitutes learning and hence the best approaches to instruction. Diversity in learning and instruction naturally leads to placing boundaries on our ideal view. We shall examine each of these perspectives in turn.

From a learning perspective, why is our course ideal? To answer this question, we need to lay out what we consider learning to involve. At its most fundamental, learning is a process of transformation of knowledge that occurs through interaction of an individual with information in that individual's environment. Knowledge has associative and structural aspects and is a highly individual matter, as the constructivist educators keep reminding us. Students interacting with the same piece of information will elaborate and interpret it differently. Students might need different elements of information from one another in order to each grasp a common element of study. Diversity and degree (potential for) of information interaction is the key here. Information can be provided by the learning materials (such as the textbook), by the instructor (for instance in comments on an assignment), by other students (as in an online forum discussion). The learner gradually fashions his or her knowledge through these various interactions.

Berge (1997) notes that online instruction often involves applied subjects and asks whether these subject areas are more compatible with online approaches. This is undoubtedly the case, since increased interaction, particularly with fellow-students, may be particularly useful in grappling with information that is value-laden (often the case in applied settings, where the practical experience of different students can be profitably shared). In dealing with highly structured and consensual information (think of the typical introductory course in a field of study), open discussion is less crucial.

This area of analysis—the intent to match learning process requirements with content types of information—has been recognized as important ever since Gagne (1965)

emphasized it in his theory of learning. It remains a difficult area today and underlies a good deal of the current debate involving constructivism.

Turning now to the instructional perspective, we define instruction as the fashioning of the learner's context to optimize information interaction, and hence learning. Two facets exist: the first is engagement (initiating and pursuing the interaction), the second is adaptiveness (enabling access to just the right information that is needed).

Engagement itself is a function of two facets: interest in the information being interacted with (the content) and the social setting involved (institutional and group processes). The first—intrinsic interest—relates to what is called either intrinsic motivation or epistemic curiosity. Instructionally, it is generated through the choice and sequencing of the information to be provided and is largely a matter of content selection (a fundamental instructional decision). The second—social context—either creates pressure to persevere (doing well on assignments, for instance) or adds vivacity to the interaction (dialoguing with others online, for instance). The focus on authentic tasks for assignments and on collaboration in learning, both features in our ideal online course, support engagement as we have discussed it here.

As for adaptiveness, it is mostly a question of availability of information—the right information at the right time. Our ideal online course moves with the times in its emphasis on individual initiative and exploration, as opposed to the more passive stance of receptive information processing. The instructional challenge is essentially one of guidance—matching individual student needs with appropriate elements of information, whether static or dynamic. The openness of the structure in the ideal online course, encouraging initiative and independent interaction, provides much learner control and hence has the potential to optimize the necessary matching of needs with resources.

Again, however, the nature of the information to be learned mitigates the value of the approach. Highly structured content is more amenable to a traditional teacher-centered instructional style (illustrated by the traditional classroom lecture) than is more debated and value-laden content. The troublesomeness of the learning-content analysis mentioned above carries over into the domain of instruction—quite naturally, of course, since instruction is in the service of learning.

Some practical debates

In this section we will examine is a set of more practical concerns that remain highly debated, such as the issue of pacing students through the course, degree of adaptation to different learners, the importance of face-to-face presential instruction, and public access to online courses.

The first issue is that of pacing. A number of online courses involve strong pacing. Students all start at once, deal with given topics in given timeframes, and are ushered on at a group-set pace. Other courses involve more time flexibility, where students may

start and end at different times and even engage topics in different sequences. How flexible is ideal is difficult to say—it probably depends on a whole host of particulars to given situations.

A second issue is the one of presential instruction. Basically, is a mixed approach (part presential, part at-a-distance) more valuable than a single-mode approach—say all at-a-distance? The issue gets more complex when we define forms of presential interaction. For instance, what is the benefit of a synchronous component to an online course? An audioconference and an online chat are examples of such synchronous interaction forms. Some educators feel their value is minimal, while others feel not.

By the same token, many instructors feel quite tied to at least some minimal face-to-face presential moments in distance education courses. Others are happy to have none of the face-to-face interactions. We suspect that this is more tied to the way the instructor conceives of themselves as teachers. Often, if we feel that interpersonal contact is our strength, we want to increase that sort of interaction, whereas if we suspect we are not particularly good at presential instruction, we may try to minimize this type of interaction. In the end, this practical consideration may be more important than what experiments might tell us about the right balance of face-to-face and distance interactions for the learners from an instructional standpoint.

Other issues of practical concern are the value of peer assessment and the technological look of the course. Peer assessment is seen by some as a way of decreasing (and potentially improving) student-instructor interaction while increasing student-student interaction (with potential benefits there as well). With respect to technology, some online courses are what can be called glitzy (they might involve the latest bells and whistles in terms of multimedia effects) while others are fairly straightforward. Is there much engagement value in the former, or is there potential for distraction—not only for the student, but for the course designer as well?

One final pragmatic question remains, that of public access to online courses. Here again, there are debates and political realities inherent in the question. Many online courses require passwords to gain access while others are open to the world for anyone who chooses to use the resources. There are certainly advantages and disadvantages to each of these approaches. In the open access case, there is the opportunity to share the instructional courseware widely with many audiences for feedback and trials and to serve a broad community including those who may need additional learning experiences but are not interested in degree granting or credit bearing undertakings. On the other hand, in most institutions of higher learning, credit is the coin of the realm and the way in which universities make money. Therefore the issue of open access or passworded access is one that each university unit will have to make for themselves weighing both the advantages and disadvantages of each approach. These issues, like most practical ones, remain open to much experimentation.

Conclusion

It is quite evident that the task of defining an ideal online course is a highly adventurous and risky one. Not only do many of the issues discussed in our analysis remain open to debate, particularly so because of the fragility of learning and instructional theory at this time, but online courses as we know them today are themselves fairly new.

Networking technologies, both hard and soft, that make possible online instruction are evolving at a continuing rapid rate that keeps shifting the grounds of possibilities for increasing learner-information interaction. The evolving technologies provide not only more potential in this respect, but also often increase the ease of use factor, which makes participation in online learning all the more appealing and satisfying. In technology terms, proposing an ideal online course a few years from now will undoubtedly lead to a rather different description that the one provided here.

There is also evolution in the areas of learning and instructional theories. Constructivism has had a strong influence on instructional design in the past decade and challenged many of its previously accepted tenets. There is still strong debate as to the value of the newer approach, but certainly, it forces a level of theoretical questioning that is extremely valuable in itself. It is likely that refined models of learning and instruction will emerge out of the ongoing debate and lead to yet further perspectives in these areas. This in turn will influence what might be conceived as ideal for online courses.

We have written this paper in full acknowledgment of the risks involved in any search for the ideal. We believe that any statement of thought in as explicit a form as possible (the online course, in this case) is valuable in furthering the academic dialogue regarding this evolving technology and we invite others to join in this dialogue. Critique the vision proposed here and debate the assumptions made on its behalf. In this way, alternate visions of the ideal online course will emerge and further inform instructional practice.

References

Bates T (1995) *Technology, Open Learning and Distance Education* Routledge, London.

Berge Z (1997) Characteristics of online teaching in post-secondary, formal education *Educational Technology Magazine* May–June, 35–47.

Collis B (1996) *Tele-Learning in a Digital World* International Thomas Computer Press, London.

Daniel J (1996) *Mega-Universities and Knowledge Media* Kogan Page, London.

Dick W and Carey L (1996) *The Systematic Design of Instruction* (4th ed.) Harper Collins, New York.

Duchastel P (1997) A web-based model for university instruction *Journal of Educational Technology Systems* **25** 221–228. Http://www.crim.ca/~pduchast/unimodel.htlm

Gagne R (1965) *The Conditions of Learning* Hold Rinehart, New York.

Hackbarth S (1997) Web-based learning, Special issue of *Educational Technology Magazine* May–June 1997.

Jonassen D (ed) (1982) *The Technology of Text* Educational Technology Publications, Englewood Cliffs, NJ.

Jonassen D (ed) (1996) *Handbook of Research for Educational Communications and Technology* Simon and Shuster Macmillan, New York.

Jonassen D *et al*. (1995) Constructivism and computer-mediated communication in distance education *American Journal of Distance Education* **9** (2) 7–26.
Khan B (ed) (1997) *Web-Based Instruction* Educational Technology Publications, Englewood Cliffs, NJ.
Khan B (ed) (1998) *Web-Based Training* Educational Technology Publications, Englewood Cliffs, NJ.
Moore and Kearsley (1996) *Distance Education—A Systems View* Wadsworth, Belmont, CA.
Savery J and Duffy T (1996) Problem-based learning: An instructional model and its constructivist framework *in* Wilson B (*ed*) *Constructivist Learning Environments: Case Studies in Instructional Design* Educational Technology Publication, Englewood Cliffs, NJ.
Stacey E (1995) Becoming flexible and virtual—the impact of technology on traditional university teaching and learning. Paper presented to the conference "The Changing University" at the University of New South Wales, Sydney, Australia, November, 1995. Link: http://www2.deakin.edu.au/deakin_virt/Syd.htm
Tinker R (1997) Courses reform education using the power of the Internet. Concord Consortium Newsletter.
Wilson B (ed) (1996) *Constructivist Learning Environments: Case Studies in Instructional Design* Educational Technology Publications, Englewood Cliffs, NJ.