

# Education, Hypermedia, and the World Wide Web: Old Realities and New Visions

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## ABSTRACT

This article is an introduction to the special issue of *CyberPsychology and Behavior* entitled Education, Hypermedia, and the World Wide Web. This article describes the methods for soliciting contributions and presents a brief overview of the authors and their articles. I also discuss some general themes that I gleaned from the authors' contributions. A central theme that emerges from these articles is that the majority of web-based learning available presently is simply an extension of "traditional" classroom instruction, which suffers from fundamental flaws. A contrasting theme, which also emerges, is that the World Wide Web, in conjunction with societal demands, can serve as the impetus for a revolution in education, creating a more functional and student-centered system. Some of the applications introduced by practitioners/developers in these articles serve as models of such learning environments.

## INTRODUCTION

IT HAS INDEED BEEN A GREAT PLEASURE and an honor to serve as the guest editor for the *CyberPsychology and Behavior* special issue entitled The Virtual University: Education, Hypermedia, and the World Wide Web. In one of the first, if not the first article to appear in a main stream academic education journal on the World Wide Web and education, Ron Owston<sup>1</sup> led with what has become one of the most commonly quoted statements in articles covering this topic: "Nothing before has captured the imagination and interests of educators simultaneously around the globe more than the World Wide Web" (p. 27).

Just 3 years ago, when Ron Owston published this statement it would have been difficult for him to realize how much more true it would be in 2000. His article consisted of a

modest review of resources available and some discussion of potential uses of the Web. Today, there is almost no major university that has not developed a set of Web-based courses, many of them with entire degree programs online. There is also an unprecedented move on the part of industry to offer education online, and, in fact, the line between industry and academia is becoming increasingly blurred. Entire online universities have appeared and achieved accreditation. This whirlwind of activity is exciting, frightening, or both, depending on one's view. Either way, the pace, growth, and the instability this creates in our views of education is staggering and unprecedented.

Through my interactions with my academic colleagues, I am also very much aware of the caution educational practitioners and researchers advocate. I'm also familiar with the outright fear and uncertainty that is engen-

dered in the academic community when a term such as *the virtual university* is invoked. Nevertheless, more than anything, for good or for bad, my bias is that I am one of those educators caught up in the excitement of the World Wide Web. I see great potential for enhancing traditional educational techniques at least and possibly even a unique opportunity to rethink, change, and improve our basic philosophy of teaching and learning.

When Mark Wiederhold invited me to put together this special issue, the first question he asked me was Who are the leaders, the "experts," in web-based education? Despite the fact that my record of research and development in the area would indicate that I should know, I found this to be a difficult question. After all, despite the exponential growth of web-based education, the area is still very new, and the number of educational researchers, theorists, and practitioners well known in the area, is surprisingly small. Therefore, I turned to an appropriate source of information for this topic: education E-mail listservs. I posted a query to two of the largest and most active lists dedicated to education and the World Wide Web: the World Wide Web Courseware Developers Listserv<sup>2</sup> and the World Wide Web in Education Listserv.<sup>3</sup> In addition, I posted a query to some American Educational Research Association Lists.<sup>4</sup> In each case, I asked for the opinion of list members as to who they believed were the most important researchers, educators, developers, and practitioners associated with the general area of education and the World Wide Web. I received many helpful responses. I also took into account my own experience at national and international meetings that are beginning to spring up such as the International Conference on Web Based Learning<sup>5</sup> and the WebNet World Conference on the WWW and Internet<sup>6</sup>; and my experience at annual meetings of the American Educational Research Association.<sup>7</sup> Finally, of course, I took into account my reading of the existing literature in traditional education and education research journals, as well as the many journals related to Web-based education that are beginning to appear. Based on all of this, I created a list of those who I believed to be the most well-known, influential, productive, and, perhaps,

most importantly, best thinkers, researchers, and practitioners in this new area of "Web-based instruction." Much to my delight, most of those near the top of the list agreed to contribute an article to this special issue.

## AUTHORS AND ARTICLES

Roger Schank's name was mentioned frequently by those who responded to my query about a leader in this area. He is well known, not just for his quality research and prolific writing in instructional technology, cognitive psychology, and artificial intelligence, but also for his visionary views on what education should be. I selected his article to follow this introduction because I think he does an exemplary job of pointing out fundamental flaws in our current educational methods and presents a convincing case for how the World Wide Web could provide a vehicle for changing the fundamental ways in which we go about teaching and learning.

Hilary McLellan also comes highly recommended. I considered it crucial to include a representative from the private sector for this issue, and she fit the bill perfectly. She is a perfect example of an effective blend of academia and industry. In her contribution, she moves seamlessly and effortlessly between a discussion of academic instructional design and theories of E-commerce.

Most of the articles that appear in this issue are written in a style that differs from the traditional academic journal article. This is partly due to the fact that I asked authors to address issues at a high level. It also reflects the new ways of thinking associated with the World Wide Web in Education. Connie Moss's contribution is the best example of this. She provides an inspiring vision of what electronic collaboration should be, and what's more, this is firmly grounded in her own experience with the ambitious "Teaching and Learning Project" she created.

Curtis Bonk is certainly one of the handful of researcher/practitioners who is a leader and expert in Web-based collaborative learning. He edited one of the first books on the subject<sup>8</sup> and has created some of the earliest and most am-

bitious conferencing projects. This development continues today, and he describes this in his article. He is a good example of a researcher/practitioner whose web-based instructional development and practice is strongly influenced by his research and vice-versa.

I was fortunate enough to chair a session at the 1999 American Educational Research association meeting that included a paper that Larry Sherman presented. In his talk, he discussed his experience with, and assessment of, Web-based collaboration. His talk began with a discussion of Constructivism and Post-Modern theory, which served as an overriding philosophical framework for his practice and research. I found his discussion to be the clearest and best done discussion of these topics I have ever heard. As a consequence, I invited him to contribute an article on the subject to this special issue. Some make a good case that discussion of such large overarching theories does not do much to directly inform practice and research (see Andrew Dillon's article in this issue). However, I believe that a special journal issue on the World Wide Web and Education that does not include some discussion of these philosophical concepts, which are so often sited in education these days, would be incomplete. Further, I believe Larry Sherman does a wonderful job of couching this philosophic view within the context of Web-based collaboration.

One of the most often cited potential advantages of the web and other hypermedia systems is adaptability. Presumably, a well-designed web-based instructional module can take into account various learner characteristics by collecting relevant data based on the learner's interaction, and it can respond accordingly, much as an effective human tutor would. Paul De Bra is one of the first and most well-known researchers to tackle this complex issue of Web-based adaptive environments in his own research and development. His article provides the reader with some sense of the complexity associated with an adaptive Web-based environment. He also addresses some important research issues that can be generalized to much research in instructional technology.

Ron Owston, whose quote led off this introduction, has been influencing the field of edu-

cation and the World Wide Web since it's inception, and his article in this issue is a perfect example. He tackles the crucial issue of assessment of Web-based learning, something that is sorely needed within this new field. He reviews four assessment projects he directed, ranging from small-scale and detailed to large scale and general. From this experience he derives useful principals that will aid those carrying out assessments and those interpreting assessments in the future.

Like Ron Owston, Mark Windschitl also caught my attention because of an article of his that appeared in an issue of the *American Researcher*.<sup>9</sup> The article made a good case for how the World Wide Web can change the nature of the research questions we ask. His contribution to this special issue follows up on this seminal article by discussing criteria to be used in selecting the most appropriate questions, and by discussing them within the context of the use of the World Wide Web in K-12 classrooms.

In 1998 Andrew Dillon and Ralph Gabbard published an article in the *Review of Educational Research* that presented a somewhat depressing view of research on the efficacy of hypermedia for instruction.<sup>10</sup> For obvious reasons this review got much attention in educational research and educational technology circles. I read this review with great interest and, though the conclusions were discouraging, I was impressed by the level of scholarship and by the generally constructive nature of the review. Because the World Wide Web is one giant hypermedia system, I believed Dillon and Gabbard would be perfect contributors to the special issue. I also wanted to be sure and include researchers who could provide a cautious note and constructive criticism. For that reason, I was very pleased when they both agreed to contribute articles. In his article, Andrew Dillon offers valuable advice for reconceptualizing hypermedia design that is based on existing human-computer interaction research. Ralph Gabbard reviews often cited claims about instructional hypermedia that are not supported by research.

Badrul Khan edited the first book on Web-based instruction<sup>11</sup> that was more than a "how to" manual. The book is one of the most often cited works in this new area, and a similarly

seminal book Khan edited on Web-based training is scheduled to come out near the beginning of 2000.<sup>12</sup> In his article, he presents a model of Web-based instructional design based on the premise that various Web-based components can be conceptualized as contributing to basic features that can, in turn, lead to meaningful learning in a Web-based environment.

## THEMES

### *Old realities*

Figure 1 represents some of the general themes that I gleaned from the articles contained in this special issue. The overriding

theme is one of old realities and new visions. One consistent theme through many of these articles is that the promise of Web-based instruction is principally a vision. It is not, at least in its present state, a reality. Roger Schank minces no words in his evaluation of existing courses on the web, and this theme also weaves its way through many of the other articles. Schank makes a strong case that many characteristics of the present education systems are fundamentally flawed and that most web courses presently being offered have these same flaws. Examples of these problems include assessment based on memorization, artificial time constraints, and lecture as the primary method of information delivery. Of course, there are well-designed and effective

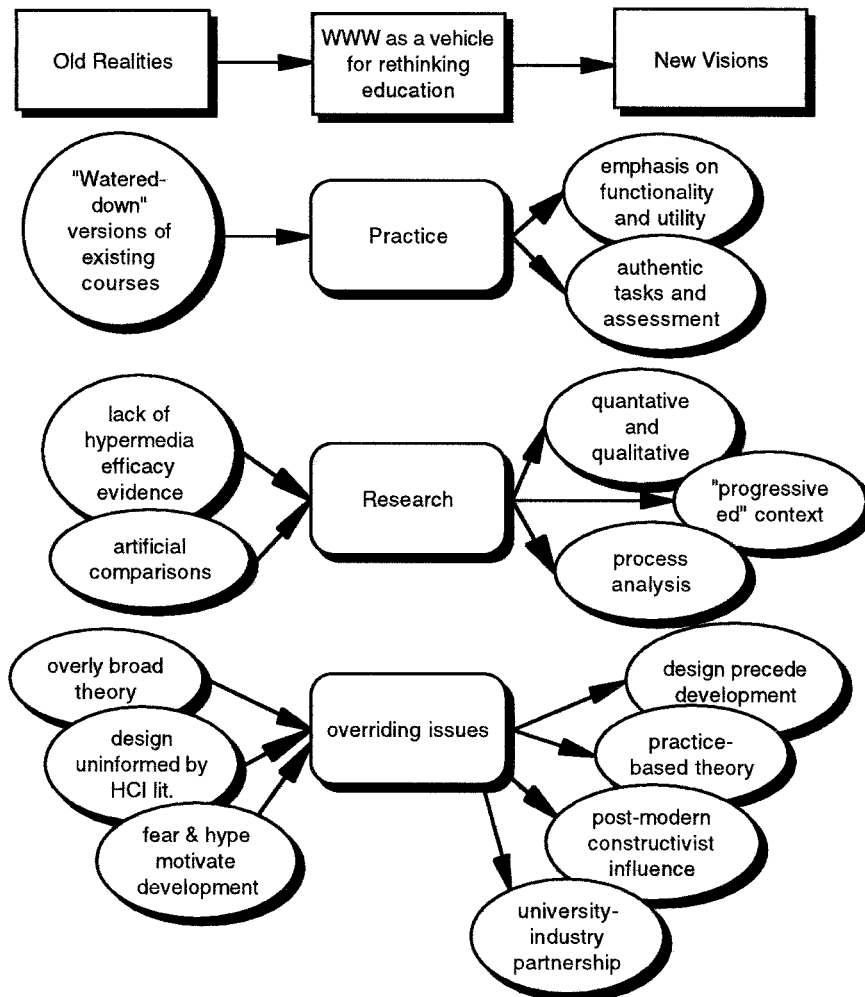


FIG. 1. Representative themes of special issue.

Web-based systems in existence, such as the collaborative environments discussed in the Bonk and Moss articles in this issue, but most of the authors included in this issue would probably agree that these are the exception.

With regard to existing research methods, Paul De Bra points out that comparisons of new hypermedia systems (e.g., adaptive) with a watered-down version of the new system are unrealistic and unfair. Further, both Andrew Dillon and Ralph Gabbard reiterate their point from their earlier review article<sup>10</sup> that there is a lack of support for the efficacy of hypermedia systems. In particular, Gabbard argues that common claims made in the literature are not substantiated by evidence, such as the claim that hypermedia gives more control to the learner and that this will, consequently, lead to more effective learning.

With respect to higher order issues relating to design, theory, and philosophy, Dillon points out that the most common types of theories cited in education are of little utility in research due to their broad and general nature. Connie Moss is also critical of theory that does not inform practice. Dillon also notes that there is a large empirical literature on human factors and human-computer interaction that could greatly enhance the efficacy of hypermedia systems. However, many researchers are reluctant to make use of this work due to similarities with behaviorist models of instructional design from the 1960s, which Dillon argues is not a fair (nor necessarily relevant) comparison. One final old reality with respect to overriding issues is that the motivation behind the explosive increase in Web-based instruction is not a desire to enhance education. Schank points out that a principal motivation is simply the "fear" that if a university does not develop an extensive Web-based distance education program, it will be left out in the cold. Moss points to a commonly cited motivation, which is the hype surrounding the World Wide Web. "On the cyber sea, the lure of the sirens' song can be powerful. Irresistible distractions can lead education designers to fashion professional learning environments that leave educators drowning in information and thirsting for meaning" (Moss, this issue, p 43).

### *New visions*

Despite these less-than-encouraging realities, there is also a vision running through these articles that the web offers great potential. Even in the articles by Dillard and Gabbard, which I included specifically as critiques, both authors make it clear that they are not "opposed" to the use of hypermedia and the World Wide Web in education. They both offer suggestions directly or by implication for how Web-based learning can be improved. Several of the authors suggest explicitly or implicitly that the introduction of the World Wide Web, due to its dramatic impact on education, can act as a vehicle for the rethinking of the way we go about teaching and learning. Roger Schank makes this case most directly and dramatically. According to Shank, education will get better because people will demand it. So, in this sense, the web as a social phenomenon, beyond any actual characteristics of hypermedia or universal connectivity, has the potential to greatly influence education.

Ideally the web could lead to practice that is more functional and utilitarian. For example, a student would take a subject for as long as it takes to learn it and students would "learn by doing." Authentic tasks, such as student discussions surrounding actual teaching cases, as in Bonk's caseweb (see Bonk et al., this issue), could be common practice rather than an exception. Assessment could be based on performance of desired tasks, and grading would become irrelevant.

Research and assessment on the web could be driven by the specific needs of the stake holders and would consist of a mixture of qualitative and quantitative methodologies. Such research would be driven by specific educational needs and would present a more complete and holistic view of the phenomenon being studied. Ron Owston presents examples in his article in this issue of this type of research, which he has already carried out. The research could focus more on the learning process rather than outcomes, as Mark Windschitl recommends in his article. Web environments offer special tools for such an analysis, such as tracking of students via analysis of hypermedia tra-

versal, as Owston discusses in his article; and analysis of transcripts of collaborative discussion, as Bonk uses in his work. Consistent with Mark Windschitl's view, research could also focus more on the examination of "progressive educational concepts such as autonomous learning, collaboration, and authentic complex tasks" (Windschitl, this issue, p X).

Finally, the web could act as the impetus for the rethinking of many higher level philosophical, theoretical, and design concepts as well. One of the most controversial paradigm shifts that is taking place right now is the blurring of the lines between private industry and academia. Though many educators have warned of the dangers of the over-commercialization of education, there are certainly advantages of university–industry partnerships. Among these is the opportunity for education to become more responsive to employers' needs. Further, integrating design models that are applicable to industry, such as the "experience design" concept McLellan presents in her article, could act to energize and expand current views on instructional design. McLellan suggests that educational developers "need to shift their thinking from the notion of delivering instruction to staging educational experiences" (McLellan, this issue, p 60). The functionality, as compared to objectivity, inherent in Postmodern Constructivist Philosophy, as addressed in Sherman's article, can also be integrated into Web-based environments to further encourage the utility of this type of instruction. The theories that educators use to drive practice and research could be more specific and grounded in practice, consistent with the views that Dillon and Moss express in their articles. Finally, a careful instructional design analysis could *precede* development of Web-based instruction based on a specific model of web components and desired features, as Badrul Khan advocates in his article.

### *Final thoughts*

As I read through these articles and reflected on existing weaknesses and potential strengths of Web-based learning environments, it struck me that much of the criticism of existing Web-based learning is due to the public nature of

the World Wide Web. Current courses on the web, which are most frequently models of current courses in the classrooms, remind us in a more public way than we have ever been reminded before that many of our current teaching and learning methods are not consistent with what we know to be conducive to learning. It seems to me that this alone, the public nature of education via the web, may be the principal driving force behind positive educational change that could accompany the meteoric rise of Web-based learning.

It is also interesting to note that even if the World Wide Web does eventually fulfill our highest expectations and transforms education in the most pedagogically effective ways, it will be impossible to determine whether this was a function of the World Wide Web, changes in societal views toward education, or both. There is no question that, as technology at all levels becomes more important in our society, there is a greater demand for learning that is functional, aimed at specific skills, efficient, and life-long. This societal demand will most likely drive Web-based learning just as society is in turn affected by it. So it's important to remember that all of our discussions of the World Wide Web and learning should take into account the interaction between Web-based learning and the larger societal context in which it takes place.

I thoroughly enjoyed serving as a guest editor for this issue. It was an honor to participate in a collaboration with thinkers such as those who contributed to this special issue. In reading these articles I have been motivated to rethink many of my basic notions about issues surrounding Web-based development and design for learning and, more importantly, the nature of what education should and could be. I hope that reading the articles that follow will have the same effect on you.

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