

LEARNER-CENTERED  
THEORY AND PRACTICE  
IN DISTANCE EDUCATION  
CASES FROM HIGHER EDUCATION



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## Preface

In this volume we have focused on two objectives. First, we want to bring the voice of the learning sciences to the study and design of distance education. Over the past two decades, we have learned a tremendous amount about how people learn and how to engage them in the learning process (see for example, National Academy of Science, 2000). However, we find little of that work applied to the design of distance learning environments. It is not that the principles of teaching and learning change when we look at distance education – it is that the context for learning results in markedly different constraints and affordances when compared to face-to-face teaching. How do we promote engaged learning when students are distributed around the world? What should it mean pedagogically to “put a course on the web?”

In seeking to meet this goal, we invited individuals who were a part of distance education programs that reflected the principles for engaged learning, asking them to describe their programs from the perspective of the pedagogical design but also focusing on issues of assessment, retention, and workload. These programs are from business, education, library science, and bio-engineering as well as campus- and system- wide efforts.

Our second goal was to assure that the programs are presented in enough detail so that readers with different interests will have the detail they need to understand the pedagogical approaches and the implications of implementing those approaches. Of course, fully achieving this goal is quite impossible without supporting an ongoing dialogue. So we tried to approach the goal by bringing together a diverse group of specialists working in distance education to comment on and discuss the chapters. We invited those from the learning sciences, professionals in educational evaluation and policy, administrators, and from the corporate sector, all with expertise in issues of distance learning, to review, discuss, and write reactant chapters on each of the programs. The group met at the Asilomar Conference Center in Monterey CA to discuss these chapters as well as larger issues in the design of distance learning environments. In fact, key elements of the open discussion at Asilomar were captured and are included in this book. The result of this effort is an edited volume that describes eight distinct distance education programs. For each program, there is a chapter describing the program with a

focus on the pedagogy, a formal reactant to the chapter, and an edited transcript of the group discussion of the chapter. This is our attempt to provide the level of detail and the perspective taking that is too often missed in many program and course descriptions.

This book is intended for a wide audience of those engaged in delivering, supporting, or administrating distance education programs at the post-secondary level. The descriptions, strategies, and principles will inform the design of continuing education as well as degree-based education and corporate education and training. This book also has relevance to the broad audience engaged in distance education for adults.

Finally, let us acknowledge the support that made this book possible. First and certainly the critical factor is the support from the U.S. Department of Education's Fund for the Improvement of Postsecondary Education's (FIPSE) Learning Anytime Anywhere Program (LAAP) (USDE Grant No. P339B990108-01). Brian Lekander, Coordinator of the Learning Anytime Anywhere Partnerships (LAAP) Program, and Joan Krejci Griggs, Program Officer and Coordinator, were immensely helpful in identifying participants and planning the Asilomar meeting.

We also appreciate the support of the Naval Postgraduate School in Monterey, CA, and Provost Dick Elster for providing equipment and technical support at the Asilomar meeting. We also thank Martha Zuppan at the Center for Research on Learning and Technology at Indiana University for her administrative support and Trena Paulus, Rohany Nayan, and Nellie Beatty for their web site development, editing, and transcribing services. Finally, Naomi Silverman and Lori Havlyer, our editorial crew, have been a joy to work with. We appreciate Naomi's enthusiastic embracing of this book, her thoughtful editing, and her support in moving it through the system.

## **Chapter 1**

### **Theory and Practice in Distance Education: An Introduction**

Thomas M. Duffy and Jamie R. Kirkley

Indiana University

Controversies over the impact and role of distance education abound. On one hand, we hear that distance education will never survive. The estimates of and interest in the market for distance education have been overblown (NEA, 2002). Just look at the struggles of Western Governors University (Carnevale, 2000), the demise of the for-profit NYU Online (Carlson & Carnevale, 2001), Open University United States (Arnone, 2002), California Virtual University<sup>1</sup> and Cognitive Arts and the near demise of Fathom and Unext.com's Cardean University. And it is not just the for profit companies, Arizona Learning Systems (Carnevale, 2002), funded by the state, closed its doors for lack of students. Every week, it seems the Chronicle of Higher Education has new articles on "distance education ventures" in trouble. And as Stein notes, venture capital for distance education has dried up. "After pouring billions of dollars into e-learning startups over the past two years, venture capitalists are now pulling back. Many of the companies they funded face excessive competition, layoffs, and bankruptcy. Even the relatively successful startups in the sector have very little hope of going public, at least for the time being." (Stein, 2002).

On the other hand, distance education has grown at an explosive rate. At the University of Maryland, University College, distance education enrollments have grown from 4% of total enrollments in 1997 to 64% in 2002 and now stand at over 26,000 (Allen, 2002). In the State University of New York system, distance education has grown from eight courses and 119 students in 1995-1996 to over 1,500 courses and 38,000 students in 2000-2001 (Fredericksen, Pickett, & Shea, 2000; Shea et al, this volume). The rate of growth of online courses at University of Phoenix online appears to be exceeding the record growth of their face based programs, with the distance courses expanding to 49,000 online students in just 3 years. The University of Central Florida enrolls

approximately 4,000 students each semester in their courses taught fully through the web. (Dziuban & Moskal, 2002). Finally, over 3,000 courses are offered online through the Illinois Virtual Campus ([www.ivc.illinois.edu](http://www.ivc.illinois.edu)) while the California Virtual campus catalog contains 4,400 courses (<http://www.cvc.edu>).

These contrasting perspectives characterize the polarized discussions that have arisen around distance education. On the one hand, it is viewed as the next revolution in education, extending the reach of education to those who cannot come to campus, making education more affordable, providing new models for life long learning (e.g., through communities of practice), and reforming teaching practices through the emphasis on student discussion and activity and the elimination of the lecture as the central teaching activity. On the other hand, distance education is seen as lowering the quality of instruction, a money making rather than educational enterprise, an environment where cheating cannot be controlled, and an environment that threatens the teaching role both through the lack of any physical constraints on class size and through the objectification of the “course,” thus threatening course ownership and potentially leading to the disaggregation of the roles of faculty.

Of course both sides of these arguments take a very narrow view of distance education, failing to recognize the diversity of practices and goals. One cannot say that, in general, distance education is of high or low quality any more than we can commend or condemn lectures or seminars. The quality depends on the design of and the student’s engagement in the learning environment. There are poorly designed lecture courses and seminars, just as there are poorly designed distance education courses. In an American Federation of Teachers (AFT, 2000) survey of 200 members who teach online, 84% said they would teach online again. Fifty-four percent felt that their online students learned as much as students in their campus based classes, while 18% felt the distance students performed more poorly and 28% felt they outperformed students in the campus based courses. In essence, distance education courses were right in the mix with all other courses on the dimension of quality.

The one thing we think distance education has done is to force a closer examination of and attention to teaching practices in higher education regardless of whether the teaching is at a distance or in the classroom. Perhaps one of the most interesting issues that has

arisen in these debates is the quality of learning that occurs online. Although the AFT survey indicated that the learning in online and face-to-face classes was basically equal, they nonetheless expressed a concern over the quality when they questioned whether “deep understanding of difficult material—beyond amassing facts – can occur in the absence of same-time same-place interaction” (AFT, 2000).

This concern is particularly interesting given the lack of research on learning in the undergraduate classroom. Most higher education research relies on survey data, e.g., class ratings and specialized survey’s like the National Survey of Student Engagement (Koljatic & Kuh, 2001; Kuh, in press), to infer, based on student report, that learning has occurred. Very little research has actually looked at student learning in the classroom. The work that has been done leads us to question the efficacy of our current classroom based model.

Hayes and his colleagues (Chenoweth, Hayes, Gripp, et.al., 1999) examined learning in four different undergraduate classrooms. He worked with the faculty to clearly define the objectives for the course and to collaboratively build an objective test to assess the degree to which the students achieved those objectives. The test had to be approved by the faculty member as a fair test of the absolute core of the learning expected of every student. Learning was then assessed using both pre-test post-post design and a no treatment control. There were five objectives defined for the first year English class – and remember that these were the objectives reflecting core expectations, not the lofty hopes of the faculty member. The tests on these five objectives indicated that the students showed significant gains on only one of the five goals relative to the control group. Work with a faculty member teaching a History Survey course identified three core goals and testing showed only one of those three goals showed significant gains. As we noted, there is seldom an opportunity to experimentally evaluate learning. Thus, these faculty, like most of us, had been certain that their students were learning and they were shocked by the results.

A similar critique can be made of the quality of discussion in the college classroom. The AFT worries that a face-to-face class experience is needed to develop a deep understanding of difficult topics. One must assume that the benefit of face-to-face is the lively interaction that can occur in the classroom. But Mikulecky (1998) presents evidence that questions that conclusion. He compared the classroom discussions of an online class, a

classroom based whole class discussion, and classroom based small group discussion (when the instructor asked the students to get in their groups to discuss an issue). This was not a controlled study: students in each condition were at different levels in their studies and enrolled in different courses. However, the focus was on the discussion of a single topic common to all three courses. The contrasts were quite striking. The whole class “discussions” amounted to repeated sequences of a student asking the instructor a question and the instructor answering – or vice versa. The small group discussion was mostly off topic, e.g., social issues from the night before of the next evening, or organizational, e.g., what is required, who will report out, etc. In contrast, the online students pursued the issues deeply in a problem centered discussion and integrated their relevant personal and professional experiences into the discussion.

Nunn (1996) and others (e.g., Smith, 1983) further suggest that quality of discussion in a college classroom is not a forgone conclusion. Nunn examined the level of discussion in medium size (15 to 44 students) classes and found on average that only 2.3% (1 minute out of 40) of class time involved student talk. Furthermore, only 25% of the students in a class were involved in that talk.

Once again, this is not to suggest that there is not rich discussion in campus-based courses. But it does suggest that rich discussion will not occur simply as a function of bringing students together. In the same vein, we note that distance education also does not necessarily lead to rich discussion. Web based courses typically consist of resource materials, assignments, and discussion environments. The success of the course often depends on how that discussion space is used. It is a common experience for faculty teaching online to struggle to get students to participate. As in the classroom, there is a lot of wasted discussion time – time when students are simply talking or doing a project rather than thinking deeply about issues and using the learning resources to ground their thinking. And there is a lot of time where students simply do not participate. As Riel and Harasim (1994) found, discussion must be an integral and required part of the course. Then, as Mikulecky’s (1998) and many others (Collison et al, 2000; Salmon, 2000) have found, rich discussion is possible.

But how do we design courses to be taught at a distance? What are the best practice models that will inform our own design efforts? What are effective models? As we looked

through the literature, we found little to inform our thinking. There is a lot of advice on the components of design, e.g., on how to facilitate groups effectively and on the support faculty require. But the actual course designs tended to be in the vein of “transferring a course to the web.” While we are sure that there were many excellent courses out there, we found two problems.

First, there were few instances of principle-based design. The learning sciences have made tremendous gains in understanding how people learn (e.g., Bransford, Brown and Cocking, 2000). However, it is primarily K-12 education that has been the data base for our new understandings and the bulk of the application of our new understandings has been to the design of K-12 educational programs. We see little attention to higher education generally and a definite absence in distance education. There is little discussion of constructivist learning theory guiding the design and practice of distance education beyond stating the need for active discussion among students. It is important to clarify that we do not think that a different theory of learning applies just because we have moved to a distance environment. We certainly see learning as a constructive process (Duffy and Cunningham, 1996; Barab and Duffy, 2000; Duffy and Jonassen, 1992). That is, in our view learners are goal directed, and they use learning environments to construct an understanding to aid them in achieving their goal. Unfortunately, that goal is typically to pass a test and the learning needed to “pass a test” often has little to do with being able to use the resources to function outside of the classroom (Honebein, Duffy and Fishman, 1993 ; Bransford and Schwartz, 2001)..

This book is an attempt to meet that need. That is, we sought authors who had principle-based distance learning efforts and who could talk about the design of their distance learning program from a conceptual perspective. Of course, we were looking for program designs consistent with a learner-centered perspective. (Note that we were looking for programs rather than individual courses.) Interestingly we were able to identify very few programs in North America that were consistent with a learner-centered perspective – and those that we found are represented in this book. There are likely many other programs that are pedagogically and theoretically interesting; we are sure we missed some and perhaps many. However, that just reinforces our belief that little attention is

being paid to the rich and growing number of well designed and theory-based distance learning environment. The programs are not well known!

The second problem we encountered in looking at the literature was that the distance education courses were simply not described in very much detail, especially the detail that would help us interpret the theory-practice linkages. There were many questions we wanted to ask as we read each article – but that simply was not feasible. So in designing this book, we sought to establish a context in which the questions people have might be answered. Thanks to the support of the Fund for the Improvement of Postsecondary Education, we were able to bring all of the participants in the book, and a few others, to Asilomar California where papers were presented and then discussed. That discussion led to revisions and clarification of the chapters and much of the discussion was also captured and is included in this book.

For each of the eight programs presented, a formal discussant critiques the chapter and places the key issues in a larger context. After the discussant presentation, we present the open discussion among the participants that followed the formal presentations. We are really pleased with the diversity of discussants who contributed to the success of this book and to the interaction at Asilomar. We sought learning science researchers and practitioners in distance education, but we also wanted to make sure that the array of issues relating to distance education were addressed, so the participants included specialists in evaluation, policy, and organizational management and communication. Reflecting this goal of obtaining multiple perspectives, we asked Sally Johnstone (WICHE) with her focus on policy and Jim Botkin (Natural Voice Coaching) with his organizational management perspective to offer the final reflections on the papers and the discussions.

Most of the program designs are problem-centered designs, but the variation between them is considerable. A comparison of these contrasting strategies alone is extremely informative. Lopez-Isalez (Monterrey Technological Institute) has tried to institutionalize a team based and instructor driven online problem based learning approach modeled after the University of Maastricht. Duffy and Kirkley (Indiana University) and Bransford (Vanderbilt University) describe designed problems presented in an engaging multi-media format and a rich set of resources. Stinson (Ohio University), on the other hand, presents real, whole business problems with students beginning their work initially in

a face-to-face environment and then continuing to work at a distance over a period of two months, using only a rich discussion forum. Finally, Lesh's work (Purdue University), while not formally a problem-centered learning environment, explores a rich array of environments that support students in exploring teaching practices in mathematics.

The designs of these environments have significant scaling implications. The programs at Monterey Tech Virtual University (Lopez Islas) and SUNY (Shea et.al.) with Lopez Islas's institutional strategy clearly the most scalable. Shea et al (SUNY) are clearly the most scalable. However, as Ruhleder (University of Illinois, Champaign-Urbana) noted in reflecting on the papers, the programs that were guided by the most detailed models were also those that appeared to be least scalable.

The different models also have cost implications for both the university and the student. Face-to-face meetings are the greatest cost factor for delivery of instruction, while development costs are heavily impacted by the use of multimedia and the amount of material that is written specifically for the course as for example in the work of Duffy and Kirkley and Bransford et.al.. While our focus was on the learning design, it is clear that additional discussion is needed to consider the cost-effectiveness trade-offs of these different approaches. This is certainly an area where learning sciences research and cost model approaches advocated by Erhmann (2002) would aid the discussion.

Perhaps the issue that stood out most clearly was the complexity of the concepts of collaboration, community, and interaction. There was a clear bias among the authors toward a rich collaborative community environment. However, the relationship between community and collaboration is complex. For example, the face-to-face meetings that were central to the work of Stinson and Polin seemed to produce a rich community environment in which graduates choose to remain affiliated with the program and even volunteer to help teach the next group of cohorts. The students did not necessarily collaborate on team projects, but rather seemed more involved in learning about and helping one another with their action research project and discussing issues in a seminar type of format. It seemed clear, though there is no data to support the conclusion, that the synchronous component and the face-to-face meeting in particular are critical to this community building. While Ruhleder provides students with a preliminary face-to-face meeting and meetings include synchronous chat, there did not seem to be the same sort of community building as reported

by Polin and Stinson. Perhaps it is that Ruhleder was less community and team focused – with the chats being open channels for student-initiated discussion during lectures. Thus it is not just that face to face and chat that are important, but rather that there are principles of community development that are critical. Though once again we return to the question as to whether the community “spirit” impacts learning or simply leads to more socializing.

In contrast to the synchronous efforts, Lopez-Islas and Shea both emphasize asynchronous learning and the reflective process associated with problem solving and discussion. It is clear from the descriptions that while these environments may lead to knowledge construction as Lopez Islas describes, there is not the sense of community and commitment among students. Clearly, collaboration and dialogue do not necessarily lead to community – but perhaps it leads to better understanding of the concepts and processes being taught. It is often through discussion as well as collaboration that concepts and relationships are visited, revisited, and enhanced. Additionally, with asynchronous discussion, students can be challenged to communicate and negotiate perspectives on various issues in a reflective environment, addressing issues within context, and managing group production as well as their own learning.

Finally, Duffy and Kirkley argued that the instructor may well be able to fulfill the role of challenging the student’s assumptions and engaging in the dialogue if not the dialectic that seems to be important to learning. That is, they argue that students can function in a self-paced environment with the student having access to an online mentor. While we know the mentor or teacher is one of the most important factors impacting learning (Bloom, 1984), they argue that we have tended to ignore the mentor role and indeed emphasize its subservience to the group process (Collison et al, 2000).

Individual mentoring permits the design of self-paced learning environments and this, in turn, led to a discussion of the goals and needs of the learners. Many students, especially working professionals, come to distance learning because of the opportunity it offers to manage learning along with job, family, and community responsibilities. It is not just any place, but also anytime (and hence not synchronous) and any pace (hence not cohort based) that is important to their success. Indeed, the recent work by Duffy and Kirkley (Duffy and Grabinger, 1999; Malopinsky, Kirkley, and Duffy, 2002) focuses on the design of self-paced, mentored professional development for teachers because teachers

told us that flexibility in pacing is more important than having a peer group. As one of our teachers told us, “I always have access to the mentor if I need help or want to try out an idea.” The teachers in professional development are certainly frustrated by time-based requirements and perhaps even the requirement to spend time interacting with others. On the other hand, other students entering distance education may find it a lonely space and look for the camaraderie of the classroom. The students are likely to find the synchronous environment and the opportunity for face-to-face meetings as central to their motivation to learn.

All of this is to say that the online learning environment provides a rich research context in which to probe more deeply into the issues that are so central in the learning sciences. As Andersen and Lekander both noted in their reflections on the chapters, the theories of learning may be too tied to the classroom model of learning. Certainly Resnick (1989) has made this point very strongly in distinguishing in school and out of school learning. Perhaps we should be considering the contrasts in the classroom and distributed learning environments in a similar way as we seek to evaluate and extend theory. As Andersen noted, we would do well to heed Glaser and Strauss’s (1967) grounded theory approach with the emphasis that theory is a process grounded in the data and hence the theory grows and evolves as new sources of rich data, like the distance learning environment, enter the discussion.

The program descriptions and discussions in this book provide a rich array of approaches to distance education, all within the learner centered framework. The issues raised in this chapter are all explicitly discussed or implicit in the work. There are four sections following this introduction, each focused on a critical issue in distance education today: *Community Building*; *Problem Centered Learning*, *Innovative Uses of Technology*, and *Scaling Up*. In each of these sections, there are two primary chapters and a response chapter for each of the primaries. Additionally, there is a transcribed and edited representation of the whole group discussion of each primary chapter. The final section of the book, *Summing Up*, provides chapters focusing on policy issues in corporate America and higher education.

## ***Section II: Community Building***

Community is a theme that emerges throughout the book and seems to be associated with the use of face-to-face meetings and chat. Both of the programs described in this section use both of these strategies to encourage students to get to know one another and to support open dialogue on issues. While both are very successful programs as gauged by student enrollment growth and interest in the program, one led to very strong community among students while the other did not.

In the first primary chapter, Linda Polin (Pepperdine University) uses a community of practice lens to examine a masters degree program in teacher education that utilizes an asynchronous learning environment supplemented with chat sessions using Tapped In. Face-to-face meetings and an extended action research project serve as cohesive organizers for community building and learning activities across courses. Scott Grabinger (University of Colorado at Denver) responds to her chapter by examining Polin's theory-into-practice approach as well as by contrasting traditional instructional design processes with those using a socio-cultural approach. He also addresses how theoretical components and the use of learning tools affects the design of online courses. The open discussion focuses on developing online communities of practice, the importance of tool design to support learning, and issues related to assessing quality in learning.

In the second primary chapter, Karen Ruhleder (University of Illinois, Champaign-Urbana) describes an online masters degree program in library science that uses live audio-streamed lectures accompanied by student chat. An asynchronous learning environment is also an integral part of the learning environment. She addresses issues of managing chat and lecture as well as the rationale for using this unusual approach. Research outcomes on virtual interaction with this approach are also presented. Mark Schlager (SRI International) responds to Ruhleder with an assessment of the UIUC strategy as well as a discussion of the challenges of designing distance learning environments to support a community of learners engaged in multiple collective and individual activities. The open discussion focuses mainly on using synchronous technology to support learning and issues related to the role of adjunct faculty in online learning programs.

### **Section III: Problem-Centered Learning**

Most of the programs in this book used some form of problem centered learning. However, the two programs in this section had problem centered learning at the core of their approach. Additionally, as with the chapters in the previous section, the two programs provide a study in contrasts: one focused on meeting individual needs through individual study, while the other is a very collaborative problem solving approach with an emphasis on community building.

In the first primary chapter, Thomas Duffy and Jamie Kirkley (Indiana University) begin with a discussion of the principles for the design of a learner centered or constructivist distance learning environment. These principles are then used to examine an MBA curriculum offered by a for profit virtual university, Unext.com's Cardean University. The courses are entirely asynchronous and have a self-paced, problem centered learning format. In addition to the linkage of design and conceptual goals to practice, they discuss the competition between pedagogical goals and business rules in this for-profit effort. Finally, they question the role and necessity for student interaction in online courses. In her response, Lani Gunawadena (University of New Mexico) examines issues related to designing online inquiry based learning environments using constructivist and socio-constructivist theories of learning, including challenges with balancing structure and dialogue in distance education design, and issues related to collaboration, assessment, and transfer of learning. The open discussion focuses on how the business rules of Unext shaped the design of their courses. This also contains interesting commentary on the role and relationship of community and collaboration within online learning environments.

In the second primary chapter, Stinson (Ohio University) describes an MBA program that is a mixture of face-to-face and web-based asynchronous learning. The program uses a problem based learning format that contrasts significantly in strategy from the program described by Duffy and Kirkley. This is a cohort-based program with student's working in teams. All work, other than start-up and reporting out at the end of a problem occurs in the asynchronous discussion environment. Robert Wisner (Army Research Institute) responds with commentary on the design of the OU program with regard to pedagogy and community. He also focuses on how it might better be evaluated

by using specific guidance from the training literature. The open discussion focuses on issues of measuring intellectual capital, the scalability of a program like the MBA without Boundaries, and the roles of faculty teaching in the program.

#### **Section IV: Innovative Uses of Technology**

Of course all of distance education makes use of technology and all of the programs described are innovative. However, in this section we focus on two programs where the technology is central to engaging the learners.

In the first primary chapter, John Bransford et al (Vanderbilt University) describe the AMIGO project, a problem centered approach to distance education that emphasizes strategies for engaging student in the professional issues. Several examples of the use of the AMIGO design in teaching educational psychology and biotechnology are discussed. Terry Andersen (Athabasca University) responds to Bransford et al by focusing on the issue of *quality* in online learning and the variety of techniques that can be used to assess the quality of online learning. The open discussion includes an elaboration of the How People Learn framework (Bransford, Brown, & Cockings, 2000) and how to design challenges that are engaging and truly useful for learning rather than exercises that are neither relevant nor useful.

In the second primary chapter, Richard Lesh et al (Purdue University) focus on using a specialized version of Constructivism called a *models perspective* that is being used within a variety of distance learning settings in teacher education to help improve pedagogical and technology integration skills. They examine how technology is used in a variety of innovative learning environments to support strategies and goals for real world, complex learning. Matt Champagne (Iota Corporation) responds with a discussion of challenges of and solutions for evaluating technology based and specifically web based learning environments. He offered embedded assessment as one key strategy. The open discussion focuses on the systems approach to thinking and how that informs the design of learning environments. Other issues include the function of roles in learning as well as the scalability of the types of approaches discussed by Lesh et al.

#### **Section V: Scaling Up**

Most of the chapters in this book can be considered describing boutique programs, programs that are focused first on creating a rich learning experience and secondly on scaling the process. Here we focus on two programs where scaling is central – the

emphasis is on supporting an entire university system in the movement to distance education. The concern is the development of scalable models.

In the first primary chapter, Peter Shea et al (SUNY) reports survey data from students and faculty in the distance education programs in the SUNY system (20,000 students last year). It contrasts from the other chapters in that the design of the courses in a program is not the focus since there are a variety of strategies used across the system. Rather the emphasis is on students' perception of depth of learning, interaction, quality of the experience as well as the faculty member reports of their teaching strategy and their satisfaction. Carson Eoyang (Naval Postgraduate School) examines the SUNY research and offers insights into SUNY's role as a large, nationally recognized program and discusses the conceptual and methodological challenges in conducting large scale research. Open discussion addresses issues of research design for surveys, specifically with regard to sample bias. Other interesting issues include the role of synchronous and asynchronous technologies to support learning and the political and research issues that surround this issue.

In the second primary chapter, José Rafael López Islas (Monterrey Technological University) examines the efforts of the Virtual University to mount a wide scale implementation of a problem based learning model. He takes us through the experiences of moving faculty along the path to an increasingly interactive environment and the problems that ensue. They eventually adopt the University of Massstricht problem based learning approach (where PBL has been a required approach in all classes for the last 25 years) with the goal of applying it to all of the classes taught at Monterrey Virtual University. Data on student interaction in the classes is described in some detail as MT-VU moved toward the PBL approach. In her response to Lopez-Islas, Jamie Kirkley (Indiana University) discusses the challenges of using theory to guide design and assessment of distance learning environments. She examines the challenges with using theory as a design tool. She also addresses specific analytical research methods for examining constructivist learning environments. Open discussion focuses on the role of tools to support the PBL learning process as well as how students are assessing in the online learning environment,

## Section VI. Alternative Views

In these final two chapters, we bring fresh eyes to bear on the issues of distance learning in higher education. Rather than a traditional reflection on the book, we asked thought leaders outside the instructional design, evaluation, and learning science perspectives to offer their views on the approaches and the thinking reflected in the rest of the book.

First, Sally Johnstone (WICHE) addresses the plethora of challenging policy issues for distance education at the national, regional, state, and local levels. For distance education to continue to advance and grow, she states that we must address many difficult policy issues along the way. The open discussion addresses possible the complexities of the policy issues as well as some ideas for addressing these. Other issues include the impact of using knowledge objects as well as the role of technology costing in forcing many to deal with policy.

In the second chapter, Jim Botkin (Natural Voice Coaching) and Prasad Kaipa (SelfCorp) discuss the interesting intersection of learning in business and education. They address future trends in learning and the need for business to find creative solutions for meeting the educational needs of the workforce. The open discussion of the Botkin/Kaipa chapter addresses issues of the potential use of learning objects. It also contains an excellent discussion of the role of theory in designing learning environments, which is an appropriate ending point given the focus of this entire work.

With this book, we aim to advance the discussion of how the learning sciences can inform the theory, research, and practice of distance learning as well as face-to-face learning. We hope that others will continue the conversation as we strive to better understand the role and impact of distance learning on learning process and outcomes, pedagogy, practice, tool design, and process on supporting learners with obtaining high quality educational experiences.

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## Footnotes

1. While the for-profit California Virtual University closed, the California Virtual Campus site which catalogues and coordinates all of the California online courses is thriving as noted in the next paragraph.

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