SEVEN YEARS OF ONLINE LEARNING

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Abstract: Successful online teaching and learning stems from an integrated, problem-solving approach to the design, development, management, and implementation of the online learning environment. Seven years of experience in using online learning environments for individual classes and complete programs in Instruction Technology has facilitated the development of a strong foundation of strategies and techniques for the online teaching and learning process.

This paper explores lessons learned from seven years of online teaching and learning. Stakeholder perspectives are explored. Lessons include ideas and tips related to: design, development, maintenance, support, learning management systems, and support systems. Guidelines in the development of complex online learning systems are also suggested.

Authors' Bio: Dr. Karen Rasmussen consults in the design and development of a variety of products, including webquests for Sci-Binder, a tool for teachers, supporting science and technology initiatives. She was co-designer and co-developer of UWF's first online program, a master's in Instructional Technology, which, in its initial cohort had a retention rate of 96%. She has worked in the creation of technology-rich, authentic learning environments for Florida's PK-12 students. She collaborates extensively in the area of Online Professional Development, including OPDs for Florida's teachers in technology integration, reading, and assessment and curriculum alignment. She has conducted hundreds of training sessions related to technology. Her primary interests lie in the areas of technology integration, online support systems, and the design and development of web-based learning environments; she publishes in the areas of competencies for instructional designers, assessment and student performance for online expeditions, supporting learners in distance environments through support systems and mentors, design and development of learning communities and distance learning programs.

Dr. Pam Northrup has spent her entire career investigating how technology can be used for teaching and learning. She led the development efforts of STEPS (Support for Teachers Enhancing Performance in Schools) that is used extensively as a web-based performance support tool to assist Florida's teachers in planning for school reform. She has also been involved in the development of a standards-based performance support tool; START (Science Tools And Resources for Teachers). Within this work, she is developing a web-based EPSS using the SCORM framework that will allow teachers to drill down into pre-populated databases aligned to National and State Science Standards and customize content for web-based Science in the classroom. Her work in Online Professional Development (OPD) has led to the creation of three online inservice workshops for teachers. She was co-developer of UWF's first online program, a Masters degree in Instructional Technology and wrote the University's strategic plan for Distributed Learning. She writes frequently on how interaction plays a role in online learning and is currently developing a framework for reusable learning objects for increasing the efficiency of online learning. She consults regularly with school districts, industry, and the Navy. She is an active member of the NW Florida Distributed Learning Consortium. Her primary interests include technology integration, distributed learning, and how EPSS can improve performance.

Dr. Charles Lombardo has held positions in management, training, and consulting including director of HPT and vice president of educational services prior to joining UWF in 2001. He has a strong background in Human Performance Technology, with experience in developing instructional and other performance solutions in a variety of industries. He has extensive experience in providing user support including training, documentation and job aids during software implementation and has also assisted organizations with strategic planning. He holds a certificate in Human Resource Development and is trained as an instructor in Information Mapping. His primary interests include developing human capital, change management, motivation, and evaluation of HPT solutions.

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INTRODUCTION

The mid-1990s saw a revolution in the use of technologies that support education and training initiatives. Low-cost technology, access to networks, and demands for increased skills and knowledge of employees, has fueled demands for alternative delivery systems that are convenient, effective, and efficient. The Internet and the World Wide Web (WWW) offer educators and trainers a comprehensive delivery system that allows educating and training systems to deliver programs anywhere, anytime, to anyone.

Since 1995, faculty in the Division of Technology, Research, and Development at the University of West Florida have offered online workshops, individual classes, and programs to students in the area of instructional technology. In the Fall of 1999, an online masters program in instructional technology was initiated with an initial cohort of 25 students. By the summer of 2002, 24 of those students had graduated, a retention rate of 96%, far above the national rates, which are as low as 50% in some cases (Carr, 2000).

These experiences have led us to develop a framework of online learning that is interactive, active, and engaging. The promise of the WWW is not just in the providing of information, but, rather, in a collaborative and exciting learning environment that facilitates development of new knowledge, skills and abilities that can be used in the professional career of the student. On one hand, page-turning, linear, sequential instruction can certainly be effective in terms of testing performance, but in application of real-world concepts and processes, an active learning environment helps students to transfer concepts to those real-world environments. Interactive environments permit an interchange of ideas with the lesson, the instructor, and other students in a flexible and dynamic environment and community (Rasmussen & Northrup, 1999).

STAKEHOLDER ROLES

In active online learning communities, stakeholders assume roles that help to create the learning environment. These stakeholders, designers/developers, instructors and students, form the online community (See Figure 1). Designers and Developers create the structure, framework and activities of the learning environment. Instructors implement the framework and activities for the students, who then interact to reach the goals of the instructional setting. The following discussion explores these roles from a theoretical background and then offers views from the stakeholders.

Designers/Developers

Background. Resource constraints have forced designers and developers to investigate new ways of creating instructional materials. Designers are examining traditional instructional design models from different perspectives to find ways to decrease production time and increase efficiency. The use of technologies for delivery systems has increased the complexity of the instructional system, further straining design and developer timelines.

In today's demanding instructional settings, designers must concurrently design and develop as they build rapid prototypes and proof of concepts. This process suggests that instructional design tasks are not isolated from one another: rather, the outputs of one task are immediately put into action as inputs into another task. Overt, continual formative evaluation is also required in this alternative view of design and development (Northrup, 1995). Costly design and development errors can easily occur if consistent, high quality formative evaluation is not conducted.

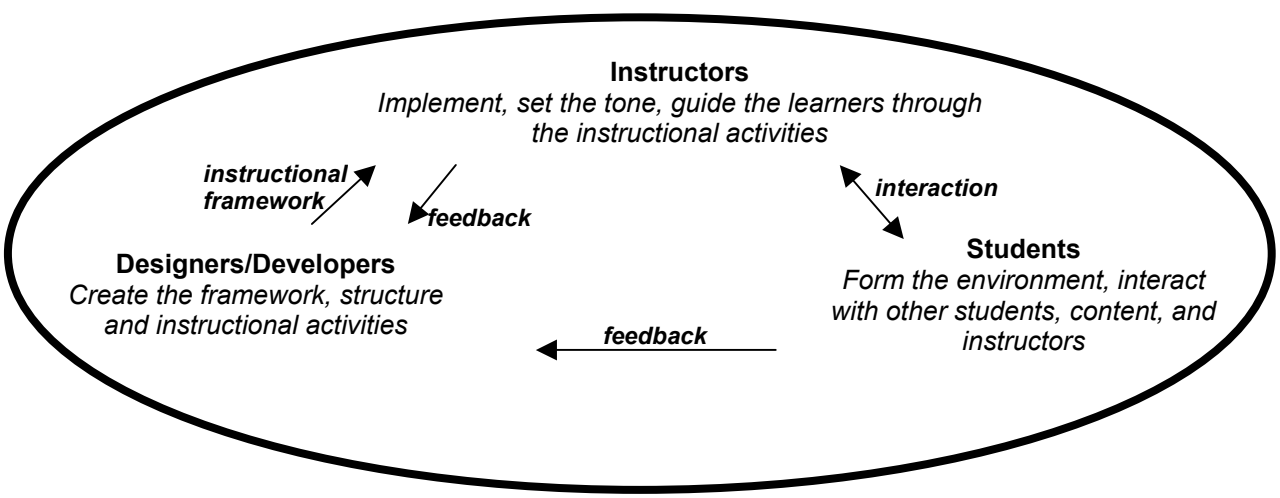

Figure 1. Learning Environment

Designers also are faced with the need to develop new instructional strategies to take advantage of technical enhancements. Web-based technologies offer designers a new set of capabilities not found in traditional stand-up training or CBT, including chats, threaded discussions, and presentation options (e.g., multimedia, audio-narrated PowerPoint), Developers, in turn, must implement those new strategies.

There are other related issues that designers must accommodate in a web-based learning environment. Issues of student motivation, navigation, learner control, feedback, interface, and message design must be identified and addressed (Davidson-Shivers & Rasmussen, in press). In addition, instruction delivered online must meet technical requirements, including accessibility, load speeds, servers, cross-browser functionality, ADA, and copyright.

Designers and developers must possess a new cadre of skills to meet the challenges of working in technology-rich, network accessed education and training environments. New methods of integrating design and development techniques can be implemented to facilitate the realities of creating online learning environments.

View from the Designer/Developer. In the online masters program, designers act as developers, using technical support as needed. In most cases, this individual also acts as the instructor. This blurs lines of responsibility when actually identifying stakeholders' views. In our early technology-design and development experiences, we created CBT using a variety of tools. Many of the strategies that were used for CBT could certainly be used for web-based instruction and early instruction reflected that foundation. As we designed more interactive environments, we experienced a series of evolutions, beginning with developing highly interactive assignments that entailed complex assessment protocols. Each class that was created had a unique theme and interface that had a corresponding unique navigational strategy.

As the number of online classes grew, the types and amounts of instructional strategies become increasingly consistent in terms of navigation and interface, with a consequential effect of decreasing both design and development time. Student assignments were reviewed and revised to ensure that non-essential interactions and activities were removed. A series of templates were designed and developed that shared common buttons, backgrounds, and links. Content developers could create text in word processing systems that could, then, be easily inserted into the template.

Through this same timeframe, tools for developing pages and sites continued to improve. New features and capabilities of editors provided even more flexibility in day-to-day production tasks. Other tools, specifically learning management systems became available that facilitated a new level of functionality, especially in terms of record-keeping, testing, communication, and security. On one hand, the LMS limited the ability of the designer or developer to creatively manipulate the learning environment; on the other, an LMS provides a structured environment, with a variety

of tools that support teaching and learning, that is consistent across learning environments.

Our designer/developers now create courses using a combination of LMSs and individualized websites. This work structure permits designers and developers to design and develop an appropriate learning environment as they take advantage of the functionality of the LMS. The individual web pages use similar templates and navigational aids that are consistent with structures that students are used to, decreasing the cognitive overload of each new class. This streamlining of efforts also permits our designers and developers to explore instructional possibilities of emerging technologies, including Flash, Director, and databases that can dynamically present web site.

Instructors

Background. In online learning environments, instructors or facilitators meet challenges that they do not experience in traditional education and training settings. Technical issues, ranging from working with the developed instructional materials (e.g., making personal changes to the web-site, accessing servers, and interpreting student technical issues). Many instructors do not have the complex skills needed to manipulate web sites, learning management systems, and other technical support systems in an online world.

In an anytime, anywhere learning environment, instructors may be expected to be "on call" far in excess of their responsibilities in a traditional learning environment. Depending on the number and location of students, complexity of the content, level of interaction required, contact from learners might overwhelm the instructor. There may also be a cyclic rhythm to the learning community: Students typically require more support at the beginning of an online class as they develop technology literacy skills and skills to be a distant learner. Additional support may also be necessary when assignments are due.

Online learning environments offer instructors benefits in many ways. The environment is quite flexible, especially after the instruction is created, in that the instructor can fulfill his or her responsibilities at convenient times and places. In many cases, instructors develop much closer relationships with students because they communicate directly, sharing perspectives and ideas in a person-to-person fashion.

View from the Instructor. Online environments provide instructors with different challenges than the traditional face-to-face environments. Instructors must be technology-savvy and be able to be flexible and responsive in ways that are required in traditional environments. In our program we use a variety of technological tools to present information and interact with students. The tools (templates, LMSs, e-mail, electronic conference systems (e.g., NetMeeting), chat room, threaded discussions, web boards, etc.) give our instructors flexibility to revise instruction and work with students at times that are convenient for both students and instructors. Instructors must act as troubleshooters with students when other support methods are not available.

Our instructors develop relationships with students that generate these types of comments*: "I learned a tremendous amount in these classes. You've done an outstanding job of putting the classes together, but it's your personal attention to each individual student and your desire that each of us succeed that really makes you stand out as an exceptionally caring and skillful educator."* These relationships last long beyond the class, as students enter the profession, networking with instructors continue.

Teaching online can be overwhelming to novice instructors. The amount of contact via e-mail, chats, threaded discussions, can appear to last forever. As the number of students in a class goes up, the corresponding number of contacts also increases. In our program, we have had to establish parameters about when feedback will be returned to students (e.g., questions answered within 24 hours), when assignments will be graded (e.g., one week from the due date, unless graded via the LMS), and when instructors are available (weekly online office hours).

Students

Students in web-based learning environments have a variety of issues that they face as they make the commitment to become part of the online learning community. The benefits are many. Online learning is convenient (available anytime, from anywhere), flexible in terms of personal scheduling, and offers choices to students that they might not otherwise have. In many cases, online learning mimics the one-on-one nature of a personal tutor in that the students have a personal e-mail link to their instructor who, then, in turn, responds back. This feedback in combination with

becoming part of a learning community provides students with motivation to continue to develop new knowledge, skills, and abilities that they can, hopefully, apply in their own work environments.

There are, of course, challenges for students in an online learning environment. Many students may feel isolated, outside of the classroom setting where they do not consistently "see" their instructor or other students. This isolation may lead to anxiety that can frustrate students. Resources of technology may also limit an individual's ability to participate in the learning environment. Newer technologies often require the student to upgrade equipment for their own study setting. This upgrading may be manifested in faster computers, better network access, and multimedia requirements.

View from the Student. Over the past seven years, students have become, in general, increasingly technology literate. In addition, more and more students have participated in online learning experiences and are entering the distance environment prepared to be distant learners.

The support systems for students have grown from minimal "how to" guides to a comprehensive tutorial on technology literacy, time management, and interaction guide. Administrative systems, also, have matured to include admissions and registration via the web, electronic library resources, as well as administrative portals that provide distant learners with resources that, in the past, they would have had to come to campus to obtain.

Each term students are asked to provide feedback to designers, developers, and instructors in a variety of fashions. Individual instructors have students comment on their classes and students complete traditional university evaluations. At the end of their program, students are invited to share their comments about the program, online learning and individual courses. Feedback is reviewed so that modifications can be made to the learning environment. Students provide valuable insights to the learning environment, content, and instructors that are integrated into the design of the courses.

- *So far I have enjoyed the freedom offered by the online class. It is great for me to be able to sit down and do what I need to do when I have a free moment.*
- *I never thought that I would be able to survive a non-traditional class or even enjoy one. Throughout the semester, however, I have become much more comfortable with this style of learning.*
- *This class has been a God-send. I do my work whenever and wherever. I can even work in the middle of the night. Best of all, I feel that I am truly learning something.*
- *You have been wonderful at corresponding with me. I have benefited from the collaborative online work that I have been involved in with my study buddies.*
- *This course has been set up to interact with all types of learning styles. I have really enjoyed working with the various different media of instruction.*
- *Mixing in media types such as Real Player and PowerPoint have made this interactive learning experience interesting.*

LESSONS LEARNED

Design and Development

New technical and instructional demands are placed on designers to move materials to the web quickly, to provide just-in-time instruction, and to make modifications to the materials as needed to facilitate organizational goals. To meet these challenges, designers must re-examine work processes of designing high-quality materials. Rapid changes in information exchange and the Internet, along with technological developments assist designers in distributing content to learners as quickly as possible.

To assist in design issues, Northrup and Rasmussen (2001a; 2001b) used a framework developed by Hannafin, Hannafin, Land, and Oliver (1997) to develop web-based programs. This framework includes major categories of:

- Psychological
- Pedagogical
- Technical
- Cultural
- Pragmatic

Table 1 presents the underlying theoretical bases for the design of online programs. This theoretical foundation was used to frame design strategies that were used in the online program.

Table 1.
Theoretical Framework of Online Programs.

Theoretical Framework	Foundational Theories
Psychological	Situated Cognition
Pedagogical	Anchored Instruction
Technological	Utility on the Web
Cultural	Learning Organizations, Social Learning, Individual Differences
Pragmatic	Administration, Student Interpretation and Motivation

(For a complete description of the framework, see Northrup & Rasmussen, 2001a; 2001b.)

The design strategies, formulated from the framework, used on the online program include:

- Cognitive apprenticeships
- Modeling
- Scaffolding
- Coaching/Mentoring
- Scaffolding
- Collaboration
- Authentic Context
- Authentic Activity
- Reflection

Tools such as learning management systems, content management systems, and task management systems support the design strategies. In addition, these tools allow designers and non-designers to enter content into databases that can be reused. The Advanced Distributed Learning movement began as an approach to permit the armed services to create and share instructional resources rather than to replicate content on similar topics. This movement has resulted in the development of learning object systems that focus on technological attributes, metadata standards and system specifications that define levels of granularity and interoperability (Singh, 2000).

These changes have forced designers to explore how learning objects can be designed to promote efficiency, provide consistency, and to facilitate reuse. Learning objects permit designers to build small instructional objects that can be used and reused in different learning contexts.

Early developers were programmers who could master the intricacies of html coding. These individuals kept the secrets of web page development far from the typical designer. Editors and learning management systems, have streamlined actual development of instructional web pages and web sites.

We followed this same model. Web pages and sites were created in isolation, depending on the course and the site. Each site had a different interface, using individual preferences for color, fonts, graphics, etc. Satisfying in a creative way, there was little consistency among the courses, which led to student frustration and a lack of common identity.

Tips:

- Designers and developers must work closely with each other to maximize efficiency and effectiveness
- Use design and development teams that structure tasks among staff who have varying abilities and use senior staff to conduct quality control and assurance
- Follow a theoretical framework in the design and development of learning environments that align instructional strategies to outcomes, tools, and student and instructor needs
- Integrate electronic databases into design process to facilitate access, re-purposing, and content sharing.
- Use templates, LMSs, and other tools to streamline and standardize products to create common, consistent interfaces
- Use available technologies and resources to re-purpose systems and materials
- Develop databases for designers and subject matter experts to insert content into instruction

Learning Management Systems

A learning management system is "software that automates the administration of training events" (Brandon-Hall, as cited in Northrup, 2000). A LMS typically registers users, tracks courses in a catalog, and records data generated by the students and the instructor. A LMS also provides reports and may assist the organization in managing online assessments. Although LMSs have many positive attributes, they can also provide instructional limitations in creativity and flexibility. Designers and developers must work within the structure of the LMS that may include limitations in modifying the interface and pedagogy of the tool. Some systems may also require outside supporting systems when they do not posses needed tools.

During the past seven years, capabilities of learning systems as well as the realities of online learning have merged to provide a set of tools that can be incorporated into an online environment. The combination of a LMS and a comprehensive editing/development system permits a hybrid functionality to a learning environment. In other words, using the LMS for what it does best along with a system for creating websites, permits designers and developers to be creative and flexible in the design and development AND management and maintenance of a learning environment.

Tips:

- Fully test functionality of LMS to explore instruction capabilities
- Use LMSs for what they do best: collaboration, testing, tracking

Interaction

Interaction is an important variable in learner satisfaction and is key to maintaining student persistence in courses (Northrup, 2002). Defined as engagement in learning (Hillman, Willis, & Gunawardena, 1994), interaction appears to be a component of student satisfaction. A continuum of interaction exists, depending on the requirements of the learning goals, organization, and learner can be incorporated into the learning environment. Instructors and designers must guard against too much or too little interaction: too much may be perceived as busy work, learning to frustration, boredom, or overload (Berge, 1999); too little may lead to isolation (Northrup, 2002).

Northrup (2002) developed a framework for interaction that guides the learning environment and community. The framework can be used by designers as well as instructors to frame student interaction experiences in the online environment.

- Content Interaction. Effective content interaction appears to be a combination of partially individualized courses that also use audio-narrated presentations to present content. Other strategies such as case studies, games, and focused group discussions, based on assigned readings, facilitate positive content interaction.

- Conversation and Collaboration. Meaningful and appropriate interaction between and among students and with instructors can be facilitated through discussions and sharing of information, especially when using long-term, consistent teaming groups. Other strategies for promoting this type of interaction include debating and questioning experts.

- Intrapersonal/Metacognition. Students need to be able to monitor their own progress. Advance organizers, guiding graphics, note-taking guides, and structured due dates permit them to structure their learning environment. Students also need to develop their own time-management strategies to help them structure their own study time.

- Support. Timely responses, mentors, and tutorials provide students with the support interaction required to be successful.

Tips:

- Avoid interaction just for the sake of interaction: always have a purpose for interaction
- Respond to the entire class when individual questions relate to class issues
- Set guidelines and timelines for interaction and feedback
- Hold online office hours for students to meet with other students and instructors to ask questions
- Initiate a buddy system where students can interact with each other

Support Systems

Distance learning programs require strong support systems in order to facilitate learner success and reduce attrition rates (Rasmussen, 2002). Support should be viewed as a teaming effort. Depending on the number of students served and the amount of support that they need, no one individual can provide the amount of support that learners will need to be successful.

Support can take three perspectives: Administrative, Instructional, and Technical. *Administrative* support involves systems such as admissions, registration, library, bookstore, etc. These administrative systems notify learners when online learning begins and distributes final grades or certificates. The administrative support systems use a variety of communication techniques, ranging from personal communication and e-mail to traditional mail services to communicate with students. These administrative systems may be departmentally- or organizationally-based, depending on the organization.

Instructional support systems include those outlined previously in the interaction support section. Other types of instructional support might include mentoring and establishment of cohort groups and class buddies who provide peer support. Instructional support systems should include easy access to communication tools so that students can easily contact instructors, mentors, other students, and administrative support personnel.

Technical support systems are critical to online learning success. Students who are at a distance need to be assured that when they have technical difficulties (which will certainly occur), there are support tools to assist them. Technical difficulties can frustrate students more quickly than any other challenge in an online environment. Support tools should include technology-based such as question and answer (e.g., FAQs) pages on the site itself, searchable databases containing previous technical problems and help desk access (e-mail and telephone). Technical mentors might also be used to resolve a student's technical issues.

Instructors, typically, should not be the only support system for a learning environment. Although the instructor is certainly the focal point of the environment, it is impractical to believe that the instructor can be available 24 hours a day, 7 days a week to respond to student needs at any time. Instructors, themselves, also need a support system where they can find technical and pedagogical assistance as needed.

Tips:

- Develop tutorials, FAQs, and support guides
- Include support structures in the learning environment, including technical and instructional contacts
- Advertise administrative supports to students

CONCLUSION

Online teaching and learning has faced a fast-paced path over the past seven years. Technology tools and best practices in online learning have led to a series of lessons learned that can be used in the creation of effective learning environments that meet the needs of students. These lessons, available to designers, developers, instructors, and online students provide a foundation of support as we continue to offer instruction at a distance.

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