DISTANCE TEACHING A GRADUATE COURSE ON INFORMATION SYSTEMS ANALYSIS AND DESIGN

Ping Zhang
Syracuse University

A graduate distance course on Information Systems Analysis and Design was designed and delivered under the guidance of the following four beliefs: (1) an effective education is a learner-centered education; (2) distance students are more likely to experience situated learning and problem-based learning; (3) enforced learning should enable distance learners to achieve higher learning performance and satisfaction; and (4) the driving force behind a distance course is the effective learning of subject topics, not the enforcement of state-of-the-art distance education technologies. The course was well presented and received. Students reported a very satisfactory learning experience. This paper describes in detail the course planning, actual delivery, learning results, and technology use. Different distance course models are also introduced. Experiences, lessons learned, and practical suggestions can help other distance instructors to deliver effective distance education. The author concludes with a discussion of several important distance education issues.

INTRODUCTION

Distance education is a process to create and provide access to learning when the source of information and the learners are separated by time and distance (http://www.reeusda.gov...). Distance education has become increasingly common in recent years as distance education technologies expand at an extremely rapid rate. Distance education has also become an important part of higher education all over the world. There are, however, many challenges and uncertainties that distance instructors need to face in order to effectively deliver all types of distance courses. Unfortunately, not many reports on successful delivery of distance courses can be found. Thus many distance instructors have to struggle and try things by themselves.

This paper discusses the experience and lessons learned during the design and delivery of a graduate distance course on Information Systems Analysis and Design (SA&D). Several aspects of the report make it valuable to a variety of audiences. First of all, the author discusses four important philosophies that are pertinent to distance education. Some researchers have identified some of the philosophies, such as learner-centered education (Sherry, 1996), situated learning (Streibel, 1991), and the observation that technology should not be the driving force of distance courses (Sherry, 1996). However, the philosophies have not been widely incorporated into distance instructional designs. It is also unknown whether these philosophies ensure successful course delivery. Second, the subject matter of the course, Information Systems Analysis and Design, is rather cognitively challenging to teach and learn. The course requests students to build skills to succeed rather than just to acquire information or knowledge, and this is challenging even in a traditional teaching and learning mode. As distance education grows, more cognitively challenging courses will have to be delivered in a distance format. Experience and lessons learned in this course can definitely help other distance instructors to avoid pitfalls and be more effective. Third, the paper describes methods of collecting useful information on students' background and learning. The instruments can be used widely in many kinds of courses, traditional or distant. Fourth, the paper introduces several models of distance courses at Syracuse University. This can be valuable for distance education directors who need to plan and design distance course models. Fifth, the author discusses several important distance education issues in light of distance teaching practice, including distance teaching workload distribution, the role of distance instructors,

and class policies. To limit the length of this paper, statistics of actual technology use in distance learning are described in a different paper (Zhang, 1998) in order to fill a gap: there are many suggestions about how to use the available technologies in distance education, but few usage data are collected and analyzed to provide insight into the effectiveness of distance technology.

The next section states the philosophies that guide the design and delivery of this course, then uses an instructional design model (http://www.reeusda.gov...) to describe the design of the course. The design process is by no means a straightforward sequence. There are many iterations and revisions. This section reports on major considerations, not the sequence of actions. Section 3 reports the actual delivery of the course, while section 4 is about learning results. In section 5, the author draws conclusions, discusses several distance education issues, and provides suggestions for distance instructors.

PHILOSOPHY

Four underlying beliefs guide the design and delivery of this course. First of all, the author believes that in any education, the ultimate goal is effective learning by the learners. Thus an effective education is a learner-centered education. Therefore, the course design starts with a thorough analysis of potential students in this class.

Theories in distance education research indicate that distance students tend to experience situated learning and problem-based learning (Streibel, 1991; Savery & Duffy, 1995). Most distance students are motivated and mature adult learners and have working experience. They would prefer to actively construct their own internal representations of knowledge rather than accept what the instructor gives. Thus they would more likely experience situated and problem-based learning. The challenge for distance educators is to set up a cognitively rich learning environment to facilitate the distance students' knowledge construction processes.

The third belief is that enforced or controlled learning will help distance learners, who play multiple roles in their lives, to achieve higher learning performance and satisfaction. Enforcement includes instructor's control of students' effort on different subject topics in the course (workload, iteration or reinforcement, and integration), on students' involvement in class activities and collaborative learning, and on learning pace (time scheduling). This philosophy implies that learning is not completely controlled by the student. This is disagreeable with the self-controlled-learning approach that some of the current distance education research advocates.

Sherry notes that "too often, instructional designers and curriculum developers have become enamored of the latest technologies without dealing with the underlying issues of learner characteristics and needs, the influence of media upon the instructional process, equity of access to interactive delivery systems, and the new roles of teacher, site facilitator, and student in the distance learning process." (Sherry, 1996) The author agrees with Sherry and believes that the driving force of a distance course is the effective learning of subject topics, not the enforcement of state-of-the-art distance technologies.

COURSE DESIGN

Syracuse University's School of Information Studies has been offering independent study degree programs in Library Science for many years. In August 1996, we started offering a distance learning master's degree in Information Resources Management (ISDP-IRM). The 42-credit degree program consists of a selection of courses offered each semester, including summers. Current courses can be in any of the three models. Model A is an intensive summer class. Students reside on campus (thus the course is called a residency course). They meet in classrooms (including labs) eight hours per day for a period of two, five, or seven days for one, two, and three credit hours respectively. Students finish the course within the residency period, sometimes with additional time given to complete assignments. Model B is offered entirely at a distance via the Internet. Students and the instructor do not see each other at all during the course. Model C has a short period residency (3-4 days) for face-to-face intensive meetings, followed by distance learning via the Internet during the rest of the course. The SA&D course described in this paper is a Model C course with a four-day residency and four months of home study via the Internet. During these four months, students submit most of their course-required assignments.

During the very first course in this degree program, which was a Model A class in the summer of 1996, this author guest lectured three hours on general aspects of SA&D. Students then spent unexpected three more hours discussing what they would like to learn from this class. The author has taught SA&D to traditional graduate students several times and one Model A distance course. However this guest lecturing experience made the author realize the very different

experiences and expectations of the distance students. It was very obvious that the course needed to be completely redesigned to satisfy the distance students' learning objectives. The planning and redesign of the course started immediately following the guest lecture and lasted for about five months.

Learner Analysis

In addition to some known characteristics of distance learning students, such as maturity and motivation, the author focused on more specific features of the potential students for this class, beginning with an analysis of all ISDP-IRM students in the degree program. Using the information students provided to the program, profiles were constructed on the basis of technical proficiency (production software applications, operating systems, Internet facilities), working experience (type of work, responsibilities at work), future career plans if any, and other comments on the degree program.

According to the profiles, most students had no work experience with SA&D. Few of them had knowledge about SA&D, although quite a few of them thought they knew a lot about SA&D. Most of them were not interested in being analysts in the future, nor system builders. However, they were interested in the relationships between SA&D and other organizational issues, the trend of system development, and different roles analysts might play.

A tentative course syllabus was constructed based on this analysis and was published on the class web site. A more in-depth learner analysis took place after students registered for the class but before the class began. This in-depth analysis consisted of three major components: learner background, learner needs or expectations for this class, and learner self-assessment on the subject topics. Sixteen registered students were asked to fill out a questionnaire. Fifteen completed questionnaires were collected and analyzed.[1] Appendix A is a copy of the pre-questionnaire.

Part A of the pre-questionnaire asks about students' educational background, Information Systems related experiences, and their motivation for taking this class. The students had diverse educational backgrounds, evenly distributed among the four types. Nine of the students had no experience in SA&D, three had more than eight years, and three had less than four years. Four students had never been users of an IS or involved in management of IS projects or personnel. Five students took a similar SA&D course years ago (from three to fifteen). Two students had absolutely no team work experience; seven had more than ten years; and the rest had from one to four years. The top two reasons for taking this class were summarized as (e) gain knowledge, skills, experience, and (a) degree required/advised to take.

Part B is a measure of students' perceived learning objectives. The results show that the students' learning objectives come almost equally from their own (12 selections on item B1) and the course syllabus (10 selections). Thirteen out of 15 students felt that their learning objectives were consistent with those specified in the syllabus. One student selected "identical," while one student selected "in conflict."[2]

In Part C, students were asked to assess their own SA&D expertise or competency before they took the class. Two students seemed to have some expertise on most topics, while the majority had little competency. Table 1 lists the class-wide average of the answers to the competency questions (before class). These answers were used as a reference of students' current competency. Thus the depth, pace, and coverage of the course can be determined.

The author also collected information on students' distance learning experience from the degree program director. Before the SA&D class, 11 out of 15 students took a web design course, 14 took at least one Model A course, 11 took at least one Model B course, and two took one Model C course. Only one student had not taken any distance course.[3]

As the majority of the students had some distance learning experience, they were asked to predict the effectiveness of teaching techniques or methods on three components of the SA&D course: knowledge, skills, and perspectives. This also familiarizes students with potential techniques to be used in the class and potential topics to be covered in the class. Part D is the Predicted Effectiveness of Teaching Technique.[4] The collected data helped the instructor to select particular instructional methods for different course components. The course syllabus and other course materials were finalized based on this second part of the learner analysis.

Learner-Centered Objectives and Course Content

SA&D is a complex, challenging, and stimulating

organizational process that a team of business and system professionals uses to develop and maintain computer-based information systems (Hoffer et al. 1996). In today's world, where information systems are an inseparable part of an organization, SA&D is an expertise that every Information Technology professional should have. With the rapid development of CASE tools, 4GL database management systems, and GUI, the focus of SA&D shifts from technological constraints to problem-oriented constraints. Often the major constraint on our ability to build effective systems becomes our inability to understand the full scope of the problem. (Fertuck 1995)

SA&D is often difficult to teach, and students often find it very difficult to succeed. Students either do not have real world experience of organizational needs for information systems, or they do not have the technical background for making sense of the back end of the system development life cycle (SDLC). Thus they cannot fully understand the entire SDLC process. Further, the modeling methods covered by most SA&D courses are cognitively challenging. Training students to think precisely in different ways than those they are accustomed to is difficult. It is not easy either to make students realize that mastering the complexity of a system during analysis is quite an exhaustive task. Students often realize that the course requires them to actually build their analytical skills, communication and collaboration skills, and managerial skills in order to succeed the course.

This class began with a consideration of the current technology trend (more software outsourcing and buying from the shelves, less in-house development), the importance of knowing the front end to the understanding of the entire field, along with students' backgrounds, interests, and future career plans. The class planed to cover most aspects of SA&D, with a focus on the front end of the SDLC process. This focus includes an emphasis on soft skills (oral and written presentation skills, time management, and the ability to interact with peers), which are highly regarded by current IT employers (Computer World 1997). The course objectives are (1) To comprehend SDLC process and different software development methodologies, (2) To build analytical skills by studying and applying system analysis techniques (Entity Relationship modeling, Data Flow modeling, and Object Oriented analysis), and (3) To understand managerial issues and special challenges involved in SA&D process. Several items from Part C of the pre-questionnaire were dropped from the main coverage of the course and became optional self-study topics, which could be used as students' term paper subjects. These items are C2 (organizational activity modeling), C6 (logic modeling), C7 (data normalization & definition), and C11 (CASE tools). The system boundary and specification item (C21) is highlighted in the class to reflect the main focus on the front end of SDLC.

These course objectives are accompanied by three learning themes that are guided by the philosophies: (1) Experiential learning through assignments and projects; (2) Collaborative learning the important concepts and techniques with peers through project conduction; and (3) Learning more from each other through project evaluations.

To utilize students' situated learning and problem-based learning, to motivate students' learning and application of SA&D to the real world, and to enforce the students' integration of separate course topics, one of the major aspects of the course is a requirement for students to identify, initiate, specify, and analyze real world projects. Each student is to play different key roles in SA&D in order to learn different perspectives. Thus each of them has to be both the customer (user) of a project and the analyst of another project. A customer of a project identifies a real world project topic, initiates a project proposal, and then assists the analyst in finishing the analysis by providing details and evaluating the deliverables. An analyst analyzes the proposed project, provides representations of the project using the techniques introduced in class, gets approval from the customer for each deliverable, and revises analysis results based on feedback from the customer. Both the customer and the analyst are responsible for the entire project. Specifically, a customer is solely responsible for the proposal. The responsibility distribution for the analysis is 20% by customer and 80% by the analyst. A very important document for the project is the so-called Interaction Worksheet, where each party of a project records all the project-related interactions he or she has with either the instructor, the TA, or the other party, the means of communication and the length or duration, the topics, and the major decisions made. Their effort and performance are assessed by selected peers, the instructor, and the TA. This implies that each student also has a chance to be an evaluator of students' projects and thereby to learn from others in the class.

Using real world projects increases both challenges and workload for the instructor and the TA. In order for the

instructor and the TA to be able to comment on each of the projects individually, they must be able to grasp the important features of the project or the field and analyze the project to a certain extent.

Students are evaluated by (1) their performance on several individual assignments (position paper, term paper, modeling techniques, and project review) and (2) collaborative effort and performance that are reflected in their project reports.

Instructional Methods and Strategies

Since this SA&D course actually has three different periods (pre-residency, a four-day residency, and a four-month remote home study period), different strategies are used for each period. For pre-residency, students need to warm themselves up for the course at both the concept level (subject content) and the practical level (a real world project). During the intensive residency period, the emphases are on the overall picture of the field, understanding of the three modeling methods (Entity-Relationship, Data Flow Diagram, and Object-Oriented Analysis), and the initiation of team projects. For the home study period, individual assistance via available technologies becomes the primary concern. The goal is to ensure that students can get timely assistance and feedback, can finish individual assignments on time with acceptable quality, and most importantly can finish the team projects.

Before the residency, students are asked to skim the textbooks to familiarize themselves with the subject topics and to find their weaknesses. As a result, students are to write a position paper on the roles of a system analyst in the system life cycle. They are also to identify a real-world information system project to be analyzed by a classmate. Students must have a certain amount of SA&D knowledge in order to find an IS project. They have a chance to get feedback from the instructor on the nature and scope of their projects before they come to campus and a formal project proposal has to be submitted by each student on the first day of class. Since the student is the customer of the project, he or she must "sell" the project to someone, so that on the third day, a contract with signatures from both the customer and the analyst can be submitted to the instructor.

During the four-day residency period, the major delivery method is lecture giving an overview of the fields and many related issues, followed by extensive in class exercise on the three different modeling methods. A guest lecture provides a different view of the field. Students are advised to use evenings to build project teams, initiate projects, digest lectures, and prepare individual assignments.

During the four-month home study period, students finish three individual assignments on the three modeling methods examined in class (ER, DFD, and OOA). Students arrange their own ways to finish the projects. Their first project reports are to be thoroughly evaluated by the instructor and the TA. Considering the comments, students revise their analyses and prepare the final reports. The final report is a complete package including (1) the original proposal and contract, (2) system requirement specification, (3) three analysis results using the three methods, (4) comments and insight on what was learned as a customer and an analyst, (5) comparison of different analysis methods, and (6) a record of all communications and decisions on projects, including customer-analyst interactions and students-instructor interaction. This final report is to be reviewed by other students. By the end of the semester, each student submits a term paper focusing on any interesting issues in SA&D.

The following technologies are set up and supported for the course. Since every student has email access, every member of the class, including the students, the instructor, and the TA, is required to subscribe to the class listserv. The listserv functions as a broadcast facility and class-wide discussion vehicle. The instructor's personal email address, the TA's personal email address, and a class email address are available to the students. Although some email utilities can attach a binary file, which can be used as a way of distributing some course materials or assignments, not everyone uses the same email utility. A class FTP site is thus set up for distributing class materials and collecting students' assignments. The use of FTP is optional. A class web page functions as a map that includes links to class FTP site, all email addresses, and course materials such as syllabus, class handouts, assignments and solutions, course work evaluation summary, students' current grades, and help instructions for the class listserv and FTP. Students are encouraged to develop their own web pages for this class or use IRC if they feel it necessary. However, the class does not technically support IRC. Other technologies to be used include fax, FedEx, priority mails, first class mails, and phone calls. For a detailed description of technology use, see (Zhang 1998).

COURSE DELIVERY

The course was delivered in the spring 1997 semester. A total of 16 students registered and showed up on the first day of the residency period. One student decided to drop the class after the first morning because he felt the course workload would be too heavy for him. Among the 15 students, one is from Japan, one from Spain, one from Canada, and 12 from five states of the United States (LA, NY, PA, SC, and VA). Fourteen finished the SA&D course on time. Student N reported that she had family problems and technology problems during the semester. Although the instructor and the TA tried very hard to help her, she did not pass the course. Nine out of the 14 students were taking one other distance course, while one student was taking two other distance courses at the same time.

Starting from the residency, the progress of the course was just as planned in terms of subject content and time schedule. Few changes or adjustments were made. To the instructor's surprise before the residency period, three out of 16 registered students did not turn in the pre-questionnaire on time, and five did not turn in the project proposal on time. Thus a class policy was announced on the first day of residency, stating that any overdue assignment would incur a penalty of 10% off total points of that assignment for each day late. After the residency, a few students turned in some of their assignments one or a few days late with no excusable reasons, and they learned right away how costly being late was. Subsequently, for the rest of the class, there were few late submissions, except two cases in which the two students involved were hospitalized around the time the assignments were due. Since the author anticipated the possible late assignments when planning the time schedule, there was little impact on the students' completion of consequential assignments.[5]

Actual technology usage data are collected and thoroughly analyzed (Zhang, 1998). One fact indicated by technology use data is that there was very little class wide discussion among students, particularly over the listserv. Students tended to seek help directly from the instructor first. In this course, students were not required to contribute to the listserv, nor were they evaluated by how much contribution they provided to the class listserv. Without this pressure, the class wide listserv seemed very quiet. No student complained about this, although one student pointed this out as an interesting fact during an email conversation with the instructor.

DISTANCE LEARNING RESULTS

This section reports partially what happened on the students' side. Some of the students' comments are used to give readers a feel for the learning results. Specifically, some evidence on effort, collaborative learning and role playing, and satisfaction is provided. The evidence comes from student comments on post-questionnaires and project reports. The post-questionnaire at the end of the class also collects data on students' self-assessed competency achievement, which is summarized in the section.

Effort

> ... I must have re-written the project proposal ten times as I thought of more data points to consider...
>
> My analyst and I made sure we were in contact almost everyday....
>
> My analyst and I often sent 6-10 emails per day. We used The Palace to communicate synchronously.[6]

Collaborative Learning and Role Playing

> The questions posed and feedback received as a customer gave me a deeper insight into my role as an analyst. In turn, I was able to be more helpful and thorough as a customer because of my work on the analyst's side of the project.
>
> As an analyst I also learned a few other things. First, the customer often knows more than they can communicate. The more time you spend with the customer, be it in person, by email, fax, phone or IRC, the more knowledge of the system you're going to pull out of them. Milestones were discovered when knowledge was pulled from the customer. ... this brings up humanistic skills. I also found that it is important to not let the customer feel bad about (things they forgot to tell or small errors)...
>
> In conclusion, this project was extremely useful. While I learned the most playing the part of an analyst I would not want to have

given up the part of the customer either. Even if I am usually analyzing systems I now have more 'bed-side manner' than I otherwise would have.

My role as a system analyst in this project lent me insight into the field and provided me with knowledge and experience that can be carried over into other business roles.

As a customer I found a number of things quite interesting. First, in my role of 'business professional' I found that to put forth a good proposal I had to do a lot of thinking and research ahead of time. For me, this was a surprise... What I learned is that if I am a customer I will have a much more positive, easy and successful customer-analyst interaction if I do some research and put out an intelligent new-systems request. I feel I saved a lot of time (by doing so)... If I were paying an analyst for this time, I would want to save as much time and money as possible.

Satisfaction

As the president of my organization, I have gained tremendous insight into what will be required to move the organization forward, as well as some of the pitfalls to avoid. I am now equipped with concrete tools to move us from an antiquated manual system to a simple, easy-to-use automated system. Thanks to this project I have a pretty good idea how to get it done.

I don't know by now if the work done is correct, but I feel satisfied, because I've learned many things. Specially I've learned how to approach a project first.

Thanks for a great class. I learned a lot (even I have been an analyst for 10 years) and enjoyed meeting you. I hope to have you for another class later in the program.

I have learned a great deal in this class and this exercise in particular. I had NO experience in SA&D. While I found the course very challenging I feel that I will take with me a plethora of skills that I will be able to use in my new vocations.

This project has taught me a great deal about an organization I thought I knew well... As a person who is employed full-time in the information technology field, I have received substantial job-related benefits from this experience. Already I have put the knowledge I've gained to good use evaluating and planning information management projects at work... I am glad to know that my employer (who is paying my tuition) is getting its money's worth. More importantly, I'm pleased that my investment of time and effort is paying tangible professional dividends.

Other Comments

A fairly large concern of mine was the lack of time we had in class to discuss more fully some practical examples of the modeling techniques.

As a student, this project and this course have provided me with some very helpful ideas about what I do and do not want from a career in information technology, and what academic choices will get me where I want to be.

When the final version was handed to me to sign, I was satisfied and convinced that this was the solution and that we will implement it into our system. As a matter of fact we already have.

I found that managerial skills were an important part of this project. Coordinating communications, juggling the various diagrams on a concurrent basis and meeting deadlines were all important. It made me and my customer feel good to put parts of the project to bed and finish within our given time allotment.

Most of us will have some familiarity with DFD. More weight should be placed on EER and OOA.

Having to start from scratch and proceed to a reasonable level of completeness was also very good to me. At times in the beginning I felt that I would never have a reasonable product designed, and at times toward the end I wished I could let an underling finish the grunt work.

But it gave me an idea of what system analysis is all about. All in all a very demanding and very rewarding assignment.

Students' Self Assessment of Competency Before and after Class

The post-questionnaire asked the students to assess their before-class competency, which was already asked in the pre-questionnaire, and after-class competency. The assessment for after-class is similar to that in Pre-questionnaire Part C except that, (1) there are two rows for each item: before and after; and (2) items C2, 6, 7, 11 are dropped, and C21 is added[7]. Table 1 lists the summary of the competency data.

It is interesting to notice that the two assessments of before-competency agree with each other (average difference is less than 0.5 per item) for most students except two. One student lowered the second assessment by an average of 1.06 per item. This student has ten years real world experience of being an analyst, but little formal training. It is possible that after taking the course, he realized that there was more to learn beyond what he thought he already knew. The other student, on the other hand, took a SA&D course many years ago and applied some of the concepts in real world projects. The course reminded her of a lot of the things she had almost forgotten. Thus her second assessment is considerably higher than the first one (an average of 1.34 per item). In fact, the second assessment looks as if, with the exception of object-oriented analysis, she learned nothing from the course (there are no differences between before- and after-competency for all the items except OOA). [8]

On an average, the class gained more than two scales on most items. C9, communication and collaboration, gained least (with a gain of 1.6) because students were already "literate in it" before the class (with a score of 3.1). A gain of 1.6 is, however, a very significant achievement for this skill, which is vital for all full-time working people. Among three analysis techniques, object-oriented analysis was the lowest expertise students had before class (with a score of 1.4) and was the least improved (with a gain of 1.9). Students also commented in other places that they wished the class could spend more time on it. This suggests a change in future SA&D course design and delivery.

TABLE 1

SELF-ASSESSED SA&D COMPETENCY: CLASS AVERAGE SCORES

Class Average on Items [a]	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C21	Avg
Before (pre-q) [b]	2.1	*2*	1.7	1.7	1.5	*2*	*1.9*	1.5	2.8	2.7	*1.8*	2		2.02
Before (post-q)	2.4		2	1.8	1.2			1.5	3.3	2.6		2.3	2.3	2.23
Before (average)	2.3		2	1.8	1.4			1.5	3.1	2.7		2.2	2.3 [c]	2.22
After	4.5		4.3	4.5	3.3			4	4.7	4.6		4.2	4.3	4.28
Gain	2.2		2.3	2.7	1.9			2.5	1.6	1.9		2	2	2.06

[a] For the meaning of each item, please refer to Part C of Appendix A, the pre-questionnaire. For C21, the item is "System boundary and requirement specification."

[b] Some data items (in italics) were asked before the class. However, they were not covered in the class. Thus these items were not asked to the students at the end of the semester. The Average for the row does not include these non-covered items.

[c] Since this item was asked only once, the score is used as the average of the item.

Students' self-assessment is one way to indicate the effectiveness of the learning process. The instructor's evaluation of students' individual assignments and projects is another way to judge learning performance. Among the 14 students who passed the course, 11 earned A, two A-, and one B+. This is the best class among all the four SA&D classes (three traditional, one distance) this instructor has taught.

DISCUSSIONS AND SUGGESTIONS

It can be concluded that under the guidance of the four distance education philosophies discussed earlier, the SA&D distance course met the students' needs, was successfully delivered, and achieved high student learning satisfaction. The learner-centered view makes the course fit the needs of this particular group of distance students. Distance instructors should do a thorough analysis of learners. Only if the course objectives are consistent with, if not identical to, the learners', can effective learning be possible.

Although students are in control of their own learning, as suggested by several distance education researchers, this author's experience is that they still need structure (what to do, how to do it, why and when) and reinforcement, as well as timely feedback that is in the context of their own learning experience. As one student pointed out:

> I felt I learned a significant amount in this course. The workload was heavy, and deadlines were enforced, but this improved learning.

With the exception of subscribing to the listserv, no technology was mandatory. Students reported little frustration with computer technology. Technology did not function as a distracter, thus students could concentrate on the subject matter. However, on the instructor's side, there were times that on-line assignments could not be accessed due to different software or software versions used. In several of the worst situations, a total of four to seven emails were sent back and forth between the instructor and the students before the assignment was finally delivered successfully. The instructor found that the most efficient way for receiving assignments is fax, although there were times that entire reports were missing, or pages were missing.

The following are several other important aspects the author has experienced. Some of these issues suggest the need for further experimentation and discussion. Some of the difficult situations could have been avoided or minimized if the author understood them more fully ahead of time.

Distance Instructional Workload Distribution

Compared to traditional courses, distance courses take a considerable amount of effort and time for up-front preparation. Well-planned distance courses need little adjustment. It is, however, very important to anticipate potential problems that might happen along the way and leave room for adjustment if necessary. Changing course objectives or content can be very frustrating to the students. For example, one student commented that

> I thought you were an excellent teacher and one of the FEW that kept up with the responsibilities of your DISTANCE students - too often we tend to get ignored by the professors and you are the only one that made and stuck to the schedule for the class. I feel that by doing this a lot more learning took place ...

The Roles of Distance Instructors

Some researchers defined the role of distance teacher as "a facilitator of learning rather than a communicator of a fixed body of information." (Jonassen, 1992, in Sherry, 1996) Our experience disagrees with this definition. The traditional instructor's roles are not completely gone. Communication of information, knowledge, and perspectives of a subject field is still a very important task for distance instructors. The new challenge is to be more effective in such communication, both oral and written (for example through emails). Distance students still need guidance to acquire information, knowledge, skills, and perspectives. The traditional enforced learning still works in a distance mode.

Distance students seem more demanding of their instructors. They want immediate feedback, more feedback, and more understanding from the instructor. Distance instructors need to be prepared to properly handle this situation.

Class Policy

A pitfall for distance teaching is the tendency to place too much trust in students. Many useful class policies may be dropped from traditional courses when the courses are redesigned for distance students. This is actually not the fault of distance students. Both distance instructors and distance students play multiple roles in their lives. As in any civilized community, well-defined and agreed class regulations and policies make everyone's life easier. When making class polices, distance instructors are challenged to (1) be more thoughtful, (2) keep on top of the work and communicate well with students about the policies, and (3) stick to the policies. Making good policies and executing them will cause students less frustration, confusion, and disappointment, and enable the instructor to be more efficient.

Possible policy issues are: (1) time frame for assignments (as the late charge policy in this course), (2) delivery methods for assignments (some distance instructors only accept hard copies of assignments via mails), (3) software applications and versions, and (4) email response frequency or time frame.

Administration of Distance Teaching

Compared to traditional teaching, distance teaching requires an instructor to have stronger organizational skills and time management skills due to much heavier class administrative needs. A teaching assistant can help only to a certain extent. Most of the time, the instructor needs to face the administrative challenges. Here are some suggestions to reduce the administrative cost. (1) Always keep a copy of everything that is to be sent to the students, or some agreements with students, so that future recall effort can be minimized; a context can be constructed quickly for a conversation; a misunderstanding can be diagnosed and clarified; and a copy can be obtained should things get lost during the delivery. Organize logically to allow fast retrieval. (2) Discover a way of tracking assignments with minimum effort. The author found that it was very time consuming and overwhelming to keep a record of when who turned in what. A distance teaching colleague offered a great idea: use pre-printed address labels for each assignment, then time stamp each received assignment by putting the label on the received assignment. The remaining printed labels would be the people whose assignment is not yet received. So the address labels become a mechanism for assignment management! (3) Use a separate email address for the course. Using the instructor's personal email address in this SA&D class was a big mistake and very costly to the instructor. Email messages also need to be well organized to ensure minimum retrieval effort. (4) Handle teaching issues at a certain time of the day (which should also be stated as class policy) so that other tasks can be done. (5) Be prepared for technology failures. Any technology can fail at any moment, and technology failures can affect both class communication and course work delivery. Designing alternatives and enforcing acknowledgment of receipt between parties ensure that less damage is caused.

ENDNOTES

1. In the data collected and analyzed, the author withdrew the questionnaire of the student who dropped the class on the first day of residency.

2. The reason for this student selecting "in conflict" was not clear. However, it turned out that this student failed the class. This student is named Student N. See later sections for more detail on this student.

3. This student enrolled in the degree program the same semester this course was offered.

4. Not shown in the paper. Interested readers can contact the author for a copy of this part.

5. Except Student N, who stopped submitting assignments in the middle of the semester. In the project where she was the customer, the analyst of the project managed to finish the project with help from the instructor and the TA. In another project where she was the analyst, it is unknown how much effort she put into the work, as she never turned in the report, even though she said she finished it.

6. Author's note: this student lives in Japan, his partner in the US. The Palace is a graphical IRC tool.

7. See the section of Learner-Centered Objectives and Course Content for reasons for dropping and adding items.

8. In other places, she commented that she learned a great deal in this class, especially dealing with someone who has little experience in the information systems field during the team project practice. The competency assessment is not the only place to evaluate learning effectiveness.

REFERENCES

Instructional Design for Distance Education, http://www.reeusda.gov/new/programs/distanced/id2.htm

Computer World, Careers Edition, Spring 1997, 10(1)

Fertuck, Len. 1995, *System Analysis & Design with Modern Methods*, Business and Educational Technologies, A Division of Wm. C. Brown Communications, Inc., Dubuque, IA.

Hoffer, J., J. George, and J. Valacich. 1996, *Modern Systems Analysis and Design*, The Benjamin/Cummings Publishing Company, Inc., New York.

Jonassen, D. 1992, Applications and Limitations of Hypertext Technology for Distance Learning. Paper presented at the Distance Learning Workshop, Armstrong Laboratory, San Antonio, TX

Sherry, L. 1996, Issues in Distance Learning, *International Journal of Distance Education*, 1(4), 337-365, http://www.cudenver.edu/public/education/edschool/issues.html

Streibel, M. J. 1991, Instructional Plans and Situated Learning, in G.J. Anglin, (ed.), *Instructional Technology, Past, Present, and Future*, Englewood, CO: Libraries Unlimited, 117-132

Savery, J.R. and T. M. Duffy. 1995, Problem-Based Learning: An Instructional Model and Its Constructivist Framework, *Educational Technology*, 35(5), 31-38

Zhang, Ping. 1998, A Case Study on Technology Use in Distance Learning, *Journal of Research on Computing in Education*, 30(4), 398-419.

APPENDIX A
LEARNER SURVEY: PRE-QUESTIONNAIRE

This questionnaire is designed to get some background information about each student so that the professor can adjust teaching accordingly. No identity is needed. However, there will be other questionnaires during the semester and there is a need for matching the same student with different questionnaires. So please use a pseudo-code consistently as your ID. It is suggested that you use your mother's middle name followed by the month and day of her birthday.

ID: **Date:**

Part A. Questions about yourself (demographic data)

1. Which best describes your educational background (circle best choice):
   a. technical b. behavioral c. managerial d. other _____
2. Which degrees do you hold so far (circle all that apply):
   a. BA in (area) _____ b. BS in _____
   c. MA in _____ d. MS in _____
   e. MBA f. Ph.D. or Doctoral in _____ g. other _____
3. You have been working in Info. Systems analysis or design field for _____ years.
4. You have been a user of (managerial) Info Systems for _____ years.
5. You have been involved in management of Info Systems or resources for __ years.
6. You have been involved in managing IS (project) development for _____ years.
7. You have been involved in managing IS professionals for _____ years.
8. You have taken a similar course about _____ years ago.
9. You have _____ years of team work experience (closely work with others on any type of work)

10. Top two reasons you decided to take this course (circle up to two):

a. degree required/advised to take
b. only available course at the time
c. preparation for getting in degree program
d. market driven (big market out there)
e. gain knowledge, skills, experience
f. update old knowledge, skills
g. professional enhancement
h. new career path
i. just interested in the topic
k. professor's reputation
l. other _____

11. Presently you are _____ years old.

12. Your gender is a. male b. female

13. Currently you are in

a. ISDP-IRM b. ISDP-MLS c. ISDP-TNM d. IRM e. MLS f. TNM
g. other _____

Part B. Questions about your learning objectives

1. Your learning objectives for this course are from (circle all that apply):

a. course syllabus b. other course materials _____ c. friends or peers or advisor d. your own
e. other _____

2. You feel that your objectives and those specified in the syllabus are

a. identical b. consistent c. in conflict

Part C. Assess your current expertise & competency:

Competency: None-> High

1: no awareness 2: can recall and recognize it 3: literate in it 4: grasp all key concepts
5: capable of applying it to situations of at least intermediate complexity (such as a project)

1. SDLC concept and stages
   1 2 3 4 5
2. Organizational activity modeling
   1 2 3 4 5
3. Conceptual data modeling (ER, EER)
   1 2 3 4 5
4. Process modeling (different level DFDs)
   1 2 3 4 5
5. Object-oriented analysis
   1 2 3 4 5
6. Logic modeling (decision tree/table, structure chart, state transition)
   1 2 3 4
7. Data normalization & definition (with any RDB)
   1 2 3 4 5
8. System synthesizing (combine data, process, logic, etc. models together)
   1 2 3 4 5
9. Collaboration & Communication
   1 2 3 4 5
10. Project identification, initiation, planning
    1 2 3 4 5
11. CASE tools concept and role in SDLC
    1 2 3 4 5
12. Managerial issues involved in system life cycle
    1 2 3 4