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The **International Journal for Instructional Technology and Distance Learning** is a monthly refereed journal for researchers, faculty, students, administrators, and innovators and practitioners at every level of education and training. Distance learning has been adopted widely for education, home schooling; and for training professionals in corporations, business, industry, government, military, health sciences, and foundations.

Instructional Technology and Distance Learning have special value for institutions seeking to improve teaching and learning and expand their reach through distance learning technologies. This Journal draws from the best current information in research, theory, implementation, and best practices.

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Editorial

Welcome to the inaugural issue of the *International Journal of Instructional Technology and Distance Learning* (IJITDL). It fills a void for a refereed international journal that shares current research, theory, and practice among faculty, students, and administrators in higher education, and among innovators and practitioners at every level of education and training. Distance learning has been adopted widely for education, home schooling; and professional education and training in business and industry, government, military, and health sciences.

Distance learning provides opportunities for education and training when participation is difficult if not impossible due to conflicting schedules, geographic location, mobility, and personal responsibilities. Quality of learning has been demonstrated to the satisfaction of most critics, and many organizations have implemented the technology and techniques of distance learning to enhance their on-campus programs. The result is global acceptance and adoption of distance learning as a viable complement or alternative to traditional learning programs.

It is our plan to publish approximately 2,400 words – 6 to 9 articles, each month. We need authors and quality articles. We need *your* input to guide editors and referees as to your interests and concerns. We need information about you to attract sponsors and provide you with quality services for a price you cannot refuse – for free! Our goals include:

- On-time publication with 99.9% up-time
- Bulletin board and threaded discussions
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We are installing the latest Microsoft server and office programs to streamline administrative and production tasks so we can concentrate on quality, services, and growth. We invite your participation in filling out our one minute questionnaire in return for announcement of each new issue via email. Click here!

Linda Wojnar and Donald G. Perrin, Editors

Editor's Note: Here is a classic adaptation of best practices in distance learning to a real world environment. Security concerns, geographic distribution, and budget play a key role in shaping this global program. The learners are Air Force Officers who, by virtue of their rank, have substantial education and training. This enables a relatively small team of trainers to support a large number of trainees.

Peer learning and study groups complement learning from interactive multimedia and video. There is purposeful redundancy between online and CD delivery to adapt the program to a broad spectrum of learning environments. A powerful feedback component supports specific student needs and provides data for continual program improvement. The distance learning program continues to seek and adopt technologies that will improve quality and performance.

Distance Learning at the Air Command and Staff College
A Discussion of Several Distance Learning Best Practices

Donald A. MacCuish

Abstract

The Air Command and Staff College is the Intermediate level Professional Military Education institution for the US Air Force. It has had a distance learning program since 1948. This paper discusses several contextual factors that inhibit the adoption of best practices into the Distance Learning Program. The author shares six of the best practices currently in place at ACSC in hopes that others will find these of interest and useful in their program. He also identifies best practices that are currently being evaluated for adoption.

Introduction

The Air Command and Staff College (ACSC) is the United States Air Force's intermediate school (ISS) of Professional Military Education (PME). Ideally every officer in the Air Force would come to Maxwell AFB at the mid-point in their career (12-14 years of service) to attend an intensive one year graduate level program of instruction covering topics such as leadership and command, national and international securities studies, military strategy, evolution of air power, joint and coalition military operations, and other topics related to the military profession. The method of instruction includes lectures, seminar discussions, practical exercises, and research electives. Although the majority of students are Air Force officers from all career specialties, the sister services (army, navy, and marines) are all represented. Each seminar includes a Department of Defense civilian, either an Air Force reserve or National Guard officer, and one or two international officers. Sixty-five countries are represented in the class of 2004.

As we all know, this is not an ideal world. Not every student has the opportunity to complete his or her ISS PME requirement by attending the resident program. Since completion of the ACSC program is a virtual requirement for promotion to Lieutenant Colonel a potential problem area exists. The Air Force has mitigated this problem through the creation of a distance learning (DL) program. It is worth noting that the ISS PME requirement has existed since the inception of the Air Force as a separate service in 1947. The DL program was established a year later in 1948.

Program Inhibitors

Issues impacting the DL program are many. They include, but are not limited to, curriculum matters, security, the current Air Force operational tempo, worldwide disposition of Air Force personnel, and our students. Every decision we make as a staff is influenced by these factors and must be considered. As with all decisions there are trade-offs and we take great pains to minimize the negative consequences of our actions. Learning from past mistakes, identifying best practices and incorporating those that would improve our program, and adherence to sound educational principles has enabled us to become a program to emulate.

Curriculum content is based on the needs of the Air Force, guidance from the Chairman of the Joint Chiefs of Staff, Congress, the Air University Continuum of Officer Professional Military Education, faculty expertise and student feedback. Since both the resident and DL programs must parallel each other we in DL build our program from resident program materials. This means that the DL program actually reflects the previous year's resident program. In other words we are out of step with the resident program by one academic year. Curriculum content and learning materials change annually because of changes in the international climate, laws and treaties, the National Security Strategy, military doctrine, and so forth.

Many of the best practices used by corporations and civilian universities cannot be adapted to our situation because of a number of factors. For example, currently there is debate about appropriate class size at civilian universities. Listservs, such as DEOS, have had discussions on class size ranging from 7 to 35 per instructor. With a typical annual enrollment of 11,000 students, we do not have the faculty or staff to support these types of numbers. Nor are we able to employ a more traditional organizational methodology. Instead our concept utilizes a student lead 'seminar' (study group) or more traditional 'correspondence' format. Although this is not an ideal methodology, it works. As a result we are not able to offer threaded discussions, or other types of best practice activities used in more conventional environments. This is unfortunate as these practices can improve the learning experience of students and establish bonds between faculty and their students as well as between students themselves.

Computer and Internet security are not only of concern to the military, but to universities and corporations as well. However, our security requirements are typically more stringent than those of either universities or corporations. We are not only required to meet Department of Defense standards, but Air Force and special community standards as well. Local firewalls can often further restrict our use of technology. These factors are one reason we are still trying to improve our responsiveness to student needs by offering online registration and online testing. Although we have identified a technical approach to both of these our need to verify that an individual is authorized to take our course would require us to have a certain degree of access to the records at the Air Force Personnel Center (AFPC). For obvious reasons such access is quite restricted. In addition, by regulation our tests must be proctored and not all of the Education Centers, which are available worldwide, can, at this time, support such an effort. Then there are those on deployment who are not located near an educational center. Our regulations do provide 'work around' guidance so we can service individuals in these types of situations.

We at ACSC DL are also dependent on outside agencies for critical support, and I do not necessarily mean contractors. Although we develop a lot of our learning materials there is a large amount we must obtain permissions to use in our program. Copyright costs in many cases are fairly reasonable, but in other cases they are quite unreasonable. Sometimes copyright issues preclude us from incorporating some excellent practices into our program. In addition to copyright issues we are required to have our printed and CD-ROM materials produced through the Government Printing Office (GPO). Neither the GPO nor its subcontractor are always responsive to our needs or schedule. Yet, if we could independently contract locally this would no longer be an issue.

We are further required to use the antiquated learning management system operated by another Air Force agency. As a result, ACSC DL is dependent on an outside agency to accommodate procedural changes in its business model as well as incorporating the software changes necessary before we can implement many of the best practices we have determined will improve our effectiveness, efficiency, or responsiveness to many issues raised by our students.

These factors help define our situation. They provide the reader an understanding of our operational context. Universities and corporations may have some or none of the inhibitors I just

described. Accordingly, we may or may not have the same or similar inhibitors facing a university or corporation. Even when the same inhibitors challenge different organizations the situational context might be such that the degree of impact is quite different thereby changing the equation all together. My point here is that there are some best practices that are universal and then there others that are only best practices in a specific contextual environment and this is an important consideration when evaluating a practice for adoption or when trying to determine why someone rates a practice as highly as they do. If it solves their problems, or improves the educational experience of their students then it is hard to question the value of the 'best practice'. Even I am sometimes guilty of such judgments. If it works, it is probably a 'best practice', but that does not mean there is no room for improvement.

Six of Our Best Practices

The first best practice we use that I want to share pertains to media balance. We deliver course materials to our students using three methods. All reading materials are distributed by course books and when allowed by the copyright holder on both CD-ROM and on our password protected Internet site. Exercises, video lectures, and other learning materials are distributed by CD-ROM and over the Internet. Several years ago all learning materials were distributed only on CD-ROM. Our students were not very happy with this experimental arrangement so we quickly adopted, what has turned out to be, a well balanced approach using several media sources. Admittedly this approach does have some redundancy, but it gives our students options when faced with TDY, or business travel, and deployments overseas.

A balanced use of media does not necessarily mean you must duplicate what we do. Quite the contrary. I have had the opportunity to review other distance learning programs. One of the things that has struck me time and time again is the over reliance on one type of media. Another common error is inappropriate use of media. My advice to other practitioners is to carefully evaluate your courses or programs with a jaundice eye to a better use of media. This does not mean change your use of media types to become more balanced or to add another type, but match your media selection to the learning outcomes you want to achieve.

Also consider the learner. You do not want to bore the learner with uninteresting learning activities, and you do not want to have so much variety that the learner is more focused on what you will do next. The ISD process has it right. Select your media based on your instructional goal. Do not use a different type of media simply to use a different type of media. Also, be realistic. Time, money, and system (yours as well as the learner's) capabilities must be part of the equation as well.

Our second best practice I want to share is the use of video lectures accompanied by a slide presentation. This is sometimes referred to as the 'talking head'. In the old days sound slide presentations were extensively used, and they were very effective in presenting learning materials. The talking head accompanied by slides is a modern day version of that sound-slide presentation. It too is a very effective way to engage the student and improve his or her learning, provided the lectures are not too long. We have found that presentations that are 15-20 minutes in length tend to be the ones that receive the best feedback. We believe that after 20 minutes student interest significantly diminishes.

I like this approach because the student can print out the slides beforehand so he or she can take notes. The student can pause the presentation, go back or go forward. This capability gives the student a lot of control over his or her own learning. In our case it also serves as a means of bringing our distance learning students into contact with our resident program faculty. With a student body of over 11,000 students who are dispersed all around the globe, anything that helps them feel closer to the institution adds to the learning experience.

This year we have purchased our own mobile digital video system. The system includes a computer, monitor, video camera, and software cost something in the neighborhood of $6,500 to $7,000. We are no longer dependent on the Air Force Television System for studio time, so we now have a great deal of flexibility. This is very important because we like to use resident faculty as lecturers, and their time is very important. In addition, the software gives us limited studio capability so we can add a few 'bells and whistles' to the presentations thereby enhancing them quite a bit. These enhancements also help us make the presentations more interesting to our students, but again moderation is key.

As noted previously, we provide our video materials to our students using CD-ROM and on our website. With our new mobile system we can quickly change the focus of a lecture to reflect changes in the world system, doctrine, or update important information. Although we will not be able to make changes to the CD once it has been mailed to our students, we can post an errata notice on the website and substitute the revised video for the old one. When we were dependant on AF TV making such changes to materials was too difficult to accomplish.

The large size of our student body and the small number of faculty members prevents us from using threaded discussions, which are widely used in many training and educational settings. Our compromise, and the third practice I want to share, is an online bulletin board system. Initially we instituted the bulletin board system so students could ask our DL faculty questions about the learning materials, concepts being taught, and other things as well. This is still the primary objective. However, more and more students are answering each other's questions and creating their own discussions. We believe these student-generated forums not only facilitate learning, but also help build camaraderie.

Students also ask technical and administrative questions using the bulletin board system. Our policy is to respond to each question within 24 hours during the week and within 48 hours on the weekend and during holidays. We have been able to pretty well maintain this standard, and student feedback acknowledges our success in this area.

One of the best technology practices we have recently adopted is the liquid screen. With technology automatically adjusts the text in the viewing area to conform to the available space. Without this technology the viewer has to expand the viewing area to accommodate the text or has to move the scrollbar laterally to read across the page. Having to do this line after line as you read soon becomes an irritant and inhibits learning. By using this technology students can easily scroll down the page as he reads.

Next time you are reading materials online pay particular attention to the screen display. If you have to both scroll across and down take note of how irritating it is and imagine how you would feel if you were trying to learn something.

Today's Air Force is experiencing a high operations tempo. A large number of our students are operationally deployed outside the United States, just returning from overseas deployment, or preparing for overseas deployment. This 'reality' is not limited to active duty personnel. It includes our reservists and National Guard members as well. This places a 'professional development' burden on our students because they typically have a four-year window in which to complete their PME educational requirement prior to being considered for promotion to Lieutenant Colonel. In addition, almost all have family responsibilities that required their attention. Members of the two reserve forces (AIR FORCE Reserves and National Guard) also have fulltime civilian jobs, and their employers. Most of their employers are supportive of the deployment schedules and the impact on their business, but you can only go to the well so often before the employer's support becomes less enthusiastic. Thus, we take due diligence when designing our lessons and begin levying requirements on our students.

Our approach is to identify the best balance between PME requirements, expectations of the Air Force, curriculum (including course and lesson) objectives, and the students. Our goal is to build a realistically rigorous graduate level program based on these primary factors. I believe this is an approach more graduate level institutions should adopt as well. In other words what is the best curriculum model for use in an asynchronous environment? Perhaps there are many. I think it is obvious that the fifteen 3-hour session model adapted for distance learning is not necessarily the answer.

This is what we do. We publish two recommended schedules, one for those who have organized student led study groups that meet once a week and complete the program in slightly less than eleven months, and one focusing on the correspondence student with an eighteen month time line. Many of our correspondence students do not want to take 18 months to complete our program, so we have written a program that allows them to enter start and projected ending dates and include time for holidays and vacations too. The program then provides them with a schedule that the student can print to help them complete the program on their schedule. This software program takes into consideration reading, watching the videos, exercises, and other requirements so that demands on the student's time are relatively constant.

This best practice works quite well for us. It is important for the reader to remember that our DL program is asynchronous. Several years ago we tried several synchronous approaches and none of them worked for us as very few of our students have a time schedule that permits them to complete an entire program in this fashion.

The sixth and last best practice we at ACSC DL use concerns our emphasis on student services. We have assembled a highly motivated staff of competent individuals who truly function as a team. The administrative group addresses all student registrar functions such as enrollment and disenrollment, getting records to promotion boards, responding to student queries, and all administrative issues. Two women in this section typically handle 40-50 telephone calls from our students each day. It is not uncommon, however, for former students to ask for help. Last year, for example, a student who completed the program during the Vietnam War sought their assistance in obtaining a copy of his diploma, a task that they were successful in accomplishing. The technology group not only helps students with technical matters regarding the CDs and the website, but they also help students to problem solve their own computer problems. In addition, they identify and evaluate new and emerging educational technologies (the mobile digital video system, for example), and implement technical enhancements to our program such as online registration and testing.

Prior to my arrival and the establishment of this department the ACSC Commandant was routinely receiving emails and telephone calls from commanders of Air Force units complaining about the ACSC DL program, particularly over reliance on CD-ROM, lack of course books, the workload we expected students to carry, and lack of administrative and technical support. These six 'best practices,' particularly the one focusing on student services, have literally transformed our program from one of ridicule by both students and our sister service equivalents to one that is considered by all to be the model for Intermediate Level Professional Military Education. But there is always room for improvement and that is why there are a number of 'best practices' we have seen that we intend to incorporate into our program or are currently evaluating for adoption.

Several Best Practices We Are Considering

One of our ongoing efforts is to identify and evaluate other people's best practices to determine whether or not a practice is appropriate for our program. If a practice is not, why is this the case? Sometimes a practice that does not suit our needs spawns an idea to help us improve our program. There are also practices for which the timing is not right, that can be incorporated in the future.

As a result, we periodically re-evaluate practices we once determined to be unsuitable for our purposes.

The Army War College (AWC) has two best practices we recently considered. We hope to implement one of these when we release the new version of our program in early 2004. The War College's Distance Learning department has color-coded the borders of each course differently using the color schemes of various NFL teams. When a student opens the web site of a particular course, Strategic Leadership for example, the borders of each page follow the color scheme (blue) of the Dallas Cowboys. The borders contain navigation and other important information. The main headings are in bold print and in the other color (white) of the Cowboys colors.

Why did they decide to use the color themes of the various NFL teams? Well, the NFL has invested a lot of money on imaging. Team color combinations is one example of the research NFL teams have conducted. We agree with those at AWC that the NFL has mastered the use of color as a means of communication. We believe that we can leverage what the NFL has done with color to enhance the learning experience of our students.

The Army War College had a second idea we will spend more time evaluating. This practice deals with sound, an audio introduction. When a War College student opens the website to a particular course he not only is stimulated by good use of color, the scheme of an NFL team, but also with a 5 to 10 second musical bite that creates a theme for that particular course. This audio stimulation helps set the tone for the learning session, not only for the student but for his or her family members as well. Children soon learn to 'chill' when they hear that special sound because mom or dad has gone to school or their parent is now studying.

When the student begins the next course, both the color scheme and sound bite are different. It does not take long for an association to begin. The two cues, one visual and the other audio, mentally prepare the student to learn or, as War College folks say, 'prime the pump'. This type of technique, preparing students to learn, is a well established educational practice. Initially the audio might be a detractor, but over time, according to the War College's DL staff, the students come to expect it and they enjoy the associations the color schemes and sound bites bring.

A word of caution. When our Dean suggested implementing these two best practices everything was going well. After offering up the suggestion he decided to give an example of each. First he suggested a color scheme of green and silver, the colors of the Philadelphia Eagles. Our Director of Operations, an Eagle fan, was enthusiastic. Then our Director of Curriculum asked for an audio example. He paused and then suggested the William Tell Overture. Everything went down hill from there. The Curriculum Director started to laugh and said all she could visualize was the Lone Ranger and Silver galloping down and then up a hill. We are rethinking the audio part. There is a moral to this: consider associations you might awaken as well as those you want to create. You do not want your students to visualize Little Joe, Hoss, and Adam riding across the tundra of the Ponderosa either – so the theme to Bonanza is probably not a good choice.

A third best practice is threaded or guided discussions. These are good, not only because they require student participation, but because it stimulates students to discuss concepts being learned. Thus, they apply them and integrate them into their vocabulary and thought processes. Many distance learning programs use discussion and dialog quite effectively. These are learning tools we would like to integrate into our program provided we can manage them well. If we cannot do it right and at the same time improve the learning experience of our students, we will not implement the practice. With a staff of twenty, and over 11,000 students, we cannot figure out how to make it work well. We have considered using AIR FORCE Reserve and Guard Personnel who have completed the program, but there are a number of issues that would have to be resolved. The current operations tempo does not lend itself to a solution, at this time. Why, then, include it in this section? Perhaps a reader might have a suggestion we have not considered.

It almost goes without saying that focused 'hands-on' activities, exercises, and simulations improve learning. The literature on this is ubiquitous. We have already incorporated several activities and a simulation into several courses in our program. Our students are required to complete a simulation before they can receive credit for our program. The simulation requires that they develop an air campaign and fight an enemy. They must generate Air Tasking Orders (ATO), select the most appropriate munitions for use against targets, and wage a successful air campaign. They have a limited number of weapons systems, targets can be regenerated, and their resources are finite. It is very realistic. Forget to task tankers or do not provide them with air cover and you can lose aircraft because they can not refuel, or your tankers can be shot down. After each round the student receives feedback on how effective their operation was. They are also told what they did well and what their mistakes were. Anecdotal feedback from our students has been very positive.

This is a good exercise. It is effective. We built it and maintain it without outside support.

We are evaluating how to leverage this technology to create a life-like scenario that the student enters during the first course. As the students move through each course in our program they would be required to complete modules embedded in the program long scenario that requires them to apply the principles learned to that point in this free-flow simulation. As their knowledge builds, so would the complexity of the simulation. It would all culminate in employment of the air portion of the military instrument of power in a world crisis.

There are a number of factors we need to resolve not the least of which is funding. There are a number of major design issues involved. Since the content of our various courses change from year to year, the design has to be flexible enough to make significant changes quickly with our existing staff. To accomplish the intended educational objectives, it must be robust enough to cognitively engage our students. Finally it has to be realistic.

This is significant to tie all of our courses together with a common thread. For some reason, we in education and training often do not do this well. Students take a course, and the next, until they complete a program. We leave it to them to pick up on the connectivity.

In this section I have identified four best practices we are evaluating for adoption for our DL program. There are others I could have added, but I wanted to depict a strategy that incorporates short, mid-term, and long range best practice objectives. We believe that a program cannot remain stagnant. It can only be improved and our approach is identify existing best practices, evaluate them, modify them if necessary, and implement those that will work well in our situation. We also seek to leverage our existing best practices in a particular course to improve the entire program.

Conclusion

Military officers of all four services have professional military education requirements at defined points in throughout their military career. At the Captain level, the focus is on the tactical level of war. As Majors, it is the Operational level, and when they are senior Lieutenant Colonels or junior Colonels, the focus is on strategic matters. All three levels of Air Force officers are taught at Maxwell AFB in Alabama. Ideally every officer would complete their PME requirement in a resident program, but this is not possible, ergo they complete a non-resident or distance learning program.

Over the past five years in particular the Air Command and Staff College DL program has developed a number of 'best practices.' In this paper six are shared – balanced use of media, video lectures, use of a mobile digital studio, a user friendly bulletin board system, liquid screen technology, and emphasis on student services. Each of these has resulted in significant

improvements to our program. We are always looking to improve our program. We have a plan that calls for identifying, evaluating, adapting and leveraging best practices already in use. Four are discussed here, but there are others that could have been included

Unfortunately, not all best practices are transportable from one learning environment to another. I have identified several contextual factors that we have to consider when evaluating the best practices of others. How do those factors inhibit adoption of someone else's best practices for your program? This reality needs to be addressed early before too much time and effort is expended.

Finally, this article was designed to share our experience about several best practices that work well in our program and those we are considering for the future.

About the Author

Dr. Donald A. MacCuish is Associate Dean of Distance Learning at the Air Command and Staff College, Maxwell AFB, AL 36112-6426. He has extensive experience in design, development and implementation of interactive training and education programs, and has published many articles on training, curriculum development, and educational and psychological assessment.

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Editor's Note: Interaction is key to the success of distance learning. This review of the literature distills and structures the findings of almost one hundred research studies. Although many of these practices are already implemented by instructional designers and practitioners, it is vital to have research confirmation of relevance and importance. It provides insights into the dynamics of interaction and suggests ways to enhance student participation and learning in a Web-based course.

Using these research findings as benchmarks, are you making optimum use of interaction and feedback in your web-based courses?

Understanding Interactions in Distance Education: A Review of the Literature

Veronica A. Thurmond
Karen Wambach

Abstract

Interaction in a traditional classroom is much different than the interaction that occurs in a Web-based course. The differences in interaction are largely due to the instructional media used in Web-based courses. Despite the difference in the pedagogical mediums, the interactive component that faculty design into a traditional classroom course is just as important – if not more so – in the Web-based course. Therefore, because of the proliferation of Web-based courses and the differences in interaction between the traditional and Web-based pedagogical platforms, a vital need exists to assess the effectiveness of interactivity in a Web-based course. The purpose of this paper is to provide a literature review on interaction as it pertains to distance education and Web-based courses. This review of the literature covers four types of interaction: learner - content, learner - learner, learner - instructor, and learner - interface.

Offerings of distance education (DE) and Web-based courses are on the rise. Between 1998 and 2001, one-fifth of the nation's two-year and four-year educational institutions planned to offer distance education courses. Further, in 1999-2000 eight percent of undergraduates and 12% of master's students enrolled in distance education courses (NCES, 2002a). According to the National Governor's Association (NGA), in 1998 58% of two-year and four-year institutions offered distance education courses and 84% of all colleges were expected to follow by the year 2002 (NGA, 2001). As a medium for DE, course specific Web sites were used by about 40% of full-time faculty in a nationally representative sample of post-secondary institutions (NCES, 2002b). Without a doubt, Web-based classrooms are a reality in higher education.

However, the Web-based classroom differs substantially from the traditional classroom in several ways. An important example is that the interaction between students and faculty, other students, and the course content are very different. Despite the difference in the pedagogical mediums, the interactive component that faculty design into a traditional classroom course is just as important – if not more so – in the Web-based course. Therefore, because of the proliferation of Web-based courses and the differences in interaction between the traditional and Web-based pedagogical platforms, a vital need exists to assess the effectiveness of interactivity in a Web-based course. The purpose of this paper is to review the current literature on interactions in Web-based education and its effects on student outcomes.

Defining Interaction

The importance of interaction in distance education generally is acknowledged (Billings, Connors, & Skiba, 2001; Boyle & Wambach, 2001; King & Doerfert, 2000; Meyen & Lian,

1997; Moore & Kearsley, 1996; Muirhead, 2001a, 2001b; Sherry, 1996; Tuovinen, 2000; Wagner, 1994) and the concept of interaction in distance education has been the focus of much research (Billings et al., 2001; King & Doerfert, 2000; Muirhead, 2001a, 2001b). However, no consensual definition for interaction exists in the educational literature (Soo & Bonk, 1998). The concept of interaction is a core element of the seven principles of good practice in education (Chickering & Gamson, 1987). These practices include: encouraging faculty/students contact; developing reciprocity and cooperation; engaging in active learning; providing quick feedback; emphasizing the amount of time dedicated to a task; communicating high expectations; and respecting diversity.

Authors have described some of the dimensions that comprise the concept of interaction, such as communication, collaboration, and active learning (Kenny, 2002). Frequently the social process was highlighted in definitions (Beard & Harper, 2002; Crawford, 1999; Wagner, 1994). Additionally, interaction in Web-based courses can occur synchronously or asynchronously (Smith & Dillon, 1999). The definition of interaction used in this article is a compilation of the interaction descriptions offered by Moore (1989), Hillman, Willis, and Gunawardena (1994), and Wagner (1994).

Thurmond (2003) defined interaction as:

> *...the learner's engagement with the course content, other learners, the instructor, and the technological medium used in the course. True interactions with other learners, the instructor, and the technology results in a reciprocal exchange of information. The exchange of information is intended to enhance knowledge development in the learning environment. Depending on the nature of the course content, the reciprocal exchange may be absent – such as in the case of paper printed content. Ultimately, the goal of interaction is to increase understanding of the course content or mastery of the defined goals (p. 4).*

Wagner (1994, 1997) made a distinction between interaction and interactivity. According to Wagner (1997), interactions "occur when objects and events mutually influence one another. Interactivity . . . appears to emerge from descriptions of technology for establishing connections from point to point . . . in real time" (p. 20). The disparity seems to be that interactivity involves the technology used in learning, while interactions describe behaviors of individuals and groups.

Types of Interaction

Four types of interaction have been cited frequently in the literature: learner-content, learner-learner, learner-instructor, and learner-interface (Chen, 2002; Crawford, 1999; Ehrlich, 2002; Kirby, 1999; Meyen & Lian, 1997; Navarro & Shoemaker, 2000; Rovai, 2002; Sherry, Fulford, & Zhang, 1998; Smith & Dillon, 1999; Swan, 2001). The first three forms of interaction can be found in both traditional classrooms and Web-based courses. The last type of interaction, learner-interface, may be present or totally absent in traditional classroom courses; thus, instructors may not need to consider this interaction. However, in a Web-based course, the learner-interface interaction can have a tremendous bearing on students learning the content (Hillman et al., 1994); consequently, instructors need to consider the impact that Web-based technology will have on learning when designing Web-based courses. Moore and Kearsley (1996) provided an in-depth explanation of the first three types of interaction, while Hillman and colleagues (1994) described the last interaction.

This literature review regarding studies examining interaction variables has been divided into these four types. Although specific sections have been delineated for this literature review, in reality it is difficult to separate the types of interaction and overlapping may occur in a Web-based course (Kirby, 1999). The four types of interactions are not mutually exclusive.

Learner-Content Interaction

Learner-content interaction results from students examining/studying the course content (Moore & Kearsley, 1996) and from participating in class activities. Part of the learning process includes how students interact with the content presented in the Web-based course. Studies on learner-content interaction were not always easy to discern and may have been tied to other variables such as learner-learner interactions or learner-interface interactions. Factors that affected students' perception of learning the course content included continuous contact with the content (Leasure, Davis, & Thievon, 2000); clarity of course design (Swan, 2001); time (Atack & Rankin, 2002); participation in online discussions (Jiang & Ting, 1999); and mode of delivering course content (Faux & Black-Hughes, 2000)

Continuous Contact With Content

Learning in a Web-based course may be enhanced by continuous interaction with the content (Leasure et al., 2000; Swan, 2001). The Web-based format may encourage deeper immersion and interface with course content than the traditional course format. Leasure and colleagues (2000) reported that nursing students in a Web-based course interacted with the course content throughout the week via electronic bulletin board discussions, readings, and talking to group members. In contrast, students in the traditional course tended to come to weekly class meetings and complete course assignments a couple of days prior to class. Continuous, extensive contact with the course content in the Web-based section increased enthusiasm for the course and may have resulted in improved grades for online students (Leasure et al., 2000).

Clarity of Content Design

Students may perceive learning in a Web-based course easier if the material is presented using a similar format for each content area (Swan, 2001). Also, students perceived more learning when greater consistency was found in the structural design of the course modules ($r = .74$, $p < .01$). Interestingly, students reported greater levels of learning in courses that had fewer modules. A key to enhancing learner-content interactions appeared to be clarity of course design (Swan, 2001). Streamlining structural course content for simplicity and repetitiveness may help enhance learner-content interactions and help compensate for the lack of face-to-face meetings.

Time

One barrier to interacting with the course content is the lack of time to participate in coursework. Atack and Rankin (2002) collected data from 57 nurse participants and reported that one of the greatest obstacles to learning in the online environment was the lack of time available to devote to the course content. The participants reported that they did not have time to access the content at work, indicating that their work environment probably was not an ideal environment for learner-content interactions. The issue of lack of time extended to the home environment because subjects had to compete with others to access their computer at home.

Web-Based Medium

The medium used to deliver course information may affect whether students actually learn the content. Navarro and Shoemaker (2000) studied 151 students enrolled in a traditional class format and 49 in a cyberspace format. The cyberspace course provided lectures on CD-ROM, electronic bulletin, electronic mail (e-mail), and chat rooms for asynchronous discussions. Additionally, online discussion rooms were available for synchronous discourse. Students in the online format performed significantly better ($p < .01$) in the course as reflected in their final exam grade. For those using the online format, the mean average was 11.3 ($SD = 2.6$, $n = 48$) and for the traditional class the mean was 9.8 ($SD = 2.5$, $n = 145$).

In contrast, some students in other studies have indicated a preference for the traditional classroom format (Faux & Black-Hughes, 2000; Sole & Lindquist, 2001). Two researchers

compared three methods for teaching an introductory course in social work to undergraduate students (Faux & Black-Hughes, 2000) and found dissimilar findings. One section of the course was taught in the traditional class format, the second using the Internet only, while the third combined the strategies in the first two methods. The results of the study indicated that students preferred learning the content from an instructor rather than the Internet. Students reported that they were unable to learn the content through the Internet and were uncomfortable learning information from only one medium. Also, the students commented that they preferred listening to the content rather than reading it (Faux & Black-Hughes, 2000). Likewise, Sole and colleagues (2001) found that students preferred learning in a live, traditional classroom format – as opposed to a Web-enhanced video course.

Level of Content Interaction

As in the traditional classroom course, learner-content interaction in a Web-based course can take the form of discussions. Online discussions are not only a form of learner-content interaction, but also learner-learner and learner-instructor interaction. In online discussions, students learn the course content by the text supplied by others participating in the discussions. Swan (2001) evaluated perceived learning as it related to students' perceptions of interacting with the course content by collecting data from over 1,400 students in 73 asynchronous courses. The findings revealed a positive relationship between high levels of activity in the courses and learning. The more students believed that their participation in discussions enhanced their learning, the more they thought they learned (Jiang & Ting, 1999). Additionally, Swan (2001) found that students were more satisfied with the course and perceived greater learning when more of their course grade was based on participating in discussions.

Summary of Learner-Content Interaction

These findings from the studies provide support that students interacting with course content in a Web-based format can and do learn the material. Other findings revealed that increased student interaction with the content, consistency in structural design of course modules (Swan, 2001), and perceived contribution to online discussions (Jiang & Ting, 1999) lead to higher levels of learning. Lack of time to participate in course work has been identified as a barrier to learner-content interaction (Atack & Rankin, 2002). Overall, students may have more continuous interaction with the content in a Web-based course (Leasure et al., 2000), which may contribute to more learning and overall greater satisfaction with the course. In contrast, other studies reported that students preferred to learn the course content in the traditional classroom setting where they could listen to the content rather than read it (Faux & Black-Hughes, 2000) or preferred live instructions rather than video taped/Web-facilitated interactions (Sole & Lindquist, 2001).

Learner-Learner Interaction

The interaction that occurs among students is extremely dissimilar between a Web-based course and the traditional classroom course. The Internet format excludes physical interaction, which may have an impact on learning (Beard & Harper, 2002). Learner-learner interaction can be between one student and another or between several students. In order for effective learning to occur, four types of peer behavior are necessary in a computer mediated environment: (a) participation, (b) response, (c) provision of affective feedback, and (d) short, focused messaging. Team work, or collaborative learning, involves students working together in groups to complete academic assignments (Alavi, 1994; Palloff & Pratt, 2001). This form of learner-learner interaction is intended to promote understanding the course content and stimulate critical thinking. Collaborative projects may lessen feelings of isolation and promote a sense of a learning community (Abrahamson, 1998; Palloff & Pratt, 2001) in the Web-based classroom.

On the other hand, students who were required to participate in teams or group projects in a Web-based course have reported less satisfaction with the course (Thurmond, Wambach, Connors, & Frey, 2002). Thurmond and colleagues (2002) stated that the reason for the dissatisfaction may have been due to the challenge of completing course assignments without the face-to-face contacts.

Studies addressing learner-learner interactions in Web-based courses highlight the need for students to connect with their classmates (Atack & Rankin, 2002; Billings, Connors, & Skiba, 2001; Fredericksen, Pickett, Shea, Pelz, & Swan, 2000; Jiang & Ting, 1999; Muirhead, 1999, 2001b; Soo & Bonk, 1998; Swan, 2001). Although Web-based courses may not have face-to-face interactions, properly designed forms of interactions between students using the Internet may have more depth. Some authors have indicated that students reported the quality of their interactions with other learners in Web-based courses were similar to those in the traditional classroom. Furthermore, the interactions were sometimes increased in the Web-based course (Lenhart, Lytle, & Cross, 2001).

Although the interactions that occur in the Web-based course are through an electronic medium, the electronic format seems to be an effective medium for dialogue (Larson & Keiper, 2002). Larson and Keiper (2002) examined discussions that occurred in a secondary Social Studies course and compared qualitative data gathered from face-to-face in class discussions, as well as electronic threaded discussions. The researchers reported that some of the students who often did not participate in the face-to-face classroom discussions talked more in the *online* discussions. Additionally, students have reported enjoying the interaction and attention more from their instructors and peers in an online course (Aase, 2000).

Students' interaction with their classmates in a distance learning environment can contribute to learning (Moore & Kearsley, 1996). For example, a study by Fredericksen and colleagues (2000) examining asynchronous learning found that students who reported greater interaction with other students in an online course stated higher levels of perceived learning. Muirhead (1999) reported that students believed their learning was influenced negatively by other students who participated late in online class discussions.

Similarly, instructors have reported on the importance of learner-learner interaction (McGinn, 2000; Muirhead, 1999, 2001a; Soo & Bonk, 1998). In a study with eight experienced distance education instructors, Soo and Bonk (1998) used the Delphi Technique and reported that the teachers in online learning rated the learner-learner interaction as the most important form of interaction, followed by learner-instructor interaction. This finding supports the idea espoused by other researchers that the student is central to any learning (Ehrlich, 2002; Soo & Bonk, 1998) and that instructors are needed to guide the students.

Despite the design of interactive components in Web-based courses, some students still may prefer to interact with their peers or faculty much as they would in the traditional classroom setting. Billings and colleagues (2001) reported that students ($N = 219$) enrolled in Web-based courses were less likely to interact, with both students and faculty, than they were in their traditional classroom.

Summary of Learner-Learner Interaction

Findings regarding learner-learner interaction indicated that students who interacted more in a Web-based course may perceive greater learning. Also, collaborative group interaction can help in learning the course content and easing feelings of isolation. However, some students may prefer the interaction that is found in the traditional classroom setting.

Learner-Instructor Interaction

The interaction that transpires between students and faculty is intended to help reinforce student understanding of the material or elucidate meanings. Interacting with instructors can help students clarify nebulous points and reinforce correct interpretation of course information. In the traditional classroom setting, oftentimes learner-instructor interaction can occur in a face-to-face, physical meeting. In the Web-based course, most often this type of interaction must be transmitted by electronic means, such as chat discussions or e-mail communications.

The role of the instructor in a Web-based pedagogical format is a dramatic change from one in the traditional classroom. In the traditional classroom, the instructor often takes center stage and becomes a lecturer; in the Web-based format, the instructor becomes more of a facilitator (Gutierrez, 2000). Not only is the role of the instructor markedly altered in a Web-based course, but so is the interaction that occurs between the students and the instructor (Gutierrez, 2000). Despite the differences, the interaction between the student and teacher is as crucial in the Web-based classroom as it is in any learning environment (Chickering & Ehrmann, 1996; Chickering & Gamson, 1987; Jaffee, 1997; Moore & Kearsley, 1996; Muirhead, 1999, 2001b). Some researchers have indicated that the quality of interactions in the Web-based courses between students and instructors were equal to, or better than, interactions in the traditional courses (Lenhart et al., 2001).

The literature on learner-instructor interaction has been linked to variables such as face-to-face encounters (Restauri, King, & Nelson, 2001; Thurmond et al., 2002); timely feedback (Atack & Rankin, 2002; Berge, 2002; Billings et al., 2001; DeBourgh, 1999; Sciuto, 2002; Soon, Sook, Jung, & Im, 2000; Thurmond et al., 2002; Vrasidas & McIsaac, 1999); performance (Fredericksen et al., 2000; Jiang & Ting, 1999; Swan, 2001; Woodside, Wong, & Weist, 1999); and instructor presence in the learning environment (Atack & Rankin, 2002; Billings et al., 2001; Gunawardena, 1995; Schoenfeld-Tacher, McConnell, & Graham, 2001; Thurmond et al., 2002; Volery, 2001). Students value the interaction with their teachers (DeBourgh, 1999; Jiang & Ting, 1999; Thurmond et al., 2002) and much of the research reported in the literature strongly supported learner-instructor interactions. Thurmond and colleagues (2002) reported that students who felt they knew their instructor also believed that the course offered a variety of ways to assess their learning and actively participated more in online discussions.

Learner-instructor interactions help to reinforce understanding of the course content and/or clarify nebulous learning points. Using survey data collected from 287 students in 78 Web-based courses, Jiang and Ting (1999) examined what variables were predictive of student's perceived learning. Results of multiple stepwise regression analysis indicated that learner-instructor interaction was the most significant predictor of perceived learning. Similarly, Fredericksen and associates (2000) reported the most significant variable to learning in an online course was students' interaction with the teacher.

Face-To-Face Interaction

The concern regarding the absence of the face-to-face interaction between students/instructors, and the potential impact on student learning, has been broached by many (Barnes, 2000; Beard & Harper, 2002; Chen, Ou, Liu, & Liu, 2001; Ehrlich, 2002; Restauri et al., 2001; Schoenfeld-Tacher et al., 2001). In an attempt to better understand the differences between the traditional classroom environment and a learning environment augmented or replaced with distance education technology, Restauri (2001) compared end of course evaluations between a video conferencing distance education course and an online course.

Data were collected from 142 video conferencing students and 62 online students. Of the online students, 90.3% reported that because of the online format, their interaction with their instructor

either improved or remained the same. These same students (61.3%) also reported that they were more willing to respond and partake in the online course than in their traditional classes. These findings provided support that the online format was an acceptable medium for interaction.

Restauri (2001) concluded that the face-to-face factor was not important, rather students' interaction needs in the online environment was more dependent on frequency and personalized contact. Furthermore, high frequency of private e-mail communication between student and instructor has been identified as a strong predictor for higher student grades (Stocks & Freddolino, 1998). In contrast, Beard and Harper (2002) reported that students and instructors were concerned about the lack of learner-instructor interaction in a class that was delivered both in the traditional and Web-based format.

Timely Feedback

Feedback is defined as the exchange of information between student and instructor about an action, event, or process that results in enhanced student learning. Timely feedback has been noted as an important variable in student learning (Chickering & Gamson, 1987) and distance education courses (Berge, 2002; Billings et al., 2001; Boyle & Wambach, 2001; Chickering & Ehrmann, 1996; Sciuto, 2002; Soon et al., 2000; Thurmond et al., 2002; Vrasidas & McIsaac, 1999). Feedback is critical to assessment and provides students information about their progress in the course (Collis, DeBoer, & Slotman, 2001).

In a Web-based course, the need for quality feedback becomes more paramount because of several factors. First, because a Web-based course lacks face-to-face interaction, receiving written comments from the instructor becomes even more crucial. One of the most important areas where students interact one-on-one with the instructor is when instructors provide individual feedback. Second, the geographic separation between student and teacher may limit physical contact (Price, 1997) and foster a sense of being disconnected from those in the course (Atack & Rankin, 2002; Billings et al., 2001). Third, the flexibility in the pace of Web-based courses allows students to work ahead. Therefore, faculty need to provide timely feedback so that students can maintain their own pace and schedule. Finally, the use of the Web technology for providing feedback may create the need for additional faculty support (Collis et al., 2001). If a large number of students are enrolled in a Web-based course, some faculty may need assistance responding in a timely manner.

Vrasidas and McIsaac (1999) focused on interactions among students and between students and instructors in a graduate telecommunications course consisting of seven students and the instructor. The course was structured to include both face-to-face and online sessions. Through observations, tape recordings, and semi-structured interviews, the researchers reported that the qualitative data indicated several major factors influencing interactions. Among the major influencing factors was receiving prompt feedback. When students perceived that instructors did not respond in a timely manner, they felt discouraged and curtailed their participation. Lack of timely feedback can result in learners' ambiguity about their performance in the Web-based course and can contribute to their frustration (Hara & Kling, 1999). Therefore, instructors need to provide students with timely feedback to keep them engaged in the learning.

Similar findings were reported by Soon and colleagues (2000). The researchers obtained course feedback from 60 students on their satisfaction with an Internet distance-learning course. One area that received negative responses from the students included insufficient feedback from professors regarding reports and questions. Thurmond and associates (2002) reported that in examining satisfaction in 120 students enrolled in Web-based courses, one of the strongest predictor variables was timely comments from instructors. Providing more prompt feedback may enhance students' satisfaction (Leong, Ho, & Saromines-Ganne, 2002). The issue of timely feedback is important because students need to know how they are progressing, as well as have

an idea on how they can improve their performance in the course (Chickering & Ehrmann, 1996; Chickering & Gamson, 1987).

Course Performance

Course performance is a variable that has been linked to learner-instructor interaction. In one study, students' perceptions of interactions with their instructors were related positively to the percentage of their course grade that came from participation in the course discussions (Swan, 2001). The more students' course grade relied on partaking in the online course discussion, the more they believed that they interacted with the instructor ($r = .31$, $p < .01$).

Fredericksen and colleagues (2000) found a positive relationship between reported level of interaction with the instructor and level of perceived learning. Data from this study came from 1,406 students enrolled in an asynchronous online course. This relationship was significant because those students who felt they did not have adequate access to their online instructors tended to feel that they learned less. The finding supports the need for faculty to have frequent, constructive communications with their students (Restauri et al., 2001). The researchers also reported a positive relationship between students' level of interactions with other students and perceived level of learning (Fredericksen et al., 2000).

Presence

Social presence is a variable that may affect learner-instructor interactions in distance education courses and is an important aspect to effective online learning (Volery, 2001). Social presence is the extent to which learners exist in the distance learning classroom (Crawford, 1999). Presence extends beyond geographic boundaries (Shin, 2002) and may not be an easy notion to conceptualize. Based on an extensive literature review, Lombard and Ditton (1997) described six ways to conceptualize presence as: (a) social richness; (b) realism; (c) transportation; (d) immersion; (e) social actor within the medium; and (f) medium as social actor.

Because of the lack of physical, face-to-face contact in Web-based courses, students may not feel the instructor's presence in the course. The absence of the visual cues that normally exist in the traditional classroom may lead to feelings of isolation or lack of connection with students and instructors in the Web-based environment (Atack & Rankin, 2002; Billings et al., 2001). Getting to know the instructor is more difficult in a Web-based environment because of the absence of the face-to-face interaction and the lack of visual cues. In examining 120 students enrolled in Web-based courses, Thurmond et al. (2002) reported that students who responded more positively to knowing their instructors also tended to believe that there were a variety of ways to assess their learning; reported more timely feedback from the instructor; and participated more actively in course discussions. Similarly, others have reported that students' perceptions of social presence were significant predictors in students' perception of overall learning (Richardson & Swan, 2001).

Schoenfield-Tacher, McConnell, and Graham (2001) investigated how instructor's presence affected student group interactions in an online course. Subjects were students enrolled in a university Histology course – 33 in a traditional course format, 11 in an online course. The study used both a qualitative and quantitative methodology. Qualitative data consisted of observations of classroom interactions in online chat sessions and on-campus lectures, both of which included the instructor. Students were also observed in an on-line review, where the instructor was not present. The interactions were coded and categorized as either content, administrative, management, and social; this information, along with course exams, provided the quantitative data.

The researchers reported several interesting findings. First, when pretest performance was controlled, online students' posttest results were significantly above those in the traditional

classroom ($F = 5.95$, $p < .05$), with a small to medium effect size ($\eta^2 = 0.192$). Second, both forms of online interactions (chat and review) were significantly higher than for campus students. Finally, no attempts at social interactions were observed in the lecture setting. These findings provided strong support for the idea that online students performed better than their classroom counterparts. Additionally, the study indicated that interactions in an online course may surpass those in traditional classroom courses (Schoenfeld-Tacher et al., 2001).

Summary of Learner-Instructor Interaction

Studies reviewed have linked learner-instructor interaction with variables such as face-to-face interaction, timely feedback, course performance, and presence. The studies supported that students did not consider the face-to-face interaction with their instructor an important issue. Students interacted as much, or more, in an online course. Their performance online was also better than their classroom counterparts (Schoenfeld-Tacher et al., 2001). The absence of the instructors' physical presence did not appear to affect student performance in an online course because students seemed more willing to participate in the online course than if they were in a traditional course format (Restauri et al., 2001). Additionally, students perceived more interaction with their instructor the more their course grade depended on their participation (Swan, 2001). There was also a positive relationship between the amount of interaction with their instructor and their level of perceived learning (Fredericksen et al., 2000). Finally, students agreed that timely, prompt feedback from their instructor contributed to positive perceptions of learner-instructor interactions. (Collis et al., 2001; Thurmond et al., 2002; Vrasidas & McIsaac, 1999).

The findings regarding learner-instructor interactions are important because they provide instructors with information on ways to enhance student participation and learning in a Web-based course. Also, the studies put to rest some of the fear that faculty may have about the detrimental affects of the absence of face-to-face interactions. The key to positive student outcomes regarding learner-instructor interactions seem to be linked to frequent, personalized contact with the students (Stocks & Freddolino, 1998).

Learner-Interface Interaction

The affect of computers on student learning has been studied by many researchers (DeBourgh, 1999; Hillman et al., 1994; Kenny, 2002; Leasure et al., 2000; Payne, 2002; Stocks & Freddolino, 1998; Wilson & Weiser, 2001). The narrative essay by Chickering and Ehrmann (1996) on the use of technology in education strongly advocated that technology use should support the seven principles of good practice in education. In essence, the relationship between student and technology should work in tandem to promote online learning. The technological tools themselves are neutral (Payne, 2002); therefore, the manner in which students interact with the technology is what impacts on their learning. The desired outcome of students' interaction with computer technology is that they learn the content and that computer use fosters their willingness to continue with the online course. The major variables linked to learner-interface interactions included computer experience, students' perceptions regarding the technology, and access to technology.

Computer Experience

Students' experiences with computers can affect their learning in a Web-based course (Leasure et al., 2000; Stocks & Freddolino, 1998; Wilson & Weiser, 2001), as well as improve their computer skills (Atack & Rankin, 2002). Soon and colleagues (2000) obtained end-of-course feedback from 60 students on their satisfaction with an Internet distance learning course. The authors stated that in order to participate effectively in the course, computer proficiency was required. Unfortunately, many students had difficulty with interfacing with the technology because approximately 60% of the subjects were new to the computer course. Another learner-interface

issue was the problem with connecting to the Internet. The difficulties students experienced with interfacing with the technology was a strong, negative barrier to learning (Schrum & Hong, 2002; Soon et al., 2000).

However, difficulty with interacting with the technology did not always lead to negative outcomes (DeBourgh, 1999; Kenny, 2002; Leasure et al., 2000); furthermore, other studies reported that students' experiences or skill level with computers did not influence their overall satisfaction with the course (DeBourgh, 1999; Leong et al., 2002; Thurmond et al., 2002). Findings from one qualitative study indicated that, although students dreaded having to learn the computer technology, learning via an online medium helped increased their confidence in using a computer (Kenny, 2002). Others have echoed this finding by reporting that the Web-based format exposed students to activities with computers that helped increase their confidence (Billings et al., 2001; DeBourgh, 1999; Leasure et al., 2000; Yucha & Princen, 2000). Additionally, students had a positive perception of their interaction with computers because of their ability to access coursework anytime (Kenny, 2002). The interaction with the computers increased their independence and fostered responsibility. They were able to overcome the frustration and technical difficulties associated with the computer medium and reported satisfaction with the course (DeBourgh, 1999). Surprisingly, Kenny (2002) wrote that students found the interactive nature of the course addictive.

Perceptions About Technology

If students have difficulty interacting with the technology used in Web-based learning, they could come to view the technology negatively – thus affecting their overall learning in the course. In a comparison between a traditional, a Web-based, and a combination of the two teaching platforms, Faux and Black-Hughes (2000) found that students did not like interacting with the computer technology for their learning. The students commented that they did not feel comfortable with learning the course content totally through the Internet, and that they got lost on the Internet because of their lack of comfort with the computer. The students reported that they preferred to listen to the content rather than interface with the technology to learn it. The implication of this last finding is that the students preferred to learn the course content by listening to the instructor in the traditional classroom setting, rather than interacting with the computer and reading the course content.

Daley and colleagues (2001) conducted a qualitative, participatory action research study of 46 graduates and five professors from five universities worldwide (United States, England, and Australia). The researchers found that students' attitudes and the way they perceived technology influenced their learning. They tended to reflect negatively on their learning if they viewed the technology as time-consuming or contributing to delay in response time. In contrast, students perceived learning more positively if they viewed the time delay as time for reflection. These findings were significant because of the focus on students' attitudes and perceptions regarding the technology. The implication is that online instructors need to develop a climate where students view the learner-interface interaction in a favorable light.

Access to Technology

One facet that affects how students view their interaction with technology is their access to the technology (Stocks & Freddolino, 1998; Vrasidas & McIsaac, 1999; Zafeiriou, Nunes, & Ford, 2001). Many students may not have access to the computer lab or a personal computer. Although this technical requirement generally is stated for students early in the course (Morris, Buck-Rolland, & Gagne, 2002), the inadequate access to computers remains an issue. In one study, despite students being informed about the hardware and software requirements for the course, students who elected to take the course were frustrated when they encountered the lack of speed in accessing the content (Morris et al., 2002). Those less comfortable with the technology in

Web-based courses may become even more frustrated because of their issues with access (Hara & Kling, 1999).

Technological problems can cause frustration in even the most seasoned computer user. Sometimes the problem is due to incompatibility between the hardware and software resources students may be using. Students are sure to become frustrated if they are not made aware of technical specifications early in the course. The issue of technology is a significant concern, especially in remote areas where the lack of necessary infrastructure support may result in difficulty accessing the course content.

Schrum and Hong (2002) discussed the learner-interface issue in terms of access to the technological tools in online learning. Results from surveys of 14 educators indicated that the greater the challenge for students in accessing the tools to partake in coursework, the more readily students could provide reasons for withdrawing from an online course. This finding is significant because learners may not have the necessary hardware or software readily available in their home or work environment. Subsequently, if students are inconvenienced unnecessarily each time they have to access the technology for school, they may come to resent the learner-interface interaction. Conceivably, the inconvenience could be a deterrent for remaining in the class or enrolling in future online courses.

Summary of Learner-Interface Interactions

In summary, variables that have been linked to learner-interface interactions included computer experience, perceptions about the technology being used, and access to technology. Studies reviewed provided conflicting findings regarding the affect of students' perceptions of their interaction with the technology. Unfamiliarity with the technology has been cited as a negative barrier to learning (Schrum & Hong, 2002). Furthermore, students have indicated that the use of such technology has resulted in their getting lost on the Internet (Faux & Black-Hughes, 2000) – stating a clear preference to listening to the course content in the traditional classroom setting, rather than reading it online. Also, students' perceptions of the access to technology clearly influenced whether they believe the technology was helpful or an inconvenience (Schrum & Hong, 2002).

Conversely, other studies have concluded that despite the inexperience with the technology, students have reported increased confidence in computer use (Billings et al., 2001; Kenny, 2002; Leasure et al., 2000; Yucha & Princen, 2000) and have come to view the delays associated with the technology as a time for reflection (Daley et al., 2001). Finally, other studies reported that computer experiences had no impact on overall student satisfaction (Leong et al., 2002; Thurmond et al., 2002).

In essence, lack of computer experience or difficulty with interacting with the technology does not lead necessarily to negative learner-interface interactions. Much of the learner-interface interaction seems to hinge on how students perceive the technology. Thus, students who are not experts in the use of the technology for learning may still report positive student outcomes in the course.

Recommendations for Future Research

The literature reviewed provided valuable knowledge regarding interactions and online courses. However, researchers need to continue to investigate the impact of interactions in Web-based courses. One area that may yield worthwhile information is in studying various types of module designs in online courses. Swan (2001) reported that students learned with fewer modules and when the modules had similar designs. Perhaps repetition in structural designs of online course modules contribute to more positive student outcomes. Various types of modules designs could

be evaluated to determine the types students find most useful. Complex and simple modules could be compared to assess how easily students can navigate through the course content and to obtain feedback on their style preferences. Such information could be very beneficial to those involved in designing Web-based courses.

Another area that needs further research is the amount of time spent interacting with the course content. Leasure and colleagues (2000) reported that students in Web-based courses had more continuous contact with the course content because of their participation in electronic discussion and e-mail exchanges, than did students in the traditional classroom setting. As a result, students in the Web-based course were more enthusiastic and performed better. More research examining the amount of time spent with the course content is needed. A comparison between study time in the traditional classroom setting and the virtual environment also could prove enlightening.

Finally, research in the area of instrument development needs critical investigation. Attention needs to be directed towards development and use of psychometrically sound instruments to assess interactions in Web-based courses. Some of the studies evaluated did not provide solid information on the reliability or validity of the instruments used in the study (Merisotis, 2001; Merisotis & Phipps, 1999). The lack of valid measures could result in reporting of inaccurate findings. Furthermore, the use of inappropriate measures of interactions stifles the progress of interaction research. Consequently, a worthwhile endeavor would be time devoted to the development and refinement of an instrument that assess the four types on interactions discussed: learner-content, learner-learner, learner-instructor, and learner-interface.

Development of such an instrument would require a protracted amount of time and should be tested in different populations. One way to obtain a psychometrically sound instrument would be through a collaborative effort among those who design and teach Web-based courses. The sharing of results from the use of a central instrument assessing Web-based interactions would help in refining the instrument to better reflect the different types of interactions described. Feedback from those who have used and tested the instrument would be useful in making the necessary adjustments for specific populations. Such a collaborative effort could result in a psychometrically sound instrument that accurately reflected the dimensions of interactions, as well as proved invariant across varying populations.

Summary

The review of the literature on interaction reveals two strengths. First, the studies examining various interaction variables in distance education and Web-based courses provide support that the concept of interaction is an important factor to evaluate in student learning. Second, the literature review addressed both positive and negative findings. Caution should be taken regarding interpretation of the literature review because the bulk of research in distance education has not used a true experimental design, which allows researchers to make stronger causal inferences. The majority of the studies reviewed used a descriptive, exploratory design conducted in the natural setting. The next steps in interaction research in Web-based courses should include more studies using quasi-experimental designs so that stronger statements can be made about the affects of interaction in Web-based courses on student outcomes.

DISCLAIMER:

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Army, the Department of Defense, or the United States government.

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Editor's Note: This study is based on a graduate methods course taught online. It measured concerns about technology integration of 23 K-12 teachers as they progressed through the course. Significant changes were measured in awareness, informal, personal, management, consequence, collaboration, and refocusing as a result of this semester long experience.

Experimental Effects of Online Instruction on Teachers' Concerns About Technology Integration

Yuliang Liu, Peter Theodore, Ellen Lavelle

Abstract

This study investigates the experimental effects of online instruction in a graduate research methods course on K-12 teachers' concerns about technology integration. The concerns of twenty-three K-12 teachers regarding technology integration were measured using the Stages of Concern Questionnaire (SoC) both before and after completing an online course. The concerns were measured along seven dimensions: awareness, informal, personal, management, consequence, collaboration, and refocusing. Significant changes in all seven dimensions were found after the teachers' participation in a graduate online course. Discussion includes important implications for future K-12 teacher education programs and suggestions for further research in this area.

Introduction

In recent years, because of support from various funding sources, the percentage of public schools connected to the Internet has continued to increase in the United States: from 35% in 1994, to 95% in 1999, to 98% in 2000, regardless of grade level, poverty level, and metropolitan status. In addition, the ratio of students to instructional computers in public schools reached 5 to 1 (Cattagni & Farris, 2001; Education Week, 2001; Williams, 2000). This ratio is considered a reasonable level for the effective use of computers within schools according to the President's Committee of Advisors on Science and Technology 1997 (PCAST, 1997). However, according to Education Week (2001), we should go beyond machines. That is, we should be aware that human factors are as important as hardware and software improvements. In order to enhance the use of technology for students, one human factor that is crucial is teachers' engagement with computers.

Despite increases in resources and training opportunities, according to Rowand (2000), several factors still affect teachers' use of computers and the Internet in classrooms. The first factor is years of teaching experience. Newer teachers are more likely to utilize computers or the Internet to facilitate various teaching activities than those with 20 or more years of teaching experience. The second factor is poverty level. Teachers in a wealthy school district are more likely to utilize computers or the Internet in teaching than those in a poor school district. In addition, only about one third of teachers surveyed reported feeling well prepared or very well prepared for utilizing computers or technology in teaching. One of the most frequently cited reasons that experienced classroom teachers do not use technology in their teaching is that they find it difficult to implement in the regular classroom (Picciano, 1994; Sheingold & Hadley, 1990). Even experienced teachers who take the initiative to upgrade their technology skills through activities such as reading, hands-on practice, and K-12 instruction may require as long as five years to fully master computer-based technology integration. Similarly, many teachers have attended college before computers were used in the classroom, so they did not benefit from exposure to models of effective technology integration in their content areas. This lack of experience and general lack of

confidence regarding classroom applications of computers may foster teachers' attitudes that do not serve the full and useful integration of technological resources in the classroom (Sheingold et al, 1990).

Another factor that affects teachers' use of computers and the Internet in the classrooms is teachers' attitudes or concerns. According to recent research (Atkins & Vasu, 2000; Gbomita, 1997; Snider & Gershner, 1999), teachers' attitudes or concerns, as one of several important human factors, have a significant influence on one's computer adoption or implementation behavior in the classroom. According to Mills (1999), elementary school teachers' concerns and perceptions of an integrated learning system (ILS) affect the way they implement that ILS. It can be inferred that one's attitude or concern about technology is a critical factor in terms of how rapidly and/or successfully one integrates technology into one's teaching. Thus, for schools expecting to integrate computer technology into teaching, teachers' concerns about technology integration must be considered. In addition, according to Norton and Sprague (1998), teachers' concerns about technology integration can even be changed in subtle ways by technology integration workshops, but not to the extent that they result in substantial changes in teaching practices. Finally, Liu, Lavelle, and Andris (2002) found that participation in online courses resulted in a modification of K-12 teachers' attitudes measured by locus of control. The purpose of this study is to investigate the effects of online instruction on teachers' concerns about technology integration in schools.

Online education is increasing rapidly at all levels of education worldwide (Kearsley, 2000). This increase has positively influenced many aspects of education, such as learning and teaching styles, both directly and indirectly (CEO Forum, 2000). Much current research focuses on the learners' achievement and course evaluations as related to online education (Russell, 1999; Kearsley, 2000). There is relatively little attention paid to the effects of online instruction on learners' attitudes. As more and more K-12 teachers are currently pursuing advanced degrees in programs that utilize various computer and communication technologies, it is increasingly important to investigate the effects of online instruction on teachers' attitudes or concerns about technology integration.

The research regarding the effects of technology on student learning and attitudes is somewhat mixed. On one hand, Clark (1983, 1994) maintained that media do not influence learning in any condition. On the other hand, Kozma (1994) debated that technologies such as computers and video will influence learning by interacting with an individual's cognitive and social processes in constructing knowledge. More recent studies have supported the effects of technological media on learners' attitudinal dimensions, such as locus of control (Liu, Lavelle, & Andris, 2002; Swan, Mitrani, Guerrero, Cheung, & Schoener, 1990), learning styles (Ching, 1998), and concerns about the use of the media (Rudden & Mallery, 1996). In addition, the effects of participation in an online professional development course on school administrators' ideas about technology integration and methods to support teachers' integration practices in K-12 schools have also been reported (Ertmer, Bai, Dong, Khalil, Park, & Wang, 2002).

For example, in Liu, Lavelle, and Andris' study (2002), 12 graduate instructional technology students participated in an online course ("Distance Education") in spring 2001. Rotter's (1966) locus of control (LOC) scale was used to measure LOC change at the beginning, middle, and end of the semester. At the completion of that online course, all students were found to develop their LOC from external to internal. That is, results indicated that online instruction can promote positive beliefs about one's confidence in managing technology as measured by locus of control. In addition, Rudden and Mallery (1996) studied the effects of short term Internet instruction on preservice teachers' concerns about technology integration. That study involved 53 college sophomores in elementary education. All participants were required to use the Internet to complete two directed academic tasks with a partner. One task was to find a Web site related to a

special interest and to integrate it into a literacy lesson. The other task was to develop an annotated bibliography of five Web sites useful for teachers. Participants were found to increase their concerns in four of the seven areas—awareness, information, consequence, and refocusing, as measured by Hall, George, and Rutherford's (1977) Stages of Concerns Questionnaire (SoC). The above study indicates that even short term Internet instruction can promote some of the preservice teachers concerns about technology integration. However, the above study only involved the preservice teachers with two academic tasks for a short term online participation.

The present study is aimed at investigating the effects of online instruction on K-12 inservice teachers' concerns about technological intervention in instruction during a semester-long graduate Research Methods in Education course. Specifically, a research hypothesis can be derived and stated as follows:

Hypothesis: Students will have higher scores as measured by Hall et al. (1977) Stages of Concerns Questionnaire (SoC) at the completion of a graduate online course compared to the beginning of that online course.

Methods

Participants

The lead investigator in this study was the instructor of a graduate online course, Research Methods in Education, at a midwestern state university in fall 2001. The lead investigator taught this same course in traditional classrooms in summer 2001. In addition, he had previous online teaching experiences in other instructional technology courses. Participants were 28 graduate students enrolled in an online section of Research Methods in Education, a core course for the masters' degree in education. Students received extra points as an incentive for participation in the study. After all students were recruited and agreed to participate, they were asked to complete consent forms and demographic surveys. For the majority of the participants, this was their first time taking an online course. Five students dropped out throughout the semester in this study because of various reasons, such as technological problems or family issues. Thus, 23 participants were included for the final analysis in this study.

The participants' survey results indicate that all participants were majoring in one of three graduate areas: education, elementary education, or instructional technology. A majority of the participants were in the first or second year of their graduate study. The other demographic information on the participants (e. g., age, ethnicity, experience in using technology and internet access) is shown in Table 1.

Table 1
Participants' Demographic Information (N = 23)

Demographic Variables	Frequency	Percentage
Age		
25 or under	3	13.0
26-35	13	56.5
36-45	6	26.1
46-55	1	4.3
Ethnicity		
Caucasian	22	95.7
Other	1	4.3

Gender		
Male	5	21.7
Female	18	78.3
Job Title		
School administrator	3	14.3
School teacher	18	78.3
Other	2	8.7
Computer Experiences		
More than 5 years	19	82.6
2-5 years	4	17.4
E-mail Experiences		
More than 5 years	11	47.8
2-5 years	10	43.5
1-2 years	2	8.7
Home Computer Access		
Yes	22	95.7
No	1	4.3
Home Internet Access		
Yes	22	95.7
No	1	4.3
Previous Online Class		
Yes	3	13.0
No	20	87.0
Levels of Computer Skills		
Beginning	9	39.1
Middle	12	52.2
Advanced	2	8.7
Levels of Internet Skills		
Beginning	7	30.4
Middle	13	56.5
Advanced	3	13.0

Independent Variable

The independent variable in this study was online instruction, which was delivered completely online on WebCT. A hybrid of instructional techniques, which have been considered as very effective involving the use of online technology (Clark, 1999), were employed in this course In this online course, several major features of WebCT were used throughout the semester. (1) An online objective chapter quiz was administered every week and was graded automatically. Thus, students receive immediate feedback. (2) The bulletin board was used to answer and discuss each chapter's essay questions and for mutual critiques among students every week. (3) The online synchronous chatroom was used for discussion of course-related assignments and other communication. (4) Students were required to complete a cooperative 3-person group project through various communication methods, such as bulletin board discussion, online chatroom, and private e-mail in WebCT, as well as conversation via telephone. In addition, in order to reduce learners' learning anxiety and to maximize learning efficiency, two face-to-face technical orientations were conducted in the beginning of fall semester in 2001.

Experimental Design

This study involved a single group pretest-posttest design. Specifically, the participants in this study were pretested with the selected Stages of Concerns Questionnaire by Hall et al. (1977) in the first week face-to-face orientation meeting in fall 2001. Then the participants were exposed to the online WebCT environment after the first week through the final week. Finally, the participants were posttested with the same instrument online in the final week. The mean differences on each of the seven scales in the SoC Questionnaire were statistically tested to determine whether there were any significant differences in the concerns instrument.

Instrument

Stages of Concern. The Stages of Concerns Questionnaire is an established instrument and focuses on K-12 teachers' concerns about an innovation. For this study, the innovation is defined as technology integration in teaching such as using the Internet or computers to accomplish instructional objectives. The SoC Questionnaire developed by Hall et al. (1977) is widely used to assess concerns about technology. The advantage of the SoC instrument is that it can measure, over time, a continuum of concerns an individual may develop related to technology integration in teaching. This instrument assesses 7 stages of concern. (1) Stage 0 is called awareness (e. g., "I am not concerned about the Internet."). (2) Stage 1 is called informal (e. g., "I'd like to know more about the Internet."). (3) Stage 2 is called personal (e. g., "How will the use of the Internet affect me?"). (4) Stage 3 is called management (e. g., "How much time do I need to get my materials ready when using the Internet?"). (5) Stage 4 is called consequence (e, g., "How will the use of my use of the Internet affect my student's learning?"). (6) Stage 5 is called collaboration (e. g., "I am concerned about relating my use of the Internet with other instructors."). (7) Stage 6 is called refocusing (e. g., "I have some ideas about how something may work better."). According to Hall et al., the above seven stages of concerns can be divided into internal and external concerns. The seven stages of concerns are distinctive but are not necessarily mutually exclusive. Educators during the pre-teaching and early-teaching phases will be likely to have concerns related to self (internal). In the late-teaching phase, there tends to be a shift in concerns that focuses on student learning and personal professional development (external). The SoC questionnaire is appropriate for this study since most participants are K-12 teachers enrolled in the educational graduate program and their jobs are increasingly demanding the integration of instructional technologies into their teaching.

This instrument consists of 35 items that participants rate using an eight point Likert scale that ranges from "not true of me now" (0) to "very true of me" (7). Participants choose the appropriate degree to which their concerns are true of them. High numbers indicate high concern, low numbers low concern, and 0 indicates very low concern or completely irrelevant. Five statements represent each of the seven stages. All 35 items appear in the instrument in a mixed order. The raw score for this scale is the simple sum of the responses to the five statements on that scale. The internal reliability using Cronbach's alpha coefficients ranged from .64 to .83 on the seven scales. The validity of the questionnaire was assessed using different strategies, such as intercorrelation matrices and judgments of interview. Hall et al. (1977) also found that the correlations on the 195-item questionnaire were higher near the diagonal. This finding supports the idea that each scale was more like the ones immediately surrounding it than those farther away (Hall et al. 1977). In addition, validity and reliability has subsequently been examined in other studies, and the original ideas have been supported.

Dependent Variables

There were two dependent variables. The first one was the concern scores in all seven stages, including awareness, informal, personal, management, consequence, collaboration and refocusing. The SoC questionnaire was pretested and posttested on two occasions. Since most

participants were not familiar with the use of WebCT, the pretest was administered in the paper-and-pencil format in the first face-to-face orientation meeting in fall 2001, measuring the initial state of the learner's characteristics before online instruction. The posttest was administered online in the final week, measuring the developmental state of those characteristics affected by online instruction over the semester.

The other dependent variable was participants' academic performance, which was based on their final grades in this course. The final grades were based on the following components at the completion of this online course: (a) individual weekly essays and critiques (30%); (b) bulletin board discussion and group project (30%); (c) weekly online quizzes (30%); (d) individual reflection statement of his/her own group project and mutual evaluation of the group members (5%); (e) participation and involvement in this research project (5%). Of the total 23 participants, 21 received "A" and 2 received "B" for their final course grades.

Results and Discussion

All data was coded and analyzed using SPSS 11 to compare for the mean differences between the pretest and posttest scores using a paired sample t-test. The means and standard deviations of the scores in two administrations (pretest and posttest) are shown in Table 2. In addition, the graphical representation of the paired mean differences in the concern scores in all seven stages between the pretest and posttest is shown in Figure 1.

Table 2

Means and Standard Deviations of the Instrument Scores in the Pretest and Posttest

		Test Type	N	Mean	Std. Deviation	Std. Error Mean
Stage 0	Awareness	Pretest	23	5.6087	4.15319	.86600
		Posttest	23	12.5217	4.63062	.96555
Stage 1	Informal	Pretest	23	20.3043	5.98053	1.24703
		Posttest	23	28.3478	4.59850	.95885
Stage 2	Personal	Pretest	23	21.6087	8.12258	1.69367
		Posttest	23	29.6957	6.34203	1.32240
Stage 3	Management	Pretest	23	14.8696	8.44934	1.76181
		Posttest	23	22.0870	7.15995	1.49295
Stage 4	Consequence	Pretest	23	22.2609	6.64843	1.38629
		Posttest	23	27.6957	6.24088	1.30131
Stage 5	Collaboration	Pretest	23	22.1304	6.89733	1.43819
		Posttest	23	27.5217	8.55926	1.78473
Stage 6	Refocusing	Pretest	23	23.3043	5.83434	1.21654
		Posttest	23	30.6522	5.47398	1.14140

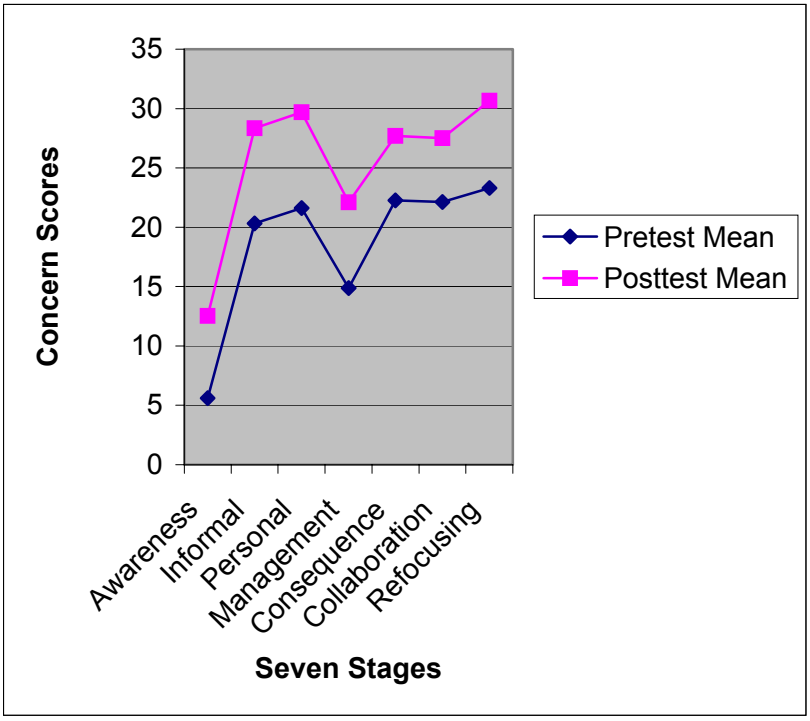

Figure 1. Mean differences in seven stages between pretest and posttest scores

According to Hall et al. (1977), Figure 1 indicates two peak stages in the concern scores: stage 2 (personal) and stage 6 (refocusing). That is, participants in this study not only had great concerns about possible effects of using the Internet on themselves, but also had some ideas about how technology integration could work better in their teaching. In addition, there is a consistent increase in all seven stages at the end of the online course, compared with those stage scores at the beginning of the online course. In order to determine the mean differences between pretest and posttest, the results of the paired t tests between pretest and posttest are shown in Table 3.

Table 3

Results of Paired t Tests of the Instrument Scores between the Pretest and Posttest

		Paired Differences (Pretest-Posttest)					t	df
		Mean	Std. Deviation	Std. Error Mean	95% Confidence of the Difference	Interval		
					Lower	Upper		
Awareness	STAGE0 - STAGE0	-6.91	3.18	.66	-8.29	-5.54	-10.44**	22
Informal	STAGE1 - STAGE1	-8.04	5.94	1.24	-10.61	-5.47	-6.49**	22

Personal	STAGE2 - STAGE2	-8.09	7.72	1.61	-11.43	-4.75	-5.02**	22
Management	STAGE3 - STAGE3	-7.22	6.09	1.27	-9.85	-4.58	-5.68**	22
Consequence	STAGE4 - STAGE4	-5.44	6.39	1.33	-8.20	-2.67	-4.08**	22
Collaboration	STAGE5 - STAGE5	-5.39	7.94	1.66	-8.83	-1.96	-3.26*	22
Refocusing	STAGE6 - STAGE6	-7.35	4.01	.84	-9.08	-5.62	-8.80**	22

Note: * $p < .01$. ** $p <. 001$.

Table 3 indicates that significant differences were found in all 7 stages in SoC instrument — awareness (Stage 0), informal (Stage 1), personal (Stage 2), and management (Stage 3), consequence (Stage 4), collaboration (Stage 5), and refocusing (Stage 6)—between pretest and posttest ($p < .01$). Thus, the hypothesis was supported. There were significant differences between the pretest and posttest in the scores of all the seven stages.

All the participants developed significantly higher concern scores about technology integration at the completion compared to the beginning of the online course. Specifically, in Stage 0 scores, there was a significant difference between pretest and posttest ($t = -10.44$, $df = 22$, $p < .001$); in Stage 1 scores, there was a significant difference between pretest and posttest ($t = -6.49$, $df = 22$, $p < .001$); in Stage 2 scores, there was a significant difference between pretest and posttest ($t = -5.02$, $df = 22$, $p < .001$); in Stage 3 scores, there was a significant difference between pretest and posttest ($t = -5.68$, $df = 22$, $p < .001$); in Stage 4 scores, there was a significant difference between pretest and posttest ($t = -4.08$, $df = 22$, $p < .001$); in Stage 5 scores, there was a significant difference between pretest and posttest ($t = -3.26$, $df = 22$, $p < .01$); in Stage 6 scores, there was a significant difference between pretest and posttest ($t = -8.80$, $df = 22$, $p < .001$).

Thus, online instruction effectively changed the participants' concerns about technology integration in the schools, including both internal (related to self) and external (related to student learning) concerns. The first four stages are internal, including awareness, informal, personal, and management. The last three stages are external, including consequence, collaboration, and refocusing. For educators, any changes in both the above internal and external concerns are very important for technology integration.

However, the above findings are not consistent with some previous research results. Rudden and Mallery's (1996) study only reported significant differences between pretest and posttest in four concern areas: awareness, information, consequence, and refocusing. This inconsistency may be related to several important factors. The first one is experimental duration. Rudden and Mallery's study only involved a short-term online instruction, but this study involved a semester-long course. The second one is experimental tasks. Rudden and Mallery's only involved two academic tasks, but this study involved numerous course-related assignments and tasks. The third one is research participants. Rudden and Mallery's study involved preservice teachers at the undergraduate level, but this study involved K-12 teachers at the graduate level.

Important Applications for K–12 Education

Since there are not many studies investigating the effects of online instruction on K-12 teachers' concerns about technology integration in the schools, this is an important exploratory study in this area. This study indicates that online instruction can effectively help K-12 teachers heighten their concerns about technology integration in the schools. This result not only has significant practical

implications for K-12 teacher education since all K–12 teachers are encouraged to use technology to assist their classroom instruction in order to improve students learning performance, but also promises contributions to the concern literature in the area of technology integration. Based on the results of this study, more online instruction should be proposed for educational programs. Thus, embedded online courses may be used in place of more lengthy/costly training. However, since this study was a single group pretest and posttest experimental design, care should be taken when any generalization is made to other environments. Therefore, further investigation of this topic is required in other control group environments.

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Editor's Note: Most instructors find teaching online courses requires more time than traditional courses. Both teachers and learners agree there is usually more interaction between teacher and learner and among learners than in a traditional course. Dr. Tomei's study measures the difference in instructor time for parallel version of a live vs. online course and establishes ideal class size.

The Impact of Online Teaching on Faculty Load

Computing the Ideal Class Size for Online Courses

Lawrence Tomei

Abstract

It is not uncommon for non-teaching administrators to view online, distance learning-based courses as the "mother lode" for sizeable tuition revenue increases. Why shouldn't an online instructor be capable of handling a hundred students? After all, there are no office hours, no classroom presentations, and no pencil-paper assessment.

This study examined the impact of substituting didactic instruction, face-to-face advisement, and pen and paper evaluations with web-based content, electronic information and inquiry, and online assessment. It analyzed the impact of distance learning demands on faculty teaching loads and computed the ideal class size for an online course.

Many readers are distance educators who, for the first time, will be provided with new facts to confront those who see online teaching as a panacea for expanding revenues and increasing student enrollment.

I. Introduction

The role of the traditional classroom teacher evolved over the centuries to include a common set of skills and competencies agreed upon by most in the discipline (Budin, 1991). For example, the traditional classroom teacher must be certified for the appropriate grade level. In the United States, the appropriate foci comprise early childhood, elementary, middle, and secondary concentrations. Only 5 percent of schools have grade configurations outside these age-centered criteria. (U.S. Department of Education, 2001) In addition, a majority of teacher preparation programs train their teachers in an academic content area first, followed by the theory and application of instruction. Successful educators are expected to pursue a continuous program of professional development that begins soon after certification and lasts until retirement. Finally, the traditional classroom teacher is expected to devote considerable hours both in and outside the classroom -- whatever is necessary to produce successful student learning outcomes (Kerr, 1989). Professional preparation, academic excellence, lifelong learning, and personal commitment are the hallmarks of the successful traditional teacher.

Since its arrival as a teaching strategy, many of these self-same characteristics have come to define successful distance educators as well (Cuban, 1986). In addition, new skills come into play before teachers assume the role of distance educator. Some of those additional skills include understanding the nature and psychology of distance education; identifying characteristics of successful distance learners; designing technology-based courseware; adapting teaching strategies to deliver instruction at a distance; evaluating student achievement in an online environment; and, recognizing the incremental demands of teaching (e.g., faculty load, online assessment, out of class interaction, etc.) under these new set of circumstances (Centre for New Technologies in Teaching and Learning, 2001). Of all the peculiarities of teaching at a distance, none appears so

crucial to successful student learning than teacher-student interaction.

II. Research

Teacher-student interaction plays what is perhaps the pivotal role in student attitudes about online learning and distance education. Research agrees that student attitudes, in turn, are significantly affected by the manner and degree of this interaction. (Simmons, 1991; Ritchie and Newby, 1989).

Throughout a typical semester, distance learners interact with their instructors via synchronous and asynchronous communication media. Successful distance educators often require their students to email short messages within the first weeks of a course in an effort to detect any misunderstanding of course expectations, learning assignments, or lesson objectives (McLellan, 1991). Later, online chat rooms provide a forum for students and teachers to share ideas in a near real-time learning environment. Chat logs are easily captured by the technology for cooperative learning exercises. Both forums offer advantages and encounter limitations.

- Asynchronous communication, most often in the form of electronic mail and threaded discussion groups, continues to represent the greatest use of technology in terms of quantity of teacher-student interaction. (Simonson, 2000.)
- Synchronous communication often evidences itself as online chat sessions and claims a growing cadre of supporters with a penchant for improving the quality of teacher-student interaction.

Surveys show over 9,300 Internet service providers in 120 countries, 30 million regular Internet users in the United States alone, and 70 million Internet users worldwide (National Center for Education Statistics, 2000). The use of synchronous learning environments such as BlackBoard, FirstClass, CyberProf, TopClass, E-College, and WebCT continue to grow with nearly one million distance learners already online with that number expected to triple by 2004. (Simonson, 2000). Research indicates that students perceive significant advantages for online learning over traditional methodologies including better use of limited time and better access to courses and class schedules. (O'Malley and McCraw, 1999).

It is not uncommon for non-teaching administrators to view online, distance learning-based courses as the mother lode for sizeable tuition revenue increases. After all, to the uninitiated, the argument can be made that if a traditional classroom teacher can accommodate a class of 25 students with the demands of face-to-face instruction, scheduled office hours, and individualized grading, why shouldn't an online instructor be capable of handling a hundred students whose learning is assisted by computer, whose office hours are diffused 24x7 thanks to electronic mail, and whose instruction is available on-demand thanks to its digital format?

Adding insult to injury, to date, distance educators had only their hunches and limited experience to defend against over-subscription to their online courses. They understood that online learners needed continuous feedback. They realized that their brand of learners expected near real-time responses any time of the day, every day of the week. They had a hunch that class sizes should be smaller, not larger. With this study, distance educators now have facts to confront those who see online teaching as a panacea for expanding revenues and increasing student enrollment.

III. The Questions

This paper seeks answers to the following questions in an attempt to establish a baseline for reasonable teaching load for distance educators.

1. What are the teaching demands of an online course? What is the impact of substituting didactic instruction, face-to-face advisement, and pen and paper evaluations with web-based content, electronic information and inquiry, and online assessment?
2. What is the impact of distance learning demands on faculty teaching loads? Communications involving asynchronous (email) and synchronous (online chat) interaction impact available faculty time. Does teaching at a distance require more or less of an instructor's time?
3. What is the ideal class size for an online course? Given that the study examines instruction, advisement, and assessment, we should be able to compare apples with apples to arrive at the ideal online class size given available faculty and teacher-student interaction demands.

For reader clarity, it should be understood that this study did not undertake to answer the question: What is the level of student achievement in distance learning versus a traditional classroom format? This study does not purport to offer findings pertaining to successful learning outcomes or the quality of instruction using either format.

IV. Methodology

During a semester of GITED 511, Technology and Education, students had the option of completing their course requirements in either the traditional or online format. Traditional students attended evening classes one night a week for 15 weeks. Distance students proceeded sequentially through each of 15 sessions, communicating with the instructor via weekly emails, end-of-session posts, and periodic online chat sessions. The author was provided a unique opportunity to explore the similarities and differences among teacher-student communications comparing the impact on the instructor of both formats simultaneously during the same semester. During the semester, 11 students opted for the traditional format while another 11 students chose to take the course online.

The author had taught the course using the traditional format five times in previous semesters. The online format had been offered on three of those previous occasions. During the semester, each of the 22 students chose their instructional format and no attempt was made to select participants who either had or had not experienced online learning in previous attempts. After registration, it was determined that only two of the 11 individuals taking the online format had experienced previous online learning.

V. Findings

A. Traditional Format.

In its traditional presentation, the impact on teaching load is represented in Table 1. For comparison purposes later, the analysis is presented by session. Some hours varied by number of students enrolled and are highlighted in the table under Student Assessment.

Classroom content hours consisted of 15 sessions conducted one night a week from 5:30pm - 8:15pm. An additional 3.0 hours per week of required student readings, exercises, and projects were not considered part of this study.

Teacher-student interaction involved disseminating course-related information and responding to student inquiries. Counsel and Advisement was typically provided in the form of scheduled office

hours from 4:00pm until the start of class at 5:30pm. However, some totals shown coincided with increased interaction associated with the typical beginning and end of a semester.

Student assessments consisted of two major projects and required considerable instructor attention for evaluation purposes. Project 1 (due Session 4) required students to prepare a 12-15 page report on a technology of their choice and needed a minimum of 22 hours (two hours per student) to assess. Project 2 (due Session 10) required students to apply the Technology Façade (Tomei, 2002) checklist to a school or organization and report the findings of their efforts; a minimum of 33 hours (three and a half hours each) was needed to assess this student project. The portfolio review (due Session 15) demonstrated student efficacy of their electronic portfolio and needed another 5.5 hours (thirty minutes per individual) for assessment.

Impact of the Traditional Format on Teaching Load. Some 136 hours of face-to-face interaction was found to be the norm for the 11 traditional students. The three-credit graduate course imposed a minimum of 40 instructional hours (.30 of total contact hours). Another 35 hours (.26) were expended in out of class advisement. Finally, 60 hours (.44) of assessment was needed to evaluate student-prepared projects. Faculty teach a full-time load comprising three courses and accounting for some 400 hours of instruction per semester.

B. Distance Learning Format.

Distance learners submitted weekly emails to the instructor to validate their progress through each required session. As they completed each session, students posted a synopsis of the readings and assignments in a threaded discussion group. Finally, students submitted two projects and an electronic portfolio to the instructor as email attachments.

Impact of the Distance Learning Format on Teaching Load. As noted earlier, the environment of distance learning substitutes self-paced, web-based, digitized content materials for didactic teaching; electronic mail for face-to-face student advisement; and, student posts and online chats to augment traditional assessment. In each table, the term “instances” refers to the number of specific student inputs. Also, since electronic mail, posts, and online chats take the form of written communication, "words per week" refers to written instructor responses translated into contact hours for comparison. The effective typing speed for the instructor in this study was tested at 40 words per minute using the Angelfire web site at http://www.angelfire.com/ak/nutechbiz/typingtest.html.

The tables reveal significant variations in teaching load between the traditional and online formats:

Delivery of Instructional Content (Table 2). To receive credit for a completed session, students posted a synopsis of the readings and online instruction to the discussion group. Some posts required additional clarification resulting in more than the minimum number of posts (11 students x 15 sessions = 165). Each post required an average of 14 minutes for instructor review prior to formulating a response.

Online chat sessions were conducted three times during the semester for an average of 110 minutes each. Chats validated student understanding and enhanced collaborative learning. Instructor response involved a written critique of each session in the form of formal minutes sent to each student via email attachment.

For delivery of instructional content, the impact on teaching load was 59.18 hours compared to 41.25 hours of traditional instruction.

Student Counsel and Advisement (Table 3). Students submitted weekly emails to the instructor to document their progress through the sessions. During some weeks, students might close several sessions by posting and verifying activity; in other weeks, students might report no activity. Electronic mail replaced the traditional face-to-face interaction with online students and focused on administrative as well as academic aspects of the course. Each email required a minimum of nine minutes to review prior to formulating a response. For lengthy emails (particular to Sessions 11, 12, and 14), an additional four minutes per email was required.

For online counsel and advisement, the impact on teaching load was 40.43 hours compared to 34.75 hours for traditional students; a negligible difference.

Student Assessment (Table 4). The same two projects plus the electronic portfolio required the same 60.50 hours for instructor evaluation. In addition, the impact of manually entering instructor responses was calculated.

For online student assessment, the impact on teaching load was 56.22 hours compared to 60.50 hours of traditional assessment.

Recapitulation (Table 5). Table 5 presents the impact of the distance learning format on the teaching load of GITED 511, Technology and Education. A final Totals Column summarizes the percent of activity during each session for further comparison.

VI. Interpretations

Faculty contracts often take into account three commonly agreed upon elements. Most important is teaching itself. A majority of a full-time faculty load is rightly dedicated to the delivery of instructional content, advisement of student charges, and evaluation of student progress. Research fosters the continuous professional development of the individual while service to the school or community constitutes the third element.

Most educators are familiar with the 40-40-20 formula for allocating faculty time: 40 percent devoted to teaching, 40 percent to research, and 20 percent to service. (AAUP, 1968). However, the Association of Departments of Foreign Languages goes on to suggest that many institutions do not mandate research, so a more reasonable distribution is "something like 80 percent teaching, 5 percent research, and 15 percent service." (Mancing, 1991). For this study, a full-time teaching load was based on 15-week semesters, 40 hours per week, for a total of 600 available hours per semester. An 85:5:10 ratio was used and when applied to the available 600 hours per semester, gave faculty 510 hours for instructional delivery, 30 hours on scholarship, and 60 hours on service. Contractually, if a faculty member is expected to offer three courses each semester, the target for each course, then, would be 170 hours (510 instructional hours divided by 3 courses). These available hours are used to draw our final conclusions and compute ideal class sizes.

A. Impact on Teaching Load. With a maximum allowable time per course of 170 hours, the surveyed class of 11 traditional students represented a less-than-maximum teaching load (136.5 hours). The online format, however, exceeded the traditional load (155.83 hours). In percentages, approximately 14 percent more hours were required to teach the same number of students online versus traditional classroom.

B. Teacher Roles of Content, Advisement, and Assessment. The variations in teaching load between the traditional and online formats are depicted in Table 6. Providing instructional content online required more time than the didactic, traditional format. It was interesting to note, however, that advisement required nearly the same amount of time for either format (34.75 hours and 34.73 hours). Assessment called for a higher percentage of teaching hours in the traditional mode (44.0 versus 36.0 percent). Regarding total hours, online teaching demanded a greater commitment across all teaching roles, particularly content delivery.

C. Weekly Impact on Teaching Load. Online teaching loads were much more erratic with peaks during periods of assessment and advisement (Sessions 6, 11, 14, and 15). Traditional teaching was stable for seven of the 15 weeks with three peak demands (Sessions 4, 10, and 15) coinciding with the assessment of student projects.

D. Ideal Traditional Class Size. The only variable factor (hours fluctuating with student enrollment) in traditional teaching involved student assessment (See Table 7). The ideal class size for the traditional format was calculated at 17 students.

E. Ideal Online Class Size. All three teaching components (instructional content, counsel and advisement, and student assessment) in the online format were affected by student enrollment. So, each component contributed to the total 170 available hours. (See Table 8). The ideal class size for the online format was calculated at 12 students.

VII. Conclusions

This paper sought to establish a baseline teaching load for faculty involved in online instruction. It was found that online courses required more time for all three elements of teaching: instructional content, counsel and advisement, and student assessment. In addition, online teaching demanded a minimum of 20 percent more time than traditional instruction, most of which was spent presenting instructional content. The weekly impact on teaching load varied considerably between the two formats. Traditional teaching was found to be more stable across the semester while online teaching fluctuated greatly during periods of advisement and assessment.

Finally, the ideal class size was calculated for each instructional format. Several assumptions were in force during the study. First, a 510: 60: 30 ratio (content to advisement to assessment) was assumed. Second, a three-course teaching load was calculated giving faculty a minimum of 170 available hours per course. Third, the 11 traditional and 11 online students used in the Fall 2000 semester surveyed were assumed representative of both types of students along with a mix of competencies and learning styles. Fourth, and finally, the GITED 511 course employed for the study was assumed to reflect the demands of a representative course of study. Under these assumptions, it was computed that **the ideal traditional class size was 17 students while the ideal online class size was 12 students.**

For the first time, research has shown that successful distance education is contingent upon smaller, not larger, class sizes – nearly half the size of its traditional ancestor. Online teaching should not be expected to generate larger revenues by means of larger class sizes at the expense of effective instructional or faculty over-subscription.

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Table 1.
GITED 511, Technology and Education, Traditional Format

Session Number	Classroom Content Hours per Week	Counsel and Advisement Hours per Week	Student Assessment Hours per Week	Total Contact Hours	Percent Per Session
1	2.75	3.75		6.50	4.8
2	2.75	3.50		6.25	4.5
3	2.75	2.50		5.25	3.8
4	2.75	1.50	*22.00*	26.25	20.0
5	2.75	1.50		4.25	3.1
6	2.75	1.50		4.25	3.1
7	2.75	1.50		4.25	3.1
8	2.75	1.50		4.25	3.1
9	2.75	1.50		4.25	3.1
10	2.75	1.50	*33.00*	37.25	27.0
11	2.75	1.50		4.25	3.1
12	2.75	1.50		4.25	3.1
13	2.75	3.50		6.25	4.5
14	2.75	3.50		6.25	4.5
15	2.75	4.50	*5.50*	12.75	9.2
Teaching Load	41.25	34.75	*60.50*	136.50	
Percent	30.0	26.0	*44.0*		100.0

Table 2.
Distance Learning Format, Instructional Content

Session Number	Delivery of Instructional Content (Threaded Posts and Online Chats)		
	Instances	Student Input (Words)	Instructor Response (Words)
1	1	131	0
2	1	25	0
3	0	0	0
4	9	1837	64
5	12	2781	246
6	16	3775	578
7	20	4735	782
8	21	1251	406
8	Chat	3245	650
9	25	3238	87
10	18	837	0

11	17	102	0
12	16	272	104
13	20	1251	504
13	Chat	3952	806
14	23	1937	636
15	24	4178	968
15	Chat	6892	1306
Totals	223	40,439	7,137
Teaching Load	56.22 hours		2.96 hours

Table 3.
Distance Learning Format, Counsel and Advisement

Session Number	Counsel and Advisement (Electronic Mail)		
	Instances	Student Input (Words)	Instructor Response (Words)
1	8	90	1272
2	14	300	3030
3	10	1743	166
4	12	2888	527
5	14	2099	494
6	8	1082	1088
7	20	3792	774
8	11	1461	99
9	8	2090	517
10	10	3060	454
11	12 4	6863	570
12	16 4	15045	626
13	8	1163	644
14	16 4	9005	7652
15	13	5,584	1,856
Totals	192	56,265	19,769
Teaching Load	32.34 hours		8.09 hours

Table 4.
Distance Learning Format, Student Assessment

Session Number	Student Assessment (Attached Files)	
	Instances	Instructor Response (Words)
1		
2		
3		
4	5	948
5	1	1457
6	2	3633
7	1	1155
8		
9		
10		
11	9	7091
12		
13		
14		
15	8	5951
Totals	**26**	**20,235**
Teaching Load	47.79 hours	8.43 hours

Table 5.
Distance Learning Format Recap

Session	Instructional Content		Student Advisement		Student Assessment		Totals	
	Instances	Instructor Response (Words)	Instances	Instructor Response (Words)	Instances	Instructor Response (Words)	Words Per Session	Percent Per Session
1	1	0	8	1272			1272	2.70
2	1	0	14	3030			3030	6.43
3	0	0	10	166			166	0.35
4	9	64	12	527	5	948	1539	3.26
5	12	246	14	494	1	1457	2197	4.66
6	16	578	8	1088	2	3633	5299	11.24
7	20	782	20	774	1	1155	2711	5.75
8	21	406	11	99			505	1.07
8	Chat	650					650	1.38
9	25	87	8	517			604	1.28
10	18	0	10	454			454	0.96
11	17	0	16	570	9	7091	7661	16.25
12	16	104	20	626			730	1.55
13	20	504	8	644			1148	2.44
13	Chat	806					806	1.71
14	23	636	20	7652			8288	17.58
15	24	968	13	1856	8	5951	8775	18.61
15	Chat	1306					1306	2.77
Totals	223	7137	192	19,769	26	20,235	47141	100.0
Teaching Load	56.22 hours	2.96 hours	32.34 hours	8.09 hours	47.79 hours	8.43 hours	Teaching Total 155.83 hours	
Percent	38.0 percent		26.0 percent		36.0 percent		100.0 percent	

Table 6.
Variations in Traditional versus Online Teaching Load, By Elements

Traditional Format		Elements	Online Format	
Percent	Hours		Percent	Hours
30.0	41.25	Instructional Content	38.0	59.18
26.0	34.75	Counsel and Advisement	26.0	40.43
44.0	60.50	Student Assessment	36.0	56.22
		Total Hours		155.83

Table 7.
Calculation of Ideal Traditional Class Size

41.25 Instructional Content Counsel and Advisement X Assessment 170.00 Total Available Hours	Assessment = 94.00 hours Therefore, 11 students : 60.50 hours :: x students : 94.00 hours x = 17 students

Table 8.
Calculation of Ideal Online Class Size

59.18 x Instructional Content 40.43 x Counsel and Advisement 56.22 x Assessment 170.00 Total Available Hours	Therefore, 11 students : 155.83 hours x students : 170.00 hours 155.83 x = 1870 hours x = 12 students

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Editor's Note: University of Phoenix devised an innovative solution to the diminishing supply of new teachers entering the system. Recruitment focused on adult learners who had already had Bachelor degrees. "Key predictors of success" were the basis of selection. Online learning, simulations, and e-portfolios were key ingredients to ensure program quality, accessibility, and success.

University of Phoenix Online Masters in Teaching Program

Cindy K. Knott

With one of the most critical teacher shortages in the United States history compounded by the large percentage of retiring teachers in the next decade, the number of adults changing careers into the teaching profession and returning to college is on the rise. The teacher candidate population has shifted from the traditional student to the adult learner. "The recent increase in the number of traditional students interested in education will not meet this need, and there are real limitations on the ability of traditional colleges to entice eligible teacher education applicants" (Morey, 2001, p. 305). As we begin to consider the importance of the individuals who are re-careering as a definite pool of prospective teacher candidates, the traditional teacher education programs and delivery are under scrutiny. Alternative certification programs must be considered as an avenue to support a population who may find the enrolling in a traditional teacher preparation program a challenge due to other obligations (Huling, Resta, and Rainwater, 2001).

To address the teacher supply/demand issues confronting the nation, distance and alternative teacher preparation programming will allow the flexibility for the emerging non-traditional student to enter the profession. Thus, there is an interest in the delivery of teacher preparation programs, from traditional universities to virtual learning environments to meet the needs of this population. With the use of technology, a completely new paradigm shift is taking place from the traditional model for preparation of teachers to a model requiring the same objectives only differing in delivery method. The University of Phoenix (UOP) Online Master of Arts in Education/Teacher Education (MAED/TED) Programs is designed for students for geographical or personal reasons cannot complete the coursework in a traditional setting. These programs for elementary and secondary teacher certification are 33-credit Master's Degree (MAED) programs, leading to Arizona teacher licensure. Candidates for this program have already earned a bachelor's degree and wish to gain the pedagogical knowledge and skills that will assist them in becoming competent and effective educators, while earning a Master's

Degree. This program suggests that successful teacher candidates will:

- Participate in Field Experiences that are tied to either specific course objectives and/or program standards.
- Reflect on their performance and thinking throughout the coursework.
- Integrate technology into the curriculum.
- Utilize critical thinking in making decisions.
- Collaborate with learning teams on problem solving situations.
- Complete a Teacher Work Sample Project.
- Demonstrate continuous progress and development throughout the program in their electronic portfolio.
- Student teach in an approved placement with a certified classroom teacher.

For accountability purposes, data collection occurs at four key phases in the teacher preparation program, a method based on work done by the Renaissance Partnership for Improving Teacher

Quality ("Teacher Work Sample Methodology," 2001.) Students will submit work sampling documentation to an e-Portfolio under the appropriate program domains of teaching responsibility. During each of the four student teaching seminars, university faculty will assess individual student's e-Portfolio according to program criteria and mastery levels. Online UOP faculty members are required to complete a 10-12 week approval, training, and mentoring process prior to teaching in any program. In addition, MAED/TED faculty must pass a 3-day Faculty Program Orientation (FPO) regarding program components, procedures, and policies in order to best serve the students.

Coursework is all on *rEsource.* Resource is how the University of Phoenix students and faculty will gain access to the learning materials for their courses. It is a virtual distribution system for all UOP materials associated with a course. It is a one -stop shop making all course materials and resources at a click of a button. The materials and resources include Unimodule®, e-Text, articles, self-assessments, supplemental materials, web-links, and multi-media presentation tools. Technical support is available 24 hours, 7 days a week to support students and faculty.

The 10-week student teaching placements may be in public, private or charter schools. Qualified faculty supervisors, site supervisors, and cooperating teachers provide quality and consistent supervision throughout this experience. Together these three supervisory roles have an integral part in the student teacher assessment process. Facilitation of student teacher placements come about in a variety of ways, ranging from initially soliciting their own placements for campus approval to placement with a local university partner in order to complete their student teaching. Teacher Education Coordinators assure the appropriate application procedures are accurately completed. Students are required to follow all school and district policies. Ongoing data collection, continual formative and summative assessment, and developmental evaluation based upon program standards and rubrics allow for a program of quality, rigor, and accountability. Candidates not progressing satisfactorily along the program continuum will receive counseling and remediation options through the student retention process.

In order to meet the tremendous need for quality teachers, alternative teacher preparation programs, including distance-learning environments, are avenues by which current deficiencies in the teaching profession can be met. As the teacher candidate population moves from the traditional student to the non-traditional student, the online environment is one way to address the learning styles and life demands of the adult learner. Along with a quality teacher-preparation program built on national and state standards, the flexibility of the online classroom is very appealing to students. The UOP Online teacher preparation will prepare teacher candidates to understand and have experience in:

- Teaching in Diverse Environments
- Learning Theory
- School Law and Ethics
- Classroom Management
- Curriculum Design and Assessment
- Instructional Strategies
- State and National Standards
- Literacy
- Family and Community Collaboration
- Technology

The innovative program has grown quickly to 1400 students and 130 instructors. UOP does provide additional training for instructors who teach in the MAT program. New instructors take a relevant three-day workshop prior to teaching in the program.

> *There is a wealth of information disseminated during the three days. These documents provide the facilitators with all the information they may need to effectively teach the MAED/TED curriculum. The 3-day workshop provides the new facilitators with a wealth of knowledge. Documents such as the Online Training Manual, MAT 500 Unimodule (curriculum), PowerPoint Presentation of the program overview, Program Rubrics, contact list, and course sequence are given to the facilitators. Upon completing of the workshop, the facilitators are well equipped to teach for the MAED/TED Programs. (T. Kanai, personal communication, March 18, 2003)*

Due to the tremendous teacher shortage throughout the nation, institutions across the United States have been encouraged to look for ways to provide alternative paths to certification. Now, many colleges and universities are using online modalities to deliver portions of their programs to teacher candidates. As a further guarantee that candidates have the pre-requisite skills and knowledge necessary to positively impact student learning, candidates completing UOP programs will still be required to meet additional, individual local state requirements. This may include additional coursework, successfully passing knowledge and content area exams, as well as participating in on-going mentoring programs.

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In addition to Dr. Knott's lifelong education interests, she is an active community member and has traveled abroad for the University of Phoenix Online. She has participated and presented at many national and local conferences, including serving on a panel discussion for "No Child Left Behind." Dr. Knott is a full-time faculty member at the University, receiving awards for both outstanding faculty and performance.

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Editor's Note: Doctoral students must prepare and present proposals for their Doctoral Dissertation research. Brent Muirhead addresses the need for certain planning structures to ensure that purpose, proposal, methodology, results, and significance are clearly stated and intelligible to the target audience. This raises certain challenges in research design communication.

Academic Research Presentations: Practical Advice for Today's Graduate Students

Brent Muirhead

Introduction

Presenting research results is a vital aspect of graduate work. It is an exciting time in a student's degree program because it represents the culmination of many hours of hard work. The communication of research findings provides a valuable opportunity to inform others of a current investigation and it and can lead to future speaking opportunities at conferences, grants for future research projects, school and business meetings and offer natural connections to new job opportunities! My discussion will highlight major elements in preparing academic presentations that will help students to best represent their research while effectively meeting audience expectations. An emphasis will be placed on action research projects that are growing more popular in today's graduate education programs.

Presentation Purposes

Action research projects are naturally proactive endeavors that are designed to promote an accurate understanding and awareness of educational problems. They are solution- oriented investigations that use systematic analysis and data reflection that are essential for encouraging the implementation of instructional changes in classrooms and educational institutions (Johnson, 1993). Action research projects are becoming more popular among contemporary professionals in the social sciences and especially those involved in social work, health and education. (Hart & Bond 1995) cite seven distinguishing characteristics to action research:

- is educative;
- deals with individuals as members of social groups;
- is problem-focused, context-specific and future-orientated;
- involves a change intervention;
- aims at improvement and involvement;
- involves a cyclic process in which research, action and evaluation are interlinked;
- is founded on a research relationship in which those involved are participants in the change process (pp. 37-38).

Presenting academic material requires careful preparation and planning to effectively communicate to your audience. It is important to consider the diversity of expertise within a group of educators. Audiences will usually contain people who are experts in your subject area, others who have a general knowledge of the topic and the remainder who have basically little or no knowledge. How do you plan to effectively reach such a wide range of knowledge levels within one group? A popular communication strategy is to directly address the experts while integrating relevant and interesting illustrations and ideas into the presentation that make the

results accessible to entire audience. It is a multidimensional speaking technique that demonstrates respect for those who attend your presentation (Cryer, 2000; Hill, 1997).

Essential elements for action research presentations:

- Problem description and documentation
- Setting: population
- Solution strategy
- Analysis of results (anticipated & otherwise)
- Recommendations for change & for future researchers
- Solicitation of audience feedback

Problem Description & Documentation

The problem statements should be presented in descriptive language that the audience can easily understand. The presentation should include several key studies from the literature review to provide solid support for the rationale for pursuing your research problem. There is a real temptation to share a host of studies but it tends to distract people who generally are more interested in understanding why an individual has undertaken a particular study.

Setting: Population

This section should reflect a basic overview of the study participants and help acquaint people with the school or organizational setting for the research project. Due to the international interest in research efforts, be sure to share enough factual information about the study site and population to inform individuals from other countries. Also, it might be necessary in some situations to include a brief overview of key terms to effectively communicate with a diverse audience.

Solution strategy

Presenting possible solutions to educational problems is a vital part of the research process. Individual projects will often focus on issues within a specific realm of practice in a classroom or throughout a school such as disciplinary referrals. It is important to present information in a concise manner that highlights the specific changes to improve the educational setting. Therefore, stress three or four changes that will help you keep your presentation focused and reduce potential resistance to your ideas (Calhoun, 1993).

Analysis of Results (anticipated and otherwise)

Interpretation of qualitative and quantitative data is always a very challenging task. The author recommends reviewing your results in light of the concepts of significance, generalizability, reliability and validity. The generalizability of an action research project requires you to ask specific questions which examine the degree of broader applicability of your particular study. Blaxter, Hughes & Tight (2001) recommend asking yourself the following questions:

- … if you have carried out a detailed study of a specific institution, group or even individual, are your findings of any relevance beyond that institution, group or individual?
- Do they have anything to say about the behavior or experience of other institutions, groups or individuals, and if so, how do you know that this is the case? (p. 221)

Every study has a certain level of limitations involving generalizability. Action research projects are designed to address real problems in a school such as the quality of student writing or reading

comprehension skills. Collaborative action research projects offer opportunities to increase the significance of an investigation by exploring and examining issues within a school or several schools. Individual case studies and action research projects remain an important part of today's academic community.

Researchers need to carefully share conflicting or even somewhat confusing results because this represents valuable information. Often, it stresses the complexity of studying the teaching and learning process and the need to explore the topic in greater depth in a future research venture.

Salmon's (2000) investigation into facilitating online dialogs at the Open University (London, England) reflects how an individual study can benefit both a higher education institution and offer potential insights for online teachers. Her findings were based on a combination of content analysis of online communication of students and teachers, focused group work and testing and evaluation of a new teaching and learning model. Salmon developed a comprehensive chart of five facilitator or e-moderator competencies:

1. **Understanding of online process**- understand how to promote group work, pace online discussions, experiment with new ideas
2. **Technical skills**- use software to facilitate student interaction by monitoring student messages and create conferencing opportunities
3. **Online communication skills**- able to effectively interact with students by using concise and clear messages that encourage academic dialog and personalize the online experience
4. **Content expertise**- credible subject matter knowledge and experience to share comments/questions that stimulate lively debate
5. **Personal characteristics**- able to adapt to different teaching situations and demonstrates a genuine excitement about online learning

The five facilitator skills provide an excellent overview of distance educator competencies. The educational community can use the facilitator skills in a variety of ways: instructional design specialists that are creating online curriculum materials help assist distance educator administrators who are recruiting online personnel, trainers of online faculty members who need guidelines to help them make accurate assessments and individual instructors who want to develop a professional development plan.

Recommendations for Change & for future researchers

As you prepare your presentation, take the time to consider the questions that those who might be skeptical of your findings and share recommendations for changes. Garofoli & Woodell (2003) relate, "why would some faculty be so skeptical when others have achieved great success and discovered new ways to increase learning outcomes? Why would faculty resist tools that can help them simplify their work?"(paragraph 2).

Action research can be an effective tool for promoting relevant changes within a school setting by informing policy debates and improving teacher research skills and practices.

A research project may:

- address gaps in knowledge by investigating an area of research that fills a void in existing information
- expand knowledge by extending research to new ideas and practices
- replicate knowledge by testing old results with new participants or new research sites
- add voices of individuals to knowledge, individuals whose perspectives have not been heard or whose views have been minimized in our society (Creswell, 2002, p. 4).

Solicitation of Audience Feedback

The audience can be a good resource for advice and feedback on your presentation and a forum to enhance professional knowledge and practices in today's classrooms. Naturally, researchers are somewhat anxious about the personal risks involved having their project being scrutinized by others. O'Brien (1998) relates, "one of the prominent fears comes from the risk to ego stemming from open discussion of one's interpretation, ideas, and judgments. Initiators of action research will use this principle to allay others' fears and invite participation by pointing out that they, too, will be subject to the same process, and whatever the outcome, learning will take place" (Risk, paragraph 1). Audience feedback can help individuals identify shortcomings or flaws in their research project which can be addressed in a future journal article or in future investigations. Dialog over research results can provide the basis for a deeper understanding about current interpretations of educational practices and theories. Graduate students should be encouraged by the fact that their presentations will give others the opportunity to publicly affirm the positive elements and educational contributions of your work (Blaxter, Hughes & Tight , 2001)

Conference Speaking & Publishing Opportunities

The action research project can be a good resource for sharing valuable knowledge with the academic community. It is wise to investigate potential speaking opportunities at your school (i.e. staff development days), national and international conferences. Today's technology and educational conferences often provide Web sites with specific details about their expectations for papers. Conference leaders will post information describing their preferences for paper topics, targeted audience, word length of papers, style format, how to create graphs and charts, multimedia directions and the amount of time allocated for each presentation. The author recommends emailing one of the conference leaders with your presentation ideas to help affirm them or have information to modify your topic. This is an important step because competition for presenting papers can be enormous and you can greatly increase your acceptance rate to conferences by checking with individuals who are organizing the event.

As you explore various speaking opportunities, it is a good time to examine publication of your research results in journals, magazines and newsletters (print & online). The publication process requires diligence, persistence and a willingness to shape your material to target specific groups of readers. Additionally, editors appreciate writers who provide creative research articles and meet their deadlines. It is very important to cultivate good working relationships with editors who can assist you in sharing your ideas with the academic community (Muirhead, 2002).

Conclusion

Research presentations are excellent opportunities to demonstrate originality and inform others of valuable investigation findings. Contemporary educators appreciate quality work because it encourages improvement in educational practices, refinement of research skills and benefits a diversity of stakeholders.

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