

## CHAPTER 1: Introduction

### *Introduction*

Distance education is a form of instruction that does not require a student to be physically present in the same location as the instructor. A distance learner may be located across campus, across the state, or even on the other side of the world. Today, online instruction, two-way interactive video, and one-way prerecorded video are very common methods of instruction for higher education. This case study focuses on online instruction as a method of instructional delivery.

A significant amount of research has been conducted on the quality of distance education. Most of this research relates to student perceptions and student outcomes (IHEP, 1999). One study examined the perceptions and attitudes of students toward computer-mediated learning and courses broadcast over a local television channel (Taylor, 2002). The students' attitudes toward this form of distance learning was generally favorable. One factor contributing to the positive attitudes was the flexibility in scheduling. The students preferred not to commute to campus to take a class, and appreciated not having a specific time block during which they had to be in class (IHEP, 1999).

Another study, conducted in the 2000 fall semester, investigated students' attitudes toward online instruction. The study examined responses from 400 students enrolled in 72 online courses offered by 15 different institutions (Taylor, 2002). In general, students responded positively. They cited flexibility of time and place as the major reason for taking an online course. They also stated that good communication and interaction were key elements for the success of the course. Many students felt they could be more open and honest online, which made it a more comfortable environment to disagree with others than a traditional classroom would be. More than 90 % of those students stated they would take another online course and would recommend the same to others (Goldsmith, 2001).

The enthusiasm about delivering a course online, and the interest about additional instructional opportunities, led to the development and implementation of the first Herbaceous Plants online course at The George Washington University. This course was offered through the Landscape Design Program in the College of

Professional Studies in an attempt to address the growing needs and requests of the Landscape Design students for such a course. Due to the inability to add additional courses into the sequence of courses for certification, the decision was made to offer the course as an elective through a distance-learning environment. This allowed students flexibility in scheduling to complete the online course at their own pace, and convenience during the eight-week timeframe.

The prevalence of online distance education courses requires university faculty to face new challenges and make new decisions in the areas of course management and design, delivery method, student communication media, creation of an engaging learning environment, assessment, and use of new technologies (Ely, 2002). As new technologies continue to emerge and students require more flexibility in class scheduling, institutions of higher education are striving to accommodate students and compete to increase enrollment.

According to Levy (2003), faculty members are faced with a number of new situations when teaching an online learning class as opposed to a traditional class. These include: the administration or management of online courses; the course layout and design; the best delivery method for the content, such as text, graphics, audio, or video; the various communication methods that the students will use, such as e-mail, discussion boards, and chats; ways to increase and maintain student involvement; appropriate student assessments for online learning; and a working knowledge of all the technologies being implemented in the online course (Ely, 2002).

Offering laboratory-based courses in a distance learning environment presents several difficulties. Distance learning has experienced continuous improvement for lecture-based courses, while much less emphasis has been given to teaching laboratory-based courses (Khader, 2002). Making a laboratory-based course accessible to distance learners requires eliminating certain barriers. Online instructors need to know how to convert traditional lectures into interactive lessons that encourage students to be active participants (Meyan, Lian, & Tange, 1997). It is an especially difficult challenge to offer distance learning in a laboratory-based course, but this challenge must be met if degree programs for distance learners are to be successful. This case study details important features of the distance learning courses, and provides

assessment results that indicate the feasibility of these methods as replacement for traditional laboratory-based instruction.

### *Purpose of the Study*

This case study examines asynchronous online distance learning, which can be completed at any time or place. The purpose of the study is to suggest practices of delivering a traditional lab-based course online and effective ways of teaching those practices. In describing the events of the Herbaceous Plants course, an examination of the developmental model was conducted to determine strengths and weaknesses of the instructional design program in the course studied. Students were provided with numerous sources of information on plant identification characteristics, cultural requirements, and examples of other successful landscape design experiences. Given all the necessary information, it was intended that the students would be able to synthesize how to use various herbaceous plants, in combination with one another, to design an aesthetically pleasing landscape design that would prosper in the environment in which the plants were installed.

### *Need for Study*

This study was conducted to determine the best ways to meet the online laboratory course needs of the adult education students in the Landscape Design Program at The George Washington University. The asynchronous, online distance learning environment was chosen as the mode of instructional delivery, due in part to the flexibility in scheduling it allows and as an alternative medium to the standard lab-based instruction that is required of other courses in plant materials.

Distance education is one of the most powerful new forces influencing the direction of education through either supply of distance learning technology or the demand for courses by society (Goldsmith, 2001). Most universities now have the hardware necessary for delivering instruction (satellite, cable-based television, and computer networks) available to them (Evans & Nation, 1992).

- The educational community challenges for the information age are:
- To restructure distance education to include strategic management.

- To create accessible, cost-effective, value-driven, high-quality services for the distance learning community (Holmberg, 1995).

Ely (1993) believed that the glamour of distance education technology engulfs many schools before they fully understand what purpose it serves, how it is going to be used, who is using it, and why are they using it. What we really need to know is why technology is in the school and how it is being used, by whom, for what purpose, how often, and what results have occurred as a result of its use. The answers are not in the technology itself, but in the people who decide about the purpose of its use, the way it is used, and the evaluation decisions made about technology usage (Ely, 1993).

Numerous studies have compared traditional and distance education student outcomes. There is research that suggests that such comparisons are flawed. The comparison of distance courses to traditional courses is called the media comparison approach (Taylor, 2002). This approach suggests that comparing one medium to another is ineffective because there is little consideration given to students' attributes and characteristics, to learner needs, or to psychological learning theories (Lockee, Moore, & Burton, 2001). What is important to measure is the students' overall growth in the subject matter, not the difference between the two mediums. The literature on distance learning also includes a wealth of advice on what should be included in the design of on-line classes.

Numerous problems with laboratory courses taught online need to be addressed prior to the design and implementation of such a course. The instructional design process played a vital role in the success of the development, implementation, and evaluation of this Herbaceous Plants course.

These models are designed to provide a framework to follow when going through the process of creating instruction. Among the activities are directing students to appropriate learning activities; guiding students to appropriate knowledge; helping students rehearse, encode, and process information; monitoring student performance; and providing feedback as to the appropriateness of the students' learning activities and practice performance (Merrill, Drake, Lacy, Pratt, & ID2 Research Group, 1996). The Dick and Carey (1995) model of instructional design was used in this study. The thorough completion of the instructional design process in this course assisted in

eliminating many of the issues and concerns that needed to be resolved, in particular types of media to use, educational materials, and evaluation methods.

### *Need for Future Research*

There is need for additional research in the field of distance education. Future researchers will need to understand the important area of uniqueness. There is no universal right way to teach. However, the lack of proper planning, implementation, and evaluation on the researcher's part can easily negate the findings of a study. For this reason, it is important to realize that the scope of this study was limited to one institution. The Landscape Design Program at The George Washington University provides a graduate certificate but does not provide degrees such as a bachelor's, master's, or doctorate. In addition, the results will be generalized only to students enrolled in The George Washington University's Landscape Design Program's online courses. In future research, it may be necessary to encompass a larger sample of participants and educational institutions.

Additionally, the present study did not specifically address the needs of distance learners with physical or mental disabilities. Although these learners are an important constituency for distance learning programs, addressing their needs is currently outside the scope of the present study. For that reason, it is vital to the educational field that research be conducted to include evaluation tools that effectively measure how the needs of distance learners with physical or mental disabilities are met.

### *Rationale for Study*

Instructional design is critical to distance education (Smaldino, 1999). Good distance education, like good face-to-face education, is based on careful planning and design of instruction (Moore & Thompson, 1997). Garrison (1989) emphasized that distance learning environments gain a great deal from the design and delivery considerations afforded by applying a systematic approach to the instructional design of these environments. Applying such an approach to the design and development of instruction delivered via distance "provides a strategy for understanding the roles of the student located at a remote site and the instructor designing materials to be delivered at

a distance over some technical medium” (Schreiber & Berge, 1998, p. 32-33). This instructional design approach, which identifies all the environmental components and determines the contributions of each to the learning outcomes, ensures a more effective distance education effort (Moore & Kersey, 1996).

This discussion of the literature clearly demonstrates that the incorporation of a systematic approach to the design of instruction at a distance is a necessity for success. However, an instructional design model must be identified to determine the most effective model in facilitating distance education. A more productive way to approach this issue is to focus not on specific instructional design models, but on the considerations that must be included within an instructional design model, to assure its effectiveness within the context of a distance-learning environment (Taylor, 2002).

This case study was designed to address the growing needs of students in the Landscape Design Program at The George Washington University for courses in distance education. It was the intention of this study to research, design, implement, and evaluate the Herbaceous Plants course offered via distance education by completing a thorough instructional design program.

#### *Questions to Be Answered*

This study was designed to answer the following questions:

1. What are suggested practices to meet the needs of students in the online Herbaceous Plants course at The George Washington University?
2. What are the characteristics of students enrolled in the Herbaceous Plants course?

#### *Limitation of Study*

As is characteristic of any research, this study has limitations that qualify its findings. First, the scope of this study was limited to one institution. The College of Professional Studies provides a graduate certificate but does not provide a degree, such as a master’s degree. No doctoral or undergraduate programs were included. In addition, the results will be generalized only to students enrolled in The George Washington University’s Herbaceous Plants online course.

The present study did not specifically address the needs of distance learners with physical or mental disabilities. Although these learners are an important constituency for distance learning programs, addressing their needs is outside the scope of the present study.

The data collection methods in this study included a limited amount of follow-up questioning in the area of evaluation tools. Therefore, the researcher was unable to determine which forms of evaluation (matching, multiple choice, essay) were most effective in the development of the student's knowledge base.

Due to the small sample size (n=5), an in-depth analysis of course statistics was limited and could not be generalized past the scope of the Herbaceous Plants (PSLD 229) course. This information, however, will be used for later research that will include additional courses and a larger sample size.

#### *Definition of Terms*

*Andragogy* – the art and science of helping adults learn.

*Asynchronous Distance Learning* – form of learning completed at any time or place.

*Blackboard* – Web-based server software platform that offers a course management system.

*Distance Education* – instructional delivery that does not require a student to be physically present in the same location as the instructor.

*Instructional Design* – the process of creating learning experiences and learning environments that promote instructional activities.

#### *Chapter Summary*

This chapter examines asynchronous online distance learning for the overall effectiveness of delivering a traditional lab-based course online, and the educational potential for the students taking an online course in Herbaceous Plants through The George Washington University's Landscape Design program. Numerous studies outlined in this chapter have compared traditional and distance education student outcomes. The comparison of distance courses to traditional courses is called the media comparison approach (Taylor, 2002). This approach will be outlined more in-

depth in later chapters. The instructional design process is described to explain its importance to the success of the development, implementation, and evaluation of this Herbaceous Plants course.

### *Preview of Future Chapters*

Related literature is reviewed as it pertains to distance education and instructional design in Chapter 2. Chapters 3 and 4 examine and detail the methods and findings of this case study, along with a comprehensive outline of the research conducted. In Chapter 5, conclusions are drawn to determine implications for distance education practices, research, and policies; laboratory-based courses transformed into online courses; and courses on herbaceous plants. It is the intention of this study to add to the base of knowledge on distance education for conducting additional studies in this field.

## CHAPTER 2: Review of Literature

### *Distance Education*

Distance education is instructional delivery that does not require a student to be physically present in the same location as the instructor. The term *distance* does not necessarily mean a long distance. A distance learner may be located across campus, across the state, or even on the other side of the world. Historically, distance education has meant correspondence study. The first distance education in the United States was offered in 1728 when an ad in a Boston paper offered learning by mail (IHEP, 1999).

Today, audio, video, and computer technologies are common delivery methods. (Distance Learning Resource Network [DLRN], 2000). According to the United States Department of Education, as of fall 1999, distance education courses were offered at 90 % of colleges and universities that had enrollments of more than 10,000 students, and at 85 % of institutions with enrollments of 3,000 to 10,000 (DLRN, 2000).

Today, online instruction, two-way interactive video, and one-way prerecorded video are the most popular instructional technologies in distance education. Distance education is not simply the addition of technology to instruction; instead, it uses technology to make possible new approaches to the teaching/learning process (Pennsylvania State Department of Distance Education, 1998). This case study will incorporate the online, asynchronous instruction media for delivery of instruction.

### *Previous Studies of Distance Education.*

In the spring of 1999, 18 public community colleges across the United States participated in a study to determine if students were satisfied with the online courses they were taking. Respondents to a 34-item survey designed for the study comprised 555 students enrolled in 113 different online courses. The questionnaire examined course administration, course instruction, access, and delivery format. A majority of participants were satisfied with all of these areas. Eighty-four percent of respondents said they were satisfied or very satisfied with the course they were taking. Eighty-six percent would recommend their course to other students and 90 % would take another online course (Bower & Kamata, 2000). In additional studies, evaluations indicated that

satisfaction levels in distance education classes are at least equal to those obtained for traditional classroom offerings (Jennings, Siegel, & Conklin, 1995).

The computer has played many roles in the modern teaching laboratory, including being used for pre-laboratory tutorials, interactive quizzes, molecular modeling and theoretical calculations, animations, collaborative learning, and as a tool to speed up data collection and analysis. According to Kennepohl (2001), it is the interactive experimental simulations that offer a viable solution for distance learners in the sciences to meet their laboratory requirement. Often it is the specific technology and its ability to bridge physical distances that becomes the center for discussion, rather than its value to enhance learning. Kennepohl (2001) also stated that research indicates that the use of computer simulations in laboratory sciences like biology, physics, geology, and chemistry promotes learning in those disciplines. In his research, Kennepohl (2001) found that simulations also have advantages over hands-on laboratory work, such as allowing students to do more complicated and hazardous experiments, obtain reproducible results more quickly, and foster a deeper understanding of the experiments. Disadvantages, like the lack of human contact, boredom, and ability to experience experimental errors are also associated with laboratory simulations. The pedagogical benefits and limitations of computer simulations have been reviewed in detail elsewhere (Muth & Guzman, 2000).

An interesting finding of this study was that no difference in overall course performance was observed between students who did the simulations and those who did not. Another finding was that simulation students completed in-laboratory work in a shorter time frame and showed a slightly higher performance in the practical laboratory component (Kennepohl, 2001).

In a similar study, researchers at the Frostburg State University conducted a lab-based experiment, not a simulation, which involved actual equipment controlled in real time from remote locations on the Internet. The experiment was the first in a series designed to provide a pedagogically sound on-line laboratory experience for Internet-delivered general chemistry courses (Senese, Bender, & Kile, 2000). The students used the experiment's Internet interface to collect data, to obtain interactive technical support and background information, and to display and analyze results. Each experiment was

designed to encourage sharing of data and collaboration with users at other institutions, providing students with a valuable first look at work in a distributed laboratory environment (Senese, Bender, Kile, 2000).

*Technologies.*

Today, there are numerous forms of media to teach via distance education. Increases in technology have led to more cost- and time-effective means of instruction. The three main technologies now used in online learning are a Web-based server software platform that offers a course management system, such as Blackboard and WebCT; two-way interactive conferencing; and videostreaming of classes or prerecorded lectures of sessions using programs such as Real Player (Table 1).

Table 1 Advantages and Disadvantages of Different Distance Learning Technologies

<b><i>Distance Learning Technology</i></b>	<b><i>Advantages</i></b>	<b><i>Disadvantages</i></b>
<b><i>Online (Synchronous and Asynchronous)</i></b>	<ul style="list-style-type: none"> <li>• Course work can be done at any time of day or night.</li> <li>• Any computer with Internet access can be used.</li> <li>• Courses can easily be taken from more than one school.</li> <li>• There are no commuting costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Lots of self-discipline and motivation are needed.</li> <li>• A computer with Internet access is needed—a significant cost.</li> <li>• Social interaction is limited.</li> </ul>
<b><i>Two-way Interactive Conferencing</i></b>	<ul style="list-style-type: none"> <li>• There is access to the courses at distant campuses.</li> <li>• Social interaction is most similar to that of a traditional classroom.</li> </ul>	<ul style="list-style-type: none"> <li>• Classes are held at specific times and places.</li> </ul>
<b><i>Videostreaming of class sessions / Prerecorded Sessions</i></b>	<ul style="list-style-type: none"> <li>• Course work can be done at any time of day or night.</li> <li>• There are no commuting costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited social interaction.</li> <li>• Distance learners may be several days behind on-campus class.</li> </ul>

Once a technology has been chosen, the mode of delivery is the next practical step. For the purpose of this case study, the mode of delivery chosen was asynchronous online instruction. The two categories of online learning are asynchronous and synchronous (Table 2).

Table 2 The Time and Space Dimension of Distance Learning Instructional Technologies

	Specific Place	Any Place
Any Time (Asynchronous)		<ul style="list-style-type: none"> <li>• Online courses (Discussion boards, web sites, e-mail)</li> <li>• CD ROMs, DVDs</li> <li>• Videotapes</li> <li>• Audiotapes</li> </ul>
Specific Time (Synchronous)	<ul style="list-style-type: none"> <li>• Two-way interactive videoconferencing</li> <li>• Two-way interactive audioconferencing</li> <li>• Traditional on-campus classes</li> </ul>	<ul style="list-style-type: none"> <li>• Online courses (interactive computer conferencing, chat rooms)</li> <li>• Radio broadcasts</li> <li>• TV broadcasts, satellite, and cable</li> </ul>

*Course Offerings in Distance Education.*

Many institutions of higher education offer a mixture of distance education courses that can be taken for credit (Figure 1). An increasing number of institutions have taken distance education to a new level by offering undergraduate and graduate certificate and degree programs that can be completed entirely by distance education (Figure 2).

Figure 1 Distance Education Course Offerings

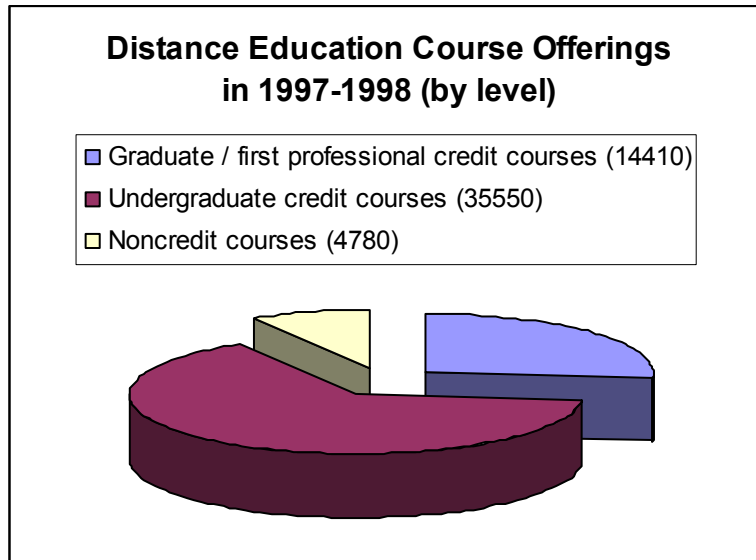
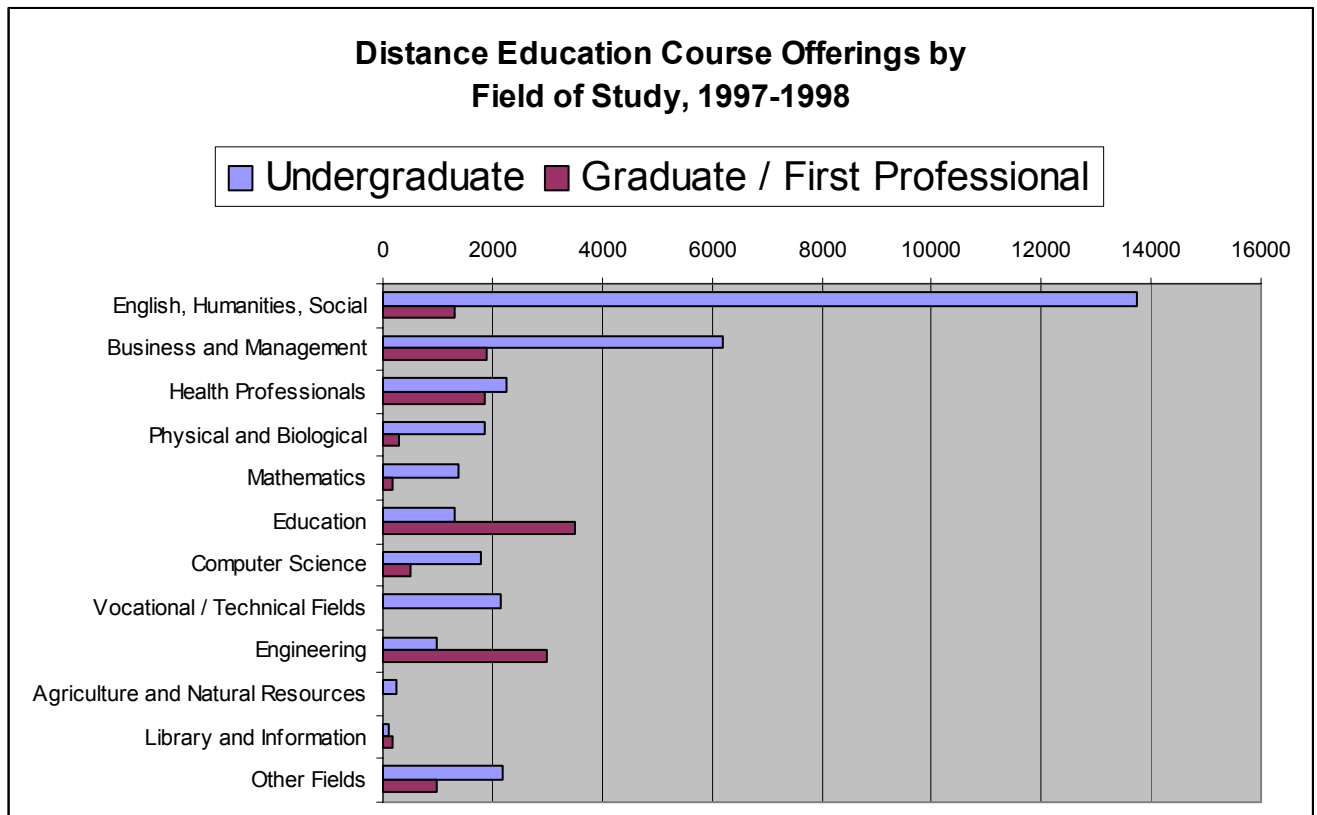


Table from IHEP (1999)

Figure 2 Distance Education Course Offerings by Field of Study



### *Similar Courses in Herbaceous Plants.*

Numerous classes have been taught on the subject of Herbaceous Plants. Due to the nature of the course materials being typically reserved for lab-based instruction, it was very difficult to find information on a course like this one. However, two courses were found at Virginia Polytechnic Institute and State University that provided a realistic, appropriate base of information and resources. The first, Perennials (a non-credit course offered completely online), provided the student with numerous publications from specialists in the field of horticulture (primarily extension agents). The second course, Herbaceous Plants, was a mixed course that had the lab-based component focused strictly on plant identification while the curriculum was taught in an on-line, asynchronous environment.

In addition to these courses, there were countless books and magazines that have materials to develop curriculum. In the future, it is important to look for materials that include a mix of goal-centered and learner-centered instruction to allow for variation in methods.

Since this course was completed via online instruction, the materials that needed to be developed were to include evaluations, lesson plans in PowerPoint, worksheets, CDs, and manuals.

A description of the evaluations and worksheets were provided in Chapter 3. The lesson plans in Power Point, CDs, and manuals were not completed during the time line of this case study. It is important to note that these items were requested in the end evaluations and will need to be developed and distributed prior to any future courses.

### *Issues and Concerns.*

A brief discussion of adult education and learning theory is necessary so that one may effectively understand the correlation between the characteristics of a successful distance learner and those of a successful adult learner. The most visible characteristic of the system of adult education is how large and flexible it has become to adapt to the needs of the changing society. Distance educators must acknowledge the relationship between their instructional methods and the needs of the adult learner (Garrison, 1989). Adult learning theory specialists provide a very helpful basis for the design and teaching

of distance education courses (Moore & Kersey, 1996). Burge (1988) also stated that the general learning processes and life conditions of adult distance learners are similar to those of adult classroom learners.

Knowles (1984) also has written extensively about androgogy, the art and science of helping adults learn. Androgogy provides a set of assumptions regarding adult learners that describe the factors that influence their learning. Androgogy is widely recognized in adult education and training (Brookfield, 1986); however, Jarvis (1985) wrote that the theory of androgogy has acquired the status of an established doctrine in adult education, but hasn't been grounded in sufficient empirical research to justify its dominant position. The core of the theory of androgogy is the assertion that adults perceive themselves as self-directing individuals. Brookfield advised that self-directedness need not be considered an innate characteristic of adulthood, "since many adults pursue lives in which self-directed behaviors are noticeably absent. Adult education would then become education devoted to the nurturing of...mature behaviors" (Brookfield, 1986, p. 6).

Educators must realize because a student is an adult does not necessarily mean that they are self-directed, motivated, and open to information. Many adult learners in The George Washington University's Landscape Design Program have full-time careers in areas other than landscape design. They typically are taking courses in the evenings after an eight-hour day at work and have a commute that can take 30 minutes to two hours.

For that reason, it is important to identify the adult learners' mindset once they are in the classroom or in their online environment. What type of day did they have at work? What work-related or family issues do they have to deal with? How much time do they have available each week for studying and completing homework? It is vital that instructors be perceptive of these boundaries in adult learners and adapt their teaching methods to reflect their clientele's needs.

Constructive developmental theorists also have discussed adult learners and adult learning theory. Other factors affecting adult learning include the diversity of adult learning needs, attitudes, and abilities, as well as the varied demands of different educational settings (Hayes, 1990). All of these factors, reflective of the characteristics

of both distance and adult learners, collectively influence the instructional strategies that will be the most effective in achieving learner success at a distance.

In summary, the integral nature of the distance education/adult education relationship helps to complete the overall picture of a distance learner. Regardless of their age, gender, and proximity to campus, the characteristics that distance learners must possess to ensure their success in a distance learning environment are synonymous with those of the successful adult learner. These characteristics include intrinsic motivation, work commitment, perceived benefit of instruction, resourcefulness, independence, efficiency, and expediency (Taylor, 2002). Garrison (1989, p.87), in his explanation of the relevance of including a discussion of adult education in the context of distance learning, states that “this discussion of adult education...represents a re-affirmation, and is consistent with education as a transaction between interdependent teachers and students based upon respect and understanding of each participant’s needs and educational role”.

### *Instructional Design Models*

Over the years, instructional design has been viewed as a discipline of study as well as a series of well-defined skills. As a discipline (field) of study, Instructional Design can be defined as the science of creating detailed specifications for the development, evaluation, and maintenance of situations which facilitate the learning of both large and small units of subject matter (Richey, 1986). When viewed as skills, Instructional Design can be defined as the systematic process of translating general principles of learning and instruction into plans for instructional materials and learning (Potter, 2004).

Ultimately, Instructional Design is the process of creating learning experiences and learning environments that promote instructional activities. Among these activities are directing students to appropriate learning activities; guiding students to appropriate knowledge; helping students rehearse, encode, and process information; monitoring student performance; and providing feedback as to the appropriateness of the student’s learning activities and practice performance (Merrill, Drake, Lacy, Pratt, & ID2 Research Group, 1996).

### *Instructional Design Models Defined.*

Instructional design models are designed to provide a framework to follow when going through the process of creating instruction. Many different models are available. Some are a step-by-step process, while others are more open-ended and allow one to take a looser path through the model. Most have some sort of graphical representation of the model to make following it easy. More importantly, each of them incorporates certain theories and principles that have been selected from research.

The A.D.D.I.E. model is a colloquial term used to describe a systematic approach to instructional development. The term is virtually synonymous with instructional systems development (ISD). The label seems not to have a single author, but rather to have evolved informally through oral tradition. It is not a specific, fully elaborated model in its own right, but rather an umbrella term that refers to a family of models that share a common underlying structure. A.D.D.I.E. is an acronym referring to the major processes that comprise the generic ISD process: Analysis, Design, Development, Implementation, and Evaluation (Molendam, 2003).

The A.D.D.I.E. model has been criticized by some as being *too* systematic, that is, too linear, too inflexible, too constraining, and even too time-consuming to implement (Grafinger, 1988). For this study, it was found that the A.D.D.I.E. model's simplicity did not provide enough detail to determine the needs of the instructional designer and the students.

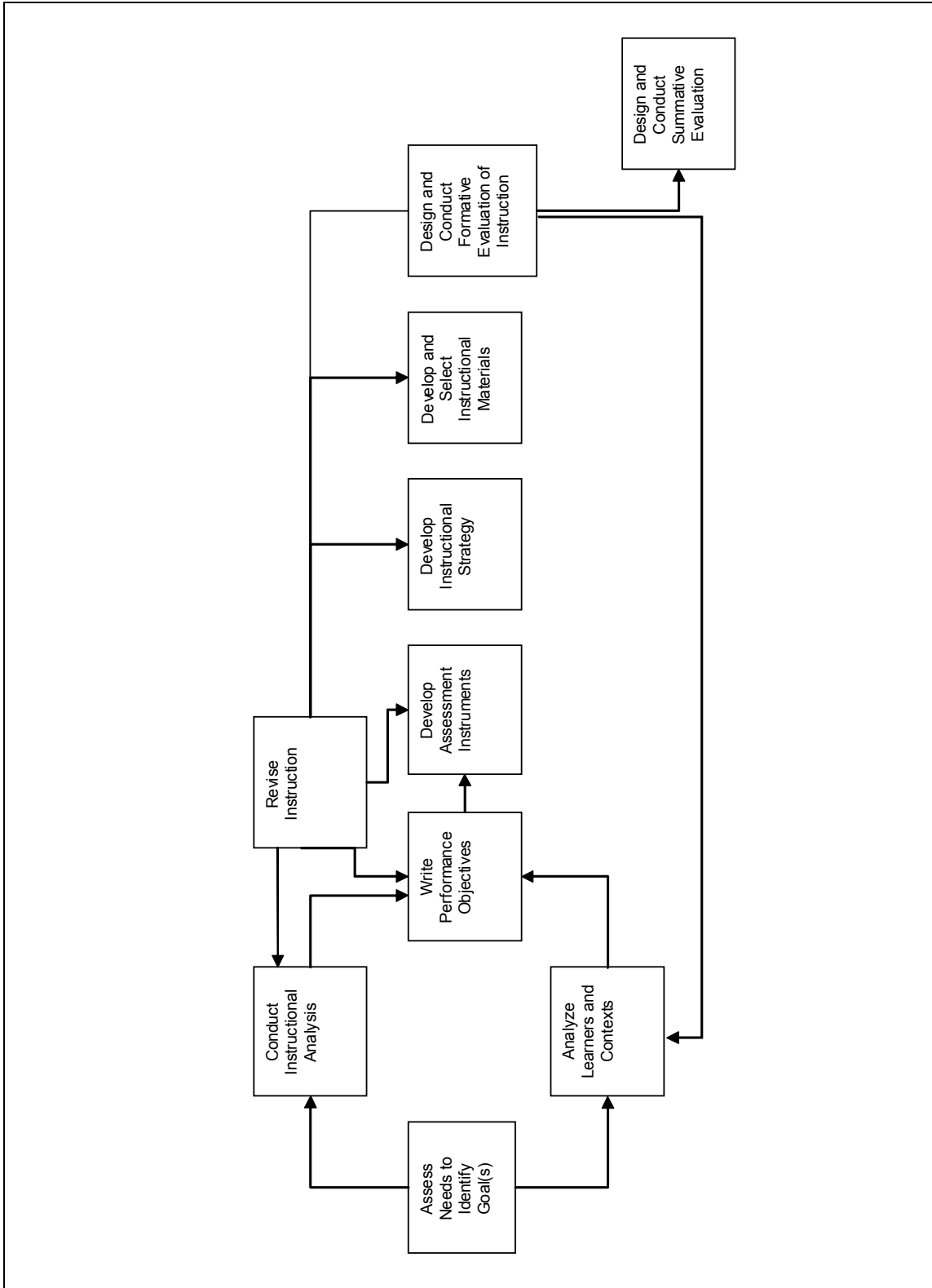


Figure 3 - The Dick and Carey Model (1995)

*Instructional Design Model: Dick and Carey (1995).*

The Dick and Carey (1995) model is one of the better-known ID models and is used by educators, trainers, and instructional designers. It is by no means the only model available, but it is a widely used model that is based on research that has been conducted over many years, and principles that have been generally accepted by those in the instructional design field (Potter, 2004). The Dick and Carey model of instructional design is systematic. The idea of a *system* being an interdependent group of items that form a unified whole is important because if one element of this system is changed, then the entire system changes. Things that teachers or trainers do in that system affect every other component. If we change the instructional materials (e.g., from books to computers), then the learning experience for the students will be completely different; if we change the learning environment (e.g., from classroom to the Internet), then the learning experience also will be changed. If the students in the class are changed, then the experience also is changed. Many instructional design models were created with this in mind, and view the instructional process as a system in which all the components are crucial. In this system, the desired goal can best be achieved when all of the components are taken into account during the design process. Each individual component's unique contribution must be taken into account.

Consequently, the Dick and Carey (1995) model was developed as a systematic approach that addresses each component of the learning "ecosystem," which include the instructors, learners, materials, and the remainder of the environment (Potter, 2004). The Dick and Carey model is also systematic in that all of the steps in the process are interrelated. Each step receives the input from preceding steps and provides the output for the succeeding steps. The components must work together to achieve the desired goal of producing effective instruction.

*Instructional Design Models for Distance Education.*

The organization of the Dick and Carey (1995) and Smith and Ragan (1999) models provide designers with a solid introduction to the concepts, applications, philosophy, and theory of the systematic design of instruction (Gustafson & Branch,

1997). Although there is no definitive answer concerning the instructional design model best suited for utilization in all distance environments, it is imperative to plan and organize prior instructional design before implementation of a distance course (Taylor, 2002). In this study, the Smith and Ragan model was not used in the instructional design process because one of the beliefs of the Smith and Ragan model (1999) stated that it is imperative for authors writing about instructional design to acknowledge the beliefs and values represented in their educational philosophy, and that they be based upon theories that have been substantiated by empirical research. While the latter may be correct, an instructional designer should not feel it necessary to include his or her own educational philosophy in the instructional design process as it may easily misdirect the designer away from the goal of the program being developed. The circular nature of the Kemp, Ramamohanarao, & Meenakshi (1989) model typically lends itself extremely well to the distance learning context, where many instructional elements tend to overlap or occur simultaneously. The Kemp et al. (1989) model has its limitations, but it does allow for the recognition of the importance of directly addressing the student support services needs of distance learners within the context of the instructional design of the course (Taylor, 2002). For this study, the designer found this model to be too complex.

### *Strengths and Limitations*

The importance of developing an understanding of distance learners, what defines them, the challenges they face, and how their instructional needs are met through chosen instructional strategies, has already been established as an essential instructional design consideration (Taylor, 2002). This understanding also recognizes the necessity to address and support learner needs that extend beyond instructional needs. Therefore, it is important for design consideration to include student support services as part of the instructional design process (Hill, 1998). However, due to the small scope of this case study, the student support services were not incorporated into the instructional design process.

## *Summary*

In Chapter 2, related literature was reviewed as it pertains to distance education and instructional design. The studies discussed in Chapter 2 provide a foundation to direct the work of this case study in laboratory-based distance education. Numerous examples have been given to provide the reader with an understanding of distance education, its many offerings, and its strengths and weaknesses. Examples of previous laboratory-based distance learning studies were summarized to provide background information. In addition, multiple instructional design models were outlined to address the need for a thorough instructional design program in the development, implementation, evaluation, and reporting of this case study.

## Chapter 3: Methodology

### *Overview*

The research design was a case study in instruction of a laboratory-based course in the distance education environment. All participants in this case study were enrolled in The George Washington University's Landscape Design Program. Upon completion of all the courses in the program, students receive a graduate certificate in landscape design. This particular class was offered as an elective course for the program. A licensed agricultural/horticultural instructor with five years of adult education teaching experience taught this course. The instructor conducted the research through an asynchronous online environment, with all course materials being available 24 hours a day. This was the first course of this type offered in The George Washington University's Landscape Design Program.

The following structured approach was consistent throughout each of the eight lesson: Students were provided two to five handouts per lesson, participated in the discussion board questions, and researched Internet resources. Upon completion of the course, it was intended that the learners would be able to synthesize how to use various herbaceous plants, in combination with one another, and to produce an aesthetically pleasing landscape design that would prosper in the environment in which the plants were installed.

In order to initiate change, in-depth planning and efficient course management throughout the design of the course was essential. The identification of performance problems and learning needs of the administration, faculty, and students was part of a systematic quality improvement program and is critical to any strategic plan for teaching via distance education. Two common reasons for failure of distance learning courses are a. insufficient planning and unclear guidelines, and b. poor strategic management during the implementation phase (Chute, Thompson, & Hancock, 1999).

Previous case studies revealed that a direct correlation exists between the extent of planning and the degree of success achieved (Belanger, Jordan, & Jordan 2000). Picciano (2001) identified the following four key elements for success in planning a review of educational planning processes: comprehensiveness, collaboration,

commitment, and continuity. In this case study, the researcher developed a thorough instructional design program to provide a course that met these four elements.

#### *Target Population.*

The Landscape Design Graduate Certificate Program is ideally suited for landscape professionals seeking to upgrade skills, individuals who want to become professional landscape designers, amateurs with an interest in the art of garden design, institutional horticultural staff, nursery employees, and garden design writers. The program provides a background in horticulture, nursery and planting standards, and the creative process of design. Courses are geared toward small-scale landscape design applications with emphasis on sound design principles, good site engineering methods, and creative use of plant materials.

This highly successful program has a strong reputation in the regional industry. Graduates are frequently sought out by area landscape design firms, plant nurseries, and contractors, or pursue advanced degrees in landscape architecture.

#### *Instructional Procedures .*

In this study, the researcher/instructor's journal was the primary instrument for gathering and analyzing data. This journal provided a strong commitment to the development and evaluation of the study as well as providing continuity in the research. Guba and Lincoln (1985) suggested that the researcher is the best instrument because it would be impossible to devise a non-human instrument adaptable and flexible enough to adjust to the variety of situations. This type of instrument requires researchers to be comprehensive in all work to take advantage of unexpected opportunities, to identify personal biases, and to acknowledge the influence of those biases on the data collection and resulting data analysis. Additionally, other methods used for collecting data were the university's student information system and original questionnaires. These questionnaires were developed by the researcher, using related literature as a framework. A collaboration of a panel of experts consisting of three faculty members from Virginia Polytechnic Institute and State University with expertise in instructional

design, distance education, and plant materials confirmed content, construction, and face validity of the questionnaires. The instructional procedures were found to be valid.

#### *Orientation.*

Two online orientations were provided for the students to review prior to instruction. The first (<http://www.edtech.vt.edu/blackboard/learnBb/>) was offered by Virginia Tech and the other (<http://cidd.gwu.edu/viewlets/students.html>) by The George Washington University.

#### *Instructional media.*

The asynchronous online learning environment platform (Blackboard) was the media utilized in this case study. Lessons were divided into eight sessions and all materials were available 24 hours a day.

#### *Communication.*

Communication took place through two mediums, the discussion board and e-mail. This provided students with a means for communicating both privately (e-mail) and publicly with one another through the discussion board at various times during the day.

#### *Questionnaires.*

Twenty original surveys (Appendix H) were developed, which included a variety of response sets, such as yes/no, multiple-choice, fill-in-the-blank, Likert-type, demographic, and open-ended questions that were designed to satisfy the researcher. Two forms of the Likert-type ratings were conducted. The first included questions with responses of strongly agree, agree, disagree, and strongly disagree, as they related to the student's beliefs. The second form included questions with responses of thorough knowledge, some knowledge, basic knowledge, little knowledge, and no knowledge, as they related to the student's own perceived current knowledge base. The statistics used for data analysis were means and frequency. Although personal reflections can sometimes be misleading, the researcher found the students' responses to be consistent with their performances on the evaluations.

## *Design*

The Dick and Carey (1995) model was chosen as the instructional design method for the Herbaceous Plants (PSLD 229) course. This was due in part to the model being widely accepted as a reliable method of instructional design, and its systematic approach that is easily replicated by others. The Smith and Ragan (1999) and Kemp et al. (1989) models were not chosen because it was the belief of the instructional designer that neither allowed for the recognition of directly addressing the students' needs as distance learners as effectively as the Dick and Carey model. It is important to note that there is no definitive answer concerning the instructional design model best suited for utilization in all distance environments. Rather, the most important factor in the selection of an instructional design model is to determine which best suits a given situation, and to conduct the instructional design process prior to the implementation of a distance education course.

This case study was used to address a felt need for a herbaceous plants course in the Landscape Design Program. During this study, it was necessary to determine what, if any, key factors motivated students to take this course.

### *Instructional Analysis.*

An instructional analysis was completed to outline the various objectives, subordinate skills, and entry behaviors as they related to the Herbaceous Plants course. This instructional analysis, however, was limited to one institution, The George Washington University. It is important to remember that each instructional design program is unique and the instructional analysis needs to be completed for each given situation.

### *One-on-One Evaluation Procedures.*

This evaluation took place with the instructional designer's administrators. The curriculum and procedures were discussed to determine if they were relevant to the goals of the course, and if there were any possible problems that might take place. A good example that an administrator pointed out was that adult learners sometimes need to be provided a buffet of information with all the details of the course; then they would

chose what information they would want to digest. It would be in the best interest of the designer to select an evaluator who has numerous experiences in the given field of the study that is being researched. The criteria for this type of evaluation need to be clarity in the instruction, the impact on the learner, and its feasibility.

#### *Field Test Procedures.*

The course and all of its material were first tried as a field test, which resembled the actual course in every detail. The field test was necessary to insure the validity and transferability of the material from one class to another. As stated before, this was an individualized, asynchronous learning environment where students could work and complete examinations at their own pace via Blackboard. The learners were selected based upon interest in the subject as well as the prerequisite of having completed the Introduction to Horticulture course.

The main purpose of the field test was to determine any factors, positive or negative, that affected the students' learning of the course material. This could have been technology, assessments, course materials, or even just personal issues with online courses. The primary tools and methods for data collection were the pre-test/post-test surveys on each lesson to determine the effectiveness of the course.

## Chapter 4: Findings

### *Background*

#### *Pilot Study Information.*

This course was offered through the Landscape Design Program in the College of Professional Studies of The George Washington University (GWU) in an attempt to address the growing needs and requests of the Landscape Design students for a course in herbaceous plant materials. Due to the inability to add additional courses into the sequence of courses for certification, the decision was made to offer the course as an elective through a distance-learning environment. This allowed students flexibility in scheduling to complete the online course at their own pace and convenience during the eight-week time frame.

#### *Structure.*

Students worked independently on activities throughout the session. They were required to access the Internet for research information not covered in the course. Students commonly used plant databases found on CDs or the Internet.

The students in this distance learning course have indicated that the most important features that led to its success were the structured schedule, which included links to all lessons, assignments, handouts and quizzes, and the course instructor's accessibility and commitment to their success.

It is important to realize that the distance learning delivery format chosen must be appropriate for the program being taught and the clientele being served. In this course, it was believed that the format chosen works well overall, but requires additional modifications are needed to become more effective in achieving the goals of the course.

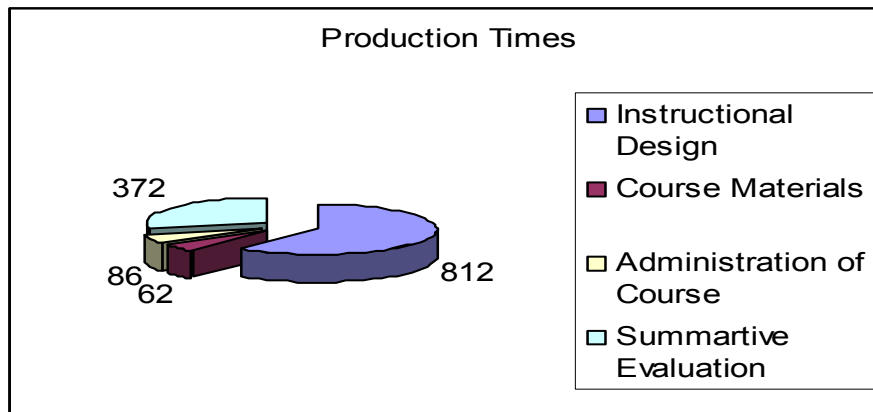
#### *Suggested Practices: Implementation*

The instructor played a facilitating role in this course by offering suggestions and insight when a solution was difficult to determine, and by offering technical expertise when needed. The following sections provide specific details outlining suggested practices as they relate to the implementation of this course.

*Production time.*

The total time, according to the instructor's journal, involved with the development, implementation, and evaluation of this course in herbaceous plants was 1332 hours. A total of 812 hours was spent completing the instructional design (research and development); 62 hours for the development and uploading of materials in the course website; 86 hours in administering the course; and 372 in the summative evaluation for this case study.

*Figure 4 - Production Times*



*Equipment and facility.*

Due to this being an online course, there were limited equipment and facility needs. One need, however, was the necessity for students to have a school facility in which to work, such as a computer lab. It was suggested that students use computer labs available at the Center for Professional Development's main location at 2020 K Street in Washington, DC. During the course, one student who used these facilities on a limited basis informed the instructor that the facilities were being closed and that she would have to go the school's library to complete any additional assignments that she had not or could not finish at home. This did not present a major problem in this course but may in future courses.

Another problem that arose during the time frame of the course was that the university's server that controlled Blackboard "went down" a total of three times. One of these instances was near the end of the time allotted for downloading the midterm. Although all students had downloaded the file, an unreliable computer server may cause problems in other situations.

### *Structural sequence.*

The structural sequence of the course was found to be effective but students commented that the addition of surveys (a total of 20) took time away that could have been used more effectively. In the future, it will be necessary to limit the number and the quantity of questions asked in evaluations so as to make the most of the students' time.

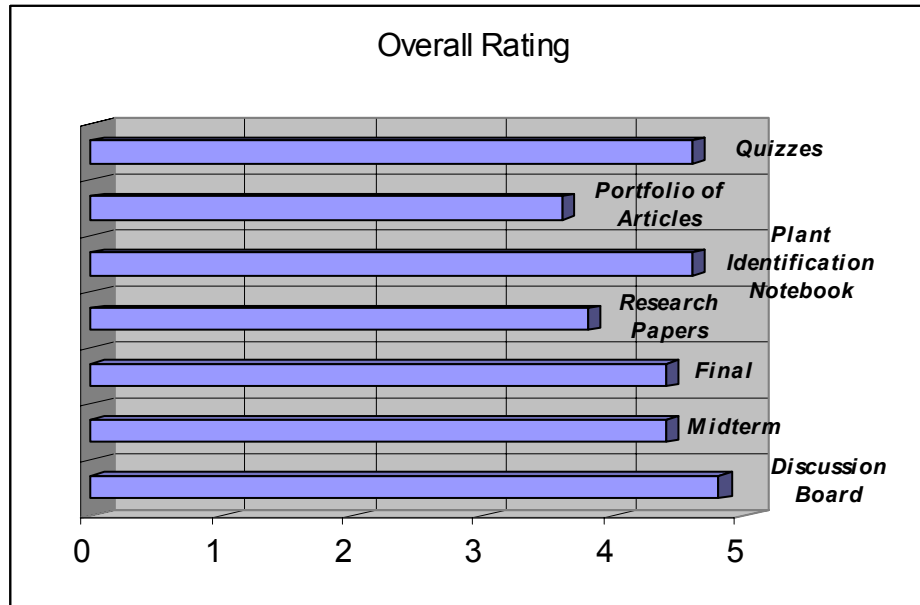
### *Course Content.*

This information has been covered previously in the instructional procedures section. It was requested by the students to revise the instruction to include more structured lessons, rather than just handouts and publications.

### *Syllabus.*

Based upon comments of the students in the completion survey, it was found that the following areas were effective in the evaluation of students knowledge; quizzes (30 % of grade), discussion board participation (20 %), midterm (15 %), final (20 %) and plant identification notebook (10 %). Additionally, students noted that the portfolio of articles and the research papers were useful, but the time spent compiling and organizing them could have been used more effectively in another area of evaluation.

Figure 5



*Schedule.*

It was found that the eight-week schedule was adequate to complete the objectives of the course. However, it is suggested that extra time be allotted during each week to allow for completion of a total of five “thumbnail” sketch designs during the course.

*Logging into Blackboard.*

Students were contacted via e-mail and phone one week prior to the beginning of the course. The instructions provided on the university’s web site were found to be inadequate and difficult for the students to understand. This caused considerable confusion and undue stress to the students. The instructor responded within two days of the first occurrence, and provided a clear and concise instructional outline of how to properly log onto Blackboard (appendix D). This seemed to have resolved the students’ problems.

### *Sources of Information.*

Student evaluations of the resources of information (handouts, links, etc.) were mixed. Many of the students felt that handouts provided from the Virginia Cooperative Extension Service and a well-respected local garden center in Northern Virginia were the most appropriate and useful.

The resources that were found to be lacking in information were literature from magazines that did not address the questions the students wanted answered. As discussed in previous sections, a structured lecture will be implemented in future classes. This will allow the information resources to be used in conjunction with the lecture to provide a well-rounded lesson.

### *Plant Lists.*

Evaluations showed that the students felt the plants chosen for the course were correctly identified and appropriate for the season. The instructor's journal noted that during the first couple of weeks students stated that there should be additional plants on the list. After the instructor reiterated numerous times that the course was one of a three-part series, and that the great majority of the plants they were asking about were covered during other sessions based upon seasonal uses, the students were more understanding.

### *Outline of Research Papers.*

The results from the evaluations found that students considered the research papers useful for collecting information on a single genus of plants, but that they felt that time could be better spent on other areas of instruction. In the future, it was suggested that this evaluation tool be removed or limited.

### *Modules.*

As discussed earlier in this chapter, eight class modules seems to be comprehensive enough to cover the subject matter but short enough to retain student interest. Some of the changes that should be made to future courses are a structured lecture dealing with more plant physiology and anatomy, and not so much on plant

identification. This would repeat previous instruction from the Introduction to Plants course, but also provide a more in-depth look at the plants' lifecycles and cultural requirements.

*Revise Instruction.*

Based upon students' written experiences (e-mails, discussion board, and grades) it is necessary to change the structure of each lesson to reflect the incorporation of additional time to facilitate the application of three designs during the eight lessons.

The revisions need to be made based on responses from the formative evaluations conducted during the implementation of the course. Based upon those responses, it is necessary to include a list of suggested ways to administer a lab-based course via distance education. The following section outlines such ways.

*Motivation.*

To begin, the goal of the course was discussed and students were given a hands-on assignment. The students were required to take a soil sample and to collect leaves/flowers from plants located near their work, home, or even at a park. This required them to complete work outside, away from the computer. Students commented that they enjoyed this since it allowed them an opportunity for a hands-on activity, something they are accustomed to in other plant courses.

*Relevance.*

This activity fostered motivation through "active participation" of having students conduct numerous threads to the discussion board in Blackboard, to tell others about their experiences or additional activities that might motivate them or make the course more interactive. A few students suggested on-site field trips and seminars at local garden centers.

### *Confidence.*

Students were given pretests of the evaluations to help them understand the Blackboard system and develop the confidence needed to work independently. After the successful completion of one or two pretests, the instructor's journal noted that students requested less guidance from the instructor and the results of the remaining test scores were consistently higher.

### *Satisfaction.*

Once a few of the pretest and surveys were completed, the student should be adequately prepared to continue on to the instructional stage.

### *Instructional Activities.*

The instructional activities were developed to prepare students with real-world knowledge and experiences. Students commented that the materials were very useful and met this goal, but that there was a need to develop a lecture outline for each lesson and to develop an outline of how to approach each lesson. Listed below is the outline that was given to the students about two weeks into the course. It should have been developed and provided prior to instruction, but was overlooked by the instructor.

### *Sample Lesson Outline.*

1. Complete the pretest survey
2. Print outline with objectives and plant lists
3. Print out/study all handouts
4. Complete the discussion board for that lesson (comments/questions, any resources you found helpful for learning the plants, or any other important information)
5. Complete lesson quiz
6. Complete post-test survey

### *Memory Aid.*

A plant identification notebook was required in this course. The purpose of this notebook was to assist students in the comprehension of readily identifying the plants through visual and cultural characteristics. The results of this activity are discussed in the evaluation section under the plant identification notebook.

### *Transfer.*

It is assumed in this course that students are taking the course for the purpose of using it in their careers as landscape designers. For that reason, it has been developed to be a practical tips-of-the-trade guide to herbaceous plants. There are thousands of books and resources available on herbaceous plants that tell how to grow herbaceous plants in general. It is not the intention of this course merely to learn how to go over information that they probably already know, but rather to add to their base of knowledge to make them well-versed landscape designers.

### *Assessment Instruments.*

As an instructional designer, the emphasis on assessment should be important. A well thought out assessment helps determine what objectives have or have not been learned by the learners. This will also help in performing the formative evaluation.

Quite a few issues should be considered when designing assessment instruments. The first thing to look at is the various types of items that can be used when creating assessment items. Possible test items for this course could include: essay, fill-in-the-blank, completion, multiple-choice, and matching.

Dick and Carey gave some guidelines for selecting item types according to the type of behavior specified in the objective. This provided a good starting point for deciding what item type to use for a particular objective. However, when it comes right down to it, the wording of the objective should guide the selection of item type—one that gives learners the best opportunity to demonstrate the performance specified in the objective. For example, if the objective was for students to identify a *Red-Hot Sally Sage (Salvia splendens)*, it would be best to have them state it from memory (fill-in-the-blank) and not pick it from a list of choices (multiple-choice). If the student has to

remember what the plant looks like and how to properly spell the common and botanical names, then a higher level of in-depth thinking than simply picking from a list of choices is required.

This study used various assessment tools to collect data related to each objective. A brief description is provided below for each.

#### *Entry Behaviors Test.*

A few possible entry behaviors had to be examined to help determine if they were indeed entry behaviors. They included introductory landscape design skills that were covered in the Landscape Graphics, Principles of Landscape Design, and Introduction to Plants courses. The survey results found that there was a need to include information on plant morphology and anatomy as a review. Although the students knew most of the information, most of them did not have the opportunity to apply the concepts they had learned into a real world situation.

#### *Pretests.*

For this course, it was important to conduct pretests for each lesson, due to the diversity in educational backgrounds of the course. The pretests included short answer, multiple-choice, matching, and fill-in-the-blank. Before each lesson, students were asked to complete a pretest, to test current entry behaviors and to assess the students overall comfort level with a given subject.

The results of the pretests found that there was a strong need for experience in landscape design principles and applications. Since the students were at various levels of the program, many of the presumed entry-level behaviors were found to be limited in the program's newer students. Some examples of this were the students' ability to visualize plants in a completed landscape, the ability to apply design principles, and the ability to draw landscape design graphics.

Based upon the results of the pretests, it is believed that there is a need for additional information on such items as soils, nomenclature, and plant anatomy.

### *Posttests.*

Posttests were given following instruction and helped to determine if learners have achieved the objectives set out for them prior to instruction. Each item on a posttest matched one of the objectives or a plant covered during the class.

The posttest examinations were composed of eight quizzes (one for each lesson), one midterm exam, and one final exam. Each of these assessments consisted of multiple-choice, matching, and true/false questions available through Blackboard.

The results of the posttests showed a stronger comprehension of plant anatomy and physiology, cultural requirements, and plant identification. Additionally, weaknesses were found in the students' comprehension of soil structure, soil pH, application of design principles, and the ability to think in the abstract (visualization).

Student evaluations of the posttests were generally positive, and provided constructive feedback such as rewording of questions for easier interpretation and the possibility of having the quizzes to be strictly plant identification.

### *Suggested Practices: Instructional Procedures*

The following sections provide specific details outlining suggested practices as they relate to the instructional procedures used in this course.

#### *Orientation Sessions.*

The instructor believed prior to the implementation of the course that the online orientations were inadequate for students who had limited or no prior experiences with taking online courses. This was found to be the case based upon responses from the evaluations and the instructor's field notes that stated that the students were confused as to where to find various course materials during the first two weeks of class.

#### *Instructional media.*

Blackboard served as the platform for administering instruction in this course. Students' feelings towards Blackboard were generally positive due to the relative ease of navigation once familiar with the format. Students also felt that the limited number of links made available by the instructor made navigation of the site easier. It is important

to remember that when working with students who are new to using Blackboard or similar programs, too much information can easily distract students' attention and cause unnecessary confusion.

#### *Communication.*

The two main avenues of communication, discussion board and e-mail, were determined to be very useful and productive. Students routinely engaged in discussion board threads to share resources and ideas. It was found that students used e-mail equally as much for communication on specific items, such as questions about the exams and quizzes. This did have a few drawbacks related to the openness in communications. For example, there were numerous times in which the instructor had to limit access to certain discussion board threads because students had stated answers to questions on quizzes before everyone had completed the lesson quiz. This added to time spent by the instructor on unexpected issues.

#### *Discussion Boards.*

It was believed and confirmed by the students' participation and comments on the discussion board that this was an appropriate means for sharing ideas, techniques, links, and resources.

Students commented that the high response rate on the discussion board was due to the value placed on it for grading purposes. The instructor's field notes stated that the goal of the discussion board was to serve a standard medium for communicating. This goal was successfully achieved.

#### *E-mail Communications.*

The second medium of communication, e-mail, was found to be very useful when students wanted to ask very specific questions or make comments directly to the instructor or other students in situations where it did not need to be shared.

### *Documents.*

The publications, handouts, and articles were found to be adequate, but with time, the continued expansion of resources from the students' work and the instructor's research could improve the depth of knowledge the students obtain from them.

### *Data Sources, Collection, and Recording Procedures.*

In this case study, quantitative data were collected from eight quizzes, one midterm, one final, 12 Likert-type surveys, and course usage information. Due to the small sample size (n=5), an in-depth analysis of course statistics was limited and could not be generalized past the scope of the Herbaceous Plants (PSLD 229) course. This information, however, will be used for later research that will include additional courses and a larger sample size. The results from the quizzes, midterm, and final were tabulated and linked to the objective or skill for which they were developed.

The course usage was collected and recorded, using two inputs, one to determine the percentage of hits and the other being a percentage of the time used per area. This information was collected over the duration of the course.

Qualitative data included such things as the instructor's field notes, e-mails, discussion board participation, research papers, plant identification notebooks, portfolio of articles, and one open-ended question at the end of each quiz. The instructor, using a matrix of required information (Appendix G), graded the research papers subjectively.

It was found that students generally covered all of the points required of them and papers ranged in length from three to 10 pages. The suggested length of an average paper was three to five pages. The plant identification notebook and the portfolio of articles are discussed more in-depth later in the chapter. All students completed the requirements and received full credit for both items. In each of the eight quizzes, one optional, non-graded, open-ended question was presented to the students for feedback. Students were not required to answer the non-graded questions. It was believed that if each question was required to be answered, these students would feel compelled to find an answer that may or may not have provided constructive feedback.

### *Field Notes/Investigator's Journal.*

The instructor's field notes were found to be the most beneficial instrument used during the course development, implementation, and evaluation. The data from these instruments are covered later over various related sections of this chapter. It is important to note that the instructor's field notes provided insight into the amount of time spent on the course and individual comments made via e-mails, discussion boards, or personal communications. These notes will serve as a comprehensive resource tool for revision and implementation of future courses in this area.

An example of this took place during the first week of classes. One student found that she could not open any of the spreadsheets in Microsoft Excel and she had to purchase the updated program for her computer to open the spreadsheets. This caused the student quite a bit of stress and unforeseen expense. It was assumed, incorrectly, by the designer that all students would have an up-to-date version of the program already installed on their computers. Due to this experience, it is now noted on the course syllabus that all students need to have a current edition of the Microsoft Office operating system (currently Windows XP).

The instructor's field notes stated that two students contacted the student helpdesk for issues that the instructor could not answer, such as logging-in problems. The students commented that the helpdesk was very pleasant to work with and was knowledgeable about the problems they were encountering. Unfortunately, there are no personnel available, other than the instructors and the computer helpdesk, for issues dealing with technology. Since there were no time limitations for this course and it was available 24 hours a day, all students were able to complete their work in the eight-week time frame provided to them.

### *Summary.*

The evaluation process requires the instructor to develop a systematic approach to developing the instruction needed to successfully develop a functionally sound course. By completing numerous formative evaluations (one-on-one, expert review, and field study) and adapting the instruction accordingly, the instructor was able to make instruction more effective, efficient, interesting, motivating, usable, and acceptable.

Examples of this include the development of the suggested lesson outline and removal of the requirement of designs for the session, due to the time limitation of being the first course and being held during the summer when most of the students were extremely busy.

This report provides a comprehensive look at the design and implementation of a summative evaluation of the Herbaceous Plants course (PLSD 229).

### *Demographics and Student Usage*

Table 3

*Demographic Information for Students at The George Washington University*

	University	Landscape Design Program	Herbaceous Plants Class
Race			
White/Caucasian	65%	79%	80%
Asian American/Pacific Islander	10%	2%	-
Unknown/Not Reported	12%	8%	20%
African American/Black	4%	5%	-
International	4%	3%	-
Latin/Hispanic American	4%	2%	-
Native American	1%	<1%	-
Gender			
Male	38%	32%	20%
Female	62%	68%	80%
Age			
<20	46%	-	-
20-25	37%	1%	-
26-35	11%	8%	20%
36-45	2%	45%	20%
46-55	2%	27%	40%
56-65	1%	16%	20%
66+	1%	3%	-

Note: GWU (Overall) n=36,456; GWU (Landscape Design) n=214; GWU (Herbaceous Plants Class) n=5

Table 4

*Summary of Student Usage*

	Day of Week			
	Hits	Percentage	Time (hrs.)	Percentage
Sunday	467	31%	97.8	28%
Monday	86	6%	16.1	5%
Tuesday	172	11%	31.6	9%
Wednesday	118	8%	29	8%
Thursday	327	21%	73.4	21%
Friday	109	7%	34.1	10%
Saturday	245	16%	62.7	18%

Location	Quantity to Individual Links			
	Hits	Percentage	Time (hrs.)	Percentage
Announcements	184	12%	3.16	1%
Content Area	466	31%	119.48	35%
Evaluations	236	15%	72.48	21%
Email	57	4%	6.64	2%
Tools Area	89	6%	19.84	6%
Discussion Board	274	18%	86.52	25%
Dropbox	41	3%	3.12	1%
Personal Information	8	1%	1.6	0%
Resources	23	2%	16.52	5%
Staff Information	12	1%	0.64	0%
Student Gradebook	134	9%	14.72	4%

	Time of Day			
	Hits	Percentage	Time (hrs.)	Percentage
12:00 AM	17	1.12%	4	1%
1:00 AM	6	0.39%	0.12	0%
2:00 AM	3	0.20%	0.08	0%
3:00 AM	0	0.00%	0	0%
4:00 AM	0	0.00%	0	0%
5:00 AM	0	0.00%	0	0%
6:00 AM	21	1.38%	7.32	2%
7:00 AM	46	3.02%	6.28	2%
8:00 AM	38	2.49%	13.32	4%
9:00 AM	69	4.53%	19.24	6%
10:00 AM	41	2.69%	16.84	5%
11:00 AM	22	1.44%	12.72	4%
12:00 PM	87	5.71%	21.48	6%
1:00 PM	65	4.27%	13.04	4%
2:00 PM	38	2.49%	7.12	2%
3:00 PM	34	2.23%	3.42	1%
4:00 PM	62	4.07%	12.08	4%
5:00 PM	37	2.43%	2.92	1%
6:00 PM	99	6.50%	14.54	4%
7:00 PM	211	13.85%	52.12	15%
8:00 PM	135	8.86%	34.76	10%
9:00 PM	268	17.59%	68.96	20%
10:00 PM	141	9.25%	18.5	5%
11:00 PM	84	5.51%	15.84	5%

Note: Total Hits 1524      Total Hours 344.7

### *Summary of Findings.*

Most students completed their work between the hours of 6p.m. and 11p.m.. Thursdays and Sundays were found to be the days in which students participated the most. While in Blackboard, students spent most of their time going through the course content and participating in the discussion board.

In general, most of the course's goals were met completely, with minor revisions needing to be made in the future. The information from this case study will be helpful in the design, implementation, and evaluation of future online courses in herbaceous plants.

The George Washington University's Landscape Design program leads to a Graduate Certificate. This course was an elective that allowed students to enhance their knowledge of plant materials. There were both positive and negative issues because this course was an elective. First, students commented that it was nice that the course was optional to take, since the sequence of courses did not allow for many additional courses. The course being an elective was found to be a negative factor in enrollment, due to the lack of additional time by students in the Landscape Design Program. It is believed that if the course were required in the program, then enrollment would not be an issue. However, the current sequence of courses does not allow such an addition.

Since the students seek to work in the landscape design field, experience is a necessity. Students agreed that being well versed in plant materials is a highly valued skill for employers. A licensed agricultural and horticultural teacher with five years of adult education teaching experience administered the course with additional faculty supervising the course.

## Chapter 5: Discussion

### *Summary of Study*

This case study examined asynchronous online distance learning to determine the overall effectiveness of delivering a traditional lab-based course Online. In addition, the educational potential for the professional development of continuing education students taking an online course in Herbaceous Plants (PSLD 229) through The George Washington University's Landscape Design program was studied.

An examination of the instructional design program was conducted to determine the course's capacities. Students were provided with numerous sources of information on plant identification characteristics, cultural requirements, and examples of other successful experiences. Given all the necessary information, it was intended that the students would be able to synthesize how to use various herbaceous plants, in combination with one another, to design an aesthetically pleasing landscape design that would prosper in the environment in which the plants were installed.

Numerous studies were outlined to compare traditional and distance education student outcomes, commonly referred to as the media comparison approach. This approach, as it pertains to the instructional design process, was outlined in-depth in this study.

A thorough instructional design was completed to establish its importance to the success of the development, implementation, and evaluation of this Herbaceous Plants course. Instructional design models, such as the Dick and Carey Model (1995) used in this study, are designed to provide a framework for instruction.

The enthusiasm about delivering a course online and the interest about additional instructional opportunities led to the development and implementation of the first Herbaceous Plants course at the George Washington University. This course was offered in an attempt to address the growing needs and requests of the Landscape Design students for a course on herbaceous plant materials.

This case study provides a description of how current techniques are used in distance delivered education courses to assist in the development of an Internet-based course that is traditionally reserved only for laboratory-based instruction. The purpose of

this case study was to develop thoughts on improving future courses and to identify which current techniques used in the course were effectively communicating the goals of the course.

*Research Question # 1: What are suggested practices to meet the online laboratory course needs of students in the Herbaceous Plants Course at The George Washington University?*

*Implementation.*

The students in this distance learning course have indicated that the most important features that led to its success were the structured schedule that included links to all lessons, assignments, handouts and quizzes, and the course instructor's accessibility and commitment to their success.

It is important to realize that the distance learning delivery format chosen must be appropriate for the program being taught and the clientele being served. In this course, it is believed that the format chosen works well overall, but requires additional modifications to become more effective in achieving the goals of the course.

The instructor believed prior to the implementation of the course that the online orientations were inadequate for students who had limited or no prior experiences with taking online courses. This was found to be the case, based upon responses from the evaluations and the instructor's field notes that stated the students were confused as to where to find various course materials during the first two weeks of class.

In future courses, an on-site orientation session should be required of all students, new and experienced, to share thoughts and ideas about the course and to complete a live tutorial of Blackboard. This will allow the experienced students to share information with the newer students.

The instructor's field notes were found to be the most beneficial instrument used during the course development, implementation, and evaluation. The data from this instrument is covered later over various related sections of this chapter. It is important to note that the instructor's field notes provided insight into the amount of time spent on the course, individual comments made via e-mails, discussion boards, or personal

communications. These notes will serve as a comprehensive resource tool for revision and implementation of future courses in this area.

### *Instructional Procedures.*

The two main avenues of communication, discussion board and e-mail, were determined to be very useful and productive. Students routinely engaged in discussion board threads to share resources and ideas. It was found that students used e-mail equally as much for communication on specific items, such as questions about the exams and quizzes. This did have a few drawbacks involving the openness in communications. There were numerous times in which the instructor had to limit access to certain discussion board threads because students had stated answers to questions on quizzes before everyone had completed the lesson quiz. This added to time spent by the instructor on unexpected issues. It was believed and confirmed by the students' participation and comments that the discussion board was an appropriate means for sharing ideas, techniques, links, and resources.

Students commented that the high response rate on the discussion board was due to the grade value placed on it. The instructor's field notes stated that the goal of the discussion board was to serve a standard medium for communicating. This goal was successfully achieved.

The second medium of communication, e-mail, was found to be very useful when students wanted to ask very specific questions, or make comments directly to the instructor or other students in situations where it did not need to be shared. As an example, a student repeatedly stated questions and answers to quizzes that the instructor had to remove prior to other students seeing those answers.

Student evaluations of the resources of information (handouts, links, etc) were mixed. Many students felt that handouts provided from the Virginia Cooperative Extension Service and a well-respected local garden center in Northern Virginia were the most appropriate and useful.

The resources found to be lacking in information were literature from magazines that did not answer the questions the students were asking. As discussed in previous sections, a structured lecture will be implemented in future classes. This will allow the

resources of information to be used in conjunction with the lecture to provide a well-rounded lesson.

The results from the evaluations showed that students found the research papers useful for collecting information on a single genus of plants, but that they felt that time could be better spent on other areas of instruction. For the future, it was suggested that this evaluation tool be removed or limited.

*Research Question #2: What are the characteristics of students enrolled in the Herbaceous Plants course?*

Students are professionals. They need to be treated in the classroom the same way. This case study found that is extremely important to have all the information available to the students when they need it, and in an organized fashion. It was found that all of the students had taken the Introduction to Plants course, which covered most of the basic botany necessary for the Herbaceous Plants course. However, it was found that students needed extra time to revisit proper nomenclature. The educational levels of the students in this course were two bachelor's degrees, two master's degrees, and one doctoral degree. This difference in the educational levels did not affect the course very much, but rather it was found that the expectations of the student with doctoral degree were much higher than those of the other students. However, this proved to be valuable to all involved because the student provided more analytical questions to the discussion board participation.

Ages ranged from the mid-30s to the 60s. The GW College of Professional Studies racial makeup at the time of this study was as follows: 52 % white, 21 % African American, 2 % Native American, 12 % Asian, 11 % Hispanic and 2 % "other." In this study, the sample (n=5) was not representative of the target population, as it was 80 % white and 20 % "unknown / not reported." This did not allow for a good ethnic representation. In future studies, it will be important to make the sample more representative of the target population.

As discussed earlier, the differences in age and career goals provided for a wider array of knowledge, backgrounds, and motivations. However, when teaching an online course, it is important that all age levels be close in their technologies usage. Students

in this course were all working full-time jobs and most were taking at least one other landscape design class. The reasons for taking this course varied, but most want to develop more cognitive knowledge in the field of landscape design, more specifically, herbaceous plants.

### *Relationship of the Findings to Previous Research*

Instructional design is critical to distance education (Smaldino, 1999). Good distance education, like good face-to-face education, is based on careful planning and design of instruction (Moore & Thompson, 1997). Garrison (1989) emphasized that distance learning environments gain a great deal from the design and delivery considerations afforded by applying a systematic approach to the instructional design of these environments.

The importance of developing an understanding of distance learners, what defines them, the challenges they face, as well as how their instructional needs are met through chosen instructional strategies, has already been established as an essential instructional design consideration (Taylor, 2002).

Although there is no definitive answer concerning the instructional design model best suited for utilization in all distance environments, it is imperative to plan and organize prior instructional design before implementation of a distance course (Taylor, 2002). As this case study has reiterated, a thorough instructional design program can go a long way toward the success of using distance education for the instruction of a laboratory-based course.

In summary, the integral nature of the distance education/adult education relationship helps to complete the overall picture of a distance learner. Regardless of their age, gender, and proximity to campus, the characteristics that distance learners must possess to ensure their success in a distance learning environment are synonymous with those of the successful adult learner. These characteristics include intrinsic motivation, work commitment, perceived benefit of instruction, resourcefulness, independence, efficiency, and expediency (Taylor, 2002).

### *Issues and Concerns*

Numerous problems with laboratory courses taught online need to be addressed prior to the design and implementation of a course in herbaceous plants. Four areas were found to be potential problems in the implementation of this course: student perceptions and expectations, transfer of materials from lab-based courses to online courses, communications/technology, and understanding of androgyny.

The first problem that arose during this case study related to the student perceptions and expectations. During the first week of classes, the students were unclear as to what the course would encompass. Many felt that they would learn all of the herbaceous plants used in industry during this one class. Unfortunately, that was not possible. Instead, this course was designed to be one of three sessions that would span over the year. After this was routinely communicated to the students, they seemed to be more understanding.

The instructor's field notes pointed out that there was a wide range of ages and career goals for the students in the course. Some were interested in using the information learned to apply in their careers as landscape designers, while others just wanted more information on herbaceous plants. This was evident in both the attitudes and motivation of the students. It was found that many of the students had different educational backgrounds which affected the overall level of expectation for the course. One student had a doctorate. Two held master's degrees. It was evident from the first course that the student with the doctorate was viewing the course more analytically than the others.

The second problem found was the transfer of materials from lab-based courses to online courses. The preliminary thoughts of the designer (as well as most instructors) were to use existing materials and techniques and to simply transfer those items over to the web. This does not work, since each situation is unique. One must realize that when you change the medium for instruction, you must adapt your teaching methods. An example would be trying to teach students about soil structure. In the classroom setting, the instructor would go over the different soil structures, what they are composed of, and how they look and feel. However, this does not fully educate the students on soil structures. It is necessary to then have the students go to a lab-based setting, where

they can have hands-on type activities that allow them to comprehend the feel, look, and even the smell of the soil.

An educator must be able to use as many learning domains as possible to fully educate a student. The same can be said for teaching a plants course online. The instructor can provide as much information and pictures as needed for the students to get an understanding of the cultural requirements and general appearance of a plant, but they will never fully appreciate the plant until they go out and look at it. For that reason, the instructor noted that in future courses, students will be required to visit local garden centers or arboretums at least twice in a given session.

The third problem that was found was communications/technology. It is imperative in the online environment that there is a clear picture of where student support comes from. This usually will be in the form of the instructor or the university's helpdesk, but it also can come from other instructors or students. This case study found that when students commented via Blackboard about a technical concerns (a thread was started just for this), it was common for other students to offer suggestions of how to address the concern prior to the instructor responding. This normally is a positive element of the discussion board. It also was noted in the instructor's journal that students lost connection with Blackboard due to the server being down twice during the session. This can easily cause frustration and stress on the students.

The final problem that was found in this case study was that many educators do not have a full understanding of androgogy. Androgogy is simply defined as the art and science of helping adults learn. If only it were that simple. Androgogy in its fullest extent is the understanding of how adults learn, what they want to learn, why they learn, and where is the best place for them to learn. As with any study of human behaviors, it is important to remember that each situation is going to be unique.

In this case study, the designer of the course had a strong understanding of androgogy, which helped tremendously in the instructional design process by providing an outlook of each student as an adult learner, not an undergraduate student. The instructional design process requires that the designer perform numerous research studies prior to the implementation of the course. One of the key steps of this process is to analyze the learners and the contexts of instruction. If a designer does not have a good

understanding of androgogy, or is used to teaching undergraduate level courses, it is very easy to develop the course at a level that is well below what a typically adult learner is expecting.

### *Implications for Future Practice, Research, and Policy*

This examination can be replicated in institutions interested in improving or implementing a distance learning program. It is necessary to remember that this case study was limited to one university and that an instructional design needs to be completed prior to the development and implementation of a similar course. Institutions can use this study to gain insight into the types of distance learning technologies and how they are being used in asynchronous programs, specifically using technologies to teach a traditional lab-based course online. In addition, while the scope of this research encompassed one university, the instructional procedures used in this study can be adapted by other institutions to achieve the full potential of current distance education technologies.

Technology involves continuous updating of hardware and software; therefore, constant updating of skills in using hardware and software is needed. How well the university addresses this issue has a direct impact on how such technology is utilized.

A comprehensive instructor's field journal should be the most important instrument in conducting a study of this type. It can be adapted to gather better data about how various procedures work, their effectiveness in the teaching and learning process, and implementation/evaluation. In addition, future research should include follow-up interview studies with graduates working in the field, to examine how they felt the program prepared them for their professional endeavors. It is recommended that in future studies more research be conducted on the affects of a more structured lecture, live tutorials, and review of current evaluation procedures.

However, there is a distinct difference between the online environment and the real world. For that reason, it was reaffirmed that the students needed to make at least two trips to local garden centers or arboretums. In this study, it was determined that it is vital for all new students to complete an on-site tutorial session on Blackboard,

preferably as a group. Additionally, it is necessary for all students to be self-guided and motivated to be successful in online instruction.

### *Conclusions*

The researcher has determined from this study that well-developed distance learning programs can be time-saving, cost-effective solutions for institutions of post-secondary education. While technology has dramatically increased our abilities to disseminate information more effectively, this study does not suggest that distance education is the solution to every educational challenge. However, in time, distance education will take its place in contemporary education while continuing to expand educational opportunities to new and distant audiences, whose quest for knowledge would otherwise be hampered by time and distance.

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