The efficacy of an electronic performance support system as a training tool for online faculty

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The efficacy of an electronic performance support system as a training tool for online faculty

by

Jeffrey Lynn Platt

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Curriculum and Instructional Technology)

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Ames, Iowa

2008

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ABSTRACT

An instructional website was developed as an electronic performance support system (EPSS) to determine whether faculty would use and learn from such a resource. This website summarized pedagogical information about online instruction that users could access 24 hours a day, seven days a week. In Phase I of the study, five college professors with experience teaching online courses evaluated the usability of the website and made suggestions on how it could be improved. Revisions were made to the website to enhance clarity and comprehension in preparation for Phase II of the study. In Phase II, 35 college instructors agreed to use the website to learn about pedagogical information related to teaching online courses. Only two people visited at least 75% of the web pages, limiting the conclusions that could be drawn. Two conclusions, however, seem warranted. First, an EPSS is not the most effective way to deliver non-mandatory faculty education because the primary goal of an EPSS is to enhance performance in a business setting rather than to facilitate learning in the academic setting. Second, any type of faculty development program must be developed from the learner’s perspective and include interaction between the participants.
CHAPTER 1. INTRODUCTION

The Need for Online Pedagogical Instruction

The advent and ubiquity of computers and the internet has lifted the restriction of instruction from being time and place bound to allow instruction to occur at any time and place. As a result of this change in technology, the field of education must also change to meet the needs of online faculty. Perhaps one of the most pressing needs of online faculty is pedagogical instruction because the majority of college professors currently teaching have not received training for this learning environment given that online education was either nonexistent or still in its infancy when they were in graduate school (Gold, 2001; Young, 2001).

A recent survey of 21 institutions of higher learning (four community colleges, one community college consortium consisting of seven separate community colleges, seven baccalaureate colleges, and nine research doctoral colleges) was conducted by the Alliance for Higher Education Competitiveness (A-HEC) to better understand the strengths and challenges of online education at colleges with “successful” online programs. A successful program was self-defined by each of the colleges because the A-HEC was interested in how these institutions defined success. When the colleges were queried about the state of their support services for online faculty, 86% of the colleges felt their course management/technical training services were implemented with good success (Abel, 2005). Ninety percent of these colleges also felt their faculty web/e-mail helpdesk was successful. Helping faculty determine student need and select appropriate pedagogy for their online courses, however, was not a successful faculty support service (43% of the colleges that offered this service felt it was successful, while 19% of the colleges did not offer this
service). An important point to bear in mind about these findings is that no faculty members participated in this survey. Instead, the survey was completed by the executive at each college who was the most familiar with the online activities of the college (e.g., deans, directors of online education, vice presidents). Given that administrators and instructors do not always agree on the effectiveness of college-wide training initiatives, the findings of the A-HEC study support the need for pedagogical support for faculty entering the online instructional environment. Moreover, 42% of the executives responding to the survey believed that faculty training and support was their top priority in the next three years (Abel, 2005). Unfortunately, most of this training and support was focused on technical support and the establishment of quality standards.

In order to help instructors who did not receive training in online pedagogy while in graduate school, some universities have developed courses and programs to provide this instruction for working professionals. Several universities (e.g., California State University at Hayward, Indiana University at Bloomington, Malboro College, the University of Illinois at Springfield, and the University of Wisconsin at Madison) have created distance-education certification programs (Carnevale, 2003). Although the content of these certification programs vary from institution to institution, most provide instruction on online pedagogy and some provide instructors the opportunity to learn the material online, which can help faculty see online education from the student perspective.

For instructors who do not have the time to take courses or enroll in a degree program there are websites (typically designed by universities, some of which have related certification or degree programs) that can provide information about how to teach online. For example, a group called the Faculty Online Technology Training Consortium created an
educational website called Maryland Faculty Online (http://www.mdfaconline.org/) that anyone can use to learn more about teaching online (Young, 2001). This website is divided into three modules, “Module A: Getting Started,” “Module B: Teaching Your Online Course,” and “Module C: Vocabulary Across the Curriculum.” Most of the information in these modules focuses on the mechanics of teaching (e.g., classroom assessment techniques, communicating online, constructing test questions, orienting students to online learning) rather than on the pedagogy driving online education. While this information is interesting and useful, it focuses more on the “what” and “how” of online education and largely ignores the “why” of online education (i.e., principles and theories upon which the instructional strategies are based; pedagogy).

Purpose of the Study

As discussed in the previous section, some colleges and universities have created online certificate programs to meet the needs of online instructors. If research information about the pedagogy of teaching online is what these college instructors need, then this information should be able to be presented in an online format without having to enroll in a formal college course. The reason this approach may be desirable to some instructors is that a formal course may not be offered at a convenient time, the location of the course may be too far away, the cost of the course may be prohibitive, and not all of the material in the course is of interest to them.

This dissertation describes an attempt at developing a website called “Ped·a·GO!·gy: Your Source for Online Educational Theory” that summarizes pedagogical information about online instruction that users can access 24 hours a day, seven days a week. Ped·a·GO!·gy was designed as an electronic performance support system, an instructional technology
model used in the business world. This approach allows users to decide what information to access rather than having to follow the order of a course syllabus. This research is only an initial design study to determine the effectiveness of providing faculty development in an online format without a traditional instructional format. Specifically, the following research questions will be addressed:

1. Will faculty access educational material without the guidance and prompting of an instructor or facilitator?
2. What topics concerning online instruction are faculty most interested in learning about?
3. Can faculty learn about online pedagogy through a website designed like Ped·a·GO!·gy?
4. Can interactive case studies serve as an effective way for instructors to apply the information they are learning in Ped·a·GO!·gy?
5. Is Ped·a·GO!·gy useful for all online instructors, regardless of their experience with online instruction and the software used to create and facilitate online courses?

Research questions one and two will be answered by keeping track of the number of pages participants visit, as well as the specific pages they visit. Multiple-choice quizzes over Ped·a·GO!·gy’s content and an exit evaluation of the website as a whole will be used to answer question three. The answer to question four will be determined through an evaluation at the end of each case study and by user feedback. Finally, question five will be answered by determining participants’ diffusion of innovation adopter classification (Rogers, 2003) and their acceptance of and comfort level with the technology used to teach online.
Description of an Electronic Performance Support System

In the words of Gloria Gery who developed the concept of an electronic performance support system, “The goal of an electronic performance support system is to provide whatever is necessary to generate performance and learning at the moment of need.” (Gery, 1991, p. 34 emphasis in the original text) Thus, an electronic performance support system (EPSS) must contain all of the knowledge learners will need and be available 24 hours a day. Essentially, an EPSS attempts to replace human tutors and teachers, while providing the same type of assistance.

The problem with many courses and training programs is that students may have to endure presentations over material they already know in order to get to precisely the information they need. Even though Maryland Faculty Online tutorial allows users to view an index of module subtopics, users are encouraged to start from the beginning. An EPSS design is more efficient than a tutorial because tutorials typically have defined beginning and end points. When users are confronted with an issue with an online course, they will be able to look up exactly the information they need in the EPSS and apply it immediately. Typically faculty go to a conference or workshop and learn useful information, but cannot develop or apply it until they get home (and get caught up on the work they missed while at the conference/workshop). An online instructor who was part of a National Education Agency focus group explained the limitations of workshops in the following manner: “It [workshops] was trying to give you everything at once and by the time you got back to your office you didn’t have a clue what they were talking about or when you actually tried to implement something a month later—[the information was] gone.” (“Focus on Distance Education,” 2001, p. 2) The easy access to information that an EPSS provides can speed the
rate of change and innovation in online courses by providing faculty access to information when they need it.

There is no standard way of constructing an EPSS because each system depends upon the needs of users, available technology, resources available, and the skill of the designer. The common thread that connects all EPSSs and distinguishes them from other systems is the degree to which they integrate information, tools, and methodology for the user.

The information that users access is called the “infobase,” which is a self-contained, standalone element that represents a complete piece of information that cannot be reduced without losing its meaning (Gery, 1991). The infobase may consist of several databases, such as text, visuals (diagrams, pictures), video, and simulations. An infobase is organized in varying ways based upon the task, software, and the nature of the information itself. The actual contents of an infobase are determined by learner and task analyses. An infobase should contain only the information that is necessary to prevent information overload for the user. There are various types of information (e.g., concepts, facts, examples, procedures, principles) that make up an infobase and various ways this information can be presented (e.g., flow chart, simulation, video, text, pictures).

The support system of an EPSS contains many subsystems that help users access information from the infobase, navigate the EPSS itself, answers questions, and provides guidance on what users should do next. Some of the most common subsystems are advisory or expert system, interactive productivity software, help system, interactive training sequences, assessment systems, and a monitoring, assessment, and feedback system. An advisory or expert system provides users with assistance on problem structuring, decision making, analysis, or diagnosing. Interactive productivity software includes any computer
programs that make a job easier, such as spreadsheets, word processing, graphing software, or flowchart applications. Help systems can either be user- or system-initiated and typically are context-sensitive and inquiry-based. Interactive training sequences typically include simulations or tutorials that help users understand a concept, process, or procedure. Assessment systems allow for pre- and post-testing of the users to help them assess their own learning or the assessment can be used to determine level of expertise. Monitoring, assessment, and feedback systems can track user activity in order to provide assistance later on, provide feedback on user actions (e.g., error messages and warnings), or provide the EPSS designer with information about user activity for the purpose of system improvement.

Advantages of an Electronic Performance Support System

On the surface an electronic performance support system (EPSS) may appear to be a type of intelligent tutoring system because both systems attempt to provide learning support without the need for human teachers. The two systems, however, differ in the type of support they provide for the learner. According to Spector and Ohrazda (2004), intelligent tutoring systems represent a strong support system because they provide humanlike expert knowledge or performance, such as diagnosing learner errors or problems. An EPSS, on the other hand, is a weak support system because its main purpose is to extend the capabilities of people rather than replacing them.

As an EPSS, Ped·a·GO!·gy is designed to anticipate the needs of learners and provide them with the guidance they need at the moment of need. The foundation of an EPSS is that learning is most effective when it is paired with doing because when learners are in the process of completing a task they will be highly motivated to learn more about methods of completing the task (Howles & Howles, 2003).
An EPSS has certain advantages over traditional face-to-face training (Hawkins, Gustafson, & Nielsen, 1998). Perhaps the biggest advantage is that an EPSS provides “just in time” training whereas a traditional training approach takes coordination of schedules between trainers and learners, an appropriate room for training sessions, and procurement of any necessary equipment. An EPSS does not have these limitations because training can occur whenever individuals need it (they just have to activate the system) and there is no need to schedule training sessions because learners can start and stop the training at any point or time given that there is no human providing the training. Moreover, learners can just focus on the specific information they need rather than having to sit through a training session waiting for their specific need to be addressed. Learners can also receive immediate feedback.

A final advantage of an EPSS is increased transferability of information from the system to one’s actual work (Hawkins, Gustafson, & Nielsen, 1998). Transfer is arguably the most important and difficult aspect of any instruction. A typical problem with face-to-face training is that the examples and exercises presented to learners cannot be tailored to each individual if instruction occurs in a group setting. Thus, learners may understand material in a training session, but have difficulty applying it to their unique situations once training is over. Given that an EPSS is designed to be consulted when individuals are working on their personal tasks, the transferability of the material should be easier because learners are providing their own context for application of the training material. In other words, learners are consulting the EPSS with a specific problem/need in mind and will be analyzing the EPSS’s content from a specific viewpoint.
Pedagogical Instruction as Diffusion of Innovation

Diffusion Defined

Everett Rogers’ (2003) diffusion of innovation is a broad theory that served as a useful framework for designing the structure of Ped·a·GO!·gy and understanding its users. Diffusion can be defined as a “…process in which an innovation is communicated through certain channels over time among the members of a social system.” (Rogers, 2003, p. 5) A deeper analysis of this seemingly simple definition speaks volumes about how online pedagogy, when viewed as an innovation, develops and spreads throughout the teaching community.

First, online pedagogy can be viewed as an innovation because, by definition, an innovation is something that is new. Granted, the educational theories that are the foundation of approaches to teaching online are by no means new (some theories, such as behaviorism, are decades old), “newness” must be understood as a perspective. For example, the internet has been around for over a decade, but for someone who has never used it, it is “new.” Thus, online pedagogical theories are an innovation to those individuals who are unfamiliar with them.

The acquisition and application of pedagogical theories must be viewed as a process. Once instructors gain access to this information, they need time to learn and understand the information before they can decide whether they will apply it in their online courses. Rogers (2003) describes five stages to the diffusion process of deciding whether to adopt an innovation (referred to as the innovation-decision process): knowledge, persuasion, decision, implementation, and confirmation.
How an innovation is communicated and through which channels is an important consideration. Communication can occur through a variety of channels (media), such as research journals, websites, listservs, and personal communication. Even though mass media channels such as the internet are usually the quickest and most efficient way of getting information about an innovation out to the masses, most individuals learn about innovations from colleagues who are similar to them (e.g., socioeconomic status, education, experience). Moreover, diffusion researchers suggest that people are persuaded more by the subjective evaluations of their colleagues than by scholarly research and explanations (Rogers, 2003). For this reason, potential users of Ped·a·GO!·gy were made aware of this website through both mass media channels and personal communications.

Rogers (2003) defines social system as “…a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems.” (p. 23) The social system in the case of Ped·a·GO!·gy as an innovation can be conceived of as online teachers at institutions of higher learning around the country. The purpose of operationally defining the social system in such a general way is to get a sense of how far (geographically speaking) Ped·a·GO!·gy, as an innovation, has spread. If Ped·a·GO!·gy is truly going to be an asset to online instructors, it cannot be confined to a specific locale.

Attributes of an Innovation

Even if an innovation is skillfully presented and clearly explained, potential adopters (those individuals whom an innovation is targeting) may not accept and adopt an innovation. What determines whether potential adopters will accept or reject an innovation? Rogers (2003) suggests there are five attributes of an innovation that influence the decision process
of potential adopters: relative advantage, compatibility, complexity, trialability, and observability.

Relative Advantage

Relative advantage refers to whether an innovation is better than the status quo and if so, to what degree it is better. Relative advantage can be expressed in various ways, such as economic profitability and social status. Diffusion researchers have found this innovation attribute to be one of the strongest predictors of how quickly an innovation is adopted (Rogers, 2003). From an economic viewpoint, Ped-a-GO!gy is a good business decision because it is a free website and any benefit received by exploring it is pure profit. In a survey of 222 college professors, most of which taught online, Bonk (2001) found that 82% were interested in becoming part of a free community that shared teaching ideas and resources. The most important feature of this community was information on pedagogy (77% of respondents). Ped-a-GO!gy may also be advantageous from the perspective of maintaining one’s social status. Specifically, some professors may be reluctant to enroll in online pedagogy courses because they have been teaching for years and feel that taking a class on teaching might suggest ineptitude (Littman, 2002). For these individuals, anonymously learning about online pedagogy via a website provides them with the information they need without having to publicly admit a need for instruction. Conversely, those individuals who feel inferior to their colleagues because they are not as well versed in educational theory could benefit from Ped-a-GO!gy by feeling more competent in their knowledge base.

Compatibility

How well an innovation fits with the adopter’s existing values, needs, and past experiences is the definition of compatibility. One foreseeable incompatibility is the current
pedagogical beliefs of potential adopters. Most of the sources of online pedagogical theory and practices (e.g., Gold, 2001; Hacker & Niederhauser, 2000; Palloff & Pratt, 2003; Palloff & Pratt, 1999) seem to advocate constructivism as the only acceptable pedagogical perspective. Thus, instructors who do not currently subscribe to a constructivist perspective might be reluctant or even resistant to a website that only covers a constructivist approach to online education. Ped·a·GO!·gy avoids this problem by presenting constructivism as only one possible approach.

*Complexity*

Complexity (how difficult an innovation is to understand and use) can also affect the adoption of an innovation. Although the Ped·a·GO!·gy website is complex in the sense that it has many infobases and topic levels, an outline format should make the website easy to use and navigate.

*Trialability*

Whether a potential adopter can test or try out the innovation (trialability) is an important consideration for individuals who are undecided. Software manufacturers realize the importance of trialability and many offer potential customers the option of downloading a demonstration version of a program from their website so customers can see if the product meets their needs before purchasing it. The trialability of Ped·a·GO!·gy is not easy to determine given that its content is conceptual rather than tangible (like software). The interactive case studies presented on the website, however, do provide instructors with the opportunity to see how a particular educational theory can be applied to solve an instructional problem. This experience with the case studies may help them determine the compatibility of a particular theory with their existing values and beliefs.
Observability

The observability (visibility) of Ped·a·GO!·gy is also linked to the interactive case studies. Visitors can use the case studies as a way of “seeing the theories in action” rather than just reading about them. Moreover, the menu system can help visitors get a grasp of what information is available, which can help them decide which topic they want to investigate further and which topic are not of interest to them.

Assessment of Innovation Attributes

Moore and Benbasat (1991) developed a scale to measure the five attributes of an innovation. Their scale was originally designed to measure the impact of personal workstations (high-powered personal computers), but as Rogers (2003) suggested, it can easily be modified to fit any particular innovation.

In addition to the five innovation attributes, Moore and Benbasat added three other attributes to their scale, voluntariness of use (the degree to which individuals choose to use an innovation), image (the degree to which the use of an innovation increases one’s social status within an institution), and results demonstrability. The attributes of voluntariness of use and image were not be included in the present study because one can safely assume that all users of Ped·a·GO!·gy are there by choice because it is an unknown source of information and therefore cannot enhance one’s image given that very few people have heard of it. Results demonstrability was retained because it is part of the observability attribute. During the development of their scale, Moore and Benbasat (1991) discovered that observability was a complex construct that could be more effectively measured by breaking it into result demonstrability and visibility. As a construct, results demonstrability encapsulates the tangibility of the outcome of using an innovation. Visibility, on the other hand, focuses on
the degree to which an innovation has been seen in a given institution rather than on the use of the innovation. Visibility was not used in this study because Ped·a·GO!·gy is a physical entity that resides in an individual’s office (like Moore and Benbasat’s personal workstation), which makes its observability difficult.

Innovation Adopter Categories and Desired Participants

Knowing one’s customers is an important rule in advertising. The company behind the soft drink Sprite was able to successfully market their product to young people and make their company more competitive in the business world. Sprite was able to gain young customers because they took the time to find out what interested this age group (i.e., hip hop music) and then associate their product with this interest. (Frontline, PBS, 2002)

A similar tactic must be used in order to understand the impact of Ped·a·GO!·gy from a faculty development perspective. The question to be asked is not just whether the website is an effective way to augment the knowledge of online faculty, but rather for whom is Ped·a·GO!·gy effective/not effective. One way to answer is question is to determine in which one of Rogers (2003) diffusion of innovation adopter category users of the website belong. Diffusion researchers have created five categories of people based upon their degree of innovativeness (how quickly they adopt a given innovation within a given social system; Rogers, 2003). The five adopter categories from most to least innovative are innovators, early adopters, early majority, late majority, and laggards. (See Figure 1.1 for a representation of how these categories are distributed under the normal curve.)

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1 These adopter categories are treated as discrete categories in order to make comparisons between categories easier. Innovativeness, like social status (which can be divided into upper, middle, and lower classes), is a continuous variable.
Figure 1.1. Adopter categories representing the typical diffusion of an innovation. (Adapted from Rogers, 2003, p. 281.)

Innovators

Innovators are venturesome and are ahead of other individuals in their social system. As a result, innovators have to be able to understand and apply complex information because there are no non-innovator colleagues who have the knowledge and experience to help them. Therefore, innovators must be able to deal with a high level of uncertainty about an innovation during their decision process of whether to adopt it (Rogers, 2003). This adopter category might seem like the ideal group to target an innovation like Ped-a-GO!-gy. However, they are not as likely to spread the innovation within their social system (i.e., college/university) because even though they are enthusiastic and willing to take risks, other teachers at their institution are typically not influenced by their adoption. Why not? The main reason is that innovators are not seen as similar enough (homophilic, in diffusion of innovation terms) to everyone else in the college. For example, teachers who are the first to teach online at a given college tend to have more computer technology skills and do not have to make as great of an adjustment from teaching face to face to teaching online. Teachers
who do not have these advanced computer skills (the majority at many colleges) do not see
these innovators as a model for them to emulate. If, on the other hand, the first people to
teach online had average computer skills and were successful, more faculty members might
be encouraged to try online teaching.

*Early Adopters*

Unlike innovators, this adopter category typically has great influence over other
members of a college and if they adopt an innovation then other people are more likely to
follow suit. The reason early adopters are more influential is that they are not seen as that far
ahead of the average person in terms of innovativeness. Moreover, early adopters have the
respect of their colleagues and are less likely to jeopardize this respect by making hasty and
risky decisions concerning innovations (Rogers, 2003).

*Early and Late Majority*

The early majority adopt an innovation just before the average member of a social
system adopts. Members of the early majority adopt an innovation with deliberate
willingness. On the other hand, the late majority are more skeptical and may only adopt an
innovation because of peer pressure or necessity. Thus, members of this adopter category
require strong evidence that an innovation is favorable to the status quo.

*Laggards*

As their name implies, laggards are the last members of a social system to adopt an
innovation. They typically do not feel the peer pressure that the late majority does because
they are more socially isolated than the other adopter categories (Rogers, 2003). When they
make decisions concerning an innovation they focus on what has been done in the past rather
than the possible merits of adopting an innovation. Laggards also tend to be suspicious of innovations and anyone who is strongly advocating an innovation.
CHAPTER 2. LITERATURE REVIEW

Faculty Development Training Programs

*Face-to-Face and Hybrid Approaches*

Training programs to help faculty develop and teach online courses take various forms. Universities may have faculty development centers that provide workshops and classes related to online teaching. Many of these centers focus on the software used to teach online rather than pedagogical instruction. Some centers, such as the University of Central Florida’s Faculty Center for Teaching and Learning (FCTL), have combined technology and pedagogical training. University of Central Florida’s FCTL formed a partnership with four other departments on campus (the Distributed Learning Course Development Team, the Office of Instructional Resources, the University Library, and Computer Services) to provide faculty with workshops, courses, individual consultation, symposia, focus groups, and mentoring to guide them through the entire process of online teaching from development to evaluation of an implemented online course (Smith, 1997). In 1998 the University of Central Florida won the APQC-SHEEO Faculty Development Award for Teaching with Technology (Information Technologies and Resources, 1998).

The focal point of this program is IDL6543 (Interactive Distributed Learning for Technology-Mediated Course Delivery), a 70-hour faculty development course (“Faculty Training, On Demand,” 2004). IDL6543 encourages faculty to think about their courses in a new way by focusing on pedagogy, technology, and the practical issue of how to develop the course in an online environment. Another feature of IDL6543 is that faculty members gain the experience of being online students (Hartman, Dziuban, & Moskal, 2000). Faculty who took IDL6543 reported “being rejuvenated in their teaching.” (Hartman, Dziuban, &
Every instructor who wants to teach online must take this course or a related course. (A less intense course was developed for those faculty members who could not get into IDL4563 because of the university’s enrollment cap.)

Indiana University-Purdue University Indianapolis (UIPUI) has developed a different approach to faculty development called Jump Start. Jump Start provides instructors with a team of experts from the university that will help them develop their online courses (“IUPUI Jump Start Program,” 2005). The team consists of an instructional designer, subject specialist librarian, the media production staff, and a copyright management consultant. The Jump Start program can only accommodate eight to ten participants each year so faculty must be selected based upon their application form. The program begins with a four-day workshop that focuses on the basics of online course design and best practices. Instructors then begin working with their design team to start constructing their new online course. The entire program takes approximately 67 days. No data are available concerning the overall effectiveness of this program.

Queen’s University in Canada also utilizes a team approach to help instructors teach online. Their approach is referred to as a Learning Technology Team, which brings together an instructional designer, librarian, computer expert, and other faculty members who have successfully taught online (Laverty et al., 2003). A team will work together for up to a year to help the instructor through the development, implementation, and follow-up evaluation stages of course development. In addition to the teamwork, Queen’s University offers workshops on pedagogical and technological aspects of online instruction. Instructors that participated in the team approach realized that any use of technology in instruction should focus on the sound pedagogy behind the use of the technology. Moreover, these instructors
believed that the use of technology benefited their students through improved participation, increased critical thinking, and a greater sense of community. Like UIPUI’s Jump Start program, Queen’s approach is limited to eight to ten instructors per year due to the large time commitment required of the non-teaching team members (which are limited in number).

Another approach to faculty training is an in-house training program that is typically developed by interested faculty members rather than developed by the institution. Nunaley and Warner (2002) developed such a program for Volunteer State Community College. Although their research focused primarily on understanding the developmental stages faculty go through as they progress to higher levels of technology use (ranging from stage one where faculty are just beginning to use electronic communication, such as e-mail and instant messaging, to stage five where faculty are teaching online), they did discuss different types of support for faculty. The following types of resources were made available to faculty: printed material in the college library, website resources, faculty in-service meetings, workshops, individualized training, course templates and standards, and peer review teams for course evaluation and coaching (Nunaley & Warner, 2002). However, no data was available for the effectiveness of these various training resources. An exploration of the websites of over 50 faculty development centers at universities nationwide suggests that this lack of data is a common occurrence. This observation does not imply that research has not been conducted, but rather that the results of any research is not readily available for inspection.

*Online Approaches*

One faculty-driven training program that does have data was conducted by Sanford Gold (2001). Gold was primarily interesting in determining the pedagogical training teachers
need to be effective in the online environment. An online, two-week training course with a constructivist focus was developed. This course was discussion centered and included individual activities (virtual field trips, evaluation of other online courses, and interactive essays) and a group project (modifying a syllabus for an online course). The content material for the course was divided into five instructional units: unit one focused on definitions of distance education and objectivism versus constructivism as guiding frameworks for instruction, unit two detailed the transition from face-to-face instruction to online instruction, unit three discussed the process and practice of online collaboration, unit four involved evaluating an online course from alternative pedagogical frameworks, and unit five explained how to develop an online course based upon the Keller Motivational-Design Model.

A linear regression analysis suggested that teachers significantly changed their thinking about their teaching practices as a result of participating in the course ($r^2=.531$) based upon their response to an online survey. The total number of hours spent in the online course was the strongest predictor of rethinking teaching practices (partial $p=.007$). However, a linear regression to determine whether factual knowledge of online instruction (as determined by the difference between pre- and post-test scores) was increased as a result of taking the course was insignificant. Gold (2001) was unable to account for this discrepancy.

The University of Phoenix (UOP) employs a large number of online instructors (approximately 5,500) and claims to be the leader in developing faculty training initiatives (Littman, 2002). Everyone who teaches online for the UOP must complete their training program regardless of prior online teaching experience. The training starts with a four-week asynchronous online course that serves as an orientation to the way online instruction occurs
at the UOP. One aspect of this orientation course is that prospective instructors get to observe a live UOP course in their discipline. The next phase of training involves teaching an online course for the university while a current UOP professor serves as a mentor. This mentor observes how the prospective instructor conducts the class and offers suggestions and feedback when appropriate. Prospective instructors are evaluated by the mentor and by students. The university places great emphasis on student evaluations because as Brian Mueller (VP/COO of the University of Phoenix) says, “We are a for-profit, private university, so we have organized the university very much like a business, based on quality control and customer [student] feedback.” (Littman, 2002, p. 52)

The UOP only accepts 30-50 percent of individuals who apply for an online teaching position. Ninety-eight percent of those who are accepted will complete the four-week orientation course and start the mentoring phase of training. Only 70-75 percent of those individuals who complete the mentoring phase will be hired by the university (Littman, 2002). Those applicants who are not hired typically received poor student evaluations or are unwillingness to subscribe to the university’s policies.

Central Michigan University has two separate approaches to help faculty learn about online instruction. The first approach involves an instructional website called “Moving Ideas Network,” which provides links to internally produced material and links to other websites (“Developing Online Instructors,” 2004). One of these in-house initiatives is “Lesson Zero” courses, which are short, self-directed lessons (e.g., “Online Teaching Best Practices” and “How to be a Successful Online Faculty”) on various online education topics presented at a beginning level. The Moving Ideas Network also posts new teaching tips, technology tips, and websites of interests each week.
The second component of Central Michigan University’s faculty development training is the Online Mentoring Program, which is required of all faculty members who intend to teach online. Participants in this program observe an existing online course and participate in threaded discussion with other instructors about best practices in online education and other issues of teaching on the web. Unfortunately no data are available on the effectiveness of these two approaches because the Distance and Distributed Learning program is expected to improve the services offered, but is not required to evaluate the program’s effectiveness (Yoon-il Auh, personal communication, June 22, 2005).

Instructional Design Model Used in the Construction of Ped·a·GO!·gy

While the format of Ped·a·GO!·gy follows the structure of an EPSS, the development of Ped·a·GO!·gy follows the instructional design model of rapid prototyping. Rapid prototyping is a relatively recent approach to instructional design. It differs from other approaches to instructional design because rapid prototyping occurs faster and does not require that learners only see a completely finished product. Rapid prototyping is sometimes viewed as less rigid and structured as traditional instructional design models because it approaches the problem of creating an instructional program from a pragmatic rather than a theoretical perspective. The concept of rapid prototyping is borrowed from the software development industry where fully-functioning prototypes of software are developed in rough fashion, presented to a client, redesigned based on client feedback, tested on target users, revised, and so forth until the software meets the needs of the users and the client.

Advocates of rapid prototyping as an instructional design model suggests a similar process is appropriate for designing instructional programs (courses) because typically there is not enough time to follow the sequence of a traditional instructional design model (e.g., the
Dick and Carey (1996) model). Tripp and Bichelmeyer (1990) developed the rapid prototyping ISD (Instructional Systems Design) model as an alternative to traditional instructional design models. The overlapping boxes in Figure 2.1 represent the fact that the various processes in instructional design do not occur in a linear fashion. Thus, the analysis of needs and construction of a prototype typically occur simultaneously and each aspect provides information about the other (e.g., actually building a prototype can lead to further questions about the needs and the content to be delivered and vice versa). The processes of design (construction) and research (utilization) are seen as occurring in parallel. Unlike traditional instructional design models, designers (instructors) learn about the needs, content, and objectives as a result of the design process rather than conducting separate analyses before design work begins. The research process attempts to learn more about the subject matter, prerequisite knowledge necessary to understand the content, the presentation modes that are best to help learners comprehend the material, and the reaction of learners to each prototype version. At any point during the utilization phase, the designer may become aware of new problems that result in changes to the current objectives or the creation of new objectives. With these changes, the rapid prototyping process begins anew.

*Figure 2.1.* Tripp and Bichelmeyer’s (1990, p. 36) rapid instructional systems design.
The nonlinear design process of rapid prototyping is an appropriate characterization of Ped·a·GO·gy’s development. Early into its design phase, potential users were solicited through a listserv for their input on what non-technology information about teaching online was needed. Specifically, the subscribers to the PSYCHTEACHER listserv, who either taught online or were considering doing so, were asked for topics they would like addressed in an instructional site such as Ped·a·GO·gy. Only seven people responded to this initial request. Table 2.1 shows the topics they were most interested in learning more about. Even though the response rate was not great, their input was used in determining the material that should be included. At the same time this input was being sought, construction of Ped·a·GO·gy’s content and organizational structure was initiated.

Table 2.1
*Summary of Responses by Topic*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student motivation</td>
<td>2</td>
</tr>
<tr>
<td>Increase student interaction</td>
<td>3</td>
</tr>
<tr>
<td>Assessment of learning</td>
<td>3</td>
</tr>
<tr>
<td>Time management</td>
<td>2</td>
</tr>
<tr>
<td>Learning styles</td>
<td>2</td>
</tr>
<tr>
<td>Instructional design</td>
<td>1</td>
</tr>
<tr>
<td>Examples</td>
<td>1</td>
</tr>
<tr>
<td>Difference between online and face-to-face learning</td>
<td>3</td>
</tr>
<tr>
<td>Cheating</td>
<td>2</td>
</tr>
</tbody>
</table>

A common approach to rapid prototyping is to develop a paper version of the prototype before constructing a working computer version (see Holzinger, 2004 for an example) in order to speed the development time and avoid spending time on a prototype that may require major revisions. This paper prototyping approach, however, was not used
because a key feature of Ped-a-GO!-gy is the ability to move from topic to topic and follow hyperlinks for more information. A paper prototype would not offer this level of flexibility, nor would it give users the same experience that a web-based environment does.

Technology Acceptance Model

The technology acceptance model (TAM) was originally developed by Davis (1986) as an adaptation of the theory of reasoned action. Davis was trying to understand what factors could explain why people did/did not accept various computing technologies and he wanted the TAM to be general enough so that it could be used in a variety of situations. Davis believed that people’s attitude toward using a given computer technology was a major determinant of whether they actually used it. Moreover, attitude toward use was seen as a function of two major beliefs—perceived ease of use and perceived usefulness. (See Figure 2.2.) Davis (1986) defined perceived ease of use as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (p. 26).

Perceived ease of use has a causal effect on perceived usefulness because a system that is easy to use should result in increased job performance. Perceived usefulness was defined as

![Diagram of Technology Acceptance Model](image)
“the degree to which an individual believes that using a particular system would enhance his or her job performance” (p. 26). Davis constructed scales to measure both perceived ease of use and perceived usefulness. Both scales consisted of 10 items with which individuals indicated their level of agreement using a seven-point scale, where one represents “strongly agree,” four represents “neutral,” and seven represents “strongly disagree.”

Venkatesh and Davis (2000) developed the TAM2 as an extension of the original TAM. (See Figure 2.3 for details of the TAM2.) The purpose of this modification was to account for the impact of social influence (subjective norms, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, ease of use) that may impact perceived usefulness. (A brief description of the TAM2 scales is presented in Table 2.2.) Like Davis (1986), Venkatesh and Davis used a seven-point scale

![Figure 2.3. The TAM2. (Adapted from Figure 2 in Venkatesh and Davis (2000), p. 197.)](image-url)
for respondents to indicate their level of agreement with the items. Rather than just identifying the endpoints and middle values of the numbers, Venkatesh and Davis specified that one = “strongly disagree,” two = “moderately disagree,” three = “somewhat disagree,” four = “neutral (neither disagree nor agree),” five = “somewhat agree,” six = “moderately agree,” and seven = “strongly agree.”

Table 2.2
*A Brief Description of the TAM2’s Scales*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
<th>Sample Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Behavioral) Intention to Use</td>
<td>the degree to which one plans to use the technology</td>
<td>Assuming I have access to the system, I intend to use it.</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>the relative advantage of using the technology in terms of job performance</td>
<td>Using the system improves my performance in my job.</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>how much effort is needed to use the technology</td>
<td>My interaction with the system is clear and understandable.</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>belief that important people in one’s life believe that he/she should use the technology</td>
<td>People who influence my behavior think that I should use the system.</td>
</tr>
<tr>
<td>Voluntariness</td>
<td>the extent to which one believes the decision to adopt a technology is not mandatory</td>
<td>Although it might be helpful, using the system is certainly not compulsory in my job.</td>
</tr>
<tr>
<td>Image</td>
<td>belief that use of a particular technology will enhance one’s status within a group</td>
<td>People in my organization who use the system have more prestige than those who do not.</td>
</tr>
<tr>
<td>Job Relevance</td>
<td>the degree to which a given technology is perceived as applicable to one’s job</td>
<td>In my job, usage of the system is important.</td>
</tr>
<tr>
<td>Output Quality</td>
<td>how well a technology is perceived to work</td>
<td>The quality of the output I get from the system is high.</td>
</tr>
<tr>
<td>Result Demonstrability</td>
<td>the tangibility of the results of using the technology</td>
<td>I believe I could communicate to others the consequences of using the system.</td>
</tr>
</tbody>
</table>
CHAPTER 3. MATERIALS AND METHODS

Overview

The present research project was divided into two phases. Phase I focused on evaluating the design usability of Ped·a·GO!·gy. (Usability refers to how clear and easy the user interface of a product or website is to use.) Individuals with online teaching experience explored the website and evaluated its usability, and their feedback was used to modify and improve Ped·a·GO!·gy before the second phase of the research began. Phase II involved online instructors exploring and using the website to learn more about the pedagogy of teaching online. Phase II participants were encouraged to complete quizzes over the website’s content material, apply what they learned by working through case studies, and complete an exit evaluation of the website.

Design of Ped·a·GO!·gy

As described in chapter one, there are various types of information (e.g., concepts, facts, examples, procedures, principles) that make up an infobase and various ways this information can be presented (e.g., flowchart, simulation, video, text, pictures). Ped·a·GO!·gy consists of various infobases housed under the following categories:

1. online student characteristics

   • This category contains sections on the:
     - demographic and personality characteristics of online students
     - characteristics of successful online students
     - epistemological beliefs of students
     - various cognitive and learning styles of students
2. student motivation
   - This category contains sections on:
     - general theories of motivation
     - implicit theories of intelligence and their relation to motivation

3. instructional design theories
   - This category contains information on the following instructional design theories:
     - Dick and Carey model
     - Kemp, Morrison, and Ross’ instructional design model
     - rapid prototyping instructional design model

4. pedagogical theories
   - This category contains information on:
     - behavioristic approaches to learning
     - cognitive approaches to learning
     - constructivistic approaches to learning
     - pedagogical theories specifically focused on online instruction

5. nature and design of an online course
   - This category contains information on:
     - the online environment as an instructional medium
     - a comparison between online and face-to-face courses
     - various instructional considerations (e.g., course pacing, social presence of the instruction, and the need for an orientation session)
     - design usability/ergonomics
6. course evaluation

- This category contains information on student course evaluations and various ways to determine the effectiveness of an online course.

The content material in the infobases is primarily text, illustrations, and case studies. These infobases are directly accessed through an expandable/collapsible outline (a “content module” in the terminology of WebCT, the course management system that was used to house the website). This content material for Ped·a·GO!·gy can be found in Appendix A.

The support system of an EPSS contains many subsystems that help answer questions. The support systems in Ped·a·GO!·gy at present are not as sophisticated as proposed by Gery (1991), but contain some of the essential features. One of these features is interactive productivity software.

The only interactive productivity software that Ped·a·GO!·gy contains is the “Take Notes,” “Bookmark,” and “Track Progress” features that are built into WebCT. The “Take Notes” function allows users to record notes as they progress through the material. The “Bookmark” function works just like a bookmark works for a book; namely, once users log into the system they can go directly to the last page they were on when they last accessed the website. Finally, the “Track Progress” feature allows users to see which pages they have already viewed, which can minimize the amount of time spent trying to determine whether a particular section has already been covered.

A brief tutorial about WebCT was included in Ped·a·GO!·gy for those visitors who were unfamiliar with how to use this course management system. This brief tutorial served as an EPSS help system. There was also a context-sensitive help function about how to do various tasks (e.g., how to post a comment to the discussion board, how to take a quiz) in
WebCT. This context-sensitive help function is a built-in feature of WebCT that is relatively easy to use.

Case studies served as interactive training sequences in Ped·a·GO!·gy. The basic topics of the case studies involved fictitious professors who were designing or modifying an online course by applying the information from the relevant infobase. After presenting the basic problem in a given case study, users were presented with different choices concerning what they think the fictitious professor should do next. Each selection led to changes in the case study as a result of the preceding decision (choice) and presented new choices for users. For example, if the case study involved how to modify an existing online course to reflect a social-constructivist pedagogy, users might have been given choices of what elements could be added to the course to facilitate interaction between students. The resulting redesign of the course would depend upon the elements they chose to add to the fictitious course. Thus, users have a more “hands-on” approach to learning the material than just reading about worked-out examples.

Each infobase had a short quiz at the end to assessment a visitor’s comprehension of the material. These quizzes were part of the assessment system of Ped·a·GO!·gy.

The final component of this EPSS’s support system is the monitoring system. WebCT has a built-in tracking program that can monitor the global and specific activities of visitors. The global tracking ability is called “Track Pages” and this function provides information about how many times a particular web page has been visited (“hits” in web terminology) by the participants as a whole and how much time has been spent on each page. (See Figure 3.1 for an example of the Track Pages function.) The “Track Students” function shows both a summary of a given student’s activity (see Figure 3.2) and a detailed listing of
the specific pages visited, as well as the time and date these pages were visited (see Figure 3.3). Visitors who use the Track Progress feature have access to the same information (about their own use history) that is found under the Track Students feature. The results of this information will be used to provide information about visitor activity for the purpose of improvement and evaluation (e.g., which infobases were most utilized) of Ped·a·GO!·gy.

*Figure 3.1.* An example of the Track Pages function.
Figure 3.2. An example of the summary information provided for an individual under the Track Students function.

Figure 3.3. An example of the specific pages visited by an individual under the Track Students function.
Phase I: Usability Evaluation of Ped·a·GO!·gy

Phase I Participants

A team of five, college-level instructors (three females and two males) with experience teaching online served as evaluators for phase one of this research project. Participants responded to an ad placed on the PSYCHTEACHER listserv. This listserv was chosen because of its focus on being an instructional support system for college faculty. The fact that this listserv is primarily for instructors of psychology courses is another positive factor contributing to its selection because the listserv’s subscribers are familiar with the process of conducting research.

Phase I Procedure

The evaluation team explored the Ped·a·GO!·gy website using a form to determine its ease of use (e.g., readability, clarity, narrow and manageable topics) and content mechanics (e.g., organization, sequencing, transitions; see Appendix B). The form included a ten-point rating scale, with one being the lowest and ten being the highest, to evaluate these eight items. The team also answered four additional, open-ended questions about the website’s best features, least effective features, stumbling blocks (i.e., problems), and any comments they felt were helpful. Evaluations were performed on the website as a whole rather than trying to evaluate each infobase’s sections.

Phase II Use of Ped·a·GO!·gy as a Learning Tool

Phase II Participants

As a minimum, five college professors with varying level of online teaching experience were desired as research participants for phase two. Each college professor was to represent a different innovation adopter category (i.e., innovator, early adopter, early
majority, late majority, and laggard) in order to investigate whether Ped·a·GO!·gy is useful to individuals with different levels of online experience and technological knowledge. In order to maximize the chance that there would be one participant for each adopter category, anyone who responded to the ad posted on the PSYCHTEACHER and POD (Professional and Organizational Development) network listservs were allowed to participate.

Overall, 35 people completed the initial survey and participated in phase two. The vast majority of these participants were women (26 females and nine males) with an average age of 47 (age ranging from 25 to 66). Most participants had a doctorate degree (65.71%) and taught full time (60%). Table 3.1 provides an overview of what material was completed by the 17 participants that actually accessed the website.

Table 3.1
Content Completed by Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Total Number of Pages Visited</th>
<th>Total Number of Quizzes Completed</th>
<th>Total Number of Case Studies Completed</th>
<th>Completed Exit Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>69</td>
<td>1</td>
<td>0</td>
<td>yes</td>
</tr>
<tr>
<td>B</td>
<td>209</td>
<td>3</td>
<td>attempted 3, completed 2</td>
<td>yes</td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>F</td>
<td>55</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>13</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>I</td>
<td>322</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>J</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>K</td>
<td>82</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
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<td>L</td>
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<td>M</td>
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<td>P</td>
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<td>0</td>
</tr>
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<td>Q</td>
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<td>0</td>
</tr>
</tbody>
</table>
Initial Phase II Questionnaire

In order to better understand the types of instructors that visited Ped·a·GO!·gy, a questionnaire was used to learn more about them and determine which innovation adopter category they represented. This questionnaire had the following sections: basic demographic questions (e.g., name, sex, age, institution, e-mail address), questions to determine innovation adopter category, and a modified technology acceptance model 2 scale. The questionnaire is described in the sections that follow (see Appendix C for the format of and items contained in the questionnaire.)

Section 1 of the Phase II Questionnaire

Demographic questions. The questions about basic demographic information (i.e., sex, age, academic discipline, education level, and teaching rank) were primarily used to categorize research participants. These items allowed for the exploration of whether there were differences on the other sections of the initial questionnaire if participants are grouped by the demographic items. These demographic questions also helped determine the type of individual for whom Ped·a·GO!·gy has the most educational value (research question number five in chapter one).

Software experience. The final four questions in this section asked participants to rate their skill with various software applications that are useful in creating/modifying the structure of an online course. Specifically, participants were asked to describe their experience with web authoring programs (e.g., Dreamweaver, FrontPage), animation software (e.g., Flash, SWISHmax), video creation (e.g., QuickTime movies, RealPlayer movies), and their knowledge of computer programming languages (e.g., Java, JavaScript, Perl). Participants rated their experience on a five-point, Likert-type scale ranging from “no
experience” to “advanced user.” Like the demographic questions, the software experience questions helped determine for whom the website is most effective.

Section 2 of the Phase II Questionnaire

Innovation adopter status scale. This section of the initial questionnaire contained 17 items that were designed to determine participants’ classification into the diffusion of innovation adopter categories (i.e., innovators, early adopters, early majority, late majority, and laggards). Unfortunately, no published scale could be found that measured this construct. Therefore, items were created based upon Rogers’ (2003) description of the characteristics of each type of adopter. Table 3.2 provides examples of items for each adopter category.

Table 3.2
Items from the Innovation Adopter Status Scale

<table>
<thead>
<tr>
<th>Adopter Category</th>
<th>Sample Item*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovator</td>
<td>1. I am able to understand and apply complex technical knowledge.</td>
</tr>
<tr>
<td>Early Adopter</td>
<td>3. I make judicious decisions about trying innovative technologies/ideas.</td>
</tr>
<tr>
<td>Early Majority</td>
<td>6. I consider fully all consequences.</td>
</tr>
<tr>
<td>Late Majority</td>
<td>4. I require convincing of the economic necessity of a change.</td>
</tr>
<tr>
<td>Laggard</td>
<td>2. I refer to what has been done in the past for guidance when making decisions.</td>
</tr>
</tbody>
</table>

*The numbers refer to the item number in Section 2 of the Phase II questionnaire.

Participants indicated the degree to which each statement described them using a five-point, Likert-type scale ranging from “very much like me” to “not at all like me.” (See Appendix C for the actual scale.) These items referred to participants’ disposition to the adoption of educational technology/ideas in general rather than specifically focusing on either online technology or online pedagogy. The reason for keeping the focus more global
was that participants, depending upon their experience with either online technology or pedagogy, may not have well-developed beliefs about either of these topics. Moreover, the typical way these individuals responded to educational innovations should be similar enough to (if not the same as) their beliefs about more specific technologies/ideas. Classifying participants into innovation adopter categories helped determine the type of individual for whom Ped·a·GO!·gy has the most educational value (research question number five in chapter one).

*Online learning platform.* Participants were asked two questions about the technology they used to teach their online courses. “Technology” was defined as the computer software being used to form the architecture of the online learning environment. The first question asked about the type of technology used to deliver online instruction. For the typical online instructor, technology is a course management system such as Blackboard, Moodle, WebCT, or ANGEL. A small percentage of instructors, however, may develop their own learning environments or may be using one developed by their institution. The second question dealt with whether participants created their online courses from scratch or used material from textbook publishers. These two questions were included to provide some descriptive information about the individuals who participated in Phase II of the present study.

*Section 3 of the Phase II Questionnaire*

This section of the initial questionnaire concerned whether online instructors accepted and were comfortable using the technology necessary to conduct an online course. The reason for assessing participants’ acceptance is that this construct may help explain why visitors to Ped·a·GO!·gy did/did not plan to make changes in their online courses as a result
of their exposure to the website’s content. Specifically, instructors who are not comfortable with using the technology for their courses may be so overwhelmed with the technology aspect of online teaching that they are unable to focus on the pedagogical aspects. Conversely, instructors who are overwhelmed with technological concerns may not visit Ped·a·GO!·gy. Thus, the measurement of technology acceptance should provide a more complete picture of those instructors who visited Ped·a·GO!·gy.

Technology acceptance was measured in the present study by using the technology acceptance model 2 (TAM2) scale and portions of Gardner and Amoroso’s (2004) modification of the technology acceptance model (hereafter referred to as TAM2m). Both of these scales are based upon Davis, Bagozzi, and Warshaw’s (1989) technology acceptance model, which suggests that an individual’s behavioral intentions to use a specific computer technology are determined by two beliefs, perceived usefulness and perceived ease of use. Perceived usefulness is conceived as an individual’s belief that using a given technology will increase his/her job performance, whereas perceived ease of use refers to the degree to which one believes that using a given technology will be free of effort.

Five subscales of the TAM2 and TAM2m (perceived usefulness of technology, perceived ease of use, attitude toward using technology, behavioral intention to use technology, and voluntariness of using technology) were used in the present study. Table 3.3 displays the items included in these five subscales and indicates the origin of the item. Items were selected from the various versions based upon their appropriateness for inclusion in the present study. One item in the attitude toward technology subscale was specifically created for this research study and does not appear in any of the versions of TAM. Given that most online instructors use commercial course management software (e.g., ANGEL, Blackboard,
or WebCT) to create and manage their online courses, the purpose of this item was to determine whether they felt the software presented too many restrictions on how they put their courses together.

Table 3.3

*Origin of the TAM2 Subscales Used in Phase II*

<table>
<thead>
<tr>
<th>Section 3 Subscale Items</th>
<th>Subscale Items Adapted From:</th>
<th>Original Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TAM (Davis, 1986)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAM2 (Venkatesh &amp; Davis, 2000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAM2m (Gardner &amp; Amoroso, 2004)</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Usefulness of Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Using technology can enable me to accomplish tasks more quickly.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Using technology can improve my instructional performance.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Using technology can make it easier to do my instructional tasks.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Using technology in my job/school can increase my productivity.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Using technology can enhance my effectiveness.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• I find technology useful in my job/school.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Perceived Ease of Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Learning to use technology is easy for me.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>• I find it easy to get what I need from technology.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>• My interaction with technology is clear and understandable.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• I find technology to be flexible to interact with.</td>
<td>✓*</td>
<td>✓</td>
</tr>
<tr>
<td>• It is easy for me to become skillful at using technology.</td>
<td>✓*</td>
<td>✓</td>
</tr>
<tr>
<td>• I find technology easy to use.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Attitude Toward Using Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• I have fun interacting with technology.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>• Using technology provides me with a stimulating challenge.</td>
<td>✓*</td>
<td>✓</td>
</tr>
</tbody>
</table>

*This item is worded differently than a corresponding item in this source, but its intent is similar.*
Table 3.3 (Continued)

*Origin of the TAM2 Subscales Used in Phase II*

<table>
<thead>
<tr>
<th>Section 3 Subscale Items</th>
<th>Subscale Items Adapted From:</th>
<th>Original Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TAM (Davis, 1986)</td>
<td>TAM2 (Venkatesh &amp; Davis, 2000)</td>
</tr>
</tbody>
</table>

### Attitude Toward Using Technology
- Using technology restricts my ability to design effective instruction. [✓]
- Using technology bores me. [✓]

### Behavioral Intention to Use Technology
- I always try to use a technology application to do a task rather than do it manually. [✓]
- I use technology with my face-to-face courses. [✓]
- I plan to use technology in the future. [✓]

### Voluntariness of Using Technology
- Using technology for my online course(s) is voluntary. [✓]
- My college requires all online instructors to use technology. [✓]

*This item is worded differently than a corresponding item in this source, but its intent is similar.

Two subscales of the TAM2m that were not found in Venkatesh and Davis’ (2000) TAM2 were “perceived complexity of using the technology” and “experience using the technology.” Although perceived complexity is similar to the TAM2’s perceived ease of use, this scale was included because it can more directly tap into whether instructors feel overwhelmed by the technical demands of using the course management system for their online courses. Specifically, participants responded to the following items:

- Using technology can take up too much of my time when performing many tasks.
• When I use technology, I find it difficult to integrate the results into my existing instructional work.

• Using technology exposes me to the vulnerability of computer breakdowns and loss of data.

The second scale, experience, provided basic information about how long instructors have been using the technology: “I have a great deal of experience using technology” and “Number of years using technology _____.”

The items in both scales were reworded to be more consistent with the wording of the TAM2 and to relate more to teaching online. (Gardner and Amoroso’s (2004) scale was focused on the use of the internet by consumers.) A five-point Likert-type scale, ranging from “strongly disagree” to “strongly agree”, was used to evaluate all of the statements on in section three of the Phase II initial questionnaire. The only exception was for one question under the experience scale (i.e., number of years using this technology), which required a numerical response. (See Appendix C for the format of and items contained in this scale.)

**Phase II Procedure**

Before participants could enter the Ped-a-GO!gy website, they had to complete the initial questionnaire described in the preceding section. When the questionnaire was completed, a WebCT account was created for each participant and information on how to log into the website was sent to participants via e-mail. The Phase II participants then explored Ped-a-GO!gy’s instructional material in any order they desired. As they explored the website, they were asked to complete the content quizzes and work through the case studies. The intent of these quizzes and case studies was to provide participants with feedback on their learning and to obtain a more objective measure of their ability to use the knowledge
gained from Ped·a·GO!·gy. Once participants were through exploring the website, they were asked to complete an exit evaluation.

Phase II Measures

Phase II Performance Assessment Measures

The 14 concept check quizzes and five case studies that are a part of the infobases provided objective information about the effectiveness of Ped·a·GO!·gy. Even though the concept quizzes are primarily designed to help participants check their understanding of the material they have covered, the results of these quizzes can provide a measure of the declarative knowledge they have gained from Ped·a·GO!·gy.

In addition to helping participants try out some of the ideas presented in Ped·a·GO!·gy, the case studies were used to assess how well participants could apply the material in the infobases. Each case study presented participants with a hypothetical professor who needed help in either creating or modifying his/her online course. After reading about the professor’s dilemma, participants helped the professor by making a series of decisions that resulted in different outcomes depending upon the choices they made. Perhaps the best way to understand the structure of a case study is to think of it as a decision tree, with each decision leading to a different set of options and ultimately, a unique outcome.

For example, participants could be presented with the following situation: “Suppose Professor Harris is creating an online Native American history course where the target audience of students is not expected to have any background knowledge of the topic. Professor Harris has been teaching Native American history for several years as a traditional face-to-face course, but he needs your help to build the best learning environment for his
online students.” Participants could then be asked to select which pedagogical approach (e.g., behaviorism, social constructivism, discovery learning) they believe would be most appropriate for Professor Harris’ course. After making their choice, they are presented a choice of the major learning activity for this course, which would differ based upon their pedagogical choice. For example, if participants chose social constructivism their choice of learning activities might be small group discussions using threaded discussion boards or a group project, whereas if behaviorism was the chosen pedagogy, the choice of learning activities might be a term paper or a series of tests. In the end, one participant’s version of the Professor Harris’ course could look radically different from another participant’s version of the same course.

As participants progressed through each case study, the decisions they made were recorded. The decision participants made in each study were then compared to the information presented in the relevant infobase to determine whether their decisions were an application of the content material. Thus, the case studies can be viewed as a transfer task that provides information on how participants are representing the problem.

Phase II Exit Evaluation

Innovation attribute scale. After visitors are done using Ped·a·GO!·gy, they were asked to rate the usefulness of the site based upon Rogers’ five attributes of an innovation (relative advantage, compatibility, complexity, trialability, and observability) by completing an exit evaluation (see Appendix D). These usefulness ratings, based upon a scale developed by Moore and Benbasat (1991), were used to help determine whether Ped·a·GO!·gy is effective as a method of delivering pedagogical training to educators (research question five in chapter one). This section of the exit evaluation consisted of 25 items (encompassing all
five innovation attributes) that were evaluated on a one to seven scale, where one = “strongly
disagree,” four = “unsure,” and seven = “strongly agree.”

Additional questions. In addition to the innovation attributes scale, eight open-ended
questions were asked about participants’ experience with Ped·a·GO!·gy. These questions
were included to collect qualitative information about participants’ overall impressions of the
website, the topics that were the most and least useful, suggestions for changes to the
website, and whether they made modifications to their online course(s) as a result of
exploring the website. (See Appendix D for the specific questions.)

Chapter 3 Summary

The present research study utilizes various measures to determine the effectiveness of
Ped·a·GO!·gy as an electronic performance support system. The quantity of measures
employed was deemed necessary due to the sparse research data available on using an EPSS
as a vehicle for delivering pedagogical instruction to online instructors. Table 3.4 lists the
measures used in both phases of research and indicates the number of items in each measure,
where the measure (and its contents) can be located in this document, and the number of
participants that completed that measure.
Table 3.4
*Summary of the Measures (Including Subscales) Used in the Present Study*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of Items on Measure</th>
<th>Location of Measure</th>
<th>Number of Participants that Completed Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase I usability evaluation form</strong></td>
<td>12</td>
<td>Appendix B</td>
<td>5</td>
</tr>
<tr>
<td><strong>Phase II initial questionnaire</strong></td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Demographic questions</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Software experience</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Innovation adopter status scale</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Online learning platform</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Technology acceptance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Perceived usefulness of technology</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Perceived ease of use</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Attitude toward using technology</td>
<td>4</td>
<td>Appendix C</td>
<td>35</td>
</tr>
<tr>
<td>o Behavioral intention to use technology</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Perceived complexity of using technology</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Experience</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Voluntariness of using technology</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phase II exit evaluation</strong></td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Relative Advantage</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Compatibility</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Complexity</td>
<td>6</td>
<td>Appendix D</td>
<td>2</td>
</tr>
<tr>
<td>• Results demonstrability (part of observability)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Trialability</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Additional questions</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results

Phase I: Usability Evaluation of Ped·a·GO!·gy

Overall, the five evaluators rated the usability of Ped·a·GO!·gy as high (M=8.64 overall; see Table 4.1). In addition to the rating questions, the evaluators were asked open-ended questions about Ped·a·GO!·gy’s best features, least effective features, stumbling blocks for users, and additional comments about the website (see Appendix B for the form used by the evaluators and see Appendix E for their specific comments). Responses from the evaluators varied concerning what were the best features of Ped·a·GO!·gy. For example, one evaluator felt “the topics are clear and straight forward, they are important to someone considering on-line instruction and they are well referenced,” while another evaluator stated “I found that the quizzes after each section not only helped to reinforce the material presented, but were enjoyable to take.” Overall, some commonalities were that the clarity and organization of the material and the use of quizzes to reinforce learning and made the material more interactive.

Evaluator comments concerning the least effective features of Ped·a·GO!·gy, however, were more variable. For example, one evaluator felt “many people dislike reading on screen…a print version would be helpful.” While this suggestion would be easy to implement, it was not acted upon for Phase II because including a print version of the content material would make tracking the pages visited by Phase II participants difficult. The same evaluator also felt that the user should not be expected to progress linearly through the material. This restriction did not exist because the website was designed as small, self-contained pages that could be accessed (for the most part) in any order through the table of
contents and hyperlinks. Perhaps this evaluator made this comment because the structure of
the website was not clear to him. An explanation that users can access the web pages in any
order by using the table of contents will be included in the “Getting Started” page (discussed
below). Another evaluator felt the topics in the discussion boards were rather vague because
the first post in each section of the discussion board only indicated that the topics would be
generated by the users. This concern was not addressed during the modification of
Ped·a·GO!·gy before Phase II of the study because, at the time, the initial posts seemed
adequate. In retrospect, the advice of another evaluator should have been followed.
Specifically, her advice was “…for each of the specific discussion topics, put a prompt for
discussion in there—for each of those [major] topics [you identified], it’s not clear what the
user is supposed to do, or how to use them, or even who will be discussion with who, and in
what time frame.”

Table 4.1
Ratings of Ped·a·GO!·gy’s Usability by Five Evaluators on Each Usability Criterion

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean Score (out of a possible 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity of content</td>
<td>8.4</td>
</tr>
<tr>
<td>Topics are narrow and manageable (not an</td>
<td>8.2</td>
</tr>
<tr>
<td>overwhelming amount of information)</td>
<td></td>
</tr>
<tr>
<td>Reader’s (user’s) questions are anticipated</td>
<td>8.5</td>
</tr>
<tr>
<td>and answered</td>
<td></td>
</tr>
<tr>
<td>Organization enhances and showcases the</td>
<td>9.0</td>
</tr>
<tr>
<td>central idea or theme</td>
<td></td>
</tr>
<tr>
<td>Sequencing of information is logical</td>
<td>9.6</td>
</tr>
<tr>
<td>Transition between topics is smooth</td>
<td>9.0</td>
</tr>
<tr>
<td>Elaborates statements with explanations,</td>
<td>8.4</td>
</tr>
<tr>
<td>reasons, or evidence</td>
<td></td>
</tr>
<tr>
<td>Readability</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Interestingly, the evaluators with the most criticisms of Ped-a-GO!·gy had looked at less than 25% of the 130 pages on the website. Evaluators that had looked at over 85% of the pages made more comprehensible comments. For example, one evaluator (who covered 87% of the pages) felt the section on the design of online courses may not be appropriate because most online instructors do not design their own courses or they may have to follow their institution’s template for online courses.

Table 4.2 shows the website categories visited by the five evaluators. The “number of unique hits” is based upon the total number of content pages, concept check quizzes, and case studies visited, but it does not include repeat visits to the same page. This total does not include visits to the homepage, glossary, or discussion boards. (When some technical terms within the content pages were clicked, a pop-up window providing a definition of that term appeared, and this appearance of the pop-up window was counted as a visit to the glossary.)

Table 4.2  
Phase I Evaluator Tracking

<table>
<thead>
<tr>
<th>Evaluator</th>
<th>Number of Unique Hits (%)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Glossary</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>29 (22%)</td>
<td>29</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>31 (24%)</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>9 (7%)</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>113 (87%)</td>
<td>35</td>
<td>20</td>
<td>9</td>
<td>43</td>
<td>26</td>
<td>12</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>115 (88%)</td>
<td>44</td>
<td>18</td>
<td>5</td>
<td>58</td>
<td>28</td>
<td>8</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Ped-a-GO!·gy Category Key:
1 = Online Student Characteristics
2 = Student Motivation
3 = Instructional Design Theories
4 = Pedagogical Theories
5 = Nature and Design of an Online Course
6 = Course Evaluation
The stumbling blocks of Ped-a-GO-gy that resulted in the most revision of the website were the homepage and the terminology used. The concern about the homepage was the absence of welcoming information to help people know how to get started. In order to address this concern, a “Getting Started” link was put on the homepage. When users clicked on this link, they will see three short sections explaining the rationale for creating this website, how to use this website, and what to do when they are done using the website.

The other stumbling block identified was the terminology used in the website. In the words of the most vocal evaluator: “My main criticism is that the package seems to be written purely and simply by an academic to impress other academics. If that is the purpose, it works. If not, it doesn’t.” In essence, this evaluator was concerned that there was too much educational jargon to be useful to the average person. He further commented:

For functional purposes “On-line Education for Dummies” is what is needed. Get rid of words like Epistemological [emphasis in original] Beliefs of Students. That is fine for any documentation that accompanies the package or as an appendix to the package but get it out of the package itself. That kind of stuff is a turn-off to most people.

In order to address this concern, all of the content material was re-evaluated to remove as much jargon as possible. In total, 39 pages were revised by either removing jargon or simplifying the explanation of technical terms. Some of the technical terminology, however, was retained so that interested users would understand what the experts in the field are talking about if they looked up any of the references provided on the website. For example, the title of the section on epistemological beliefs of students was changed to “How Students View Learning” and a page entitled “3 Types of Hypertext Navigation Patterns” was changed.
to “3 Ways Students Navigate Web Pages.” Nine section headings were also added to help users scan the table of contents for specific information.

Evaluators provided several practical suggestions on how to improve the website’s usability under the comment section of the evaluation form. Overall, there were 17 suggestions. Eleven of these suggestions were not followed because they either diverged from the intent of the website or contradicted other suggestions. (Two of these 11 suggestions have been previously discussed—providing a print version of the content material and improving the discussion boards.) For example, one evaluator felt there should be a brief overview of the different course management systems (e.g., Blackboard, WebCT), but the intent of Ped·a·GO·gy was to provide information on the pedagogical issues of teaching online not on computer software.

Another evaluator felt there should be more concept check quizzes and the question banks should be large enough to allow users to take a particular quiz multiple times and receive different questions each time. While this suggestion is an excellent idea, the website is currently only a prototype to determine if further expansion is warranted (based upon the Phase II results of the study).

An example of contradictory suggestions is one evaluator wanted more information on the website while another evaluator felt there was too much information on the website. A decision was made to retain the current amount of information given that the website was just a prototype. The decision whether more information should be added or whether information should be removed can be made after the completion of Phase II of the study.

A final set of suggestions that were not followed concerned the table of contents. One evaluator felt the numbering system within the table of contents (e.g., labeling a
particular page as 2.1.1 because it was first page under section 2.1) was confusing and unnecessary. Her suggestion would have been followed, but the numbering system of WebCT cannot be modified nor turned off, so there was nothing that could be done about this problem. The second suggestion was to not have the title of the first page under a section heading be the exact same wording (e.g., section title: Profile of Online Learners and first page: A Profile of Online Learners). This suggestion was not acted upon because the distinction between section headings and pages was deemed clear (section headings were in bold, black text while actual pages were in blue, underlined/hyperlinked text).

Some of the suggestions that were followed include: do not use the color blue to highlight text that is not a hyperlink because this color is commonly used for hyperlinks, provide a brief description of each case study before users actually enter the case studies, put each hyperlink to a different section of the website on its own line rather than having several links on one line, include a “getting started” page (previously discussed above), fix the nonfunctioning hyperlinks to the case studies, and reduce the amount of jargon in the text (previously discussed above). All of these suggestions were followed to improve Ped·a·GO!·gy for the Phase II participants.

*Phase II: Use of Ped·a·GO!·gy as a Learning Tool*

*Computer Experience of Participants*

As might be expected from people who teach online, many participants had experience with creating content for the internet, but the type of experience varied by computer application (questions 9-12 in section one of the Phase II initial questionnaire; see Appendix C). Specifically, most users had experience with web authoring software (e.g., Dreamweaver, FrontPage), but only a few had experience with animation software (e.g.,
Flash, SWISHmax), computer-based video software (e.g., QuickTime, RealPlayer), or computer programming languages (e.g., Java, JavaScript, Perl). The experience level with the different types of software is displayed in Figure 4.1.

![Bar chart showing experience level of participants](image)

*Figure 4.1. Computer software experience of Phase II participants.*

**Innovation Adopter Classification of Participants**

An important part of Phase II was to determine for whom Ped·a·GO!·gy was effective. For this reason, participants completed a questionnaire before entry into the website to identify where they were according to Rogers’ (2003) diffusion of innovation categories (i.e., innovators, early adopters, early majority, late majority, and laggards). Most of the participants were categorized as being on the innovator/early adopter end of the
continuum (see Figure 4.2). This result, although undesired, is understandable given that innovators and early adopters are more likely to seek information outside of their institution than the other adopter categories. Some participants could not be placed in one of the five categories (e.g., the innovator/early adopter and early adopter/early majority classifications; see Figure 4.2). This outcome, however, is not unexpected because Rogers (2003) viewed innovativeness as a continuous variable.

A modified version of the Technology Acceptance Model 2 (TAM2) was used to collect descriptive information about the participants’ comfort with and acceptance of the technology they use to construct their online courses. These feelings were rated on a scale ranging from one to five, with higher scores reflecting more positive feelings toward technology. Overall, participants had positive ratings toward technology (see Table 4.3 for the mean scores on the TAM2 subscales). Participants’ comfort and acceptance of technology was expected to vary by their adopter category, but as can be seen in Table 4.3, there is not much variation between the categories. This lack of variation may be due to their experience of teaching online, which requires a certain level of familiarity with technology.
Innovators Innovators/Early Adopters Early Adopters Early Adopters/Early Majority Early Majority Late Majority Laggards

Figure 4.2. Innovation adoption designations of Phase II participants.

Table 4.3
Mean Ratings (M) and Standard Deviations (SD) Concerning Comfort and Acceptance of Technology Using the Technology Acceptance Model 2 Scale

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Overall (N=35)</th>
<th>Innovator (n=12)</th>
<th>Innovator/Early Adopter (n=5)</th>
<th>Early Adopter (n=12)</th>
<th>Early Adopter/Early Majority (n=2)</th>
<th>Early Majority (n=3)</th>
<th>Late Majority (n=1)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness of Technology</td>
<td>M=4.35, SD=0.66</td>
<td>M=4.28, SD=0.62</td>
<td>M=4.73, SD=0.60</td>
<td>M=4.54, SD=0.64</td>
<td>M=3.25, SD=0.35</td>
<td>M=4.28, SD=0.42</td>
<td>3.50</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>M=3.94, SD=0.81</td>
<td>M=3.86, SD=0.67</td>
<td>M=4.10, SD=1.04</td>
<td>M=4.46, SD=0.51</td>
<td>M=2.67, SD=0.24</td>
<td>M=3.06, SD=0.25</td>
<td>3.00</td>
</tr>
</tbody>
</table>

*Standard deviations were not calculated given only one person was in the category of late majority.
Table 4.3 (Continued)
Mean Ratings (M) and Standard Deviations (SD) Concerning Comfort and Acceptance of Technology Using the Technology Acceptance Model 2 Scale

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Overall (N=35)</th>
<th>Innovator (n=12)</th>
<th>Innovator/Early Adopter (n=5)</th>
<th>Early Adopter (n=12)</th>
<th>Early Adopter/Early Majority (n=2)</th>
<th>Early Majority (n=3)</th>
<th>Late Majority (n=1)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude Towards Using Technology*</td>
<td>M=4.28 SD=0.65</td>
<td>M=4.25 SD=0.57</td>
<td>M=4.25 SD=0.79</td>
<td>M=4.71 SD=0.33</td>
<td>M=3.63 SD=0.18</td>
<td>M=3.50 SD=0.66</td>
<td>3.25</td>
</tr>
<tr>
<td>Behavioral Intention to Use Technology</td>
<td>M=4.19 SD=0.57</td>
<td>M=4.03 SD=0.63</td>
<td>M=4.40 SD=0.43</td>
<td>M=4.44 SD=0.50</td>
<td>M=4.33 SD=0.47</td>
<td>M=3.44 SD=0.19</td>
<td>4.00</td>
</tr>
<tr>
<td>Perceived Complexity of Using Technology*</td>
<td>M=3.53 SD=0.78</td>
<td>M=3.64 SD=0.80</td>
<td>M=3.80 SD=0.84</td>
<td>M=3.58 SD=0.85</td>
<td>M=2.67 SD=0</td>
<td>M=3.11 SD=0.38</td>
<td>3.33</td>
</tr>
</tbody>
</table>

*Items on these subscales had to be reverse scored so that higher values would reflect more positive ratings of technology.
†Standard deviations were not calculated given only one person was in the category of late majority.

Website Activity

Despite the large number of people who agreed to participate, very few did more than complete the initial questionnaire. Specifically, 18 of the 35 individuals never even logged into the website. Out of the 17 participants who did log on, only four people visited at least 50% of the 130 web pages and only two people visited at least 75% of the pages. (See Table 3.1 for details.)

Some sections of the website were visited more than others. The pages in the “Online Student Characteristics” section received more traffic (356 total visits) than other sections. The other two sections that were also frequently visited were “The Nature and Design of an Online Course” (140 visits) and “Pedagogical Theories” (116 visits; see Table 4.4).
Table 4.4  
*Number of Visits Per Section of Ped-a-GO!-gy*

<table>
<thead>
<tr>
<th>Section</th>
<th>Total Number of Visits</th>
<th>Total Number of Pages in Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Student Characteristics</td>
<td>356</td>
<td>31</td>
</tr>
<tr>
<td>The Nature &amp; Design of an Online Course</td>
<td>140</td>
<td>29</td>
</tr>
<tr>
<td>Pedagogical Theories</td>
<td>116</td>
<td>42</td>
</tr>
<tr>
<td>Student Motivation</td>
<td>69</td>
<td>15</td>
</tr>
<tr>
<td>Instructional Design Theories</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>Course Evaluation</td>
<td>24</td>
<td>7</td>
</tr>
</tbody>
</table>

The most frequently visited pages were those pages containing information about online students. In fact, only eight of the 23 pages with at least 10 visits were not directly related to students (see Table 4.5). Not surprisingly, most of these pages were in the Online Student Characteristics section. There were 109 pages with fewer than 10 visits, and 81 of these pages had five or fewer hits.

Table 4.5  
*Pages Most Frequently Visited in Ped-a-GO!-gy*

<table>
<thead>
<tr>
<th>Page Title</th>
<th>Total Number of Visits</th>
<th>Section Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Student Characteristics</td>
<td>39</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>A Profile of Online Learners</td>
<td>37</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>How Students View the Nature of Learning</td>
<td>24</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>(an introduction)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic Characteristics of Online Learners</td>
<td>19</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Successful Online Student Characteristics</td>
<td>19</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Student Motivation: A Definition</td>
<td>16</td>
<td>Student Motivation</td>
</tr>
</tbody>
</table>
Table 4.5 (Continued)
*Pages Most Frequently Visited in Ped-a-GO!gy*

<table>
<thead>
<tr>
<th>Page Title</th>
<th>Total Number of Visits</th>
<th>Section Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality Characteristics of Online Learners</td>
<td>15</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Introduction to Instructional Design</td>
<td>15</td>
<td>Instructional Design Theories</td>
</tr>
<tr>
<td>Placing Your Online Course in an Instructional Category</td>
<td>14</td>
<td>The Nature &amp; Design of an Online Course</td>
</tr>
<tr>
<td>Epistemic Beliefs Inventory (a tool to determine how students view the nature of learning)</td>
<td>13</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Cognitive Styles and Learning Styles</td>
<td>12</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Online Pedagogy (Overview)</td>
<td>12</td>
<td>Pedagogical Theories</td>
</tr>
<tr>
<td>Principles of Design (that transform difficult tasks into simple tasks)</td>
<td>12</td>
<td>The Nature &amp; Design of an Online Course</td>
</tr>
<tr>
<td>Traditional vs. Nontraditional Students</td>
<td>11</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Simple vs. Complex Beliefs About How Learning Occurs</td>
<td>11</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Students’ View of Learning Case Study</td>
<td>11</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Scales to Measure Learner Characteristics</td>
<td>11</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Dick and Carey Model</td>
<td>11</td>
<td>Instructional Design Theories</td>
</tr>
<tr>
<td>Behavioral Approaches to Learning (an introduction)</td>
<td>11</td>
<td>Pedagogical Theories</td>
</tr>
<tr>
<td>Course Evaluation Introduction</td>
<td>11</td>
<td>Course Evaluation</td>
</tr>
<tr>
<td>Online Student Characteristics Quiz</td>
<td>10</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>7 Dimensions of Successful Online Students</td>
<td>10</td>
<td>Online Student Characteristics</td>
</tr>
<tr>
<td>Contents of an Orientation Session</td>
<td>10</td>
<td>The Nature &amp; Design of an Online Course</td>
</tr>
</tbody>
</table>
Measures of Learning

Two measures of participants’ learning from the content material were quizzes and case studies. Neither measure provided much useful data because of the low number of quizzes and case studies completed (see Table 4.6). Specifically, participants only completed three of the 14 quizzes over the content material and two of the five case studies. The Online Student Characteristics quiz (in the Online Student Characteristics section) was completed by seven participants with an average score of 60.71%. (Note: There were only four questions on this quiz, which may account for the low scores—three of the seven people missed only one question or none at all.) The Successful Student Characteristics quiz (also in the Online Student Characteristics section) was completed by four people with an average score of 95% (five total questions). The Student Motivation quiz, however, was only completed by one person and she answered 68.75% of the 16 questions correctly. This individual was the only person that took all three quizzes and her scores on the previously mentioned quizzes were 50% and 100%, respectively. There were no commonly missed questions on the first two quizzes.

All of the five case studies presented participants with a hypothetical professor who needed help with some aspect of his/her online classes. Participants made decisions throughout the case studies that affected the final outcome. Upon the completion of each case study, participants rated the case study on its ease of use, usefulness (in designing/redesigning their own online courses), and the instructional value (i.e., degree to which the case study helped them understand the subject matter). Ratings were made using a lever that participants could slide to indicate their ratings (the rating choices were, from lowest to highest: 1, 2.5, 5, 7.5, and 10). As participants moved the lever, the facial
expression of a man who held a sign depicting the numeric rating changed in a manner consistent with the rating (e.g., a rating of 1 was accompanied by a frown and a rating of 10 was accompanied with a large smile). The three case studies that were completed were Students’ View of Learning, Student Motivation, and Pedagogical Theories.

Table 4.6
Measures of Learning Completed

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of Participants Completing Measure/Number of Participants Visiting the Measure, But Not Completing It*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept Check Quizzes</strong></td>
<td></td>
</tr>
<tr>
<td>Online student characteristics</td>
<td>7/10</td>
</tr>
<tr>
<td>Successful student characteristics</td>
<td>4/4</td>
</tr>
<tr>
<td>Students’ view of learning</td>
<td>0/7</td>
</tr>
<tr>
<td>Cognitive/learning styles</td>
<td>0/3</td>
</tr>
<tr>
<td>Student motivation</td>
<td>1/2</td>
</tr>
<tr>
<td>Instructional design theories</td>
<td>0/4</td>
</tr>
<tr>
<td>Behaviorism pedagogy</td>
<td>0/2</td>
</tr>
<tr>
<td>Cognitivism pedagogy</td>
<td>0/1</td>
</tr>
<tr>
<td>Constructivism pedagogy</td>
<td>0/0</td>
</tr>
<tr>
<td>Online pedagogy</td>
<td>0/1</td>
</tr>
<tr>
<td>Clark-Kozma debate</td>
<td>0/1</td>
</tr>
<tr>
<td>Instructional considerations</td>
<td>0/1</td>
</tr>
<tr>
<td>Design usability</td>
<td>0/2</td>
</tr>
<tr>
<td>Course evaluation</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Case Studies</strong></td>
<td></td>
</tr>
<tr>
<td>Students’ view of learning</td>
<td>5/11</td>
</tr>
<tr>
<td>Student motivation</td>
<td>1/7</td>
</tr>
<tr>
<td>Instructional design theories</td>
<td>0/6</td>
</tr>
<tr>
<td>Pedagogical theories</td>
<td>1 attempt, but did not complete/3</td>
</tr>
<tr>
<td>Design usability</td>
<td>0/5</td>
</tr>
</tbody>
</table>

*For the case studies, the number of participants visiting the measure refers to people that read a description of the case study but did not open it.

Four people completed the Students’ View of Learning case study. All of these participants read the material on epistemological beliefs of students (the subject matter of the Students’ View of Learning subsection in the Online Student Characteristics section) before
completing the case study. All four of the participants choose to administer the Epistemic Beliefs Inventory as their first option of how to help the hypothetical professor with her online course. On the surface, it would appear that the participants made this choice based upon what they learned from reading the Students’ View of Learning subsection. This conclusion, however, cannot be drawn with any level of certainty because three of the participants listed psychology as their academic discipline on the initial questionnaire and the remaining person listed education-human resources as her discipline. All four of these participants may have already been aware of this instrument given their field of expertise. The participants, however, rated the quality of the case study positively (i.e., the average rating for ease of use was 8.33, usefulness was 6.67, and instructional value was 6.17).

The Student Motivation case study was only completed by one participant (the same person that completed all three quizzes described above). This case study presented participants with three theories of motivation that could be used to assist the hypothetical professor in helping an unmotivated student. The participant went through the case study three times in order to apply each theory to address the problem posed in the case study. (After participants worked through their first choice of theories to apply, they were given the option of quitting the case study or selecting one of the remaining theories in order to go through the case study again.) All of the reasons the participant provided for her choices in the case study suggested that she carefully considered each decision. For example, when she was asked to provide suggestions for how to help the unmotivated student, she responded:

I don’t know that I’d try to directly impact her motivation all at once. Specific, detailed suggestions might sound like platitudes if Jasmine is as weak on self-efficacy as she appears from her goals. Rather, I’d try to ask her questions to get her engaged
in the material that she finds most interesting and then get her to share what she has learned on some of these topics with her classmates so that she feels more competent.

Concerning the quality of this case study, the participant rated the ease of use at 10, the usefulness at 2.5, and the instructional value at 7.5.

The Pedagogical Theories case study was completed by only one participant (the same participant discussed above). Unfortunately, whether her decisions in the case study were influenced by what she read in the Pedagogical Theories section cannot be determined because an explanation for one of her choices in the case study mentioned that she has done outside reading on the topic. Moreover, she did not provide ratings concerning the quality of the case study.

Exit Evaluation of Ped-a-GO!gy

Only two participants completed the exit evaluation of Ped-a-GO!gy. The number of visits to the website differed for these two participants. Specifically, participant A had 69 hits to the website (completed one quiz and no case studies), while participant B had 209 hits (completed three quizzes and two case studies). The exit evaluation asked participants to rate the website using Rogers’ (2003) five attributes of an innovation that influence the decision process of potential adopters (i.e., relative advantage, compatibility, complexity, trialability, and observability). Ratings were made on a seven-point, Likert-type scale ranging from “strongly disagree” (coded numerically as one) to “strongly agree” (coded as seven). With the exception of trialability (3.90), the two participants gave Ped-a-GO!gy high ratings (see Table 4.7).
Table 4.7
Rating of Ped·a·GO!·gy’s Innovation Attributes

<table>
<thead>
<tr>
<th>Innovation Attribute</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>relative advantage</td>
<td>5.57</td>
</tr>
<tr>
<td>compatibility</td>
<td>6.17</td>
</tr>
<tr>
<td>complexity*</td>
<td>6.08</td>
</tr>
<tr>
<td>trialability</td>
<td>3.90</td>
</tr>
<tr>
<td>observability*</td>
<td>6.00</td>
</tr>
</tbody>
</table>

*Some items for these attributes were reverse scored so that higher numbers would reflect more positive ratings of the website.

The exit evaluation also contained open-ended questions about participants’ experience with Ped·a·GO!·gy and feelings toward it. Both participants rated their overall experience with the website as positive with a couple of caveats. Participant A felt Ped·a·GO!·gy was “…a great repository of information,” but felt there was “…maybe a little too much theory and not quite enough application.” Participant B’s experience was “positive, but a little boring and dry.” Moreover, participant B suggested,

The case studies were fun and instructive and the reading materials were excellent—but what most “carries” an online course and what most instructors are looking for in professional development is connection with other instructors so that ideas can be shared. That makes online discussion VITAL [emphasis in original] to learning. But instructors won’t do it unless there is some incentive or reward (because it is easier and faster to avoid collaboration).

Participant A also felt that online discussion between the participants would have made the learning experience better.

The exit evaluation also required participants to describe how they used Ped·a·GO!·gy to design/redesign their online courses. Both participants stated that the information in the website gave them ideas on how to redesign their courses, but they did not list any specific
changes they planned to make. In particular, both participants felt the information on learning styles would be very beneficial as they redesign their courses. Participant A liked the information on multiple learning styles and plans to use it in her online course, but her comments suggest that either she did not completely understand the research on learning styles or disagreed with it. (The research studies that were presented suggested that modifying course material and delivery methods in order to accommodate student learning styles is unnecessary.)

Participants also indicated the strengths and weaknesses of the website and offered suggestions for change. Both respondents felt the strengths of Ped·a·GO!·gy was that it was easy to use, easy to navigate, and contained good information. The weaknesses were too much information and the need for collaborative dialogue between research participants to aid in the learning process. Suggestions for improvement centered around reducing the amount of information and increasing the collaboration with other participants.

*Follow-up questionnaire for non-completers*

Given that a large number of participants did not explore Ped·a·GO!·gy once they were granted access, a follow-up questionnaire was sent to 31 participants and 10 people responded. The questionnaire consisted of a few short questions about why they “were unable to explore/complete more of the Ped·a·GO!·gy website” (see Appendix F). Eight of the 10 respondents indicated that they were too busy with other things in their lives to explore the website in greater detail. Only one respondent indicated that the material in the website was not useful to her. Participants were also asked whether they would have completed more of the website if they would have received course credit or some other kind
of compensation. Half of the respondents indicated that compensation would have been a motivator and half indicated that compensation was not an important consideration.

Discussion

The intent of the present research was to determine whether faculty training about online pedagogy could occur in a self-paced, online, EPSS format. This question cannot be completely answered based upon the present results. Even though the Phase I evaluators gave Ped·a·GO!·gy high ratings and indicated that it would be a useful tool, few Phase II participants explored the website. The limited conclusions that can be drawn from this research may lie in basing the architecture of the website on an EPSS model and the use of diffusion theory as a theoretical framework during the conceptualization and actual design stages of the website.

Efficacy as an EPSS

The concept of an EPSS has been more extensively used in business than in education (Clark, 2006; Park, Baek, & An, 2001). One company that has benefited from using an EPSS is Federal Express (FedEx). The shipping company developed an EPSS to help their customer service employees learn more about Federal Express’ products and services so they can provide better service to employees. FedEx found that the EPSS reduced instruction time by 50% and increased job knowledge test scores by 20 points for employees that used the system (Marquardt & Kearsley, 1999). Intel and American Airlines also implemented EPSSs for their salespeople in order for them to access all of the up-to-date information they needed while they were in the middle of a sales call (Coker et al., 1999). In the past, salespeople in both companies would have to end the call and go back to the office to get the information they needed.
However, not all companies that have used EPSSs have data to support their effectiveness. A 1996 study by SB Communications surveyed companies that used computer-based training and found that larger companies (more than 1,000 employees) were the most likely to use an EPSS for training. Surprisingly, SB Communications found that only 31% of companies that used an EPSS had evaluated its effectiveness (Benson, 1997). Participant feedback was the most common form of evaluation. Only 10% of these companies had evaluated their EPSS for improved job performance by employees and only five percent had evaluated their EPSSs for their return on investment.

In the educational realm, an EPSS called STEPS (Support for Teacher Enhancing Performance in Schools) was created to help pre-service and practicing pre-K-12 teachers develop instruction in accordance with Florida’s Sunshine State Standards. Park et al. (2001) evaluated the usability of STEPS to determine its effectiveness. Based upon their analysis of STEPS’ usability and feedback from users, Park et al. made the following recommendations for designing an effective educational EPSS: design an interface that supports teacher performance, provide context specific information, provide structured navigational schemes, and provide interactivity.

As an EPSS, Ped·a·GO!·gy satisfies these recommendations. Specifically, Ped·a·GO!·gy does utilize an interface that supports teacher performance because users can go to whatever topic (i.e., context specific information) that they need information about by using the structured navigation scheme. For example, if an instructor using the site is revising the way she evaluates her online course and she would like some suggestions on the topic, she can use the table of contents in Ped·a·GO!·gy to go to the section on course
evaluation. Interactivity is also provided to users of Ped·a·GO!·gy through the case studies and the discussion boards.

Given that Ped·a·GO!·gy satisfies Park et al.’s (2001) recommendations for an educational EPSS, why was it not utilized by more research participants? Stoyanov et al. (2008) suggests that the reason EPSSs are not more effective in higher education is that the motive for their use is different than their motive for use in business (for which they were originally designed). The most important goal for an EPSS in business is to increase the performance of employees. Typically, employees need to learn something specific to complete a task and an EPSS provides this training on an “as needed” basis. For example, an employee needs to learn how to create a form in Microsoft Word that automatically imports data from Microsoft Excel in order to complete a report for a meeting. An EPSS will provide this employee with training on how to set up such a form so the report is ready for the meeting, but will not help him/her relate this knowledge to his/her existing knowledge of Microsoft Word or Excel. The employee may now know how to create auto-filling forms in Microsoft Word, but he/she will not learn any underlying principles of Word or Excel (Stoyanov et al., 2008). Thus, business places less emphasis on employee development (in the knowledge learning sense).

Colleges, however, are more concerned about learning goals than performance goals because learning how to do something without understanding why it has to be done may interfere with students’ ability to learn the subject matter (Stoyanov et al., 2008). Using the above example, college professors would not teach students how to create an auto-filling form in Microsoft Word without explaining the logic behind this process because this logic may be similar to the logic used on other tasks in either Microsoft Word or Excel. Professors
would also use this learning experience to explain some universal computing principles to help students extend what they learned to a variety of other computing tasks rather than isolate the learning to creating an auto-filling Word form.

Thus, an EPSS may not be the best way to administer faculty development because using Ped·a·GO!·gy is not essential for instructors’ job performance. Even though the information contained in Ped·a·GO!·gy could possibly improve their current/future online courses, users could continue teaching their courses the same way without any adverse effect on their job performance/evaluation. By contrast, business employees directly benefit from using an EPSS because it typically allows them to learn a new way of doing their jobs. Perhaps the success of the STEPS program lies in the fact that teachers had to design/change their curriculum (as a requirement of their employment) to meet state standards and an EPSS allowed them to do so.

Moreover, Ped·a·GO!·gy is not the same type of EPSS as STEPS. There are three types of EPSSs: external, extrinsic, and intrinsic. An external EPSS stores its database in a source outside of the software being used, which results in the user having to exit a task in order to access the EPSS (Nguyen & Klein, 2008). For example, a user working in a particular computer program has to stop working with the software to open up a web browser to access the company’s intranet database. An extrinsic EPSS is integrated in user’s computer program in such a way that the user believes the EPSS is part of the software itself. Microsoft’s “office assistance” is a simple example of an extrinsic EPSS because the help it provides is context sensitive and it does not appear to be a help file that is separate from the operation of the computer program (e.g., Microsoft Word). Finally, an intrinsic EPSS is part
of a software program’s primary interface and cannot be separated from the application itself. (The help files in a program like Microsoft Word can be opened outside of Word itself.)

As an external EPSS, Ped·a·GO!·gy cannot be accessed within whatever software application instructors are using to design their online courses. As a result, instructors have to stop whatever they are doing to access Ped·a·GO!·gy and then locate the information they need. STEPS, on the other hand, can be viewed as an extrinsic EPSS because the software teachers were using to revise their curriculum had the support and training applications of the EPSS built into it. Therefore, teachers using STEPS did not have to interrupt their workflow to access the information they needed. Ped·a·GO!·gy may have been utilized more if it could be accessed by users while they were working on designing/revising their online courses. However, converting Ped·a·GO!·gy to an extrinsic EPSS is not possible because instructors use a variety of commercial products (e.g., Dreamweaver, Flash, FrontPage) and course management software (e.g., Blackboard, ANGEL, Moodle) to create their online courses, none of which could be modified to include Ped·a·GO!·gy as part of the operating system.

Diffusion of Innovation as a Theoretical Foundation

Rogers’ (2003) diffusion of innovation theory was seen as a useful framework to use when designing the website because it suggested that the needs of instructors may be different based upon their experience with technology. During the development process, however, the website was compiled with a developer-based interpretation of diffusion theory. Surry and Farquhar (1997) believe that the use of diffusion theory in the field of instructional technology should be viewed as being divided into two major categories, Systemic Change Theories (macro-level theories) and Product Utilization Theories (micro-level theories).
Systemic Change Theories focus on reforming and restructuring educational institutions through the use and implementation of technology. Conversely, Product Utilization Theories are concerned with getting people to adopt and use a particular technological innovation. These two categories of instructional technology diffusion theories interact with two philosophical viewpoints, technological determinism and technological instrumentalism, to produce two subcategories, developer-based (deterministic) and adopter-based (instrumentalistic) theories (see Table 4.8).

Technological determinism views technology as an independent force that is not under direct human control and is the main source of social change. Technological instrumentalists view technology solely as a tool and believe that social conditions and human striving are the main source of social change. The goal of the developer-based diffusion theory is to increase diffusion of technology by increasing the efficiency and effectiveness of a particular innovation. The premise of this theory is that if technology is well designed and effective, people will not want to use anything else because the new technology is logically superior. Adopter-based diffusion theory, on the other hand, realizes that humans are not always rational and may choose inefficient technology. For example, the Dvorak keyboard is superior in many ways (e.g., faster typing speed and the frequently used keys are more evenly distributed between both hands) to the QWERTY keyboard, but people were reluctant to switch to the Dvorak keyboard because they were comfortable using the QWERTY keyboard even though it was less efficient (Surray & Farquhar, 1997). Instead of focusing on the technology itself, adopter-based diffusion theory focuses on the human, social, and interpersonal factors that affect the adoption of a technological innovation.
Table 4.8
*Summary of Instructional Technology Diffusion Theories via Their Goals and Guiding Philosophies*

<table>
<thead>
<tr>
<th>Philosophy</th>
<th>Goal Systemic Change (Macro-level)</th>
<th>Goal Product Utilization (Micro-level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer-based (determinist)</td>
<td>focus is on changing the structure and basis of an organization</td>
<td>focus is on creating and evaluating effective instructional products</td>
</tr>
<tr>
<td>Adopter-based (instrumentalist)</td>
<td>focus is on the social, political, and professional environment in a specific organization</td>
<td>focus is on the needs and opinions of potential users of a specific instructional product and the environment in which the product will be used</td>
</tr>
</tbody>
</table>

Table 4.8 is adapted from Figure 2 in Surray and Farquhar (1997).

Ped·a·GO!·gy should have been designed from the users’ perspective because participants seemed to want more interpersonal interaction (as demonstrated by Phase II participant comments), but the website’s EPSS design was not well-suited for direct communication between participants. Park et al. (2001) found that the teachers using STEPS also wanted more human interaction. The initial development of Ped·a·GO!·gy followed an adopter-based approach by soliciting input from online instructors about what they would like to see in an online training program. Unfortunately, only a few instructors responded to this request, so the emphasis unintentionally shifted to a developer-based approach. Following the developer-based approach resulted in the belief that if Ped·a·GO!·gy was well designed, instructors would find the website useful and learn more about teaching online.
Hypothetical Outcomes

Given the lack of data to make firm conclusions, one might wonder what complete data would have suggested about the efficacy of the website. The following subsections will assume that all 35 participants logged into Ped·a·GO!·gy and visited all of the web pages and completed all of the quizzes and case studies. The purpose of this section is to illustrate how the Phase II measures would have provided the necessary data to evaluate the effectiveness of Ped·a·GO!·gy as an EPSS.

For Whom Ped·a·GO!·gy is the Most Useful

Knowing who the target audience is for an innovation is important. The diffusion of innovation adopter categories were considered to be useful in determine the most appropriate audience for Ped·a·GO!·gy. For the purpose of this hypothetical discussion, it will be assumed that the 35 participants were evenly spread across the innovation adopter categories (seven participants in each category). These categories can be treated as an independent variable (with each adopter category representing a different level of innovation) and the quizzes, case studies, and the exit evaluation can serve as the dependent variable in order to conduct a series of one-way analysis of variance (ANOVA) tests. Post hoc analysis of any significant ANOVAs can determine where the differences between the adopter categories lie on the various measures.

Through the use of these analyses, the topics can be ranked based upon the performance of each adopter category. A couple of examples will illustrate how this ranking would work. Topics that all adopter categories performed well on are probably topics that are well suited for instructors that are relatively new to online teaching (e.g., late majority and laggards). Furthermore, topics that early adopters and innovators perform well on, but
other categories perform poorly on, are best suited for these two categories. By structuring
the content material by adopter category, the innovation adopter portion of the initial Phase II
questionnaire (see Appendix C) can be used to guide future Ped·a·GO!·gy visitors to start
with those sections that seem appropriate to their adopter status.

Concept Check Quizzes and Case Studies

Performance on the quizzes is an initial step in determining that participants can learn
about online pedagogy through the content in Ped·a·GO!·gy. In order for the content material
to be deemed effective, the average score on the quizzes would have to be at least 70%
because in an academic setting this value is the lowest level that is passing (C-). Participant
scoring above 70% provides an objective measure of whether they are gaining declarative
knowledge of the content material. Satisfactory performance on the quizzes is only the first
step because helping instructors apply the content to their online courses is the raison d’être
of Ped·a·GO!·gy.

The success of the case studies would be determined by participant ratings of their
ease of use, usefulness (in designing/redesigning their own online course), and instructional
value (i.e., degree to which the case study aided in the comprehension of the subject matter).
Of these three ratings, usefulness and instructional value are indicators of whether
participants feel the information has value. (The ease of use rating is primarily a check of the
usability of the case studies. Low ease of use ratings may explain low usefulness and
instructional value ratings.) Even though these ratings are subjective, they are necessary
because if participants do not feel the information is useful, they will not apply it to their
online courses. In order for the case studies to be viewed as successful, the average ratings
on both measures must be 7.5 (out of a possible 10) or higher.
Exit Evaluation of Ped·a·GO!·gy

Participant rating of the website on the exit evaluation serves as a final means of determining whether Ped·a·GO!·gy helped instructors learn more about teaching online. Of the five innovation attributes on the exit evaluation, only relative advantage provides information about the effectiveness of the website. The other four attributes focus on the usability of Ped·a·GO!·gy. (Ratings on these four scales are important because low ratings on them may lead to low ratings on the relative advantage scale. Thus, a low rating on the relative advantage scale would be more of a reflection of the usability of the website rather than a reflection of its actual usefulness.) The average rating on the relative advantage scale should be five (on a scale where seven is the highest value) in order for Ped·a·GO!·gy to be viewed as useful to participants.

The additional questions section of the exit evaluation provides useful information about what aspects of Ped·a·GO!·gy work and which do not. This information can be used to improve the website for future users. Specifically, information that few participants found useful can be removed and information that many participants found useful can be expanded to include more information.

The additional questions also provide information about how participants used the website’s information to improve their online courses. For example, participants who found the information on epistemological beliefs of students useful may use the epistemic beliefs inventory to determine how their students view the nature of learning. These instructors may then focus on how to shape students’ epistemological beliefs in such a way that helps them succeed in an online course, as well as other courses. Instructors that found the section on course evaluation useful may modify the way they currently evaluate their online courses.
Chapter 4 Summary

Before discussing the recommendations for future studies, a review of this study’s actual findings is in order. This review is divided into two sections, primary results and secondary results. The primary results section focuses on whether the present study answered the research questions posed in chapter one. The secondary results section focuses on information learned through the course of the study that does not directly relate to the research questions, but is useful in determining the next step of research concerning Ped·a·GO!·gy.

Primary Results

Research Question 1

Will faculty access educational material without the guidance and prompting of an instructor or facilitator? In the present study, very few participants accessed the information on their own. Specifically, only four people visited at least 50% of the 130 web pages. Eighteen of the 35 participants never even logged into the website.

Research Question 2

What topics concerning online instruction are faculty most interested in learning about? From the viewpoint of the six main categories of Ped·a·GO!·gy, information about the characteristics of online students and information about the nature and design of an online course were the most accessed topics. Conversely, information about course evaluations was the least visited section of the course. The individual pages with the most visits tended to be from the Online Student Characteristics and The Nature and Design of an Online Course sections. The one exception was the Introduction to Instructional Design page, (located in the Instructional Design Theories section) which was tied with the Personality Characteristics
of Online Learners page for the most visits. Why participants were drawn to this page, but yet did not explore more pages in this section is unknown. (The Dick and Carey Model page was the only other page in the Instructional Design Theories section that had more than 10 hits; see Table 4.5.)

Research Questions 3 and 4

Question 3: Can faculty learn about online pedagogy through a website designed like Ped·a·GO!·gy? Question 4: Can interactive case studies serve as an effective way for instructors to apply the information they are learning in Ped·a·GO!·gy? Due to the lack of activity by participants, research question three cannot be answered definitively.

Performance on the concept check quizzes were designed to provide this information, but the completion rate was so low that no conclusions could be drawn. Responses by the Phase I evaluators and the ratings of the case studies by Phase II participants, however, suggested that the website has potential. Specifically, two of the Phase I evaluators felt the information in the website would be beneficial to someone who is new to online teaching (for more detail, see the responses of evaluators A and D under the “Comments” section of Appendix E).

Overall, the ratings of the case studies suggested that Ped·a·GO!·gy can help instructors learn about online pedagogy. Unfortunately, only two of the five case studies were completed, and only a few people completed them. For both of these case studies, participants, on average, rated the instructional value of the case studies above a six on a 10-point scale. The case study that was completed by the most participants (i.e., Students’ View of Learning) had a usefulness average score of 6.67, which also suggested that the case studies had academic value.
Research Question 5

Is Ped-a-GO!-gy useful for all online instructors, regardless of their experience with online instruction and the software used to create and facilitate online courses? This research question could not be answered for two reasons. First, classifying participants according to their diffusion of innovation adopter category was not useful because most people were on the innovator/early adopter end of the continuum. Second, only two people completed the exit evaluation and they were essentially in the same adopter category (one was an innovator and the other was an innovator/early adopter), so there is not any information for the other categories. Moreover, there was only one person in the late majority category and there were not any laggards in the study, thus what data are available are skewed toward the innovator end of the continuum.

Secondary Results

Interest in an Educational EPSS

Even though the completion rate did not reach expectations, there does seem to be interest in this manner of learning. The fact that 35 instructors responded to a call for research participants through a listserv posting is encouraging. Granted, not all 35 participants took advantage of the learning opportunity, but the fact that they took the time to complete the initial survey suggested that faculty are looking for alternative methods of learning about online pedagogy.

Importance of Interaction

The initial conception of Ped-a-GO!-gy was the creation of an automated, self-service method of instruction. During the course of Ped-a-GO!-gy’s evaluation, the importance of interpersonal interaction became more apparent. In Phase I of the study, evaluators pointed
out that the design of the discussion boards did not encourage communication between participants. The two Phase II participants echoed the need for interaction between the users of the website. This concept does not readily fit into the concept of an EPSS because the intent of an EPSS is to provide “just in time” training for users at the exact moment they need it. Consequently, when an individual learner needs input from another participant, he/she may have to wait quite awhile for another person to respond to the request, either because the person is not online at the same time or does not log in regularly. Further research needs to be conducted to determine what role interpersonal interaction should play in an EPSS.

Diffusion of Innovation’s Usefulness

Rogers’ (2003) categories of innovation diffusion were expected to provide information about the type of online instructor that would benefit the most from a website like Ped·a·GO!·gy, however, this measure did not yield any useful information in the present study. Part of the reason for this failure was that not all of the adopter categories were equally represented (most of the Phase II participants were in the innovator and early adopter categories), and the categories that were represented, did not show much variations. The only conclusion that can be safely made from the present study is that primarily teachers on the innovation end of the continuum were interested in Ped·a·GO!·gy’s content.
CHAPTER 5: RECOMMENDATIONS FOR FUTURE STUDIES

The basic idea behind Ped·a·GO!·gy (i.e., providing instructors with information about teaching online in one convenient website) was good, however, the actual delivery of the idea was flawed. The sage advice of Richard Clark concerning the relation between technology and learning was not heeded. Specifically, Clark posited that “The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition.” (Clark, 1983, p. 445) Too much focus was placed on the media itself rather than on the learning of users. Future research needs to keep the needs of learners and their preferred mode of learning in the forefront because even though effective instructional technology can be designed, there is no guarantee that people will use or accept it. The desire for human interaction in both the present study and Park et al.’s (2001) research suggests that if interaction cannot easily and meaningfully be incorporated into instructional technology, then perhaps more traditional approaches (workshops, conferences, and academic courses) to faculty development are more appropriate.

Moreover, Ped·a·GO!·gy may have been designed too broadly (trying to accommodate everyone from novices to experts). If it was just focused on novices, less information could have been presented and it would not seem so overwhelming, a point championed by one of the evaluators in Phase I of the present study. Future studies should consider designing smaller, separate websites targeted toward the knowledge level of the users (beginner, intermediate, advanced) without regard to their diffusion of innovation category classification. The use of diffusion categories in the current study was not useful in describing characteristics of people that used Ped·a·GO!·gy or found it beneficial.
Furthermore, if Ped-a-GO-gy were to be revised, these innovation categories would not provide any useful information about the type, amount, or format of information to include.

Future studies should initially test the efficacy of an educational EPSS such as Ped-a-GO-gy in the laboratory rather than in the field. In a laboratory setting, participation can be assured through the use of graduate students as participants. The use of extra credit or making an EPSS part of their coursework can provide incentive for completion of the instructional program. Even though a laboratory setting is by its nature artificial, this initial phase of testing could determine whether people can learn pedagogical information from an EPSS. The content material could also be delivered in a traditional classroom setting utilizing lectures on the various topics. The advantage of including an in-class instructional delivery is that the content material could be assessed as a quality check to make sure it is not the content material itself (rather than the form of delivery—in-class lecture versus online delivery) that is the reason participants did not explore Ped-a-GO-gy to a greater extent.

Once the learning potential of an EPSS is demonstrated in the laboratory, the EPSS could then be field tested to determine if this method of instruction is desirable and useful to working professionals. Even though this two-stage approach to EPSS evaluation would take longer to complete, it would still accomplish the goals of Ped-a-GO-gy (determining the efficacy and usefulness of an EPSS for faculty development). Moreover, the results of the laboratory phase could provide information that increases the likelihood that online instructors will want to use the EPSS and find it useful.

The need for control in the initials stages of testing is echoed by the research of Kraut et al. (2004), who studies the opportunities and challenges of conducting research on the internet. These researchers found that online participants may not devote as much time and
energy to an online research task as they would in a traditional laboratory experiment. Some of the respondents to the follow-up questionnaire for non-completers of Ped·a·GO!·gy indicated that they did not explore the website further because they did not feel they had time to do so. Of course, any laboratory testing of an EPSS would still require participants to access the material using a computer. However, having participants working on a computer in a laboratory can ensure that they actually do explore the EPSS.

Kraut et al. found that the lack of participant monitoring and control make online data collection more difficult. Even though WebCT could be used to track the pages visited by the Ped·a·GO!·gy participants and the amount of time they spent on each page, it cannot determine what they did once they accessed the page. Did they print the page so they could study it offline? Perhaps they navigated to a particular page and was then distracted by a phone call and never actually looked at the page (even though WebCT indicated they spent 10 minutes on that page).

One method of maximizing participation in a field study is providing some sort of compensation for participation. Even though the follow-up questionnaire for Ped·a·GO!·gy did not provide any conclusive evidence that external motivation would have led to greater participation, the possibility cannot be ruled out. Giving research participants graduate credit or a certificate of completion is one possible means of compensation. As discussed in Chapter 1, several colleges are now offering courses and certificate programs in online pedagogy that are becoming more popular.

Regardless of the approach future studies take to evaluate whether an EPSS is a viable alternative to traditional forms of faculty development, the effort appears to be worthwhile. As the popularity of college online courses and the related research on them
continues to grow, the need for continual faculty development will also grow. The use of an EPSS may be one way to meet this need. The present study indicates there is faculty interest in this approach, but the best way to design the EPSS for the educational arena (as opposed to corporate setting) has yet to be determined.
APPENDIX A. Ped-a-GO!-gy’s INSTRUCTIONAL MATERIAL

Appendix A contains the information that was used to help users of Ped-a-GO!-gy learn more about online instruction. The original format of this information was a series of HTML pages and thus contained interactive features that do not completely translate to print format. In order to convey the feel and look of the website, hyperlinks will be indicated in blue underlined text with a parenthetical explanation of the destination of the link (if necessary). This parenthetical explanation will be displayed in RED, CAPITAL LETTERS to distinguish it from parenthetical information present in the original source. The original web pages used colored text and bold more often than is appropriate for a doctoral dissertation. Therefore, the used of colored text was eliminated and the amount of bolded text was reduced. (The original purpose of the colored and bolded text was to make it easier to scan the web page and get an idea of the information contained on a given page. The research of Jakob Nielsen (2000; Nielsen & Tahir, 2002), an expert on effective website design, suggests that internet users prefer online information to be organized in a manner that facilitates scanning because people will not read an entire page in order to decide if it contains the information they want.) A horizontal line will be used to separate the individual web pages.

Even though the material could be accessed in any order on the website, the material will be presented in the order as it appeared in Ped-a-GO!-gy’s table of contents. The six major sections of the website (online student characteristics, student motivation, instructional design theories, pedagogical theories, and the nature and design of an online course) are indicated in ALL CAPITAL LETTERS for the purpose of clarity. Each major section is divided into smaller subsections. The titles of these subsections will be centered on
the page and will have a mix of capitalized and uncapitalized letters (i.e., title case). The titles of individual pages within these subsections will be centered on the page, be in “title case” format, and be italicized. Thus, the hierarchical format of Ped·a·GO!·gy will be apparent by following the hierarchical header levels used by the American Psychological Association and the use of an outline nomenclature:

I. MAJOR SECTION OF PED·A·GO!·GY

I. A. Subsection of Ped·a·GO!·gy

I. A. 1. Individual Page Within a Subsection

Italicized, flush-left headings will be used with an individual page to indicate the different sections within a given page.

________________________________________________________________________

I. ONLINE STUDENT CHARACTERISTICS

This unit will focus on learning more about the students who take online courses. The material in this section will be broken into five sections:

1. A Profile of Online Learners
2. Successful Student Characteristics
3. How Students View the Nature of Learning
4. Scales to Measure Learner Characteristics
5. Cognitive Styles & Learning Styles

(EACH OF THESE HYPERLINKS GOES TO THE SECTION INDICATED BY ITS NAME.)
I. A. A Profile of Online Learners

A common mistake that some first-time online instructors make is to assume that students who take online courses are the same as the students that take face-to-face courses. This section explores attributes of online students, such as demographic, personality, and age, in order to have a better understanding of who takes online courses.

I. A. 1. Demographic Characteristics of Online Learners

Are Traditional Characteristics of Distance Learners True for Online Learners?

Understanding who takes your online course(s) is helpful because the course(s) can be modified to be a better fit with your students. Browsing through research articles can be useful to provide you with an idea of the general characteristics of online learners. Two recent studies help build a profile of the typical online learner. The first study (Qureshi, Morton, & Antosz, 2002) was conducted to determine whether traditional characteristics of distance education students were also true of online students. (Even though online learning is a form of distance education, these traditional characteristics were established before web-based learning was fairly common.) Qureshi, Morton, and Antosz’s (2002) study focused on comparing four online courses offered at the University of Ontario, Canada that required extensive use of technology to equivalent face-to-face courses.

Online students were found to possess the following characteristics:

- more likely to have children and a higher income
- more likely to have web-based experience and more experience with e-mail
- less academically motivated
more concerned about situational, institutional, and dispositional barriers to participating in educational activities (There was no significant difference between online and face-to-face students concerning whether their learning styles served as a barrier to learning.)

- Situational barriers are circumstances in one’s life (e.g., family, work, geography, and childcare) that make it difficult to pursue an education.
- Institutional barriers are organizational policies and procedures that make it difficult to pursue an education.
- Dispositional barriers are attitudes toward oneself and learning that hinder learning.

Face-to-Face Learners vs. Online Learners

Halsne and Gatta (2002) surveyed 1,642 students (340 online students and 1,302 traditional, face-to-face students) to determine the characteristics of online learners. All students were from the same community college in a Chicago suburb. Analysis of the survey results yielded the following characteristics (all of these characteristics are statistically significant) of online students:

- visual learning style (traditional students were primarily auditory or kinesthetic learners)
- spent 5.15 hours per week on coursework (traditional students spent 4.04 hours per week on coursework)
- more women were enrolled in online courses than men
- married/divorced with children living at home
- typical age range of 26 to 55 (traditional students were typically under age 25)
• average annual total family income is higher than traditional students (over $40,000 versus under $12,499, respectively)

• typically employed full time

• have more education than traditional students (i.e., online students have taken college courses before attending this community college, whereas traditional students only had a high school education)

• typically part-time students

References


I. A. 2. Personality Characteristics of Online Learners

In an effort to better understand the role that personality characteristics can play with online students at their university, Mattes, Nanney, and Coussons-Read (2003) administered the 16 Personality Factor (16PF) questionnaire to both online and on-campus students at the University of Colorado at Denver. The 16PF questionnaire assesses 16 primary personality characteristics (Warmth, Reasoning, Emotional Stability, Dominance, Liveliness, Rule-
Consciousness, Social Boldness, Sensitivity, Vigilance, Abstractedness, Privateness, Apprehension, Openness to Change, Self-Reliance, Perfectionism, and Tension) and five global personality factors (Extraversion, Anxiety, Tough-Mindedness, Independence, and Self-Control). Students also completed a questionnaire about demographic variables (e.g., age, gender, and comfort level with computers). Analysis of the two questionnaires yielded the following characteristics of online students (i.e., characteristics that differed from on-campus students).

**Characteristics of Online Students:**

- older than on-campus students (mean age of 27 for online students versus mean age of 22 for on-campus students)
- more comfortable with computers
- male online students are more extroverted
- scored higher on the 16PF’s Reasoning factor (indicating that online students have more ability to engage in abstract thinking)
- had higher apprehension scores (indicating a tendency toward worry and insecurity)
  - Mattes et al. (2003) believe this finding suggests that online students may be uncomfortable in social situations and may feel apprehensive in traditional face-to-face courses.
- scored lower on the Social Boldness factor (Low scores are typically more socially timid, cautious, and do not like public speaking.)
- male online students scored higher on the Self-Reliance factor
I. A. 3. Traditional vs. Nontraditional Students

Online courses typically include a mix of traditional-aged students and nontraditional-aged students. A comparison of their characteristics may help instructors better understand the students in their courses.

Similarity Between Traditional and Nontraditional Students

Both traditional and nontraditional undergraduate students initially tend to need more structure in online courses (Palloff & Pratt, 2003). One way to accommodate this need is to begin with more concrete learning experiences and gradually move to more abstract learning experience. For example, course activities could provide students with an experience of a concept/phenomenon and then provide a theoretical explanation for the experience rather than presenting the theory first. By providing the experience first, students may be better able to connect the experience to similar experiences in their memory, thus when the theory is presented, they are aware of existing knowledge to which the theory can be attached.

Differences Between Traditional and Nontraditional Students

Traditional Learners:

- prefer to know exactly what is expected of them
- have a low tolerance for ambiguity
- prefer sequential learning tasks

Reference

- dislike self-directed or open-ended assignments

**Nontraditional Learners:**
- tend to be goal-oriented (knowledge learned in a course can be used to advance one’s career)
- tend to be experience-based (they have more life experience to draw upon)
- can tolerate more ambiguity in assignment or course expectations
- perform well with self-directed and collaborative learning experiences
- do not require as much instruction and structure (i.e., they have a tolerance for ambiguity)

**Reference**


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**I. B. Characteristics of Successful Online Students**

We have all had successful and unsuccessful students, but what makes one student successful and another student unsuccessful? This section will explore this question by focusing on the characteristics of successful students and two other factors (procrastination and time management) that impact a student's success.

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**I. B. 1. General Qualities Online Students Should Possess**

The Illinois Online Network (2003) has created a list identifying the characteristics they believe students should possess to be successful in online courses. These characteristics are:
1. Keep an open mind and be willing to share your education, work, and life experiences with other people in the course so that you can all learn from each other.

2. Being able to communicate effectively through writing is critical because most of your online communication with the instructor and other students will occur in a written format.

3. Students should be self-motivated and self-disciplined because the freedom and flexibility of online course provide a greater temptation to procrastinate.

4. Do not hesitate to let the instructor know if you are having problems because many times the instructor will not know what is happening unless you inform her/him.

5. Be willing to set aside four to fifteen hours per week to work on a single online course because online courses typically require more time than students realize.

6. Online courses may be more convenient, but they are not easier so be aware of the course requirements and expectations.

7. Realize that online courses may require you to develop your critical thinking and decision making skills as part of the learning process.

8. Students are responsible for having reliable access to the computer technology necessary to complete an online course.

9. Take time to think things through before responding in online activities so that you can better represent your beliefs and knowledge.

10. Online students need to believe that online courses provide the same level of quality education as traditional, face-to-face courses, otherwise they may not take these courses as seriously, and thus, not learn all that they could.
The Illinois Online Network also has resources to help students determine if online courses are for them, tips for succeeding online, and articles about online learning.

**Reference**


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**I. B. 2. Seven Dimensions of Successful Online Students**

Typically research on what makes students successful focuses on the students who are successful to see what separates them from the unsuccessful students. Schrum and Hong (2002) took a different approach by investigating what factors *colleges* suggest are important for success in online courses (as indicated by material available to prospective web students that helps them decide if online education is for them). The researchers then compared these factors to literature on successful online students and then asked 14 expert online instructors to rate the importance of these factors to online success, based on their teaching experience.

The seven dimensions are:

1. **Tools:** Students who have access to the appropriate tools required for a course, such as reliable internet connection, the proper browser plug-ins (e.g., Flash, Adobe Portable Document Files, QuickTime), and consistent access to a computer, are more likely to succeed. Students without these tools are more likely to drop or fail.

2. **Technology Experience:** Successful students have experience with and are comfortable with using course tools, such as e-mail, word processing software, and
web browsers. Students who have to learn both technology and course content are typically overwhelmed and hence, do not succeed.

3. **Learning Preferences:** Students need to be able to recognize their own abilities and styles, and they must be able to adjust if the learning environment does not mesh with their abilities and styles (or at least be willing to ask for assistance).

4. **Study Habits and Skills:** Online courses typically give more control to students, so they must be willing and able to take the responsibility for getting their work done on time rather than expecting the instructor to continually prod them.

5. **Goals and Purposes:** Successful students are motivated to complete an online course because it satisfies a goal in their lives. The goal of successfully completing a course is what keeps them engaged and participating in the course.

6. **Lifestyle Factors:** Students need to be aware of the demands and responsibilities of their professional (if they are employed) and personal lives. If students cannot meet these demands and do not have the support of family, friends, co-workers, and employers, they will have great difficulty being successful in the course.

7. **Personal Traits and Characteristics:** The way students handle their personal affairs and activities unrelated to academics affects course performance. Personality characteristics, such as self-discipline and determination, do affect course success because online courses demand more personal responsibility than on-campus courses.

*How Online Instructors can Help Students be Successful*

Schrum and Hong (2002) also asked these expert online teachers what they do to help students succeed in the online course. The experts suggested the following tactics and suggestions:
• Foster a *sense of community* by having students introduce themselves to the class through student homepages or posting to a discussion board. If possible, have a face-to-face meeting with students at the beginning of the course so they can get to know the instructor and each other.

• Interact with students on a one-to-one basis and maintain regular contact with students.

• Allow students to work collaboratively on some projects so they can learn from each other.

• Establish a minimum amount of participation for all students so people are less likely to become inactive in the course.

• Provide course readings that are current, interesting, and challenging.

• Create a space in the learning environment where students can communicate with each other.

• When creating an online learning environment, use the least amount of technology necessary so students can focus on learning content rather than learning technology (or waiting for large files to download).

**Reference**


I. B. 3. Procrastination in Online Courses

Procrastination in Online Courses and Face-to-Face Courses

Procrastination is a common problem in all courses, but may be more problematic in online courses. Elvers, Polzella, and Graetz (2003) compared an online section of a course to the face-to-face section of the same course to determine if procrastination had different impacts on performance in the two sections. Both sections had access to online material that included audio lectures, graphics, videos, and activities. Procrastination was measured by comparing the date of first access for each web page and the date of the test covering that course material. Although Elvers et al. (2003) did not find a statistical difference between the two sections for the level of procrastination, they did find that procrastination had a larger effect on course performance in the online section than it did in the face-to-face section. Specifically, they found that procrastination was a good predictor of performance for each of the five tests over course material. Please bear in mind that these results only represent one research experiment and may not be true for all online courses. These results, however, do highlight the importance of procrastination as a reason why students may not be successful in an online course.

Why was procrastination a good predictor for students in online courses but not for students in face-to-face courses? The researchers suggest the difference may have to do with the structure of the two types of courses. Specifically, even though face-to-face students procrastinate as much as online students, they are at least exposed to the course material on a regular basis through class attendance. Conversely, online procrastinators may not be exposed to the material until the day before the actual exam.
Suggestions on how to Reduce Procrastination

What can be done to reduce the possibility of procrastination in online courses? Elvers et al. (2003) suggest that making the course more structured can lessen procrastination by keeping students actively engaged in the course. Ways of making an online course more structured include giving frequent tests, setting subgoals, creating learning contracts with students that must sign, setting clear deadlines, requiring course involvement (e.g., a certain number of postings in threaded discussions each week), and weekly e-mail progress reports.

Reference


I. B. 4. Time Management

Students new to online learning typically do not realize the time commitment necessary to be successful. Some of these students believe that online courses require less time than face-to-face courses because they do not have to physically attend class at a prescribed time. Therefore, encouraging students to devise a plan concerning how they will allocate time for a course can increase their chances of success. Palloff and Pratt (2003) provide the following suggestions on how students can better manage their time:

- **Setting Goals:** Students who have goals are more likely to stay focused and keep working. Students should set overall course goals as well as smaller goals, such as the amount of work to be completed each week/day.

- **Setting Priorities:** Sometimes the amount of work to be completed can seem overwhelming to students, and thus, they may have difficulty deciding which
activities to complete first. Students may find it useful to create a list of things they need/want to do and categorize these tasks into the following categories:

- **Not Important or Urgent**: Items that fall into this category are typically leisure time activities (e.g., talking on the phone, watching TV, playing video games). Even though these items are not important, students should set aside some time for them (but not too much) to allow themselves a break from course work.

- **Not Important but Urgent**: When there are items in this category students should ask themselves what the consequences will be if these tasks are not completed. Given that these tasks are not important, the consequences should be minimal, and thus, student may be better off focusing their attention on other tasks.

- **Important but Not Urgent**: Students should create a timeline for completing the tasks in this category rather than waiting until close to the deadline to start these projects (e.g., term papers due at the end of the semester).

- **Important and Urgent**: If students plan appropriately by creating timelines for tasks in the previous category, there should not be that many tasks that are both important and urgent. Proper planning can keep this category small, which will reduce stress levels.

- **Budgeting Time for Studying and Interacting Online**: An effective way to approach the creation of an academic work schedule is the preview-view-review approach.

  - **Previewing**: Students look at the entire online course (including the syllabus) before starting any work. Then they write down on a calendar when
assignments, tests, discussion postings, etc. are due and decide how much
time needs to be spent on a weekly basis to ensure that all work is completed
in a timely manner.

- **Viewing**: This stage of the process involves actually doing the work in a
timely manner.

- **Reviewing**: The reviewing stage requires students to look over completed
work and material and reflect upon what has been learned. Palloff and Pratt
(2003) believe that students are less likely to become self-directed learners
and critical thinkers unless they engage in reflection.

**Reference**


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I. C. How Students View Learning

I. C. 1. How Students View the Nature of Learning (an Introduction)

“I don’t know why I got such a low grade; I knew every definition in the book.”

Teachers occasionally hear this comment from frustrated students who disagree with a test
grade. Questioning by teachers sometimes reveals that these students knew some simple
facts, but missed the larger issue of how these facts fit together and how this information can
be applied. Why do these students assume they know the material well enough? One reason
may be their epistemological beliefs (the nature of knowledge and learning). Thus, in order
to better understand students, whether they are taking a course online or on campus, a look at
their epistemological beliefs and how these beliefs affect academic learning is in order.
I. C. 2. Simple vs. Complex Beliefs About How Learning Occurs

There is no one way of describing epistemological beliefs, so this discussion will start with simple conceptions and move to more complex. Jacobson and Spiro (1995) discuss two basic types of epistemic beliefs, *simple* and *complex*. (Jacobson and Spiro prefer the term “epistemic” because it refers to a more general character of knowing as a type of experience than does the term “epistemology.”)

**Students with a simple epistemic belief system prefer:**
- simplification of course content
- the memorization of pre-specified knowledge

Conversely, students with a complex epistemic belief system prefer:
- working with complex knowledge in multiple ways
- value more active learner construction of knowledge.

In their research on hypertext learning environments (Jacobson & Spiro, 1995), they found that students do better when they are taught in a manner that matches their belief system about the nature of knowledge. Specifically, students with a complex epistemic belief system perform better in open-ended instruction (i.e., more learner freedom and less instructor-provided structure to the course activities), whereas students with a simple epistemic belief system perform better with a direct instruction approach (i.e., more prescribed activities and greater structure to activities).
I. C. 3. Dualistic vs. Relativistic Beliefs About How Learning Occurs

Michael Ryan (1984) studied the reading comprehension of students by looking at their epistemological beliefs. Ryan classified students as having either a dualistic (fact-oriented; something is either right or wrong, true or false) or a relativistic (context-oriented; whether something is right or wrong depends upon the particular framework within which information is interpreted) perspective of knowledge. Ryan used the cognitive domain of Bloom’s taxonomy to determine the standard of comprehension used by each type of belief. Dualistic students would use knowledge as a standard for comprehension because they tend to assess their understanding of a text passage by whether they can recite its important points. Relativistic students, on the other hand, would create a schematic map of the conceptual relationships between the important points in the reading, and thus, use comprehension or application as their standard for understanding. The results of Ryan’s (1984)
study supported the above distinction because the comprehension strategy of dualistic students tended to earn them poorer grades than relativistic students.

**Reference**


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*Dimensions of Epistemological Beliefs*

Marlene Schommer (1993) was interested in comparing the epistemological beliefs of community college students and university students. Schommer departed from Ryan’s (1984) characterization of epistemological beliefs being unidimensional (dualistic-relativistic) and proposed that people have a “system of beliefs” (i.e., there are several dimensions of epistemological beliefs that are somewhat independent of each other). Through a factor analysis, Schommer arrived at four dimensions of epistemological beliefs.

**Schommer’s Four Dimensions of Epistemological Beliefs:**

- **innate ability** (people are born with a specific capacity for learning)
- **quick learning** (either one will learn material in a short amount of time or not at all)
- **simple knowledge** (knowledge is best conceptualized as isolated facts)
- **certain knowledge** (knowledge is fixed)

Specifically, Schommer (1990) found that the more students believed in quick, all-or-none learning, the more likely they were to
- form overly simplistic solutions to problems
- perform poorly on a test assessing their mastery of a topic
- overestimate their understanding of a written passage.

In a similar fashion, the more students believed in certain knowledge, the more likely they were to arrive at absolute conclusions.

*Methodological Concerns with Schommer’s Research*

Before looking at the results of Schommer’s comparison of the epistemological beliefs of community college students vs. university students, a word of caution is necessary. Schommer’s research (1993) contains a methodological flaw that may limit the applicability of her findings. This flaw concerns her choice of students and courses to compare. All community college students were from an introductory psychology course while university students were either enrolled in an introductory educational psychology course or an introductory physics course. Even though a second goal of her research was to compare the epistemological beliefs of students in social sciences versus technological sciences, the comparison is not a fair one. Students enrolled in an introductory psychology course come from all disciplines because this course fulfills a general education requirement, whereas the two university courses are targeted for a more select audience (such as students either majoring or minoring in the area). A better comparison would be to compare community college and university students taking the same course. Another possible problem with comparing these two groups is that some of the students in the university courses may be of either junior or senior status and there is no equivalent in a community college. Perry (cited in Ryan, 1984) suggests that students move from a more primitive view of knowledge (a dualistic perspective) to a more mature view of knowledge (a relativistic perspective) through
their experiences in college. Thus, some of the students in the university courses may have a more developed epistemology, not because they chose to attend a university after high school, but because they have more educational experience.

*Epistemological Beliefs of Community College and University Students*

Despite these methodological concerns, Schommer’s (1993) research does highlight some important points to consider when thinking about what learner characteristics (epistemological beliefs, in this case) students bring with them to an online course. In fact, Schommer’s conclusion argues that instructors should try to determine their students’ epistemological beliefs because “Education, by its very nature, is steeped in epistemology.” (Schommer, 1993, p. 368) Here are the findings on her four dimensions of epistemological beliefs:

- university students were more likely to believe that the ability to learn is innate
- community college students were more likely to believe that knowledge is simple, certain, and that learning occurs either quickly or not at all

*Parental Influence on the Development of Epistemological Beliefs*

Schommer (1993) also looked at how parents raised these students to determine if family upbringing affected the epistemological beliefs students developed. Her basic findings were:

- the parents of students who were less likely to believe in simple knowledge had more education and gave more encouragement to their children for independent decision making
- students who were less likely to believe in quick all-or-none learning were farther along in school and had parents with more education
female students were less likely to believe in quick all-or-none learning

References


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I. C. 5. A Developmental Stage Approach to How Students View the Nature of Learning

A final way of looking at epistemological beliefs of students is to take a developmental stage approach. The reflective judgment model (King et al., 1983) takes such an approach and proposes seven stages of development. Each stage represents a different set of assumptions about knowledge and reality that can be viewed as the way one’s beliefs are intellectually justified. These stages are sequential and hierarchically ordered and each stage represents a more complex and effective method of belief justification. Moreover, each stage represents a qualitatively different way of understanding the nature of knowledge and the process of inquiry.

Seven Stages of Epistemological Development

1. The belief that there is an absolute correspondence between perception and reality.

   Thus, *truth can be obtained merely through observation.*
2. The belief that there is an objective reality that is only known with certainty by some people (authorities, such as scientists, doctors, and teachers). If truth cannot be obtained through observation, then one should adopt the views of authority figures.

3. The realization that even authorities cannot always know or obtain the truth. When truth or knowledge is uncertain, beliefs can be justified by what “feels right.” Stage three expands the categories of knowledge into three, right, wrong, and uncertain.

4. The belief that even though there is an objective reality, it can never be known with any degree of certainty. In this stage the category of uncertain becomes further differentiated and generalized, while the categories of right and wrong are no longer seen as general categories—they are merely special cases (because there are few things that are unequivocally right or wrong).

5. The realization that knowledge is uncertain, therefore, objective knowledge cannot exist. Any belief must be considered in reference to its specific domain or context because every domain/context has its own rules of inquiry and unique perspective. (For example, the fields of psychology, sociology, and anthropology all study human behavior, but their understanding of it is different because of the way they study and perceive human behavior.)

6. The belief that even though all knowledge is based on subjective interpretation, some beliefs are more credible (e.g., more rational or reasonable) and have more support (i.e., a greater number of compelling arguments) than other beliefs. This belief is founded upon the creation of general principles of inquiry that can be applied in all domains and contexts.
7. *Knowledge is now seen as the result of a continual process of inquiry by numerous people over time.* This process of inquiry can come close to truth, as long as claims are able to be reevaluated, criticized, and reformulated as new data becomes available.

*Education Level and Epistemological Development Stage*

Where are students distributed with respect to these stages? King et al. (1983) report the following mean reflective judgment scores (think of these means as representing a particular stage number) for students ranging from high school to graduate school. (See Table A.1.)

Table A.1  
*Mean Reflective Judgment Scores for Each Education Level*

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Mean Reflective Judgment Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school juniors &amp; seniors</td>
<td>2.77-3.40</td>
</tr>
<tr>
<td>College students</td>
<td>3.30-4.07</td>
</tr>
<tr>
<td>Graduate students</td>
<td>4.00-5.67</td>
</tr>
</tbody>
</table>

*Reference*

Epistemological Beliefs and Hypermedia

Bendixen and Hartley (2003) were interested in the role students’ view of the nature of the learning process played in learning in a hypermedia tutorial. Even though a tutorial is not the same as a semester-long, online course, their findings are relevant because the tutorial’s learning environment (text with hyperlinked definitions, pictures, learning objectives, navigational menu, and site map) is similar to that of an online course.

The students that performed the best were less likely to believe that:

- authorities have special knowledge that other people do not
- the ability to acquire knowledge is innate (and thus cannot be changed by effort)

Bendixen and Hartley (2003) also found that the reading ability of students played an important role in learning from hypermedia. While the fact that reading ability was important to success may not be surprising, it does serve as an important reminder that students’ reading ability cannot be taken for granted.

Ill-versus Well-Defined Problems

Bendixen and Hartley (2003) suggest that epistemological beliefs play a larger role when the learning task involves ill-defined problem solving. In their study, for example, students who believed learning occurs quickly or not at all, performed well on the assessment task, which is in marked contrast to previous research that found poorer performance for students who believed in quick knowledge. A possible reason for this difference is their research involved a well-defined problem with factually-based assessment and previous research on epistemological beliefs typically used ill-defined problems. Thus, complex and well-developed epistemological beliefs may not be necessary for well-defined problems.
Reference


I. C. 7. Development of the Epistemic Beliefs Inventory

Marlene Schommer’s (1990; HYPERLINKS TO THE “A SYSTEMS APPROACH TO HOW STUDENTS VIEW LEARNING” PAGE) interest in the epistemological belief systems of students led her to develop the Epistemological Questionnaire (EQ). The EQ contained 63 items and was designed to identify her five dimensions of epistemological beliefs, but it was only able to support four of the five dimensions (i.e., certain knowledge, simple knowledge, quick learning, and innate ability). Schraw, Bendixen, and Dunkle (2002) believed Schommer’s five dimensions were a good way of characterizing epistemological beliefs and they wanted to provide support for her dimension of omniscient authority (people in positions of authority, such as scientists, possess knowledge that is not available to other people), which was not supported by Schommer’s (1990) original research. Thus, they developed the Epistemic Beliefs Inventory (EBI), which consists of only 28 items (seven of which were modified items from the EQ). Respondents read each of the 28 statements and state their agreement with the statement using a five-point, Likert-type scale where one is “strongly disagree” and five is “strongly agree.” Recently (L. D. Bendixen, personal communication, July 9, 2004), the EBI has been expanded to 32 items.

Take the EBI (HYPERLINKS TO AN INTERACTIVE WEB PAGE THAT ALLOWS THE USER TO COMPLETE THE EBI AND VIEW THE RESULTING SCORES)
References


I. C. 7.a. Epistemic Beliefs Inventory (a Tool to Determine How Students View the Nature of Learning)

*Here is a version of the EBI with the epistemic dimension each item measures in parentheses (for more information on these dimension see Development of the EBI): (HYPERLINKS TO THE “DEVELOPMENT OF THE EPISTEMIC BELIEFS INVENTORY” PAGE)*

Please indicate how strongly you agree or disagree with each of the statements listed below. Please circle the number that best corresponds to the strength of your belief based upon the following scale.

1. It bothers me when instructors don’t tell students the answers to complicated problems. (*Simple Knowledge*)

2. Truth means different things to different people. (*Certain Knowledge*—reverse score)
3. Students who learn things quickly are the most successful. *(Quick Learning)*
4. People should always obey the law. *(Omniscient Authority)*
5. Some people will never be smart no matter how hard they work. *(Fixed Ability)*
6. Absolute moral truth does not exist. *(Certain Knowledge—reverse score)*
7. Parents should teach their children all there is to know about life. *(Omniscient Authority)*
8. Really smart students don’t have to work as hard to do well in school. *(Fixed Ability)*
9. If a person tries too hard to understand a problem, they will most likely end up being confused. *(Quick Learning)*
10. Too many theories just complicate things. *(Simple Knowledge)*
11. The best ideas are often the most simple. *(Simple Knowledge)*
12. People can’t do too much about how smart they are. *(Fixed Ability)*
13. Instructors should focus on facts instead of theories. *(Simple Knowledge)*
14. I like teachers who present several competing theories and let their students decide which is best. *(Certain Knowledge—reverse score)*
15. How well you do in school depends on how smart you are. *(Fixed Ability)*
16. If you don’t learning something quickly, you won’t ever learn it. *(Quick Learning)*
17. Some people just have a knack for learning and others don’t. *(Fixed Ability)*
18. Things are simpler than most professors would have you believe. *(Simple Knowledge)*
19. If two people are arguing about something, at least one of them must be wrong. *(Certain Knowledge)*
20. Children should be allowed to question their parents’ authority.  *(Omniscient Authority—reverse score)*

21. If you haven’t understood a chapter the first time through, going back over it won’t help.  *(Quick Learning)*

22. Science is easy to understand because it contains so many facts.  *(Certain Knowledge)*

23. The moral rules I live by apply to everyone.  *(Certain Knowledge)*

24. The more you know about a topic, the more there is to know.  *(Simple Knowledge)*

25. What is true today will be true tomorrow.  *(Certain Knowledge)*

26. Smart people are born that way.  *(Fixed Ability)*

27. When someone in authority tells me what to do, I usually do it.  *(Omniscient Authority)*

28. People who question authority are trouble makers.  *(Omniscient Authority)*

29. Working on a problem with no quick solution is a waste of time.  *(Quick Learning)*

30. You can study something for years and still not really understand it.  *(Simple Knowledge—reverse score)*

31. Sometimes there are no right answers to life’s big problems.  *(Certain Knowledge—reverse score)*

32. Some people are born with special gifts and talents.  *(Fixed Ability)*

*Scoring:*

Add up the scores for all of the questions in each belief system. Before adding up the scores, be sure to reverse the score (e.g., a score of 1 becomes a 5) for items 2, 6, 14, 20, 30, and 31.
I. D. Scales to Measure Learner Characteristics

Understanding as much as possible about students can help instructors design more effective instruction and have a better understanding why some students are successful and other are unsuccessful, despite having similar academic abilities. This section will discuss the characteristics of online students as reported in the literature, but instructors should consider conducting an analysis of their learners to get a better idea of what attributes they bring to your course. (Even though the research cited in this section is based upon larger samples of students than in your course(s), your students may not possess the same characteristics because unique factors, such as employment status and age.)

_Scales to Measure the Cognitive-Motivational Characteristics of Students_

Alvin Wang and Michael Newlin (2000) conducted a study to determine the characteristics of students who succeeded in online section of Statistical Methods in Psychology. The importance of their research for the present discussion, however, is not the outcome of their research. Instead, the focus is on the scales they used to determine these characteristics because these scales may be of use to you in the analysis of your students (if you decide to conduct such an analysis). Specifically, Wang and Newlin (2000) focused on scales that measured the cognitive-motivational characteristics of students. The seven scales they used, along with a brief description of each are:
1. Locus of Control Scale
   a. **Description:** The Locus of Control Scale assesses whether one’s generalized expectancies for reinforcement tend to be controlled internally or externally. In other words, are the consequences to one’s behavior something that is under the individual’s control (“If I perform the same behavior in the future I can expect the same results to happen again.”) or are the results controlled by outside forces (such as other people, fate, chance)?

2. Academic Locus of Control Scale
   a. **Description:** A true-false test of students’ beliefs in their personal control over academic outcomes.

3. Learning Styles Inventory
   a. **Description:** The Learning Styles Inventory assesses a student’s approach to learning and yield scores on four subscales, concrete experience, reflective observation, abstract conceptualization, and active experimentation.
4. **Need for Cognition Scale**
   a. **Description**: This scale measures the degree to which an individual engages in and enjoys thinking.

5. **Work Orientation and Family Orientation Scale**
   a. **Description**: This scale measures achievement motivation and attitudes towards one’s career and family.

6. **Approaches to Studying Inventory**
   a. **Description**: The Approaches to Studying Inventory assesses students learning styles based upon their cognitive and motivational orientations.
   b. **Source of Scale**:

7. **Style of Processing Questionnaire**
   a. **Description**: This scale assesses the degree to which students process information in a visual or verbal fashion.

Another scale that can be used, but not mentioned by Wang and Newlin (2000), is the Motivation Strategies for Learning Questionnaire developed by Pintrich, Smith, Garcia, and McKeachie (1991). This questionnaire has two main sections, one section measuring motivation and the one section measuring learning strategies. The motivation section consists of three general components (value, expectancy, and affective) and six scales (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety). The learning strategies section consists of two components (cognitive and metacognitive strategies and resource management strategies) and eight scales (rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, and help seeking).

**References**


I. E. Cognitive Styles and Learning Styles

Cognitive styles and learning styles are two terms that are sometimes used interchangeably, but they are not necessarily the same. In this section the differences between these terms will be explored and examples of each will be provided. First, a cognitive (thinking) style refers to the way one prefers to mentally process information, whereas a learning style is one’s characteristic approach to learning and studying (Sternberg & Williams, 2002). Another interesting way to define a learning style is “…the combination of the learner’s motivation, task engagement, and information processing habits.” (Aragon, Johnson, & Shaik, 2002, p. 230) This definition is based upon Curry’s Theoretical Model of Learning Style Components and Effects. The reason Curry’s model combines cognitive and learning styles is that the typical division of cognitive from learning styles is artificial. Moreover, Curry believes that learner success in any learning environment (learning preferences will come into play in the learning environment) requires learner motivation, which will lead to task engagement, and the use of specific information-processing abilities (cognitive styles).

An important point to keep in mind is that all of these cognitive and learning styles are preferences and students can learn material that does not match their preference. While instructors may want to take learning styles into consideration when developing an online course, it is not essential to do so. One perspective on this issue is that students will have to learn other ways of acquiring knowledge than their preferred way once they enter the workforce, so perhaps school is a safe place to experiment with new learning methods.
References


I. E. 1. Examples of Cognitive Styles

**Field Dependence**
- focus is on the whole rather than the individual parts
- works well in groups
- greater social orientation
- may require more structure and clarity (difficulty identifying important details, analyzing patterns)

**Field Independence**
- focus is more on the parts rather than the whole
- works better alone and prefers unstructured tasks
- engages in more metacognition

**Conceptual Tempo**
- refers to the speed of decision making
- one’s conceptual tempo can be changed
1. **Impulsivity**
   - tendency to make quick decisions and respond to what first comes to mind
   - more error prone
   - desirable in timed situations

2. **Reflectivity**
   - spend more time examining a problem, considering alternatives, and checking for accuracy of solution

**Mental Self-Government**

1. **Legislative**
   - enjoys creating, formulating, & planning problem solutions

2. **Executive**
   - likes implementing plans, following rules, choosing from options

3. **Judicial**
   - enjoys evaluating rules or products

**Mastery**

- absorbs information concretely
- processes it sequentially
- evaluates it by its clarity and practicality

**Understanding**

- focuses on ideas and abstractions
- learns through questioning and reasoning
Self-Expressive

- relies on emotions and intuition to form new ideas
- judges value of learning products by their originality and aesthetics

Interpersonal

- an extrovert
- learns better in groups
- evaluates learning by its usefulness in helping others

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**I. E. 2. Learning Styles (Preferences)**

Learning styles can range from environmental preferences to personality differences.

**Examples of environmental preferences include:**

- amount of noise (including the preference for music or silence) in a room during learning
- comfortableness of the furniture
- amount of illumination to mention just a few.

**Some students even have a sensory modality preference in learning:**

- *visual*—learn best by looking at pictures and charts
- *auditory*—learn best by listening
- *tactile*—learn best by working with their hands

Finally, some students have personality differences in the depth to which they prefer to process information.

**Personality differences in depth of processing:**
- *deep-processing approach* (focus is on understanding course material)
  - enjoy learning for the sake of learning and are less focused on grades
- *surface-processing approach* (focus is on memorization, not understanding)
  - motivated by grades and other external rewards

**Reference**


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I. E. 2. a. *Instruments to Measure Learning Styles*

**Learning Styles Inventory**

- **Description**: The Learning Styles Inventory assesses a student’s approach to learning and yield scores on four subscales, concrete experience, reflective observation, abstract conceptualization, and active experimentation.


**Grasha-Reichmann Student Learning Styles Scale**

- **Description**: This scale focuses on how students interact with the instructor, other students, and with learning in general. Six categories are used to describe the learning styles of students: independent, dependent, competitive, collaborative, avoidant, and participant learners. These six categories are not mutually exclusive because students are rated on the degree to which they possess characteristics of each category.

**Barsch Learning Style Inventory**

• **Description**: This questionnaire has 24 items that assesses individuals’ visual, auditory, and kinesthetic learning modalities (styles). Students receive sources on all three styles based upon their responses, but the style that has the highest score is considered to be their learning style.


**Research on Learning Styles Instruments**

Krätzig and Arbuthnott (2006) were concerned about the ability of learning style inventories to accurately identify one’s learning style. As they reviewed the literature on learning style inventories, they found that most of these scales have never been empirically validated. Moreover, most of the research on learning styles has used self-report questionnaires that have not addressed the basic hypothesis underlying the theory. The basic problem with using self-report questionnaires in research is that individuals cannot be objective about their own abilities and experiences. Whenever self-report data are used in research, there is typically another measure of people’s abilities that is more objective (such as test performance). If both of these measures (self-report and an objective measure) agree, then more trust can be placed in the self-report data.
Krätzig and Arbuthnott (2006) decided to evaluate the effectiveness of the Barsch Learning Style Inventory’s (BLSI) on two factors. First, they determined the BLSI’s ability to identify students’ learning styles compared to asking students whether they felt their learning style was primarily visual, auditory, kinesthetic, or mixed. The second factor Krätzig and Arbuthnott studied was whether the learning style determined by the BLSI was correlated with performance on standardized (and validated) tests that measured memory for pictures, stories, and tactile shapes. (This aspect of their research will not be discussed here, but will be described in more detail in the section on whether cognitive/learning styles are necessary.)

The results of Krätzig and Arbuthnott’s (2006) comparison of students’ self-identification of learning style and the BLSI’s determination is not encouraging to advocates of incorporating learning styles in instruction. Specifically, there was only 44.6% agreement on the classification of students’ learning styles. From a statistical perspective this agreement is not significant (Spearman’s rho = .057). This lack of correspondence is problematic because both measures are essentially self-report, which means that the determination of learning style for both measures is based upon student self-perception and self-evaluation.

Reference

I. E. 3. Are Cognitive/Learning Styles a Necessary Consideration in an Online Course?

Research on Cognitive/Learning Styles and Achievement

Learning styles seems like an important consideration when designing any course. After all, we all have learning preferences. However, there is research (e.g., Krätzig & Arbuthnott, 2006, Aragon, Johnson, & Shaik, 2002; Liu & Reed, 1994; Shih & Gamon, 1999) suggesting that cognitive/learning styles do not have any effect on student achievement. (The reason for not separating cognitive and learning styles in this section is that the term “learning style” is not defined the same way in these three studies.) A brief look at each of these three studies will explain their reasoning.

Relation Between Learning Style and Performance

Krätzig and Arbuthnott (2006) studied whether one’s learning style, as determined by a learning style instrument (i.e., the Barsch Learning Style Inventory; BLSI), was correlated with performance on standardized tests that measured memory for pictures, stories, and tactile shapes. (Krätzig and Arbuthnott also used other self-assessment tools to determine learning styles, but in the interest of simplicity, these tools will not be described.) The reason for using these standardized tests (i.e., Rey-Osterrieth Complex Figure Test, the Babcock Story Recall test, and the Tactual Performance Test) was see if students would demonstrate the highest level of learning (and, of course, memory) when material is presented in a manner that matches their particular learning style.

The result of their research is that there was no significant relation between learning style and performance on the objective memory tests. Another result of interest to the present discussion is that the research participants (college students) were not good at predicting what factors would impact their memory performance. Specifically, 40% of the
students were classified as visual learners, whereas 16% were identified as kinesthetic learners. When students completed the memory tests, however, 23% performed best on the visual test and 52% performed better with the tactile test. Krätzig and Arbuthnott argue that this outcome raises doubts about the effectiveness of trying to match instructional presentation of course material with the learning styles of students.

Learning Styles in Online vs. Face-to-Face Courses

Aragon, Johnson, and Shaik (2002) compared an online instructional design course to its on-campus (traditional, face-to-face course) equivalent to determine if learning style impacted course achievement. (For Aragon et al., learning style is a combination of cognitive and learning styles as defined in a previous section.) Achievement was measured by the evaluation of a major course project that required students to design a complete training package that represented six to eight hours of instruction. Aragon and his colleagues found no difference in the learning and study strategies of online and on-campus students. There was, however, a significant difference between the two course sections in terms of cognitive processing habits. (Specifically, online students are more likely to engage in reflective observation (learning by watching and doing) and abstract conceptualization (learning by thinking) than their on-campus counterparts.) Despite these differences in learning styles, there was no significant difference between online and face-to-face students concerning performance on the major course project.

Can Learning Styles be Accommodated in an Online Environment?

Liu and Reed (1994) were interested in whether learning styles (specifically the cognitive styles of field independence and field dependence) could be accommodated in a
computer-based learning environment. Nonnative English speaking students learned English using specially designed software to help them improve their English through watching the movie Citizen Kane. The researchers found that although field independent and field dependent students used different learning strategies, there was no significant difference in their performance on an achievement test.

Field Independent vs. Field Dependent Cognitive Styles

Shih and Gamon (1999) also studied field independent and field dependent cognitive styles. Students enrolled in either an online biology or zoology course were studied to learn more about their cognitive styles and what impact these styles would have on their course achievement. Shih and Gamon, like the other researchers above, did not find any significant difference between the two cognitive styles regarding course achievement.

Conclusions About the Research on Cognitive/Learning Styles and Achievement

Even if one feels learning styles are an important consideration, Palloff and Pratt (2003) do not believe it is necessary to create several versions of the same material to accommodate students with different learning styles. Instead, they advocate taking a more macro level view of online instruction. Specifically, if the online course as a whole includes multiple approaches to material and provides various types of assignments, then the various learning styles of students will be addressed. The basic point is that no course can accommodate every learning style for every assignment or activity, so as long as a course does not favor one particular style, all students will have an equal opportunity to learn.

Palloff and Pratt’s views are actually supported by two of the research studies described above. (Not enough detail was provided in Shih and Gamon’s (1999) research to determine how instruction was delivered.) In Aragon, Johnson, and Shaik’s (2002) research,
instruction was delivered by streamed audio lectures, slide presentations synched with the lectures, and handouts available on the course web site. Liu and Reed (1994) delivered instruction using text, sound, graphics, and video. Perhaps the reason that these two studies found no difference in achievement based upon learning style is that both of these research studies presented course information in multiple formats, which accommodated more than one cognitive/learning style. Thus, if courses are designed with Palloff and Pratt’s (2003) recommendations, cognitive/learning styles may become a moot point. Of course, Krätzig and Arbuthnott’s (2006) research agrees that learning styles are not relevant in course design because students use a combination of learning preferences/modalities to learn course material. Moreover, their research suggests that motivational, situational, and contextual factors play a larger role in learning than learning styles.

References


http://iccel.wfu.edu/publications/journals/jcel/jcel990305/ccshih.htm

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**I. E. 4. Offering Different Types of Activities to Address Various Cognitive/Learning Styles**

One way to address the various learning styles of students is to think of course activities falling within one of three general categories, adding alternatives, learning cycles, and complex activities (Palloff & Pratt, 2003).

- In the *adding alternatives category*, instructors provide options for various assignments, such as a choice among three assignments for a given chapter.

- *Learning cycles* entail breaking the learning process into phases with each phase containing an activity that involves developing a skill related to a specific learning style.

- *Complex activities* require students to approach a topic through the use of multiple skills (which encompass various learning styles). An example of a complex activity could be a group project that allows group members to use their various learning styles to complete the project and allow group members to learn from each other.

**Reference**

I. E. 5. Six Learning Capabilities of Students

In addition to the various learning styles, Boud and Griffin suggest that everyone possesses six learning capabilities: rational, emotional, relational, physical, metaphoric, and spiritual (cited in Palloff & Pratt, 2003). Why bother with these six learning capabilities? Trying to address these learning capabilities may help instructors develop a learning environment that reflects more learning styles than just focusing on the styles themselves. Boud and Griffin believe that most of our education focuses on the rational aspect to the neglect of other capabilities. This focus on the rational may be especially true in online courses because most of the instruction is text based. Palloff and Pratt (2003) provide the following suggestions on how to develop each of the six learning capabilities:

- **Rational:** There does not need to be as much effort exerted for this capability because course readings and assignments cover this area.

- **Emotional:** The use of emoticons and the expression of emotion in asynchronous threaded discussions can provide students with a better understanding of the writer’s intent (e.g., sarcasm, humor) and mood.

- **Relational:** The use of discussion boards and the provision of a social area can foster a sense of community. Starting the course off by having students post an introduction of themselves or the creation of student homepages can help students and the instructor get to know each other.

- **Physical:** This attribute is built into online courses naturally because students can work anytime and anywhere. Making the course website warm and inviting can also help.
• **Metaphoric:** Using metaphors to link virtual activities to real-world activities can help students feel more comfortable and be less disoriented in the online environment. For example, holding virtual office hours in a chat room and referring to a discussion board that is exclusively for social communication a “café” can make the virtual environment of an online course more like the physical world of college.

• **Spiritual:** The spiritual aspect does not have to involve any sort of religion. Instead, the intimacy and relationships that can form between students through their interactions (e.g., group projects, discussion postings, chat room sessions) can serve this function.

**Reference**


II. STUDENT MOTIVATION

II. A. Student Motivation: A Definition

*Motivation Defined*

As in most areas of life, motivation in online courses is essential for success. What is motivation and how can the motivation of online students be increased? Before looking at specific motivational theories and suggestions for increasing student motivation, a definition of motivation is appropriate. An outwardly simple but deceptively complete definition of motivation is offered by Pintrich and Schunk (2002, p. 5). “*Motivation is the process whereby goal-directed activity is instigated and sustained.*”
Unpacking this simple definition reveals the complexity contained within. First, motivation is seen as a *process* rather than a product that can be possessed in various quantities. Viewing motivation as a process also means that it cannot be directly observed. Instead, motivation has to be inferred from such behaviors as choice of tasks, effort, persistence, and verbal responses (e.g., “I really enjoy working on this project”). Second, motivation involves *goals* that provide *direction* and drive one toward action. Sometimes students who are considered “unmotivated” may have the desire to succeed, but they do not know how to create appropriate goals to achieve success. Third, motivation requires *activity*, either physical, cognitive, or both. Moreover, this activity must be both *instigated* and *sustained*. Beginning activity towards a goal (i.e., instigation) is often difficult because it involves making a commitment to change one’s behavior. Sometimes activities start out well (e.g., starting a diet), but sustaining that activity to reach a goal is difficult because many goals are long-term and thus, require continuous commitment and effort.

Reference


II. B. General Motivation Theories

II. B. 1. Weiner’s Attribution Theory (Explaining Success and Failure)

Determining if online students attribute their academic success to external factors is useful for instructors for two reasons (Kennedy, 2000). First, instructors can increase these students awareness of their own learning process so they can better determine which learning
strategies are effective and whether enough effort is being expended. Second, these students could be introduced to the learning strategies used by successful online students.

*Bernard Weiner’s Attribution Theory*

Attribution, in its most basic form, deals with how individuals explain the causes for certain events that occur in their environment. How individuals explain the behavior of other people or themselves will affect their perceptions of those people or themselves and can lead to the development of an attitude. For example, if an instructor sees a student sleeping in class, that instructor can explain the behavior as due to either dispositional (the student is lazy and apathetic about learning) or situational factors (the student did not get enough sleep last night because he/she was finishing a paper or had to work late at his/her job).

Bernard Weiner suggested that people make attributions (inferences about the causes for behavior) that can be categorized along three dimensions, *locus, stability,* and *control* (Pintrich & Schunk, 2002; see Table A.2).

*Locus-of-Causality Dimension*

The locus-of-causality dimension focuses on whether a cause is perceived as being internal or external to the individual. Four basic attributions, *aptitude, effort, objective task analysis,* and *chance,* are typically used to explain why a particular outcome has occurred. Aptitude and effort can be considered as internal causes because aptitude is typically viewed as capabilities possessed by individuals and their efforts are a result of internal motivation rather than outside forces. Conversely, objective task characteristics (the nature and difficulty of a task that is independent of the person attempting the task) and chance (the opportunities presented by the environment) are viewed as external causes because both of these factors are typically the result of the environment’s influence on individuals. [Weiner’s
locus-of-causality dimension is similar to Rotter’s locus of control (i.e., utilizes the portions of the constructs of internal and external causality), but differs because Rotter’s theory combined the locus and control dimensions of Weiner’s attribution theory.

*Stability Dimension*

The stability dimension refers to whether a cause is fixed and relatively constant across situations and over time (Pintrich & Schunk, 2002). From the perspective of personality psychology, stable causes are viewed as personality traits and unstable causes are seen as reflecting the influence of the situation (e.g., a student who appears to be shy in class, but is outspoken outside of the classroom). In Weiner’s original version of his attribution theory aptitude and skills were merely subsets of the larger concept of ability. However, the refinement of the stability dimension revealed that aptitude and skills may both be internal causes for behavior, but they differ in terms of their stability. Specifically, aptitude is viewed as a stable cause because it is considered to be internal to an individual (and unchanging), whereas skills are abilities that can be learned over time (i.e., not consistent over time).

Effort is also considered unstable because the amount of effort one puts into an activity can dramatically affect performance in that activity. Moreover, the amount of effort put into an activity can vary from situation to situation, depending on other factors (e.g., time constraints, physical well being, and energy levels). Objective task characteristics are also seen as stable because the nature of a task is not determined by the individual and remains constant (e.g., the nature and methods of solving the equation $2x + 3x = 12$ do not change). Chance, of course, is viewed as an unstable cause.
Controllability

The final dimension of controllability is an important determinant of causality because the degree to which outcomes in a given situation are controllable definitely affects motivation. For example, if students believe that an instructor favors a particular student, they may feel that grades are controlled exclusively by the instructor’s personal preferences and nothing they can do will change the outcome (i.e., they have no control over course grades). Students may also feel that their aptitude for a given subject is beyond their personal control, but they believe they can compensate for their aptitude through sustained, long-term effort (which is controllable).

Table A.2
Components of Weiner’s Attribution Theory

<table>
<thead>
<tr>
<th>Stability</th>
<th>Locus</th>
<th>Internal Controllable</th>
<th>Internal Uncontrollable</th>
<th>External Controllable</th>
<th>External Uncontrollable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable</td>
<td></td>
<td>long-term effort</td>
<td>aptitude</td>
<td>instructor bias/favoritism</td>
<td>ease/difficulty of course requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• skills/knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• temporary/situational effort (test preparation, preparing a presentation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable</td>
<td></td>
<td>• physical health on test day</td>
<td>help from friends and/or instructor</td>
<td>chance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• mood</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table adapted from Pintrich and Schunk (2002, p. 117).

References

II. B. 1. a. Attribution Theory and Academic Orientation

Weiner’s attribution theory can be combined with Dweck and Legget’s (1988) research on implicit theories of intelligence (HYPERLINKS TO THE “IMPLICIT THEORIES OF MOTIVATION & THEIR RELATION TO STUDENT MOTIVATION (AN INTRODUCTION)” PAGE) to produce two extreme types of students, mastery-oriented and helpless. (The adjective “extreme” is used to indicate that these two types of students represent the endpoints on a continuum from mastery-oriented to helpless.)

Mastery-oriented students have:

- an internal locus of control (i.e., believe they are responsible for either their success or failure in life)
- attribute their successes to ability and effort
- attribute their failures to lack of effort

Helpless students have:

- an external locus of control (i.e., believe their successes and failures in life are the result of the actions of other people or chance)
- attribute their successes to chance and/or task difficulty (the task was easy)
- attribute their failures to lack of ability, chance, and/or task difficulty (the task was too hard)
II. B. 1. b. Attribution Retraining (Changing How Students View Their Success and Failure)

Attribution theory can be used to help students increase their motivation in their academic endeavors. In essence, by increasing motivation students are altering what Bandura calls self-efficacy (i.e., the belief in one’s competencies in a given domain). One way that self-efficacy can be increased is by changing the attributions students are making. Mastery-oriented students are successful because they focus on their effort and ability, but most importantly, they realize that their ability in a given domain can be increased somewhat by the amount of effort they put into learning. Conversely, helpless students believe that effort is not going to make a difference because they lack aptitude (e.g., “I not very smart”) or the task is too hard. Consequently, they put less effort into academic tasks and do not see any improvement.

In order to help these students succeed, instructors need to help students realize:

- they have the power to succeed through a focus on effort
- ability can partially be controlled (via the acquisition of skills and knowledge)
motivation results from attitudes formed by students and these attitudes are in turn formed by their attributions

Focus on Effort

First, an instructor must get a student to analyze the amount of effort he is currently putting into a given course. The student’s immediate response may be that he does not have the aptitude to do well and increased effort will not make a difference. The student may also claim that the instructor’s tests are too hard and that she should make them easier. The instructor may focus on the issue of effort first by suggesting that the student will not know if increased effort would make a difference unless he increases his effort first. His response typically will be that he has tried in the past and his efforts made no difference. At this point the instructor should remind him that he has nothing to lose by trying again.

What Can be Controlled

The instructor can next address the task difficulty issue by suggesting that the student focus on his efforts because he can control his effort, but he cannot control the difficulty level of the tests. One way he can control is effort is to ask her for help in comprehending the material and preparing for the test. With increased effort in the course, the student may begin to see some improvement. It is important for the instructor to point out to him that he should not expect dramatic changes right away because changing study habits takes time. When the student does see improvement, the instructor can point out that his increased efforts have also increased his abilities, as demonstrated by his performance.

Motivation = Attitudes + Attributions

The point of this attribution retraining, of course, is to get the student to develop more of a mastery orientation by focusing on his efforts rather than things he cannot control, such
as chance and task difficulty. (In essence, this attribution retraining is similar to the approach the psychologist Albert Ellis advocates in his rational emotive therapy; namely, point out and eliminate a student’s illogical thinking.) As the student gains confidence and improves his performance the instructor should point out that his improved performance is also due to his new attitude towards learning. Specifically, his old attitude toward learning was that he could not succeed (he was a failure) because of his low aptitude and the “meanness” of his instructor (i.e., making the test so hard). This attitude created a self-fulfilling prophecy because his low self-efficacy led him to exert very little effort and, consequently, he did not succeed. His new attitude (i.e., “I can succeed if I exert more effort”), however, changed his academic performance by focusing on what he could accomplish rather than what he could not accomplish.

Reference


II. B. 2. Locus of Control (Who Controls Your Destiny?)

Julian Rotter was interested in people’s perception of how the possibility of reinforcement is related to their behavior. Thus, Rotter focused on where people perceived the source of control (what he referred to as the *locus*—from the same Greek origin as the word location—of control) over their lives to be located. Rotter identified two types of locus of control, internal and external. Individuals with an internal locus of control believe that their efforts and activities influence both the success and failure they experience in life. In other words, they control whether they succeed or fail; they are the authors of their own
destiny. Individuals with an external locus of control, on the other hand, believe that outside factors (e.g., luck, fate, and other people) mainly influence the success and failure they experience. Typically, locus of control is discussed as a dichotomy (internal or external), but in reality it a continuum with internal and external as endpoints.

Locus of control is important in education because it arises from students’ interpretation of their environment and the possible cause and effect relationships in this environment. Thus, an important factor in locus of control is experience because experience coupled with expectations shape the actions that people will take in future situations. Individuals with an internal locus of control tend to adjust their expectancies upward after experiencing success and downward after failure (Carver & Scheier, 1996). Externals, on the other hand, tend to adjust their expectancies in the direction opposite to the prior outcome.

Rotter’s locus of control and his scale for measuring it have been used extensively in the fields of education and personality psychology to better understand people’s approach to life. (Here is an example of a simplified version of Rotter’s locus of control scale.) Despite the wide usage of Rotter’s locus of control concept, the theory (and scale) has been challenged on various grounds. The strongest challenge to locus of control theory is that it confounds two dimensions that need to be separated to better understand people’s beliefs and behavior (Pintrich & Schunk, 2002). Specifically, the theory combines the dimensions of internality and externality with controllability and uncontrollability. Later theories, such as Bernard Weiner’s attribution theory, separate these two dimensions because if an event is
uncontrollable (such as the weather) individuals do not feel personal responsibility (or at least less responsible) for the outcome (e.g., it rains on the day you planned the family reunion in your backyard).

References


II. B. 3. Self-Worth and Student Motivation

Self-worth (an emotional reaction to the self similar to self-esteem) appears to be an important concept in society because it has been used to explain a variety of problems from delinquency to weight problems. Explaining various problems as a result of low self-worth, however, is too simplistic of a solution to these problems (Pintrich & Schunk, 2002). As a result in society’s belief in the power of self-worth, some teachers are reluctant to give students negative feedback for fear of damaging their self-worth.

Much has been written about the role of self-worth/self-esteem in academics, but perhaps the most useful work is Martin Covington’s model of self-worth. Covington (1993) believes the need for self-worth is a basic need of humans and this need is manifested in our search for self-acceptance. For Covington (1993, p. 58), “Self-worth theory stresses those aspects of personal worth that are tied to a sense of competency and those feelings of
worthlessness arising out of disclosures of incompetency.” The importance of this model for academics is the lengths to which people (students) will go to maintain their self-worth. Specifically, Covington believes that individuals want to make attributions to ability rather than effort because attributions to ability increase their sense of self-worth more than attributions to effort. (Refer to the section on attribution theory (HYPERLINKS TO THE “WEINER’S ATTRIBUTION THEORY (EXPLAINING SUCCESS AND FAILURE)” PAGE) for a more in-depth understanding of the role attributions play in academic performance.) In fact, some people will try to hide the amount of effort they expended on a task so that other people will think they succeeded simply because they have high ability.

Failure-Avoiding Strategies Students Use (HYPERLINKS TO THE “FAILURE-AVOIDING STRATEGIES STUDENTS USE TO PROTECT THEIR SELF-WORTH” PAGE)

Reference

II. B. 3. a. Failure-Avoiding Strategies Students Use to Protect Their Self-Worth

Students will sometimes engage in failure-avoiding strategies in order to protect their self-worth. The purpose of these strategies is to shift the presumed causes of failure from internal factors (e.g., ability) to external factors (e.g., sickness, work schedule) that are beyond personal control or responsibility. These self-serving strategies consist of two types, self-handicapping strategies and strategies designed to ensure success in order to avoid failure (Covington, 1993).
Self-Handicapping Strategies

Procrastination. Procrastination is the most common self-handicapping strategy. By engaging in procrastination and making the right attribution, students can protect their self-worth, but they have little motivation to improve because procrastination takes no effort and does not engender a sense of control over their environment. Table A.3 demonstrates how procrastination protects self-worth.

Table A.3
Procrastination’s Role in Protecting Self-Worth

<table>
<thead>
<tr>
<th>Task Performance</th>
<th>Attribution</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>poor</td>
<td>effort</td>
<td>protects self-worth (no attribution to ability)</td>
</tr>
<tr>
<td>good</td>
<td>ability</td>
<td>enhances self-worth</td>
</tr>
</tbody>
</table>

The reason attributing poor performance to effort protects self-worth is that students can tell themselves that they might have done better if they had put more effort into the task. These students will not take their poor performance personally because it can be explained by their lack of effort rather than a lack of abilities. Thus, some students may intentionally procrastinate as a way of avoiding accurate feedback about their abilities (i.e., they would rather live with the illusion that they might succeed if they try harder rather than risk the chance of actually failing). If procrastinating students do succeed, then they will feel even better about themselves and their abilities because they believe they must really have high ability if they can procrastinate and still do well. This success serves to reinforce procrastination in the future.

While in graduate school, a friend of mine had a bad habit of procrastinating. She even procrastinated studying for her preliminary examinations until three weeks before the
actual date of the examinations. (Most graduate students in this program started preparing at least six months before the actual test date.) After taking her written preliminary examinations my friend was actually hoping she would fail in order to avoid being reinforced for procrastinating yet again. Fortunately (or unfortunately, depending on your viewpoint), she easily passed her examinations and went on to earn her doctorate degree.

*Setting impossibly high academic goals.* Another self-handicapping strategy is setting impossibly high academic goals, such as enrolling in 18 credits of coursework while working full time. In these situations failure is eminent, but that is not threatening to one’s self-worth because most people would also fail under these circumstances. Thus, one’s failure tends to be minimized because of the large number of people who also fail. For example, there are more people who have tried to climb Mount Everest and failed than there are people who have successfully climbed Mount Everest. As a society we tend to pay more attention to those individuals who beat the odds and make it to the top of Mount Everest. If the task in question is one that few people fail, such as being able to read by the time of high school graduation, we pay more attention to the individual failures and try to figure out how these failures occurred.

*Admitting to a minor/nonthreatening handicap.* A final self-handicapping strategy is admitting to a minor or nonthreatening handicap, while keeping a greater weakness (whether real or imagined) secret, such as being unprepared or incompetent. A common handicap that students readily admit to having is test-taking anxiety. Covington (1993) does not deny that test anxiety is a real phenomenon for some students. Instead, he suggests it is a socially acceptable excuse for poor performance that some failure-avoiding students exploit. For example, both Tom and Maria fail their first online exam. Tom gives no reason for his
failure so the instructor assumes he either did not put enough effort into studying or he does not have the ability to succeed. Maria, on the other hand, tells the instructor that she has test anxiety and that is why she performed so poorly on the test. As a result of this disclosure, the instructor may not make any attributions to either Maria’s effort or ability, and instead help her deal with her anxiety. In reality, Maria may not have put much effort into studying and used test anxiety as a convenient excuse to maintain her self-esteem and avoid having to change her studying behavior (because the anxiety is beyond her control—she cannot help feeling anxious).

**Strategies to Ensure Success**

*Setting impossibly low academic goals.* The second type of failure-avoiding strategies is strategies that center around activities where success is, for the most part, guaranteed. One of these strategies is setting one’s academic goals so low that failure is almost impossible. For example, some students set their goal for a class to earn a grade of “D.” If they earn any grade above a “D” they are ecstatic. If, however, they earn a lower grade they may feel bad, but not as bad as they would if their goal was a grade of “B.” The primary danger of this strategy is that “…chronic low-goal setting often leads to a prolonged state of mediocrity where success is defined only by not losing” (Covington, 1993, p. 62). In other words, these students never get a glimpse of their true potential because they do not expect much of themselves.

*Overstriving.* Perhaps the most interesting example of this second category of failure-avoiding strategies is the overstriver, who tries to avoid failure by succeeding. Overstrivers are basically in a double bind situation because, on the one hand, they work hard to succeed since success reassures them and, on the other hand, their success scares them
because they know the laws of probability suggest that they cannot succeed all of the time. An important point to keep in mind is that overstrivers attempt to prove their worth not simply by being successful, but by being perfect, which is unrealistic and improbable. This unrealistic goal may lead to greater disappointment when they actually do fail. Moreover, their self-generated anxiety may actually hinder their performance on tests because high levels of stress have long been shown to interfere with memory recall.

*Types of Students*

Borrowing the concepts of approach (desire/willingness to strive toward/“approach” success) and avoidance (desire to avoid failure) from Atkinson’s need achievement theory, Covington (1993) developed a quadripolar model of need achievement. This model yields four types of students, overstrivers, success-oriented, failure-avoiding, and failure-accepting (see Figure A.1).

*Figure A.1.* Covington’s four types of students. (Covington, 1993, p. 64)
The characteristics of these types of students reflect their attempts to maintain their self-worth:

- **Overstrivers** work hard to succeed because success is self validating and they fear failure.

- **Success-oriented students** are successful because they realistically appraise their abilities and exert sufficient effort to attain their goals, which maintains their self-worth.

- **Failure-avoiders** do not believe they have the ability to succeed, feel unprepared for evaluation situations, and experience quite a bit of achievement anxiety.

- **Failure-acceptors** have given up trying to express their self-worth in terms of ability via competitive achievement. As a result, failure-acceptors tend to become dejected and apathetic.

**Reference**


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**II. B. 3. b. Covington’s Recommendations to Improve Academic Performance**

### Redefining Motivation

In order to help students improve their academic performance Covington (1993) believes we must not think of motivation as what psychologists refer to as a “drive” (an internal state or demand for action that individuals possess in varying degrees). The reason that viewing motivation as a drive is inappropriate is that poor performance sometimes
results from being overmotivated (e.g., failure-avoiders who spend quite a bit of time studying for no gain), rather than solely resulting from being undermotivated. Instead, Covington argues that motivation should be viewed as motives-as-goals— incentives that lead (rather than drive) toward action. Only by understanding the goals of students as they approach learning can instructors attempt to help them succeed. For example, failure-avoiding students’ goal of avoiding failure leads them to focus on the outcome of their studying (i.e., success or failure) rather than focusing on whether they understand and can apply the course material. Consequently, these students tend to learn less and what they do remember cannot consistently be recalled in an accurate form.

Reconceptualizing Learning as a Means for Improving One’s Competency

Thus, Covington (1993) advocates changing the reasons for learning. Instead of viewing learning as a means to enhance or preserve self-worth through competition with one’s peers, students need to view learning as a means for improving one’s competency. In other words, students need to compare their current performance with their past perform to determine whether their learning efforts are successful (what Nicholls (1984) refers to as an undifferentiated conception of ability). From this perspective students will ask themselves whether their present performance represents themselves at their best rather than worrying about the performance of other students or how other students will perceive their performance.

In addition to convincing students to engage in self-comparison, Covington suggests encouraging students to adopt different academic goals. Three specific goals are suggested:

1. The first goal is to focus on self-mastery (i.e., becoming the best one can be).
2. The second goal is to *commit oneself to solving society’s problems* because this approach helps students think about how course material can be applied to situations and problems in our world today.

3. The third goal is to *approach learning creatively* (i.e., completing learning activities, such as papers, in such a way that helps you develop a personal understanding rather than trying to clone your instructor’s way of thinking) and as a means of satisfying curiosity (e.g., wanting to understand why things work in the manner that they do).

*How Can Instructors Arrange Learning to Help Students Utilize These Goals?*

*Covington* (1993) offers three suggestions:

1. First, assignments and learning activities must be engaging (worthy of sustained curiosity, as well as challenging). Task characteristics that promote engagement are ones that:
   a. contain multiple goals that slowly unfold as students work on the task
   b. require students to employ their creativity because the task challenges their preconceived notions and encourages them to see familiar patterns in new settings
   c. reinforces cooperative learning
   d. allow students to exercise some control over the degree of challenge the task presents

2. Instructors can structure learning to meet these new goals of students by providing sufficient reinforcers for self-mastery attempts.
3. Instructors can treat grades as sources of information or feedback that can help students improve rather than treating grades as a source of evaluation of students.

References


II. B. 4. Self-Efficacy Theory

Some educators, especially in K-12 education, believe self-esteem plays an important role in academic success and instructors should focus on increasing student self-esteem. Admirable as this goal may be, it may be misguided because self-esteem is a global sense of one’s worth or value and is not primarily focused on academic performance. Instead of focusing on self-esteem to bolster academic motivation, educators should focus on student self-efficacy because it is more specific and situational (i.e., one’s self-efficacy for math may be different than one’s self-efficacy for science). Albert Bandura developed the concept of self-efficacy to reflect one’s judgments about his/her abilities and capabilities to engage in a behavior that he/she would like to perform. In a sense, *self-efficacy is one’s beliefs in her/his own abilities* and this belief definitely affects the amount of effort one puts into activities.
High vs. Low Self-Efficacy and Subsequent Motivation

The effects of self-efficacy on motivation can readily be seen by looking at individuals high in self-efficacy and individuals low in self-efficacy (Bandura, 1994). An individual with high self-efficacy view difficult tasks as challenges to be overcome rather than personal threats. Moreover, they take an intrinsic interest in activities and become very engaged in these activities. When people with high self-efficacy fail, they quickly recover their previous sense of efficacy and increase their efforts to avoid future failure.

Individuals with low self-efficacy, however, avoid difficult tasks because they take failure personally rather than view it as a lack of effort. These people also tend to have low ambition and do not have a strong commitment to goals that they chose. When they are faced with a difficult task they will catastrophize about all the things that could go wrong rather than focus on what they can do to succeed (Bandura, 1994). Individuals with low self-efficacy are more likely to suffer from stress and depression because they do not believe in their abilities and capacity for success.

Self-Efficacy’s Role in Motivation

Typically human motivation is the result of cognitive processes. People think about actions they want to perform and the likely outcomes of these actions, and they use their resulting efficacy beliefs to guide their motivation to perform these actions. In essence, self-efficacy contributes to motivation by determining people’s goals, the amount of effort expended toward reaching these goals, how long they will persist if difficulties arise, and their resilience to failures (Bandura, 1994).

A second component of self-efficacy theory that is related to motivation is outcome expectations (Pintrich & Schunk, 2002). Bandura defines outcome expectations as the
beliefs regarding the possibility that one’s behavior will lead to an anticipated outcome. (Outcome expectations are similar to Rotter’s locus of control construct.) Self-efficacy and outcome expectations are interrelated as the following example demonstrates. Maria is anxious about her upcoming biology test, but she is confident that she has studied enough to understand the material (self-efficacy) and she anticipates earning a high grade (outcome expectation) based upon her study efforts. Even though both constructs are important to self-efficacy theory, Bandura focuses more on self-efficacy than outcome expectations because outcome expectations are heavily dependent on efficacy judgments (Pintrich & Schunk, 2002).

References


II. C. Implicit Theories of Intelligence and Their Relation to Student Motivation

In order to understand the academic motivation of students, Dweck and Leggett (1988) believe that we must understand their goal orientation (purpose for engaging in achievement behavior) for learning. However, before exploring the goal orientation of students we must understand the implicit theories of intelligence they possess. By “implicit
theories of intelligence” Dweck and Leggett mean the way in which individuals understand the nature of ability. They propose two implicit theories, incremental and entity.

2 Implicit Theories of Intelligence

- **incremental theory of intelligence:** believe that intelligence is a malleable, increasable, and controllable quality
- **entity theory of intelligence:** believe that intelligence is a fixed or uncontrollable trait

Student Goal Orientations and Resulting Behavior Patterns (HYPERLINKS TO THE “STUDENT GOAL ORIENTATIONS AND THEIR RESULTING BEHAVIOR PATTERNS” PAGE)

Reference


II. C. 1. Student Goal Orientations and Their Resulting Behavior Patterns

Why are these implicit theories of intelligence important to understanding student motivation? Implicit theories of intelligence tell us about the goal orientation students utilize as they approach achievement situations. Goals that individuals pursue are important because they establish the framework from which they interpret and react to situations. Two goal orientations that guide achievement efforts, *learning* and *performance*, are posited (Dweck & Leggett, 1988).

Students with a Learning Goal Orientation:

- look at achievement situations (e.g., tests, homework assignments, term papers) as an opportunity to increase their competence
- enjoy a challenging task
- are willing to persevere with difficult tasks because these students believed these tasks can be mastered with increased effort

**Students with a Performance Goal Orientation:**
- are concerned with gaining favorable judgments of their competence even if these judgments do not provide accurate information about their true abilities
  - prefer to only undertake tasks that are likely to result in positive judgments of their ability
  - avoid tasks that are likely to result in negative judgments of their ability

The resulting behavior patterns from learning and performance goal orientations are, respectively, *mastery-oriented behavior* and *helpless behavior*.

**Key Aspects of the Mastery-Oriented Behavior Pattern:**
- viewing tasks as challenges to be overcome
  - regardless of whether one has high or low perceived ability related to the task
- high persistence at a task
  - even if one is failing because the performance on the task will yield information about one’s competence or increase it

**Key Aspects of the Helpless Behavior Pattern:**
- avoid challenging tasks (unless they perceive their ability for this task as high)
- when they cannot avoid these tasks, they have low task persistence

**Behaviors Exhibited by Performance-Oriented Student When They Face Failure:**
- attribute their failure to personal inadequacy
- express pronounced negative emotions
• engage in verbalizations that are irrelevant to the task (typically bragging about their abilities and talents in other areas)

• display marked decreases in performance

Table A.4 summarizes the information discussed above concerning the relations between implicit theories of intelligence, goal orientations, and behavior patterns.

Table A.4
*Implicit Theories of Intelligence, Their Goal Orientation, and Resulting Behavior Patterns in Achievement Situations*

<table>
<thead>
<tr>
<th>Theory of Intelligence</th>
<th>Goal Orientation</th>
<th>One’s Perceived Ability at Present</th>
<th>Resulting Behavior Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity (intelligence is fixed)</td>
<td>Performance (gain positive judgments of competence and avoid negative judgments of competence)</td>
<td>High</td>
<td>Mastery oriented (seek challenge; high persistence)</td>
</tr>
<tr>
<td>Incremental (intelligence is malleable)</td>
<td>Learning (increase competence)</td>
<td>High or low</td>
<td>Mastery oriented (seek challenges that foster learning; high persistence)</td>
</tr>
</tbody>
</table>

Table adapted from Dweck and Leggett (1988, p. 259).

Reference

II. C. 2. How Goal Orientations Produce Behavior Patterns

As mentioned in the previous section, individual goals create a framework for interpreting and responding to events that occur, but how these goals create a framework that leads to specific behavior patterns is an important question. Dweck and Leggett (1988) suggest that goals affect the cognitive processes and affect of individuals, as well as the behaviors in which they engage. Goals affect cognitive processes through the concerns and questions one has and the information one seeks to address these concerns and questions. Individuals with a learning goal orientation are focusing on the question of how to best improve their ability or achieve mastery. Individuals with a performance goal orientation, however, are more concerned with addressing whether their ability is adequate.

The affect dimension of goals concerns the emotional reactions individuals experience in regards to challenges or setbacks. Students with a learning goal orientation do not become upset with failure, rather they interpret failure as a signal to increase their effort and possibly modify their solution strategy. The resulting affect of this increased effort is likely to be pleasure or pride in their effort and accomplishment. Conversely, the experience of failure or effort exertion is likely to produce negative emotions in students with a performance goal orientation because they interpret these experiences as evidence of low ability, which can affect their self-esteem. (For more information about the impact on self-
Esteem by performance-oriented students see Covington’s self-worth theory.

(HYPERLINKS TO THE “SELF-WORTH AND STUDENT MOTIVATION” PAGE)

The cognitions and affect related to one’s goals definitely impact behavior. Specifically they influence task choices and the quality of performance in the face of failure (Dweck & Leggett, 1988). Concerning task choice, individuals must decide whether they will only attempt activities where success is likely (or activities where failure does not reflect poorly on their abilities—i.e., a difficult task) or activities that allow them to develop mastery. Cognition and affect also influence the quality of performance in the face of failure in five ways (see Table A.5).

Table A.5
*The Role of Cognitive and Affective Factors in Behavioral Patterns When Faced with Failure.* (Adapted from Dweck & Leggett, 1988, p. 2.)

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Loss of belief in effort efficacy resulting from low ability attribution</td>
<td>1. Continued belief in effort efficacy: effort self-instruction are made rather than low ability attribution</td>
</tr>
<tr>
<td>2. Defensive withdrawal of effort: a belief that greater effort further confirms low ability attribution</td>
<td>2. No defense required: effort expenditure is consistent with task requirements and goal</td>
</tr>
<tr>
<td>3. Attention is divided between goal (i.e., worry about outcome) and task (strategy formulation and execution)</td>
<td>3. Intensified attention to the task that directly serves goal</td>
</tr>
<tr>
<td>4. Negative affect can interfere with concentration or can prompt withdrawal</td>
<td>4. Affect is channeled into task</td>
</tr>
<tr>
<td>5. Few intrinsic rewards from effort to sustain the process</td>
<td>5. Continuous intrinsic rewards for meeting challenge with effort</td>
</tr>
</tbody>
</table>
II. C. 3. Implicit Theories and Their Effect on the Ego

Another way of viewing Dweck and Leggett’s (1988) implicit theories of intelligence (HYPERLINK TO THE “IMPLICIT THEORIES OF MOTIVATION AND THEIR RELATION TO STUDENT MOTIVATION” PAGE) is to consider the impact they have on the ego. John Nicholls (1984) proposes two ways to describe the way individuals conceptualize ability, undifferentiated and differentiated.

*Ways Individuals Conceptualize Ability*

**Undifferentiated.** An undifferentiated conception of ability, commonly found in most five-year-olds, involves a self-referenced judgment of ability (i.e., “Is my current performance better than past performance on the same or similar task?”). As children reach early adolescence, they tend to shift their conception of ability from undifferentiated to differentiated.

**Differentiated.** By a differentiated conception of ability, Nicholls is referring to a social-norm-referenced judgment of ability (i.e., “How does my ability compare to the ability of other people?”). Thus, an undifferentiated conception views ability as mastery, whereas a differentiated conception views ability as capacity (an underlying trait inferred from effort and performance in the context of social comparison). Even though Nicholls’ work focused on children, he believed that adults could use either one of these conceptions of ability.
These two conceptions of ability generate different (cognitive) states that affect behavior. The state associated with an undifferentiated conception of ability is task-involvement, where one’s concern is to develop or demonstrate high ability (i.e., mastery) to oneself. The state associated with a differentiated conception of ability is ego-involvement, where one’s concern is to develop or demonstrate (to oneself or other people) high rather than low ability.

As with Dweck and Legget’s (1988) goal orientations, Nicholls’ (1984) states lead to different behaviors.

**Characteristics of the Task-Involved State:**

- Individuals tend to choose tasks that require moderate to high effort because these tasks provide the best opportunity to determine and develop one’s ability/mastery.
- Task-involved individuals tend to shy away from tasks where success or failure is fairly certain.

**Characteristics of the Ego-Involved State:**

- When people are ego-involved, the choice of tasks, in terms of task difficulty, is determined with reference to the performance of their peers.
  - If the task can be successfully completed by many people, then the task is considered easy and success on this task does not demonstrate high ability, but failure on this task would indicate low ability.
  - Conversely, if few people can successfully complete the task, then the task is considered difficult and task success indicates high ability, whereas task failure does not indicate low ability.
Thus, task-involved individuals may choose tasks where success is likely (thereby avoiding a low ability attribution) or tasks that are difficult (a “no lose” proposition— if they succeed they will be viewed as having high ability and if they fail, it is not a big deal because most people fail).

A comparison of Dweck and Legget’s (1988) implicit theories with Nicholls’ (1984) conceptions of ability will highlight some of the similarities and differences of their respective approaches. (See Table A.6.) The purpose of this comparison between these two theories is not just to show their similarities, but to set the stage for how together they can enhance our understanding of student motivation. Both theories describe the types of behaviors we see in online students (as well as on-campus students) and postulate reasons for the occurrence of these behaviors. Dweck and Leggett (1988) do an exceptional job of explaining the reasons for achievement failure (i.e., individual goal orientations; see Table

<table>
<thead>
<tr>
<th>Theory of Intelligence/Conception of Ability</th>
<th>Goal Orientation/Cognitive State</th>
<th>Resulting Behavior Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental theory</td>
<td>Learning (increase competence)</td>
<td>Mastery oriented (seek challenges; high persistence)</td>
</tr>
<tr>
<td>Undifferentiated conception</td>
<td>Task-involvement (increase ability/mastery)</td>
<td>Seek challenges; develop abilities</td>
</tr>
<tr>
<td>Entity theory</td>
<td>Performance (gain positive judgments &amp; avoid negative judgments)</td>
<td>Helpless (seek tasks where success is likely &amp; avoid tasks where success is unlikely)</td>
</tr>
<tr>
<td>Differentiated conception</td>
<td>Ego-involvement (increase capacity through reference with peers)</td>
<td>Seek tasks where success is likely or tasks where success is unlikely</td>
</tr>
</tbody>
</table>

Table A.6
A Comparison of the Implicit Theories of Intelligence (Dweck & Leggett, 1988) and Conceptions of Abilities (Nicholls, 1984).
A.5 in “How Goal Orientations Produce Behavior Patterns”) (HYPERLINKS TO THE “HOW GOAL ORIENTATIONS PRODUCE BEHAVIOR PATTERNS” PAGE) even when there is no significant difference in student ability. (In all of the research conducted by Dweck, Leggett, and their colleagues the ability level of entity theory students was not statistically different than the ability level of incremental theory students. Thus, the only difference between students was their implicit theory of intelligence.)

**Differing Expectations of Students and Instructors**

Nicholls’ (1984) research highlights the differing goals of students and instructors and how these differences affect performance. Instructors, Nicholls argues, tend to reward and praise effort and improvement and not comment on students’ fundamental ability. Ego-involved Students, on the other hand, are hesitant to expend a large amount of effort on a task because if their classmates expend less effort and achieve the same or better results, they will view themselves as having low ability and “feel stupid.” As instructors, we are all familiar with the debilitating effect of this concern over “not wanting to look stupid” (e.g., withdrawal of participation, inattention). The solution to this conflict between instructor’s desire to reinforce effort and students’ desire to demonstrate ability is to minimize the chance of ego-involvement in one’s course by separating self-esteem from course performance.

**The following practices are considered to stimulate ego-involvement:**

- grading on the curve (creates social comparison and competition between students)
- emphasis on the performance of standardized achievement tests (not applicable to all courses)
- making grades public and salient
public comments by instructors on student achievement (e.g., publicly praising the comments of a particular student in a threaded discussion)

References


III. INSTRUCTIONAL DESIGN THEORIES

Some readers may be thinking, “Instructional design? I am a teacher, what do I care about instructional design theories?” Even though most instructors do not consider themselves instructional designers, they actually do quite a bit of instructional designing, especially online instructors. Perhaps a definition of instructional design is helpful at this point.

The field of instructional design and technology encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace. (Reiser, 2002, p. 12)

There are numerous models concerning how the instructional design process either occurs or should occur. (Only a few of these models will be discussed for the sake of brevity.) Most of these models, however, share the core conceptual elements of analysis,
design, development, implementation, and evaluation (typically abbreviated as the ADDIE model). The analysis element typically includes conducting a needs assessment (e.g., learner needs, learner characteristics, task analysis) and stating a goal. Design mainly focuses on writing objectives in measurable terms. The development aspect involves preparing student and instructor materials. Implementation simply involves the actual delivery of instruction to learners. Finally, the evaluation element involves both formative (evaluation that occurs during the course of instruction) and summative evaluation (evaluation that occurs at the end of instruction). Revision of instruction can occur at any stage of the instructional design process.

Another reason for looking at instructional design models is to provide a framework for creating a new course. When an instructor is asked to create his/her first online course, he/she may feel overwhelmed and not sure where to start. Thus, viewing the task of creating a new online course from the perspective of an instructional design theory may make this task seem less daunting. Moreover, following an instructional design model is a rather comprehensive approach to course designing that can ensure that nothing is left out of one’s planning.

Reference

Reiser, R. A. (2002). What field did you say you were in? Defining and naming our field. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (pp. 5-14). Upper Saddle River, NJ: Merrill Prentice Hall.
III. A. Linear Instructional Design Theory

III. A. 1. The Dick and Carey Model

Dick and Carey’s model (1996) is the standard by which all other instructional design models are compared. Recent constructivist model (such as Willis’ R2D2 model and chaos theory) have criticized the Dick and Carey model because of its strong behaviorist influences. However, despite these criticisms the Dick and Carey model is still popular because it works. The Dick and Carey model is rather prescriptive, but an instructional designer can easily follow the steps in this model and end up with a product that will work. The steps in the Dick and Carey model are listed below, along with a diagram of the model.

Figure A.2. The Dick and Carey (1996, pp. 2-3) model.

Steps in the Dick and Carey Model:

1. Assess needs to identify instructional goal(s)—Is instruction really necessary?

2. Analysis of the instructional problem (i.e., How do experts perform the task to be taught to students?)
3. Learner and context analysis
   a. What are the characteristics and existing knowledge of the learners that must
      be taken into consideration for instructional purposes?
   b. What is the nature of the environment in which learners will learn (e.g., a
      classroom) and apply this knowledge (e.g., workplace environment)?

4. Write performance objectives

5. Develop assessment/evaluation measures (these measures should be tied to
   performance objectives)

6. Develop an instructional strategy (i.e., the sequencing and organization of
   information and how to deliver it)

7. Develop and select instructional materials

8. Design and conduct a formative evaluation of the instruction with learners from the
   target population (but not the same learners who will receive the final instruction)
   a. Evaluation by a subject matter expert (yourself, if you are the instructor as
      well as the designer, or preferably, another instructor) not connected to the
      project
   b. One-to-one evaluations (meeting with individual learners to determine the
      clarity, impact on learner, and feasibility of instructional strategies)
   c. Small-group evaluation (purpose: determine if the changes made after the one-
      to-one evaluations were successful and to determine if learners can use the
      instruction without the instructor)
   d. Field test (a “dress rehearsal” of the actual instruction in actual learning
      environment)
9. Revise instructional material

10. Conduct summative evaluation
   a. Evaluations by outside expert
   b. Field test

Reference

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III. 2. Nonlinear Instructional Design Theories

**III. 2. a. Kemp, Morrison, and Ross Instructional Design Model**

The Kemp, Morrison, and Ross (1998) model takes a different approach to instructional design than the Dick and Carey model; namely, this model is not linear. The Kemp et al. model also incorporates behavioral and cognitive approaches, whereas the Dick and Carey model is strictly a behaviorist approach. Kemp et al. developed nine elements of the instructional design process (see Figure A.3). They use the term “elements” rather than “steps” because there is no particular order to these elements. In fact, course preparation may not require all nine elements in some instances. Kemp and his colleagues believe that in the real world instructional designers do not always start and end the instructional process at specific points. For example, development of the instructional materials may begin before the learner analysis is completed with the idea that this material can be later modified to better suit learner needs.

Kemp et al. (1998) depict their model as a series of nine ovals surrounded by two layers of concentric rings. (See Figure A.3.) These nine ovals represent the nine elements of
their model. The two surrounding concentric rings include other factors that they believe also play important roles in the instructional design process.

Figure A.3. Kemp, Morrison, and Ross (1998, p. 1) instructional design theory.

A brief explanation of each of the nine elements and the outer ovals (“feedback features”) will make the model clearer. (Planning and Revision will not be discussed because they play an integral role throughout the model.) Notice that Kemp et al.’s (1998) model contains some of the same features as the Dick and Carey (1996) model. (These elements are explained in the order of their appearance in model above for clarity purposes because there is no prescribed order.)

1. **Instructional Problems:** The purpose of this element is to determine the type of instruction that is needed (if any) by conducting a needs analysis and goal analysis (i.e., what purpose the course serves). In an academic setting, a needs analysis focuses on what students need to learn from the course (either for a specific major or general student expectations) and the expectations of administration (whether or not
satisfies a general education or major requirement and it serves as a prerequisite for a higher-level course).

2. **Learner Characteristics:** This element is designed to learn more about the students who will take a course, such as their existing knowledge of the topic, academic preparation (e.g., Have they taken other courses in this discipline? Are they majoring in this area? What is their class standing, freshman, sophomore, junior, or senior?), and general characteristics (e.g., traditional or nontraditional students).

3. **Task Analysis:** This element defines the content required to address the needs of learners and other stakeholders (department, college, employers, accrediting agencies).

4. **Instructional Objectives:** Objectives perform three important functions according to Kemp et al.
   a. First, objectives provide a means for designing appropriate instruction, including the activities and resources that will facilitate learning.
   b. Second, objectives provide a framework for evaluating student learning.
   c. Third, instructional objectives can guide students during the learning process.

5. **Content Sequencing:** The purpose of this element is, simply, to determine order in which content should be presented to achieve the instructional objectives.

6. **Instructional Strategies:** This element is composed of two general strategies, the delivery strategy and the instructional strategy. The delivery strategy describes the general learning environment and focuses on the degree of individualization that will occur in the course (i.e., whether or not students can progress at their own pace or if everyone is working on the same chapter/unit on the same schedule). The
instructional strategy concerns the sequences and methods of instruction to obtain an objective.

7. **Designing the Message:** This element involves translating the instructional plan into instructional units. This element is typically not necessary in academic settings because most courses have pre-specified topics that must be taught. Moreover, if a textbook is used, course material is already translated into units of instruction.

8. **Instructional Delivery:** Typically the choice of a delivery method (e.g., lectures, group activities, self-paced instruction) is constrained by the instructional objectives and the instructional environment.

9. **Evaluation Instruments:** The development of instruments to evaluate student learning.

10. **Support Services:** In order for the delivery of instruction to be successful, several logistical matters must be considered, such as budgetary matters, facilities, personnel services, and equipment necessary for instruction.

11. **Project Management:** This aspect of the instructional design process is more appropriate for a corporate setting because it involves the management of everyone working on designing and developing a particular course. In an academic setting, the “project team” is typically one or two faculty members and thus, management is not a high priority or necessity.

12. **Formative Evaluation:** This type of evaluation provides feedback on the process of developing instructional material and typically occurs right before the final version of the material is complete. Formative evaluation may use one-on-one trials,
consultation of a subject matter expert, small-group trials, and/or field trials. Kemp et al. (1998) advocate an eight-step approach to formative evaluation.

a. **8-Step Approach to Formative Evaluation:**
   
i. *Purpose* of the evaluation being conducted (e.g., improve instructional material or improve clarity).
   
ii. The intended *audience* for the results of the formative evaluation (e.g., instructor, department chair, dean).
   
iii. Identifying the *issues* the evaluation is being designed to address (e.g., quality of instructional material, ease of use, student comprehension).
   
iv. Determining the *resources* that will be needed to conduct the formative evaluation (e.g., students, subject matter experts, data-collection instruments, computer lab).
   
v. The type of *evidence/data* that will needed to address the evaluation objectives (e.g., test scores, student surveys, interview responses).
   
vi. The type of *data-gathering techniques* that will be used (e.g., surveys, checklists, observations, interviews, one-on-one trials, small-group trials, field trials).
   
vii. The method of data *analysis* (e.g., frequency distributions, descriptive statistics).
   
viii. Determining to whom the results of the formative analysis are *reported* (e.g., the instructor designing the course, course development team, department chair).
b. **Types of Formative Evaluation:**

i. *Connoisseur-Based Studies* utilize a subject matter expert to examine the accuracy and effectiveness of instruction.

ii. *Decision-Oriented Studies* yield descriptive information about a specific question regarding instruction (i.e., how well instruction is working). This type of formative evaluation, however, does not provide information on how to improve instruction.

iii. *Objectives-Based Studies* usually use pretests and posttests to determine how well a course is achieving its objectives.

iv. *Public-Relations-Inspired Studies* are primarily used to collect data that will help garner financial support for a course/program.

13. **Summative Evaluation:** Summative evaluation is used to determine the worth of a course based upon how well it met its objectives and the performance of the students. This type of evaluation is performed at the end of a course and can use course evaluations by students and comprehensive final examinations to make this determination.

**Reference**


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**III. 2. b. Rapid Prototyping ISD Model**

Rapid prototyping is a relatively recent approach to instructional design. It differs from other approaches to instructional design because rapid prototyping occurs faster and
does not require that students only see a completely finished product. Rapid prototyping is also not as rigid and structured as traditional instructional design models because it approaches the problem of creating an instructional program from a pragmatic rather than a theoretical perspective. The concept of rapid prototyping is borrowed from the software development industry where fully-functioning prototypes of software are developed in rough fashion, presented to a client, redesigned based on client feedback, tested on target users, revised, and so forth until the software meets the needs of the users and the client.

Advocates of rapid prototyping as an instructional design model suggests a similar process is appropriate for designing instructional programs (courses) because typically there is not enough time to follow the sequence of a traditional instructional design model (e.g., the Dick and Carey model). Tripp and Bichelmeyer (1990) developed the rapid prototyping ISD (Instructional Systems Design) model as an alternative to traditional instructional design models. The overlapping boxes in Figure A.4 represent the fact that the various processes in instructional design do not occur in a linear fashion.

![ISD Model](Figure A.4. Tripp and Bichelmeyer’s (1990, p. 36) ISD model.)

Thus, the analysis of needs and construction of a prototype typically occur simultaneously and each aspect provides information about the other (e.g., actually building a
prototype can lead to further questions about the needs and the content to be delivered and vice versa). The processes of design (construction) and research (utilization) are seen as occurring in parallel. Unlike traditional models, designers (instructors) learn about the needs, content, and objectives as a result of the design process rather than conducting separate analyses before design work begins. The research process attempts to learn more about the subject matter, prerequisite knowledge necessary to understand the content, the presentation modes that are best to help learners comprehend the material, and the reaction of learners to each prototype version.

Reference

IV. PEDAGOGICAL THEORIES

IV. A. Behavioristic Approaches

IV. A. 1. Behavioral Approaches to Learning (an Introduction)

Behavioral theories focus on the role the environment plays in learning and how instructors can shape that environment to help students learn. While the preceding statement may seem to be an oversimplification, it does capture the essence of behaviorist theories. Behaviorism grew out of the philosophy of empiricism, which states that knowledge can only be acquired and known by using the senses. As a result, behaviorism focuses on the overt behavior rather than the mental processes of students in a learning environment. An understanding of behaviorism is important for instructors because they deal with student behavior everyday, but rarely do they know what is going on inside the minds of students.
There are three main theories that make up the field of behaviorism, classical conditioning, operant conditioning, and social cognitive theory. (Although social cognitive theory can be viewed as a bridge between behaviorism and cognitive psychology, it will be considered in this section on behaviorism because of its emphasis on the use of the senses for learning.) An important point to keep in mind during the descriptions of the theories that follows is that the term “conditioning” in the field of psychology is synonymous with “learning.”

IV. A. 2. Overview of Classical Conditioning (Pavlov’s Work)

Classical conditioning is a passive form of learning (i.e., no conscious effort is required by an individual for learning to occur) in which the presentation of a stimulus leads to a response. In order to classically condition people, one must find a pre-existing stimulus-response pairing. In the purest sense of classical conditioning this pair would consist of a stimulus (called the unconditioned stimulus) that naturally elicits an unlearned response (unconditioned response). For example, a loud, unexpected noise (unconditioned stimulus) will elicit a fear response (unconditioned response). Classical conditioning then involves connecting a new stimulus (called the neutral stimulus) to this unconditioned stimulus-response pairing. Typically this new stimulus is presented before the unconditioned stimulus, which produces the unconditioned response.

Neutral Stimulus + Unconditioned Stimulus ➔ Unconditioned Response

Once the neutral stimulus and unconditioned stimulus have been presented together numerous times, the neutral stimulus acquires the ability to elicit the unconditioned response in the absence of the unconditioned stimulus. (At this point the neutral stimulus becomes the
conditioned stimulus because it now has the ability to elicit the unconditioned response, which is now called the conditioned response because it is a learned response.)

**Conditioned Stimulus ➔ Conditioned Response**

The above description of classical conditioning may seem confusing to people who are unfamiliar with this theory, so the following example of how it can occur in education may help clarify this theory. When some students receive a graded homework assignment from an instructor they experience negative emotions (e.g., fear, surprise, anger) if they see a lot of red ink on their papers. Typically these students experience negative emotions before they even read the instructor’s comments. In other words, they react negatively before they know whether that reaction is warranted by the content of the instructor’s comments in red ink.

**Red Ink (Neutral Stimulus) + Negative Feedback (Unconditioned Stimulus) ➔**

**Negative Emotion (Unconditioned Response)**

*Why does this scenario occur?*

One possible explanation is classical conditioning. Specifically, the red ink can be viewed as a neutral stimulus because if you show students red ink on paper outside the context of a graded assignment, they do not have such a negative response.

*So what is truly causing this adverse emotional response?*

Obviously there could be several causes, but for the sake of simplicity, the unconditioned stimulus will be identified as negative evaluation. One could argue that the natural, unlearned response of receiving negative evaluation is experiencing negative emotions. Thus, negative emotions can be viewed as the unconditioned response that occurs whenever the unconditioned stimulus of negative evaluation is present.
How then does red ink lead to negative emotions?

Teachers typically use red pens to grade papers and when students receive their graded papers back, they see the red ink before they see what is written in this red ink. If students typically only see negative comments on their papers, they will start to form an association between red ink and a negative evaluation of their work. With repeated experience, students will come to expect a negative evaluation (even if all the comments written in red ink are positive).

IV. A. 2 a. Classical Conditioning and Education

While most of the information students learn in school is not the result of classical conditioning, this theory does play a role in student learning (albeit a minor role). As demonstrated in the previous section, negative emotions can become classically conditioned to various aspects of the educational experience (e.g., red ink, the word “exam,” courses such as math, certain instructors, group activities). Moreover, the common student experience of test anxiety can be viewed as a result of classical conditioning.

As a result of his research with classical conditioning John Watson, the founder of behaviorism, became a strong believer in the power of the environment to impact learning and development. In fact, one of the most famous quotes by Watson suggests the environment plays a large role in education.

Give me a dozen healthy infants, well-formed and my own specified world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of
specialist I might select—doctor, lawyer, artist, merchant, chief, and yes, even beggarman and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. (This passage was originally published in Watson’s 1924 book entitled Behaviorism.)

One could argue that Watson’s belief in the power of the environment still impacts education today. Specifically, the drive to create the “perfect online” course can be viewed as trying to create the environmental conditions that will guarantee learning for students. Granted, this characterization may be an exaggeration of the efforts of instructors trying to improve their online courses, but the spirit of Watson’s claim may still play a critical role in this drive for the “perfect course.” A quick search on the internet using the phrase “best practices in education” yields 5,200,000 results. This belief among educations that there is one or more “best” ways to educate students may be a cultural artifact of behaviorism’s impact upon American society.

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IV. A. 3. Thorndike’s Three Laws of Student Learning

Even though the introduction to this section on behaviorism did not list Thorndike, his contribution to education is important. Perhaps of most use to the present discussion are his three laws that relate to student learning, readiness, exercise, and effect.

- **Law of Readiness:** learning will only occur when one is willing to form connections between two or more things

- **Law of Exercise:** the strength of any learned connection depends upon:
  - the number of times it occurs
  - the intensity and length of the connection
Law of Effect: behavior that is consistently rewarded becomes learned behavior.

The law of effect is especially important to the discussion of behaviorism because B. F. Skinner based his theory of operant conditioning on this law.

Importance of Thorndike’s 3 Laws to Online Instruction:

- Not all students are ready for the type of work and interaction required in an online course. Some students incorrectly believe that an online course will be easier than its face-to-face counterpart because they do not have to meet in a classroom. Students may also not be ready for the amount of independent learning that is typical of online courses.

- In order to help ensure that students are ready for an online course, instructors can work with their college’s advisors to provide potential online students with a more realistic expectation of what an online course entails. If instructors have a web site for their face-to-face courses, they can provide students with information about their expectations for students in their online courses.

- Most course management systems (e.g., ANGEL, Blackboard, and WebCT) allow instructors to provide students with automatic feedback once a multiple-choice quiz/test is completed. This ability to give immediate feedback to learners can serve as reinforcement for understanding course material (i.e., answering a question correctly) and provide corrective feedback for incorrect answers (essentially, the law of effect).
IV. A. 4. Overview of Operant Conditioning

Although B. F. Skinner accepted that classical conditioning was an important and useful theory, he believed it did not explain enough of everyday behavior. Skinner’s theory of operant conditioning filled this void by focusing more on behavior and its subsequent consequences rather than focusing on the stimuli like classical conditioning. This focus on behavior (responses) means that individuals must make a response before learning occurs. Once a response is made, reinforcement or punishment can be used to either increase the probability that the response will occur again (i.e., reinforcement) or decrease the probability that the response will occur again (i.e., punishment). Operant conditioning, thus, can be viewed as an active form of learning (as opposed to classical conditioning) because one must perform some behavior in order to learn the consequences of that behavior. (In Skinner’s terms one must “operate” in the environment—hence the origin of operant conditioning.)

The experience of posting a comment to an online discussion board can serve as example of how operant condition shapes behavior. Juan, a student new to online learning, posts his first comment to his course’s discussion board. Both his instructor and several other students respond to Juan’s comment with positive replies, which leads Juan to post more comments to the discussion board. In this instance, the positive replies from other people served as reinforcement (i.e., increasing the chance that Juan will post more comments in the future) for the behavior of contributing to the discussion board. On the other hand, if Juan receives negative feedback from other people concerning his posting he will be less likely to make contributions to the discussion board in the future (i.e., he has been punished for contributing).
IV. A. 4 a. Programmed Instruction, the Use of “Built-In” Reinforcement

Skinner’s programmed instruction was an application of his view on learning to the classroom (Shrock, 1995). Specifically, programmed instruction involved:

- clearly stated behavioral objectives
- instruction broken into small units
- self-pacing
- active learner response to inserted questions
- immediate feedback on their performance

In programmed instruction students received positive reinforcement for their correct responses, but if they did not answer enough questions correctly they had to go back over the material and try again. Skinner believed that students would learn in a more efficient manner using programmed instruction because the reinforcements (consequences) would shape their behavior for success. Another key aspect of programmed instruction was repetition (i.e., going over material more than once). Despite the soundness of Skinner’s theoretical approach, programmed instruction was not as successful as he had hoped. Critics suggested the reason was that students felt the workbooks Skinner used were boring and the content material was broken down into too small/simplistic ideas (Crowl, Kaminsky, & Podell, 1997).

Even though programmed instruction fell out of favor, the advances of computer technology have rekindled some of its basic principles. Reader Rabbit, for instance, is a software program that helps children learn how to read using behaviorist principles, such as providing a short, entertaining animation sequence as a reinforcement for each correct answer (Pressley & McCormick, 1995). Twigg (2001) suggests that many online courses
follow a traditional behaviorist design (similar to Reader Rabbit); namely, present the syllabus, assign readings, and then answer questions over the readings. Reinforcement would come in the form of the feedback given to students about correct and incorrect answers.

In addition, a behaviorist learning environment would be considered a “teacher-centered design” rather than a “learner-centered design” because what occurs in the online course has been entirely constructed and determined by the instructor. In a learner-centered design, by contrast, knowledge is co-constructed between students and instructors through collaboration (Palloff & Pratt, 1999). Thus, a teacher-centered design is viewed as a rigid learning environment that places students in a passive learning role. The alternative being espoused from a constructivist perspective is to allow students to have more control over their learning environment. While this idea is very noble and democratic, caution must be used in its application. For example, Jiang and Meskill (2000) found that even though students were more satisfied with an online course that allowed them to construct meaning through social interaction, the academic level of students was an important factor. Specifically, students at lower academic levels (e.g., freshman and possibly students taking introductory-level courses) seemed to need more support (structure) than students at a higher academic level.

The point of the above discussion is that even though constructivism seems to be the current pedagogy of choice by researchers writing about online courses, that does not mean that behaviorism has nothing to contribute. In fact, David Jonassen, a strong proponent of constructivism, states
While objectivism [behaviorism] and constructivism are usually conveyed as incompatible and mutually exclusive, that is not the assumption of this chapter. Rather, I believe that objectivism and constructivism offer different perspectives on the learning process from which we can make inferences about how we ought to engender learning…I prefer to think of them as complementary design tools (some of the best environments use combinations of methods) to be applied in different contexts. (Jonassen, 1983, p. 217)

References


IV. A. 5. Social Cognitive Theory

Albert Bandura disagreed with Skinner’s contention that psychology must focus exclusively on overt behavior because the thought process could not be empirically studied. Bandura agreed that behavior is shaped by the consequences that follow it, but he did not believe that one had to directly experience the consequences in order for learning to occur. For example, a child who sees her brother get punished for using obscene language can come to the conclusion that the same fate may befall her if she uses obscene language. Bandura, thus, posited that learning can happen vicariously and imitated at a later time. Moreover, reinforcement acts on one’s motivation to behave, not on the behavior itself.

Social cognitive theory is important in education because students can learn from other students. For example, posting examples of past papers by students successful in the course can help students learn the instructor’s expectations for a particular assignment. The discussion board in most online courses can also lead to vicarious learning in the following manner. Student A posts a comment to the discussion board and receives several positive replies. Other students that see Student A’s success may be encouraged to post more comments in the hopes of receiving the same positive feedback.

Table A.7
A Comparison of Behavioral Learning Theories

<table>
<thead>
<tr>
<th>Theory</th>
<th>Antecedents (causes)</th>
<th>Behavior</th>
<th>Consequences (of behavior)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical conditioning</td>
<td>Unconditioned stimulus and conditioned stimulus</td>
<td>Unconditioned response</td>
<td>Conditioned response (as a result of the learning process)</td>
</tr>
<tr>
<td>Operant conditioning</td>
<td>Unknown</td>
<td>Response emitted</td>
<td>Reinforcement or punishment</td>
</tr>
<tr>
<td>Social cognitive theory</td>
<td>Observational model</td>
<td>Imitation of model</td>
<td>Reinforcement or punishment</td>
</tr>
</tbody>
</table>

IV. B. Cognitive Approaches

There are two basic approaches to looking at learning from the cognitive perspective, developmental and information processing. The cognitive developmental approach focused on the cognitive structures that develop as people mature, whereas the information processing approach focuses on how efficiently the mind processes information. A brief overview of the major theories in each approach and how they relate to online instruction follows.

Cognitive Development Models

The two major theorists in this approach are Jean Piaget and Lev Vygotsky. The theories of both of these psychologists have been extensively applied to education in the past and play a vital role in how some educators approach online education. Both theories view development as qualitative (i.e., occurring in stages rather than occurring in small, gradual changes), thus thinking in higher stages is qualitatively different than thinking in lower
stages. Jerome Bruner’s discovery learning will also be discussed because of its impact on educational practices.

*Cognitive Information Processing Approaches*

The cognitive information processing (CIP) approach primarily focuses on the way information is processed by humans and uses the computer as an analogy to explain cognitive functioning. There are three main phases of information processing, encoding (getting information in), storage (maintaining the information), and retrieval. The individual mind develops, not so much as a result of physical brain maturation (although CIP would not deny the importance of this factor), but through more efficient processing methods. Moreover, learning and behavior are both seen as resulting from an interaction of the environment and the previous knowledge and experiences of the learner. In order to understand learning, CIP argues that one must understand how human memory works. Therefore, the goal of the CIP approach is to create models of the cognitive processes that control learning and the use of knowledge (Andre & Phye, 1986). There are numerous CIP memory theories, but the current focus will be on four that are important to education, Atkinson and Shiffrin’s multistore memory model, Craik and Lockhart’s levels of processing model, Baddeley’s working memory model, and the connectionist model.

**Reference**

IV. B 1. Cognitive Developmental Approaches

IV. B. 1. a. Piaget’s Theory of Cognitive Development

An important aspect of Piaget’s theory is change in one’s cognitive abilities. There are four causal factors of cognitive change:

- **Heredity/maturation**: sets the upper limits of development. Heredity provides humans with the basic equipment to cope with problems in the environment and sets a time schedule for new development possibilities.

- **Experience**: active interaction with the environment; one develops by actively exploring his/her environment

- **Social transmission**: education (formal and informal)

- **Equilibration**: drives the above three points; it is the driving force behind all development. Piaget defined equilibration as the back-and-forth movement between our stored knowledge being consistent with our experiences (equilibrium) and the mental conflict that occurs when our stored knowledge is not consistent with our experiences (disequilibrium). Equilibration is not the same as homeostasis because cognitive development is dynamic—we must change to be stable. Resolution of disequilibrium results in an equilibrium at a higher level than before. Piaget believed that we are growing, always changing.

  When disequilibrium occurs we can either ignore the new information or integrate it into our current knowledge (what Piaget calls a “scheme”). If we choose to integrate the new information we engage in the cognitive processes of either assimilation or accommodation. Through both of these processes the mind gains a better understanding of the world and is better able to formulate theories about the functioning of the world.
**Assimilation**

In assimilation information is added to our current knowledge (scheme/schemes) without changing the structure or nature of this scheme. For example, when we read about a new species of bird that was discovered in the Amazon jungle we only have to add this new species to our bird scheme as another example of the concept “bird.”

**Accommodation**

Sometimes, however, new information can only be integrated into a scheme by modifying its structure (the process of accommodation). For example, when most people think of dinosaurs and birds they think of them as being unrelated categories (i.e., in different schemes). Recent evidence, however, suggests that birds are descended from dinosaurs, thus we have to change our schemes to include this connection.

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**IV. B. 1. a. i. Educational Application Piaget’s Theory**

One application of Piaget’s theory to online education is to present information in such a way that students experience dissonance between their current knowledge and the information being presented. This discrepancy may spark their curiosity about why the discrepancy exists and motivate them to resolve the discrepancy. (See Loewenstein’s review of the literature on the psychology of curiosity for more information on curiosity’s role in learning.) Piaget believed that the relation between cognitive disequilibrium (his term for the lack of agreement between one’s knowledge base and new information encountered) and motivation to resolve the disequilibrium was an inverted U-shaped relation (Loewenstein, 1994). Thus, when discrepancy is at a low level, new information will be easily assimilated into existing schemata without requiring much motivation or awareness of the assimilation.
When the discrepancy is at a high level, however, new information will be ignored because one’s existing schemata are not adequate to allow accommodation to occur. Therefore, when instructors try to spark student curiosity to learn more about a given topic, they must consider the current level of student knowledge and introduce material that will challenge their beliefs, but not so challenging as to overwhelm them.

Reference


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**IV. B. 1. b. Vygotsky’s Sociocultural Theory of Cognitive Development**

Vygotsky believed that cognitive development resulted from the interactions with other people (the social aspect of his theory—hence the “socio” in sociocultural) and the tools (e.g., written and spoken language, math symbols, books, computers) that a particular culture provides to support thinking. There are three important assumptions based upon Marxism that pervades Vygotsky’s theory. A comparison of these beliefs of Karl Marx and how Vygotsky utilized them is warranted (Thomas, 2000).

*The Influence of Marx on Vygotsky’s Theory:*

1. Activity generates thinking.
   a. Marx: “It is not the consciousness of men that determines their existence, but, on the contrary, their social existence that determines their consciousness.”
      (Marx (1859), Preface to “A Critique of Political Economy”)
   b. Vygotsky: Mental development is the process of internalizing the results of one’s actions/experiences with her/his environment.
2. Development advances by dialectical exchanges.
   
   a. **Marx**: Societies develop through a process of resolving dialectic confrontations.
      
      i. Marx utilizes Hegel’s dialectic formula: An individual has a specific belief (called the thesis), encounters information that contradicts this belief (this contradicting information is called the antithesis), and after much mental deliberation arrives at a resolution of the thesis-antithesis conflict (this resolution is called the synthesis). (As a side note, Hegel did not invent the dialectic process; he borrowed it from Plato.)
   
   b. **Vygotsky**: As an individual engages in activities, she/he derives methods of doing things (theses). When these methods do not work for a specific situation (antithesis), the individual must come up with a new method that works (synthesis).

3. Development is a historical process within cultural contexts.
   
   a. **Marx**: A society’s history is a chronology of purposeful change (development). “The culture (way of life) of a given society at any point in time is not only a product of the society’s past history, but also the contextual foundation for future development.” (Thomas, 2000, p. 291)
   
   b. **Vygotsky**: In order to understand the development of children we must understand the nature of the culture’s historical background because the particular environment in which children grow up offers them different opportunities and demands.
Zone of Proximal Development

As a result of his emphasis on interaction with other people, Vygotsky encouraged activities where individuals could learn from each other. In order for learning to occur teachers must be aware of students’ zone of proximal development (ZPD) and provide scaffolding to aid the learning process. The zone of proximal development is the range from one’s current abilities to one’s potential abilities (with some assistance from an expert, such as a teacher). Vygotsky felt it was important to determine what knowledge and skills students currently possess in order to provide material that is challenging, but not too difficult for students to learn. As students gain more knowledge and abilities the gap between current and potential abilities will become smaller. Without first determining the ZPD Vygotsky felt teachers ran the risk of introducing material that was either too easy or too difficult for students to understand.

Scaffolding

A related concept to the ZPD is scaffolding, which is the process of providing only the guidance that a learner needs. Scaffolding is important in Vygotsky’s view because its appropriate use can awaken the abilities in the ZPD. For example, suppose you were helping a friend, Maria, improve her computer skills. First, you would need to determine what type of tasks Maria could complete without any assistance and what tasks she needed help with (essentially, determining Maria’s ZPD). From your analysis you discover that Maria knows how to type a letter in a word processing program and how to open files on her computer, but is not comfortable using an e-mail program and does not know how to attach a file to an e-mail message. For scaffolding, you might explain to Maria that e-mail software works in a similar fashion to a word processing program and that including an attachment is the same as
opening a computer file. You could then just point out how to start a new message and let her enter the content. Then, when she wants to attach a photograph from a recent vacation, you would then ask her how she would normally open the photographic file. Once Maria explains how to open the file, explain the similarity of opening a computer file and attaching the same file to an e-mail message, and then show her where this function can be found on the menu.

**Reference**


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IV. B. 1. b. i. Scaffolding: A Vygotskian Approach to Online Instruction

McLoughlin and Marshall (2000) believe that scaffolding is crucial in an online course because many online students are unfamiliar with how to learn online (just as some teachers are unfamiliar with how to teach in an online environment). They believe there are four component skills that are essential for learning in an online environment:

- *articulation* (being aware of your own thinking—metacognition)
- *self-regulation* (being able to plan your own study and adjust your learning strategies as necessary)
- *a repertoire of learning strategies*
- *self-evaluation skills*

**Articulation**

In order to support articulation, McLoughlin and Marshall suggest having individual work areas and forums where students can chat with other students. The inclusion of
presentation areas (a typical component in most course management systems, such as WebCT and Blackboard) within an online course will meet the individual work area suggestion. The student presentation area can be used by students to share their work with other students. For instance, students who have just completed a project can share what they learned in this area so the rest of the class can learn about the topic and from each other’s projects. The discussion boards and chat rooms available in most course management systems also support the articulation skill by allowing students to directly interact with each other.

**Self-Regulation**

McLoughlin and Marshall (2000) also believe an online learning environment should foster self-regulation through task design. Specifically, learners should be able to create their own goals, be given relevant and real-life learning tasks, and encouraged to collaborate and share knowledge through interaction with others. As an example, suppose a graphic arts instructor has her students work in groups to design a corporate logo for a fictitious airline company formed by the merger of two current airline companies. This project allows students to create their own goals by deciding on how they are going to approach the task of choosing two airlines to combine and designing a corporate logo for their new airline company. The task of working with other graphic designers on a group project over the internet is a real-world, career-related task that definitely allows for collaboration and knowledge sharing with other people.

**Repertoire of Learning Strategies**

The third essential component in online learning is having a repertoire of learning strategies. This component can be accomplished through the creation of an orientation to
An online orientation could include examples of study timetables, provide guidance on how to create study goals, and provide suggestions on how to create a study plan.

Self-Evaluation

McLoughlin and Marshall suggest that their fourth component skill, self-evaluation, is supported by conversation and active participation in a social environment. The inclusion of self-tests and review worksheets can help students learn how to assess their own understanding of course material. Many textbook publishers have websites connected to their textbooks that provide self-tests over material in their books.

Reference


IV. B. 1. c. Bruner’s Discovery Learning

One of Jerome Bruner’s important contributions to education is his concept of discovery learning. From Bruner’s perspective, discovery learning is the rearranging or transformation of information so that an individual goes beyond the face value of information to form new insights about the information (Elliott, Kratochwill, Littlefield Cook, & Travers, 2000). The goal of discovery learning is to encourage students to manipulate their
environment, think more actively (rather than passively accepting whatever the instructor says), and learn the joys of being able to successfully engage in problem solving. As a result of this active approach to learning, students will learn to organize material to determine patterns and relationships. Moreover, students tend to find more value and meaning in knowledge that they directly discovered. Thus, instructors need to create activities where students will “discover” important principles and concepts rather than just having the principles and concepts directly explained to them.

**Three Major Forms of Discovery Learning**

Bruner’s emphasis on the importance of discovery in the educational process has lead to various forms of discovery learning (Mayer, 2004). Three major forms of discovery learning that have developed are pure discovery methods, guided discovery methods, and expository methods. In **pure discovery learning** students are presented with a problem with no or little guidance from the instructor. Once students are presented with the problem in **guided discovery learning**, they may be provided with hints, direction, coaching, and feedback to keep students on track. **Expository discovery learning** differs from the other two forms because it provides students with a problem along with the correct answer. A review by Mayer (2004) of the research literature on all three forms of discovery learning points to guided discovery as the best method. Mayer suggests that guided discovery learning is the most effective method because it helps students meet two crucial requirements for active learning, activation of existing information that can help make sense of new information and integration of new information with their existing knowledge.

**Educational Implications of Discovery Learning**
Bruner’s emphasis on the construction of knowledge has had a great impact on an approach to education called constructivism. As you will see in the section on constructivism, active construction of knowledge by learners is the heart of this recent pedagogical approach to student learning. Many of the books being written today about online education are written from a constructivist perspective, and utilize some form of discovery learning, so it is important to understand where this approach has come from in order to better understand its tenets.

References


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IV. B. 2. Cognitive Information Processing Approaches

IV. B. 2. a. Atkinson-Shiffron Multistore Memory Model

The Atkinson and Shiffrin’s multistore model of memory suggests that there are three main processes to memory, the sensory register, short-term memory, and long-term memory. (See Figure A.5 for a depiction of the model and see Table A.8 for an overview of the characteristics of each type of memory store.)
Figure A.5. The Atkinson-Shiffrin multistore model of memory.

**Sensory Register**

The *sensory register* processes all of the incoming information from our senses. Information can only stay in the sensory register for a short time because new information is continually being input. The length of time that sensory information can stay within the sensory register, without being forwarded to short-term memory, varies by sense modality. For example, visual information lasts less than one second, whereas speech persists for three to four seconds.

**Short-Term Memory**

Information that is attended to is then passed on to short-term memory (STM). Short-term memory can be thought of that information of which one is consciously aware. The STM aspect of Atkinson and Shiffrin’s model is probably the most misunderstood by the general public because we have all heard someone blame her/his STM for forgetting something. Unfortunately, most of these instances of forgetting are due to a failure of long-term memory, not STM. Any information that is not actively maintained through
maintenance rehearsal (mentally repeating the information until you no longer need it) or transferred to long-term memory will disappear from STM in 15-30 seconds. Short-term memory also has a limited capacity for information. Specifically, STM cannot successfully hold more than five to nine chunks of information.

*Long-Term Memory*

If the information in STM will be important in the future, it is rehearsed until it becomes part of long-term memory (LTM). The type of rehearsal that best ensures the highest level of storage in LTM is *elaborative rehearsal*. This type of rehearsal goes beyond rote repetition by attaching meaning to the information to be remembered, such as the context in which the information was learned and connections to existing memories. The storage capacity of LTM, unlike the sensory register and STM, seems to be limitless. For more information on this model of memory, the interested reader is referred to Atkinson and Shiffrin (1968, 1971).

Table A.8
*Overview of the Three Types of Memory Store in the Multistore Model of Memory*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Sensory Registers</th>
<th>Short-Term Memory</th>
<th>Long-Term Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention Required?</td>
<td>No, information enters system before attention occurs</td>
<td>Requires attention</td>
<td>Rehearsal is required for entry</td>
</tr>
<tr>
<td>Maintenance of Information</td>
<td>Not possible</td>
<td>Continued attention</td>
<td>Repetition</td>
</tr>
<tr>
<td>Format of Information</td>
<td>Literal copy of sensory input</td>
<td>Phonemic</td>
<td>Largely semantic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>Some auditory and visual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possibly semantic</td>
<td>No known limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small (5-9 chunks)</td>
<td>Possibly no loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Displaced by new information</td>
<td>Loss of accessibility or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decay</td>
<td>discriminability preference</td>
</tr>
<tr>
<td>Capacity</td>
<td>Large</td>
<td></td>
<td>Minutes to years</td>
</tr>
<tr>
<td>Information Loss</td>
<td>Decay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td>A few seconds</td>
<td>Up to 30 seconds</td>
<td></td>
</tr>
</tbody>
</table>
Table A.8  (Continued)

Overview of the Three Types of Memory Store in the Multistore Model of Memory

<table>
<thead>
<tr>
<th>Feature</th>
<th>Sensory Registers</th>
<th>Short-Term Memory</th>
<th>Long-Term Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrieval</td>
<td>Probably automatic</td>
<td>Items are in consciousness</td>
<td>Retrieval cues Possibly by search process</td>
</tr>
</tbody>
</table>

The above table was adapted from Craik and Lockhart (1972, p. 672).

References


IV. B. 2. b. Levels of Processing Model of Memory

Craik and Lockhart (1972) believed that there is only memory and dividing it into three phases (sensory register, short-term memory, and long-term memory) is unnecessary. For these researchers the more important factor was the amount of time spent processing this information because the amount of time spent encoding and rehearsing information would determine the amount of detail recovered during the retrieval phase. Thus, they believed the quality and quantity of one’s memory was determined by the depth of processing during learning. By depth, Craik and Lockhart (1972) mean, “…This conception of a series or
hierarchy of processing stages is often referred to as “depth of processing” where greater “depth” implies a greater degree of semantic or cognitive analysis.” (p. 675) If people attach more meaning (e.g., personal experiences, relation to previous knowledge, examples of that concept/idea) to the information they are learning, then there is a greater likelihood that the information will be later retrieved in a complete form.

**Reference**


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**IV. B. 2. c. Working Memory (Gatekeeper to Long-Term Memory)**

Baddeley’s working memory model is also important to understanding learning because working memory determines what information gets into long-term memory. The human mind has only so many cognitive resources that can be utilized to process information (which explains why people have difficulty doing several things at once). In essence, these cognitive resources are a closed energy system; once these resources are activated/employed, there are less resources available for other cognitive tasks. Thus, working memory can be thought of as a “mental workbench” (a system in which only a finite amount of cognitive work can be performed) that contains Atkinson and Shiffrin’s short-term memory.

Working memory is composed of three components, the *central executive*, *articulatory/phonological loop*, and the *visuo-spatial sketchpad* (Baddeley, 1992). The central executive monitors the cognitive resources (such as attention) that are allocated to a given task. The central executive employs two slave systems, the articulatory/phonological loop (processes spoken language) and the visuo-spatial sketchpad (processes visual
information), to help it accomplish its tasks. In order to better understand the relationship between these three components, think of the central executive as a gasoline pump that contains a finite amount of fuel. Whenever either of the two slave systems (articulatory loop or visuo-spatial sketchpad) processes information, the central executive must decide how much fuel (i.e., cognitive attentional resources) should be allocated to this processing. (See Figure A.6.) If working memory has more than one information-processing task, the central executive will have to determine which task should get the largest share of the fuel to complete its processing.

Figure A.6. Baddeley’s working memory model.

Working memory is an important concept in learning because if too much information is presented to a learner at one time (or too many simultaneous cognitive tasks are expected of the learner), the learner will only be able to successfully process some of this information. Table A.9 provides a summary of the functioning of each component of working memory.
Table A.9

Functions of the Working Memory Components

<table>
<thead>
<tr>
<th></th>
<th>Central Executive</th>
<th>Articulatory/Phonological Loop</th>
<th>Visuo-Spatial Sketchpad</th>
</tr>
</thead>
</table>
| Energy Requirements | Source of cognitive energy | *Varies by task
Will drain cognitive resources if the task is difficult | *Varies by task
Will drain cognitive resources if the task is difficult |
| Activities       | *Supports reasoning and language comprehension
*Initiates control and decision processes
*Transfers information to long-term memory | *Maintaining and manipulating speech-based information
*Recycles items for immediate recall | Maintaining and manipulating visuo-spatial information |

Reference


IV. B. 2. d. Connectionist Model

The connectionist model is an important CIP model because it describes memory as a network of interrelated ideas/concepts. Why is this perspective important to learning?

Earlier models of memory (e.g., Atkinson and Shiffrin Multistore Model) depict the processing of information into memory as a serial process (e.g., information enters the sensory registers, is sent to short-term memory, and finally is sent to long-term memory).

The connectionist model suggests that the brain is processing various, separate pieces of information simultaneous. Furthermore, the connectionist model suggests that memories are
not isolated pieces of information organized in a file cabinet. Instead they are linked together into a semantic network. (This network is described as semantic because most of our memories are stored in a language format.)

Perhaps the most popular connectionist theory is the parallel distributed processing model by McClelland and Rumelhart (1985). This model, which focuses on the retrieval and use of prior experience, is quite complex so the present discussion will only provide an overview of its general properties. The smallest part of the information processing system is the processing unit (sometimes referred to as a “node” by other researchers). Each unit (node) can represent any kind of information, from a simple line to concepts like “red” or “wings.” Each processing unit is interconnected with many other units to form a module. A module receives inputs from other modules and sends output to other modules. Some of the information received from other modules is sensory in nature (e.g., spoken language), whereas as other information is more abstract (e.g., concepts such as freedom and love). Each module represents a synthesis of all the information from its own processing units and the information received from other modules. Together, these modules form an information network.

So how does all of these units and modules relate to our experience of thinking? McClelland and Rumelhart (1985) view a mental state (e.g., such as contemplating the meaning of a written statement) “as a pattern of activation over the units in some subset of the modules…Alternative mental states are simply alternative patterns of activation over the modules.” (McClelland & Rumelhart, 1985) For example, if you think about the members of your first-grade class on a Monday and then again on Wednesday, there will probably be a few different names on each list. Perhaps some of the names on Monday’s list will not show
up on Wednesday’s list and vice versa. The parallel distributed processing model would explain the difference in lists as resulting from different patterns of activations of the relevant units. For the sake of simplicity, consider module A as containing the names of your class members with a single unit representing each student’s name. On Monday your activation of module A results in information from units 1, 2, 5, 12, 23, 16, 27, and 30 yielding eight names. On Wednesday, your activation of module A results in information from units 1, 2, 4, 12, 23, 24, 25, and 30 also yielding eight names, however, not the same eight names as on Monday.

After each activation has occurred, a memory trace of that particular activation is left behind. Rather than being a copy of the learned pattern, a memory trace is something from which a pattern can be recreated. Furthermore, these memory traces should be thought of as changes in the strengths or weights of the connections between units. Thus, a strong (heavier weight) connection between two units will more likely cause the whole pattern of activation to be reinstated when this connection is activated than would a weaker (lighter weight) connection.

According to the parallel processing model, when one node of a network is activated, numerous other nodes connected to this node can also be activated. For example, when someone mentions the word “cats,” the “cat” node in my network also activates the nodes for the names of my two cats (Cleo and Xena; see Figure A.7). These two nodes then activate other nodes in the network (e.g., Cleo activates nodes related to Egypt and Egyptian rulers and Xena activates nodes related to the television series “Xena: Warrior Princess,” which then activates nodes related to Greek mythology).
Figure A.7. An example of a semantic network for the phrase “my cats.”

Understanding that our minds work through networks and that the thoughts that become activated can be processed simultaneously (parallel distributive processing) helps educators understand how students’ thoughts can wander in class.

Reference

IV. B. 2. e. Dual-Coding Theory of Learning and Memory

Dual Coding Theory (DCT) is an information-processing approach that attempts to explain the basic mental structures and processes involved with the mind’s associative
network of verbal and nonverbal representations (Clark & Paivio, 1991). This theory is useful to online instructors because it can be used to understand how students learn information and can provide instructors with suggestions on how to successfully integrate textual/auditory information with graphics/animations. DCT posits verbal and nonverbal systems that are activated when information is received through the sensory systems (see Figure A.8).

Figure A.8. Paivio’s dual-coding theory (Adapted from Figure 1 in Clark & Paivio, 1991, p. 152).

Verbal System

The verbal system contains modality-specific verbal codes that represent objects or things. For example, the words “car” and “automobile” are different verbal codes for the same object. Moreover, the description “red sports car” provides visual (its “color”), auditory (the “loud” sound of the car’s engine), and possibly tactile information (the “thrust”
as it takes off). The mental representations of these verbal codes are typically processed in a sequential manner.

*Nonverbal System*

Conversely, the nonverbal system contains modality-specific mental representations of shapes, sounds, actions, emotions, and other nonlinguistic entities. For example, a baseball can be represented in a nonverbal fashion based upon its shape (round), the movement it makes when thrown (curves), and the emotions it evokes (joy, fear, boredom, etc.). Unlike verbal representations, different nonverbal representations can be processed simultaneously. In addition, mental images can undergo dynamic spatial transformations (e.g., looking at your living room and mentally rearranging it to see if the couch will fit on the opposite side of the room), which is not possible with verbal representations.

*Connections Between Representations*

Even though DCT describes the verbal and nonverbal systems as being separate, both systems work together to create a complex associative network. The links between verbal and nonverbal representations are called referential connections and are depicted by red arrows in Figure A.8. In Figure A.8 the word “clock” has a referential connection to an image of a clock. The word “hands,” however, has two referential connections, one to an image of human hands and one to an image of clock hands. A second type of link in DCT is associative connections (depicted as blue arrows in Figure A.8), which join representation within a system (either verbal or nonverbal). In Figure A.8 there are associative connections between the words “clock” and “hands” in the verbal system and between the image of a clock and human hands in the nonverbal system.
**Spreading Activation Leads to Memory**

Once stimuli begins to be processed by one of the mental representation systems (verbal or nonverbal), the stimuli activate verbal/nonverbal codes that in turn can activate other codes via referential and associative connections. This activation of secondary codes can lead to the activation of others, and thus the activation is said to “spread” to other mental representations in the network. The strength of these activations decrease as they spread out from the source, similar to the way ripples decrease in size as the radiate outward from a stone that has been dropped in water. Thus, presenting students with both verbal and nonverbal information increases the likelihood that more mental representations will be activated, which can lead to a deeper level of memory processing and increased chance of recall at a later time. (Refer to Craik and Lockhart’s (1972) [levels of processing model](http://www.nowhereroad.com/gallery/mmmmodel/index.html) for more information on depth of processing.)

**Interactive Model**

Lloyd Rieber has created an interactive model based upon the work of Paivio, Mayer, and himself, which can be found at [http://www.nowhereroad.com/gallery/mmmmodel/index.html](http://www.nowhereroad.com/gallery/mmmmodel/index.html). This model allows the user to select different instructional elements, such as

- instructional objectives (e.g., problem solving, abstract concepts, concrete concepts)
- whether there is a teacher
- type of information presentation (audio, text, static graphic, animated graphic)
- the type of interactivity (simulation, gaming, question and answer)
Once these instructional elements are specified, the user can see the impact his/her choices has on the cognitive processing of students based upon DCT. This simulation also provides an estimate of the multimedia and teacher costs of the instructional elements the user chose. The simulation also provides information on the learning outcomes experienced by students including an indication of whether students are experiencing information overload.

**Reference**


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**IV. B. 2. f. Dual-Coding Model of Multimedia Learning and Memory**

Mayer and Sims (1994) extended Paivio’s Dual-Coding Theory to create their dual-coding model of multimedia learning. Their dual-coding model posits a three-process explanation of how information that is presented both visually and verbally might be integrated into the learner’s working memory (HYPERLINKS TO THE “WORKING MEMORY (GATEKEEPER TO LONG-TERM MEMORY)” PAGE; see Figure A.9). Information that is verbally presented to the learner leads to the creation of a mental representation within working memory (depicted by arrow one).
Mayer and Sims refer to the cognitive process of creating an internal mental representation of the external verbal information as *building a verbal representational connection* (or verbal encoding). Similarly, the creation of an internal mental representation from external visual information is referred to as *building a visual representational connection* (or visual encoding; depicted by arrow two). The mapping of structural relations between the two types of mental representations is referred to as the *construction of referential connections* (depicted by arrow three).

Mayer and Sims (1994) use their dual-coding model of multimedia learning to suggest that any instructional method that facilitates the development of all three connections is more likely to promote transfer. Therefore, the addition of appropriate static images and/or animation should facilitate the learning and remembering process. The use of the word “appropriate” is a necessary caveat because only the addition of multimedia features, in order
to facilitate the construction of referential connections (as opposed to the use of multimedia for decorative purposes), will positively impact learning.

**Reference**


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### IV. B. 2. g. Cognitive Information Processing’s Educational Contributions

Andre and Phye (1986) describe four important contributions the cognitive information processing approach has made to educational practice:

- The CIP approach allows educators to create goals that are not entirely focused on behavior (as the behaviorist approach demands). Educators can create goals that attempt to change the existing cognitive structures (what Piaget calls schemes) of students even if the end result of these attempts cannot be directly observed in behavior.

- The CIP approach provides specific models of the way cognitive processes occur. These models help educators better understand how student learning can sometimes go awry and provide suggestions on how to correct these mistakes.

- CIP models (by virtue of their detailed explanation of what is occurring mentally when students are engaged in a learning activity) can lead to more effective methods for testing and description of students with typical and special abilities.

- A better understand of how new learning becomes integrated with existing knowledge can lead to the development of improved technologies for instructional design. For
example, an understanding of working memory’s constraints aids the construction of simulated learning experiences by keeping the amount of information on which the learner must concentrate low.

Reference


IV. C. Constructivistic Approaches

Constructivism, like the pedagogical theories that came before, arose because of dissatisfaction with the prevailing educational theories. Specifically, constructivism objected to objectivism (the belief that knowledge is an entity independent of the mind and thus, can be transferred from one person to other) and the computer-like models of the cognitive approach. Instead, constructivism purposed that learning is an active construction of the world and instruction should be focused on the learner, not the teacher.

IV. C. 1. Individual and Social Constructivism’s Approach to Learning

Both individual and social constructivism are based upon the philosophy of rationalism and cognitive psychological theories. The philosophy of rationalism believes that knowledge is based upon reasoning and we acquire this knowledge by interpreting events that occur in our environment. Individual constructivism is also based upon Jean Piaget’s theory of cognitive development. Piaget considered children to be amateur scientists whose actions could be explained as a result of their efforts to make sense of their world. Piaget
also emphasized that learning occurs through activity. ([Behaviorism](#), [THE “BEHAVIORAL APPROACHES TO LEARNING (AN INTRODUCTION)” PAGE]) In contrast, focused more on how the outcomes of this activity would affect future behavior.)

[Piaget](#) also believed that each child matured and developed at slightly different rates. Moreover, because each child is testing his/her own theories of why the world is the way it is, these differing theories would result in a different and unique understanding of the world.

**Individual Constructivism**

Individual constructivism builds on Piaget’s ideas by suggesting that every student will learn in different ways and gain a different understanding of course material, even if everyone in a class receives the same exact instruction. Thus, instead of advocating a “one size fits all” approach to instruction (as a behavioristic approach is considered to do by constructivists), instruction needs to be more learner centered rather than teacher centered (i.e., in teacher-centered instruction the teacher determines how instruction will proceed and controls all aspects of it). In constructivism, teachers become “facilitators” who are resources for students in their learning endeavors rather than being the “sage on the stage” (an expert who distills information to students). A constructivist environment, therefore, would present activities that students would actively engage in and learn by experience. For example, a constructivist might utilize Bruner’s [discovery learning](#) by setting up an activity where students will discover an important idea/concept on their own rather than just having the teacher explain the concept to them.
**Social Constructivism**

Social constructivism is similar to individual constructivism in its emphasis on a learner-centered environment and learning as an active construction of the mind. It differs from individual constructivism in its emphasis on knowledge being constructed between people rather than within the individual. Social constructivism is partially based upon Vygotsky’s sociocultural theory (HYPERLINKS TO THE “VYGOTSKY’S SOCIOCULTURAL THEORY OF COGNITIVE DEVELOPMENT” PAGE) of cognitive development rather than a strictly Piagetian approach. Vygotsky emphasized the role that other people in a child’s environment (home, school, peers) play in helping the child develop his/her mind. Vygotsky also emphasized that language is an important tool that spurs cognitive development. (Piaget viewed language as a byproduct or reflection of one’s cognitive abilities rather than playing an active role in developing cognitive abilities.) As a result, social constructivists believe that learning should occur in a social setting, with students working together in groups. This group work will help each student develop an understanding of course material as the group as a whole develops this understanding. Thus, understanding develops as a result of dialogue between group members. Social constructivists utilize the practices of collaborative, (HYPERLINKS TO THE “COLLABORATIVE LEARNING (STUDENTS WORK TOGETHER)” PAGE) cognitive apprenticeships, (HYPERLINKS TO THE “COGNITIVE APPRENTICESHIP (AN APPLICATION OF SITUATED COGNITION)” PAGE) and problem-based learning (HYPERLINKS TO THE “PROBLEM-BASED LEARNING” PAGE) to help students develop this understanding. As in individual constructivism, the teacher is viewed as a facilitator rather than a teacher.
Table A.10
*Differences Between Individual and Social Constructivism (Table Adapted from Duffy & Cunningham, 1996, p. 175)*

<table>
<thead>
<tr>
<th></th>
<th>Individual Constructivism</th>
<th>Social Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of the mind</td>
<td>In the head</td>
<td>In the individual-in-social interaction</td>
</tr>
<tr>
<td>Learning is a process of</td>
<td>Active cognitive reorganization</td>
<td>Acculturation into an established community of practice</td>
</tr>
<tr>
<td>Goal is to account for</td>
<td>The social and cultural basis of personal experience</td>
<td>Constitution of social and cultural processes by actively interpreting individuals</td>
</tr>
<tr>
<td>Theoretical focus</td>
<td>Individual psychological processes</td>
<td>Social and cultural processes</td>
</tr>
<tr>
<td>Analysis of learning views learning as</td>
<td>Cognitive self-organization, implicitly assuming that the individual is participating in cultural practices</td>
<td>Acculturation, implicitly assuming an actively constructing individual</td>
</tr>
<tr>
<td>Focus of analysis</td>
<td>Building models of individual students’ conceptual reorganization and by analyses of their joint constitution of the local social situation of development</td>
<td>Individual’s participation in culturally organized practices and face-to-face interactions</td>
</tr>
</tbody>
</table>

**Reference**

IV. C. 2. Situated Cognition (The Context of Learning)

Why do students have difficulty transferring what they learned in the classroom to situations outside of the classroom? Brown, Collins, and Duguid (1989) believe the answer is that learning in the typical classroom occurs in the wrong context. They believe that learning needs to occur in an environment that is similar to the environment in which the information will be utilized in the “real-world.” While very few educators would suggest that learning occurs in a vacuum or that context is unimportant, whether an appropriate context is a necessary condition is a debatable issue. The present attempt will be to understand and evaluate the claims of the situated cognition approach, especially the cognitive apprenticeship model, in order to better understand situated cognition’s place in educational practice.

Situated Cognition’s Progressivism Roots

Perhaps the best way to understand any curriculum plan is to reflect upon the ideology upon which it is based. Situated cognition is best viewed as rooted in Dewey’s Progressivism because of its belief that knowledge is always in the process of construction. Dewey believed that humans are in a continual state of growth due to their efforts to adapt and transform their environment (Eisner, 1994). In this growth process, the intellect is recast to account for the changes in the environment.

Brown et al. (1989) extend Dewey’s view of knowledge as ever evolving by using language comprehension as an analogy. Any word, they argue, has no set meaning until the context in which the word appears is known. Consulting a dictionary does not help unless one has an idea of how the word was used. Thus, the meaning of a word is always under construction. In the same vein, the meaning of a concept is always under construction...
because a concept can take on different meanings depending upon the context in which it is situated.

In order to understand the true nature of concepts (and of learning itself) one cannot view them as “abstract, self-contained entities” (Brown et al., 1989). Rather, concepts should be viewed as tools for learning because concepts, like tools, can only be understood through use. *Through the use of a tool one not only learns how and when to use it, but also learns more about the tool’s nature.* This understanding of a tool, however, does not occur in isolation—it occurs in the context of the culture in which it is used. For example, a pencil is understood and used in a different way in a culture that has written language versus a culture that has no writing system. As a culture develops so does its understanding of the tools it uses and the ways that the tools are used.

For Brown et al. (1989) a concept, culture, and its activity are all interdependent and learning must include all three. Specifically, “the culture and the use of a tool act together to determine the way practitioners see the world; and the way the world appears to them determines the culture’s understanding of the world and of the tools.” (Brown et al., 1989, p. 33) In order for students to use tools (concepts) like practitioners, they must become part of the culture that uses the tools. This belief that enculturation must occur for students to learn is also an important part of Dewey’s Progressivism.

Dewey believed that intelligence only develops through the resources of the culture. One such resource of a culture is its language, which provides a medium in which to frame and expand one’s knowledge of the world. Therefore, the purpose of school is to provide what Dewey called “educational situations” that allow students to develop their ability to deal with increasingly complex problems (Eisner, 1994). In more modern terminology,
Dewey is advocating the use of authentic learning activities to facilitate the active construction of knowledge about a particular topic. Dewey’s position can also be restated in the terminology of Brown and his colleagues: *Learning, and thus knowledge, is only acquired and understood in a context (i.e., cognitions are situated in the specific context in which they were learned)*.

**References**


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**IV. C. 2. a. Situated Cognition and the State of Education**

According to Brown and his colleagues, the basic problem with schools is that they tend to treat knowledge as a substance that can be uprooted from its soil (context) and transplanted into the minds of students with little regard for whether these minds have been properly prepared to receive it. Brown et al.’s (1989) criticism is based upon Ryle’s two types of knowledge, “knowing that” and “knowing how” (cited in Posner, 1995). “Knowing that” views knowledge as subject matter—an entity unto itself (e.g., knowledge of facts), whereas “knowing how” views knowledge as a performance ability—a skill. The current school curriculum can thus be viewed as having a “knowing that” perspective of knowledge. However, one should not assume that Brown and his colleagues are advocating an emphasis on skill development. Instead, they are railing against a view of knowledge as static and fixed in form.
Their solution to what ails the school system is to incorporate the cognitive apprentice model into the curriculum. The cognitive apprenticeship model approaches the learning process by introducing students to authentic problems in the context in which they naturally arise and allowing them to solve them the way that a practitioner in the field would. For example, the traditional way of teaching students how to compute the area of various shapes is to use formulas and textbook examples. The problem with this approach is that learning and subsequent knowledge becomes situated in a school setting with textbook examples that are well constructed and result in a clear, clean answer. In the real world, argues the situated cognitionist, problems are not well constructed and often result in imprecise solutions.

**Painting a Classroom, an Example of Authentic Learning**

In order to provide students with a more realistic problem setting, advocates of situated cognition would have students determine how many paint cans they would need to repaint the classroom. Students would have to break the surface area of the classroom walls into various geometric shapes because the surface area occupied by breaks in the walls (e.g., windows, chalkboards, and doors) have to be removed from the calculations. This activity would give students practice with the same type of problems found in a textbook, as well as providing a more practical application of their developing math skills. In the process of this activity, students would more than likely end up with extra paint because the amount of surface area covered by one or two cans of paint will rarely equal the square footage of the room to be painted. This painting activity can be complicated by having students determine whether they should purchase paint in five gallon buckets or one gallon cans based upon amount of paint required and the cost of both options. An added bonus to this type of
instruction is that students would realize that perfect solutions (like the kind that occur in textbook exercises) are not always possible.

References


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Perhaps the most important benefit of a situated cognition curricular approach is that students learn how to think like practitioners in various fields. A cognitive apprenticeship, in the view of Brown et al. (1989), is similar to an apprenticeship of a tradesperson or artisan because of the focus on how the average person learns in this natural, “on-the-job” learning environment. Brown and his colleagues refer to Jean Lave’s conception of “just plain folks” (cited in Brown et al., 1989) as the ideal way of structuring instruction. (Lave studied the way average people learned to perform everyday tasks.) Just plain folks (JPFs) engage in reasoning that is more like that of practitioners in a field, whereas traditional students tend to reason in abstract ways that are divorced from real-life situations (see Table A.11).

Table A.11

<table>
<thead>
<tr>
<th>JPFs</th>
<th>Students</th>
<th>Practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>reasoning with:</td>
<td>causal stories</td>
<td>laws</td>
</tr>
<tr>
<td>acting on:</td>
<td>situations</td>
<td>symbols</td>
</tr>
<tr>
<td>resolving:</td>
<td>emergent problems and dilemmas</td>
<td>well-defined problems</td>
</tr>
</tbody>
</table>
### Table A.11 (Continued)

*JPFs, Student, and Practitioner Activity (Table Taken from Brown et al., 1989, p. 35)*

<table>
<thead>
<tr>
<th>Producing:</th>
<th>JPFs</th>
<th>Students</th>
<th>Practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>negotiable meaning and socially constructed understanding</td>
<td>fixed meaning and immutable concepts</td>
<td>negotiable meaning and socially-constructed understanding</td>
</tr>
</tbody>
</table>

### Reference


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### IV. C. 3. Problem-Based Learning

*A Clarification of Terms*

Before beginning a discussion of problem-based learning, a clarification of terms is necessary. To someone unfamiliar with constructivist terminology, question/issue-based, case-based, project-based, and problem-based learning all seem like synonyms for the same type of learning. While they do share similarities, David Jonassen (1999) highlights some critical differences.

- In *question/issue-based learning*, students are presented with a question about a topic that has an uncertain or controversial answer (such as ethical issues).
- *Case-based learning* involves students studying cases (similar to those faced by real practitioners in the field) and preparing case summaries or diagnoses.
- *Project-based learning* involves the study of several cases that integrate various units of instruction over a long period of time (e.g., a semester long project). Students
discuss ideas, plan their approach to completing the project, collect information, and disseminate their findings.

- **Problem-based learning** is similar to case-based learning except that problem-based learning requires students to engage in self-directed learning while solving various cases across a curriculum.

**Problem-Based Learning and Online Education**

Duffy and Cunningham (1996) believe that knowledge is the ability to use information in one’s socio-cultural environment rather than knowledge being “in one’s head” (i.e., knowledge as a verb rather than as a noun). In online education, they believe the focus should not be the individual learner in isolation, but on the activity in the online learning environment. Thus, the role of computer technology is to present new learning activities and opportunities, not present information in a static fashion. Moreover, the computer hardware and software need to be transparent so learners can focus on learning course material, not how to use the medium. Duffy and Cunningham believe the best way to apply constructivism to education is through problem-based learning (PBL). They believe that education “…should model and prepare us for the self-directed learning we will need to do to be effective participants in our community and to be effective in our profession.” (Duffy & Cunningham, 1996, p. 190)

In Savery and Duffy’s (1995) description of the PBL process, students are:

- presented with the problem
  - The problem must a “real” problem that is occurring in society rather than a hypothetical problem that has little basis in reality. The reason for not using
hypothetical problems is that students are more engaged in “real” problems, and they are eager to find a solution to the problem.

- **discuss the problem**
  - Students get together as a group to discuss the nature of the problem and what the important issues are.

- **decide what information is needed to solve the problem**
  - Students generate hypotheses about causative factors that may have led to the problem and decide what additional information needs to be collected in order to arrive at a solution.

- **go off on their own to gather this information and engage in self-directed learning**
  - Students may use whatever resources are at their disposal (e.g., library, faculty members not necessarily connected to the course, professionals in the community).

- **come back together to evaluate their collected resources**
  - After everyone has collected data, students reconvene to determine which resources are the most helpful in solving the problem and which resources are not that useful. This evaluation of resources should be seen as reexamining the problem rather than a reporting of what each student learned.

- **work toward a solution**
References


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IV. C. 4. Collaborative Learning (Students Work Together)

Student collaboration is an important part of social constructivism because it leads to a deeper level of learning, critical thinking, and long-term retention of course material (Kreijns, Kirschner, & Jochems, 2003). Some readers of this section may be thinking of the terrible experiences they had as students working on a group project and vow never to subject their students to such an experience. Before completely condemning collaborative learning as ineffective, it is important to ponder why it was ineffective because other readers may be fondly reflecting on their experiences with group projects. Kreijns et al. (2003) suggest there are two pitfalls instructors must avoid to prevent collaborative learning from failing.
Pitfalls of Poorly-Designed Collaborative Learning

Taking Social Interaction for Granted. The first pitfall is taking social interaction for granted. Some instructors assume that social interaction between group members will automatically take place just because students have been placed in groups. This assumption is not only incorrect, it can result in three negative effects (free-rider effect, social loafing, and the sucker effect) that typically occur in groups that are not collaborative. The first of these negative effects, the free-rider or hitchhiking effect, occurs when some group members believe the group is working well enough that they do not need to contribute. Social loafing is similar to the free-rider effect in that social loafers reduce their contributions to the group effort. The difference between the two concepts, however, is that social loafers do not contribute when the group is sufficiently large because they do not believe their lack of effort will be noticed, whereas free riders are just trying to profit from the work of others while minimizing their efforts. The final negative effect, the sucker effect, occurs when the more productive group members realize that other group members are profiting from their hard work, but not substantially contributing to the group effort. As a result of this realization, these productive group members reduce their contribution to the group effort because they do not want to be taken advantage of (i.e., they do not want to be seen as “suckers”).

Restriction of Social Interaction to Cognitive Processing. The second pitfall instructors need to avoid is restricting the social interaction in a group to cognitive processes. In other words, students need to socialize with each other to establish trust and feel a sense of belonging before they can collaborate effectively. For example, movie director Peter Jackson wanted to make sure the four actors who played the major hobbits in the Lord of the Rings trilogy could effectively portray the strong friendship and sense of family that the story
demanded. In order to accomplish this goal, Jackson arranged various activities (e.g., a balloon ride) where the four actors could interact on a non-acting basis to establish real friendships so that once filming started, the friendships in the story would seem natural to the actors and they could focus their acting skills on other aspects of portraying their characters.

**Avoiding the Pitfalls**

How can these two pitfalls be avoided? Kreijns et al. (2003) provide four categories of suggestions derived from research on avoiding these pitfalls:

1. *Promote positive interdependence* (the necessity of every group member contributing in order for a project to be effective) through group roles by consistently reminding students of their individual roles throughout the learning activity.

2. *Build interactivity into the online learning environment* by focusing on the students rather than the technology. In other words, just because the technology of a course management system allows instructors to create chat rooms and threaded discussion areas just for socializing does not mean that students will use them. Instead, instructors need to encourage students to use these tools by requiring them at the beginning of the course to introduce themselves and perhaps starting a few informal discussions with students to increase their comfort factor with socializing online.

3. *The roles of instructors and learners must be changed* for collaboration to occur. First of all, the nature of the course needs to shift from teacher-centered to learner-centered learning. In a similar fashion, students must shift their learning approach from individual learning to group learning.

   a. *Four types of peer behaviors necessary for online collaborative learning:*
i. *participation* (both contributing one’s ideas to the group and helping others have a good learning experience)

ii. *response* (providing others with constructive feedback and asking questions to facilitate the learning experience)

iii. *affective feedback* (being patient with other students, encouraging them, referring to them by name so they feel less anonymous)

iv. *focused messaging* (sending messages to other students that are to the point and clearly articulated)

b. Two types of instructor behavior necessary for online collaboration to occur:

i. *discussion management* (e.g., keeping discussions on track, providing the necessary structure for discussion)

ii. *contribution* (e.g., providing timely feedback, providing group and individual feedback)

**Reference**


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**IV. C. 4. a. Collaborative vs. Cooperative Learning**

Despite the importance of collaborative learning to a social constructivist perspective, collaborative learning is frequently confused with cooperative learning. Ted Panitz (1996) believes the confusion results because the two types of learning have similar processes (e.g.,
group activities, a problem-based approach). Table A.12 highlights the differences he sees between the two types of learning.

Table A.12
* Differences Between Collaborative and Cooperative Learning *

<table>
<thead>
<tr>
<th></th>
<th>Collaborative Learning</th>
<th>Cooperative Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic goal</strong></td>
<td>consensus building through cooperation by group members</td>
<td>accomplish a specific goal or produce an end product</td>
</tr>
<tr>
<td><strong>Type of knowledge on which learning activities focus</strong></td>
<td><em>nonfoundational knowledge</em> (knowledge derived through reasoning and questioning rather than rote memorization)</td>
<td><em>foundational knowledge</em> (basic facts and information that is socially agreed upon)</td>
</tr>
<tr>
<td><strong>Control of learning progress</strong></td>
<td>student controlled (students determine responsibilities for each group member; teacher facilitates rather than controls the process)</td>
<td>teacher controlled (teacher specifies group interaction structures and specifies the product of group work)</td>
</tr>
<tr>
<td><strong>Final project</strong></td>
<td>students determine final product after consultation with teacher</td>
<td>teacher specifies the nature and format of the final product</td>
</tr>
<tr>
<td><strong>Responsibility for learning</strong></td>
<td>students (students learn that teachers and authorities do not know all of the answers)</td>
<td>teacher (teacher is responsible for structuring the learning environment and activities)</td>
</tr>
<tr>
<td><strong>Evaluation of group work</strong></td>
<td>typically qualitative (e.g., analysis of student interaction within the group)</td>
<td>typically quantitative (focus is on the product of group learning)</td>
</tr>
</tbody>
</table>
IV. C. 5. Challenges to Constructivism

Overview

Every pedagogical approach has its supporters and critics. Constructivism is the pedagogy that seems to be en vogue in the field of education at the present time. With the proliferation of books and articles advocating constructivism, one may not be aware that not all educational theorists are on the constructivist bandwagon. Therefore, this section will attempt to provide an overview of some of constructivism’s criticisms. The point of this section is not to suggest that constructivism is not an effective pedagogical approach. Rather, the point of this section is to demonstrate that there are pros and cons to every educational approach and that the future will bring a new pedagogy as a reaction to constructivism in the same manner as constructivism can be viewed as a reaction to behaviorism and cognitive information processing approaches.

Constructivist Teaching Fallacy

Richard E. Mayer, a veteran researcher in the educational field, is concerned with the way the theory of constructivism has been put into practice by some educators:

A common interpretation of the constructivist view of learning as an active process is that students must be active during learning. According to this interpretation, passive
venues involving books, lectures, and on-line presentations are classified as nonconstructivist teaching whereas active venues such as group discussions, hands-on activities, and interactive games are classified as constructivist teaching. (Mayer, 2004, p. 14)

Mayer refers to this interpretation of constructivism as the constructivist teaching fallacy because it considers active learning to be the same thing as active teaching. His point is that students can be just as engaged in active learning through a passive means, such as reading an engaging book, as they are in group discussions. Looking at Figure A.10, the constructivist teaching fallacy restricts instructional methods to only those methods that would be placed in the lower right quadrant (high behavioral activity and high cognitive activity). Mayer argues, however, that instructional methods that fit in the upper right quadrant (low behavioral activity and high cognitive activity) are just as an appropriate constructivist approach as methods that are high in both behavioral and cognitive activity.

\[
\begin{array}{c|c|c}
\text{Cognitive Activity} & \text{Low} & \text{High} \\
\hline
\text{Behavioral Activity} & \\
\text{Low} & & \\
\text{High} & & \\
\end{array}
\]

\textit{Figure A.10.} Dimensions of active learning. (Taken from Mayer, 2004, p. 15.)

\textit{Reason for Constructivist Teaching Fallacy}

Why does the constructivist teaching fallacy occur? Mayer believes part of the problem is that “…constructivism is a complex, multifaceted, and somewhat indefinable doctrine…” (Mayer, 2004, p. 18) In other words, the vagueness of constructivistic theory makes it difficult to define and, more importantly, to apply. For example, consider the basic
premise of constructivism, namely, that students learn by actively constructing their own understanding of the world. If this premise is accepted as true, then the choice of instructional method is a moot point because regardless of what instructors do, students will be constructing their own understanding. Thus, the instructional approaches of lecture, group discussion, and reading a textbook are all constructivist approaches. Granted, constructivist theorists would disagree with this characterization, but that is the point that Mayer is making; constructivism will continually be misinterpreted until it is formulated as a theory from which testable predictions can be drawn.

**Discovery Learning’s Role in Applying Constructivism**

Unfortunately, as Mayer (2004) points out, educators who want to use a constructivist approach are often encouraged (either through published literature or through an incorrect interpretation of constructivism) to make the learning process activity based, which typically means a focus on pure discovery learning as an instructional method (high behavioral activity and high cognitive activity). The basic problem with pure discovery learning is that it does not work. Mayer (2004) cites three decades of research in the areas of problem solving rules, (Piagetian) conservation strategies, and computer programming concepts (LOGOS programming environment) that demonstrates the ineffectiveness of pure discovery learning. This same research, however, suggests that *guided discovery learning* is an effective instructional method.

What is the difference between pure and guided discovery learning? In pure discovery learning students are presented with a problem with no or little guidance from the instructor. Conversely, once students are presented with the problem in guided discovery learning, they may be provided with hints, direction, coaching, and feedback to keep students
on track. Mayer suggests that guided discovery learning is the most effective method because it helps students meet two crucial requirements for active learning, activation of existing information that can help make sense of new information and integration of new information with their existing knowledge. Moreover, Mayer (2004) argues that cognitive activity (e.g., selecting, organizing, and integrating knowledge) is what really leads to the active learning espoused by constructivism, not behavioral activity (e.g., “hands-on” activity, discussion).

Reference


IV. C. 6. Challenges to Situated Cognition

*The Value of Abstraction*

Anderson, Reder, and Simon (1996) believe that some of the constructivists’ claims about the importance of situated learning are exaggerated. For instance, constructivists claim that training by abstraction (e.g., doing traditional math problems from a textbook) is of little use because the knowledge that is gained is devoid of the context in which it is used and thus, will not transfer to other situations. Anderson et al. describe several research studies that compare two groups of learners, one given abstract instructions related to the task and the other group who just has practiced the task, and these studies demonstrate that the group receiving abstract instruction performed better. In one of these studies two groups of children practiced throwing darts at an underwater target (the target was under 12 inches of water). The abstraction group, in addition to practicing, received an explanation of light
refraction, which causes the apparent location of the target to be deceptive. The other group (the constructivist group) only practiced. Both groups performed equally well on this task, but when the target was only under four inches of water the abstraction group was able to transfer the instruction they received to this new situation and thus performed better than the other group.

*What is “Authentic?”*

Anderson et al. also argue that “authentic” learning environments are not as important as the cognitive processes that a problem stimulates. In other words, the goal of using any activity is not to provide students with all of the props and feel of a real-world situation, but to get students to think about the problem in the way experts (practitioners in constructivist terminology) do. Moreover, they argue that often these real-world problems involve a lot of busy work and do not offer enough opportunities to learn the target competences.

Like Anderson et al., Breland (1999) has concerns about “authentic learning.” Breland’s concern, however, focuses on how constructivists’ use the term “authentic.” Specifically, he believes “authentic” is an inappropriate term to use because it suggests the alternative to authentic is “fake” or “copied,” which hopefully is not their intention. Instead, he argues that the terms comprehensiveness and fidelity (degree to which real life is simulated) should be used because they are more descriptive and precise.

*References*

IV. D. Online Pedagogy

IV. D. 1. Seven Principles for Good Practice in Undergraduate Education

Arthur Chickering, along with his various colleagues and educational associations, has created seven principles for good practice in undergraduate education. These principles are appropriate for both face-to-face and online learning and can be used as a guideline during course development (Chickering & Ehrmann, 1996). The seven principles are:

1. Good practice encourages contacts between students and faculty
2. Good practice develops reciprocity and cooperation among students
3. Good practice uses active learning techniques
4. Good practice gives prompt feedback
5. Good practice emphasizes time on task
6. Good practice communicates high expectations
7. Good practice respects diverse talents and ways of learning

Reference

**IV. D. 2. Five Principles of Instruction to Promote Deep and Durable Learning in the Online Classroom**

Online courses, due to their relatively recent appearance in education, are under scrutiny to prove they are as effective as traditional forms of instruction. To this end, Hacker & Niederhauser (2000) believe instructors can help boost the credibility of online courses by focusing on deep and durable learning. In order to help instructors develop this type of learning environment, they provide five principles that are based upon empirical research:

1) **Students are required to become active participants in their own learning by constructing deep explanations, justifications, and reasons for their beliefs and actions.**
   a) The communications tools in the typical online course (i.e., e-mail, threaded discussion boards, and chat rooms) can help students to actively construct their knowledge of a topic through discussion with the instructor and/or other students in the course. If students are explaining course material in their own words and how the material fits into their existing knowledge base during these discussions, they will have a better understanding of the material.

2) **Learning is grounded in the effective use of examples.**
   a) The examples used in an online course should be taken from the real-world experiences that students are likely to encounter rather than decontextualized, abstract examples. This use of realistic examples will help students connect the new information with their existing knowledge related to the topic. Initially, examples should be more generic in order to facilitate near transfer. As students comprehend these basic examples and their relation to the topic under study, more complex or unusual examples should be used to facilitate far transfer.
3) **Collaborative problem solving** is utilized to increase specific problem-solving skills and increase metacognitive awareness of how, when, and why to use a particular problem-solving strategy.

a) Activities or projects intended to foster collaboration among students must be large and complex enough that they could not easily be completed by single student. If an activity can be completed as easily by a single student as it can by a group, collaboration may not occur because only a few students may actively work on the project while the rest observe. A more complex project, however, will require students to divide up responsibilities and work together in order to complete the project on time.

4) Effective instruction provides *appropriate feedback* (i.e., not giving too much or too little feedback) to help students learn.

a) Hacker and Niederhauser (2000) believe that providing too much feedback can be detrimental to student learning. Their belief is derived from research on computer-aided instruction that suggests feedback can become a crutch for learners because they may come to rely on feedback rather than analyzing their own performance. For example, some professors have lamented that the spelling and grammar checking aspects of most word processing computer programs have made students lazy writers because they rely on the software to catch errors rather than proofread their work. Hacker and Niederhauser believe that students need opportunities to discover their own errors and correct them.

5) Effective instruction contains *motivational components* that enhance self-efficacy and perceived challenge.
a) Motivation in any course, whether it is online or face to face, is important if students are to succeed. “Without motivation to learn, learning becomes a sterile process that is externally dictated and internally resisted.” (Hacker & Niederhauser, 2000, p. 60) The four previous principles of instruction can help stimulate motivation to learn. Principle one can foster motivation by keeping students engaged in the course and reducing the chances that students will become inactive. The use of examples can help course material seem more relevant to students’ lives (principle two). Student involvement in collaborative problem solving can provide students with opportunities to compare their knowledge and skills with other students in order to better gauge their progress in the course. This social comparison can provide another source of feedback rather than solely relying on comments from the instructor. Finally, feedback can enhance the self-efficacy of students if it guides students to the correct information through the use of hints rather than just telling them that they are incorrect.

Reference

IV. D. 3. 12 Recommendations for Placing Students at the Center of Web-Based Learning

Bonk and Cummings (1998) developed the following 12 teaching recommendations based upon their online teaching experience and the American Psychological Association’s Learner-Centered Principles (http://www.apa.org/ed/lcp.html).
1. Create a learning environment where students feel safe and encourage a *sense of community* by asking students to introduce themselves to one another.

2. Take full advantage of the capabilities of the computer environment by creating activities that *utilize the potential of the medium*, rather than recreating what is typically done in face-to-face classrooms.

3. *Allow students to have some choice* (e.g., complete one of two assignments) to encourage students to make decisions and become self-directed learners.

4. *Facilitate*, don’t dictate (i.e., only provide students with help when they need it and let them wrestle with a problem a little before offering help).

5. Use public (e.g., commenting on a student’s discussion board posting) and private forms of *feedback*.

6. *Vary the forms of electronic mentoring and apprenticeship*. In other words, allow students (either more advanced undergraduates, graduate students, or peers from other sections of the same course) to occasionally provide mentoring to other students through feedback and discussion.

7. Use course *assignments that are integrative* and build upon each other.

8. Use of *a variety of pedagogical activities*. In other words, do not limit students to engaging in one type of learning activity, such as writing or discussion.

9. Encourage students to *explore the internet* to find information that enhances course material.

10. Provide *clear expectations* and explicit task explanations.

11. *Embed thinking skills and portfolio assessment* as an integral part on assignments.
12. Try to *personalize* each student’s online experience (e.g., get to know the students as individuals, don’t provide generic feedback, group projects, chat sessions that are not academic in nature).

**Reference**


### IV. D. 4. Cognitive Flexibility Theory (Looking at a Problem from Various Perspectives)

Cognitive flexibility theory (CFT) is a theory of case-based learning that suggests deep and flexible understanding in a complex or ill-structured domain can only occur when the learner has looked at the material from various perspectives (Jacobson & Spiro, 1995). In order for students to understand material in a given domain, instructors must avoid oversimplification where it is unnecessary (such as simplifying basic principles in an advanced course) because students need to become aware of the complex nature of the topic. Jacobson and Spiro believe the difficulty some students have in transferring their knowledge to situations outside of the course occurs because they underestimate the complexity and ill-structured nature of a given domain and believe that phenomenon can be explained simply, which is rarely true in everyday life.

In order to avoid these problems, *five principles* can be distilled from CFT to avoid the tendency to inappropriately oversimplify material:

1. Use multiple conceptual representations of knowledge (e.g., various analogies, various viewpoints) to better reflect the multifaceted nature of complex knowledge.
2. Link and tailor abstract concepts to different case examples so students gain a better understanding of the various aspects of these abstract concepts.

3. Introduce domain complexity early rather than breaking a complex topic into disconnected parts and analyzing them separately because doing so divorces the topic from its context.

4. Stress the interrelated and web-like nature of knowledge to avoid the creation of inert knowledge.

5. Encourage knowledge assembly (the integration of domain knowledge with relevant case studies to understand and solve the problem at hand).

Reference


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*IV. D. 5. Combining Pedagogical Approaches*

Amon Shabo (1997) offers advice to instructors who are trying to design online instruction from a particular pedagogy—do not do it. Shabo believes instructors should use strategies from different pedagogical traditions to find the most appropriate tool for the job. Shabo focuses on the pedagogies of [behaviorism](#) and [constructivism](#) and provides suggestions on how to incorporate the strengths of a given pedagogy into a course designed using the opposing pedagogy.
Incorporating Constructivist Principles into a Behaviorist Course

- Break the existing course material down to the basic building blocks (primary concepts).
- Create an environment where students can use these basic building blocks to construct artifacts.
- Add an evaluation mechanism to allow learners to get feedback and guidance during their construction.
- Use hypertext to provide links to additional information or sources students can use to explore part of a topic in more detail. Providing hyperlinks allows students to learn in a nonlinear fashion if that is more comfortable to them.

Incorporating Behaviorist Principles into a Constructivist Course

- Insert structured learning activities (activities with explicit learning objectives and a linear sequence of events) into existing constructivist activities. For example, two groups of students are planning to have an online debate over whether humans have free will. As part of their preparation, each group collects articles by famous people that support their debate position. Before the debate, each group has to submit a summary of each famous person’s points that support their position on free will. Creating these summaries can be viewed as a structured learning activity that is only a small part of a larger constructivist activity (preparing for the debate and the actual debate itself), but an activity that will help guide student preparation for the debate.
- Provide students with feedback, as needed, while they are working on an activity rather than providing most of the feedback after the activity is completed.
V. THE NATURE AND DESIGN OF AN ONLINE COURSE

V. A. The Online Environment as an Instructional Medium

V. A. 1. Overview of the Clark-Kozma Debate

In the area of media research there is a classic debate between Richard Clark and Robert Kozma concerning the role media plays in learning. This debate impacts online education because it requires instructors and administrators to reflect on the purpose of offering a course online. Are courses being offered online because the internet is the latest technological toy and we want to find a way to utilize it? Alternatively, do we have practical (e.g., time and place constraints on students) or pedagogical reasons for offering online courses?

V. A. 2. Media Does Not Influence Learning

Clark (1983) sparked the debate by stating, “The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition.” (p. 445) Clark’s point was that learning occurs as the result of the instructional methodology employed, not the medium (traditional lecture, television, computer) in which the content was embedded. In a later publication (Clark, 1994), Clark reiterates that in over 70 years of research on media effects there has been no causal evidence that media or any of its attributes (e.g., the

Reference

ability of a computer to deliver video, audio, and allow direct user interface) influences learning.

The reason for his stance is that the instructional methodology used in past media research studies has been confounded with the media. For example, for instructors to teach in an online learning environment they have to modify the way they would teach the same subject in a traditional face-to-face course. Thus, they may decide to have more discussions (in chat rooms and threaded discussion boards) because they cannot verbally lecture to the students. If these students perform better in an online section of a course than they do in a traditional section of the same course, Clark argues that it is not the online medium (more specifically the synchronous chat and threaded discussions) that causes the learning difference, but the difference in the way the material was taught (lecture vs. discussion). Moreover, Clark (1983, 1994) argues the same learning outcome would be found if the traditional face-to-face course changed from lectures to discussions as the basis for instruction.

References


V. A. 3. Learning with Media

Kozma (1991), on the other hand, argues that the attributes of a given medium interact with a particular instructional methodology to impact learning. The medium and the
method cannot be separated as Clark (1983) suggests it must be. Kozma believes they both play an important part in the process of designing instruction. Specifically, “…the medium enables and constrains the method; the method draws on and instantiates the capabilities of the medium.” (Kozma, 1991, p. 205) Thus, teaching online requires different methodologies than traditional classroom instruction because a different medium (the computer), with different capabilities (e.g., video, audio, the interactivity of the internet), is employed.

Learning, Kozma (1994) argues, is not a receptive process where instruction is “delivered” to students (using Clark’s delivery truck analogy). Instead, learning is an active process where students utilize available cognitive, physical, and social resources to increase their knowledge and understanding. Media can be part of these resources students use to construct a better understanding of a topic. For example, pretend you have to teach students about motion parallax. You could use a traditional lecture to explain that motion parallax is a visual cue that the brain uses to determine how far away stationary objects are when the viewer is moving. You could expand your discussion by telling students to imagine looking out the car window at the landscape while riding on a highway. They will notice that the grass in the ditch by the highway appears to move in the opposite direction they are traveling and at a high rate of speed. If students look at an object closer to the horizon, it appears to move slow, but in the same direction as the viewer is traveling in the car. The brain knows these objects outside the window are not really moving, but this apparent motion gives the brain information about how far away these objects are.

As the reader is probably now well aware, a verbal explanation of motion parallax is not quick and does require active cognitive processing and imagination of the part of the
learners. If a medium other than verbal description (or in this case, written explanation) is used, instructional methodology will be quite different. Look at the Flash presentation on motion parallax (HYPERLINKS TO A FLASH ANIMATION ON THE Ped-a:GO!-gy WEBSITE) by Titus Vilis as an example of how instruction can (and should) differ by medium in order to take full advantage of the medium’s capabilities to assist learners in their knowledge construction.

References


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*V. A. 4. Important Points About the Clark-Kozma Debate for Online Instruction*

At first glance the Clark-Kozma debate may seem to be of interest only to researchers in the area. However, this debate highlights important considerations for online instruction. First, should a particular course be offered online? As Clark (1994) points out, colleges spend a lot of money on equipment, software, and personnel connected to online learning hoping that it will be a successful endeavor. If, as Clark and the research at the time of his articles suggest, these same gains can be accomplished by more inexpensive forms of instruction, then perhaps we should use them instead. (If anyone doubts the cost of online courses, talk to your local college administration about the costs of course management
software, such as WebCT and Blackboard, and the cost of hiring and training computer
support personnel related to the use of this software.)

Second, if the decision is made to offer a course online, what combination of media
and instructional methodology should be utilized to help students learn? This question is
difficult to answer definitively, but this website will endeavor to provide some suggestions.
An initial answer to this question concerns the technological abilities of the online instructors
and their students. If instructors have a high degree of knowledge concerning computer
software (such as Flash, html programming, javascripting) or have an excellent support staff
with this knowledge, the sky is the limit. Moreover, if students have a high degree of
computer literacy, less time will be spent explaining how to use the technology related to the
course and more time can be spent learning course material. For most instructors, however,
the use of advanced technology will be out of the question for various reasons (cost of
equipment, lack of expertise), which will definitely affect their instructional methodology.

Reference

& Development, 42* (2), 21-29.

V. B. A Comparison Between Online and Face-to-Face Courses

V. B. 1. Similarities Between Online and Face-to-Face Courses

Some of the issues faced in online courses are the same as in traditional, face-to-face
courses. In fact, the argument can be made that problems in traditional courses become
amplified in online courses, rather than being unique to online learning (Carnevale, 2000).
For example, isolation occurs in traditional courses but may not be as apparent for students
because they see other students on a weekly basis (even if they do not interact with them). In online courses, however, the only evidence of other students’ presence is written comments in an e-mail, chat room, or discussion board.

Research studies comparing online courses to face-to-face courses can help identify how learning and teaching on the web differs from traditional courses. Such comparisons, however, must be done cautiously or misleading conclusions may be drawn (Kennedy, 2000). Specifically, many of these studies are based on the assumption that online and traditional students are from similar populations, which may not be true. (Various research studies [e.g., Halsne & Gatta, 2002; Pallof & Pratt, 2003; Qureshi, Morton, & Antosz, 2002] suggest that online students have different characteristics than traditional students. See the section on learner characteristics (HYPERLINKS TO THE “ONLINE STUDENT CHARACTERISTICS” PAGE) for some of these characteristics.) Moreover, some studies suggest that the assessment of student achievement will provide information about the effectiveness or quality of a course (either online or traditional), even though other variables (such as student characteristics and motivation) may also explain the results. Perhaps the largest problem is the assumption that enough methodological controls can be included in the courses being compared to allow for causal conclusions to be made. (The amount of methodological control necessary in a true experimental research design is rarely possible when studying intact courses because there is no random assignment to conditions.)
References


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V. B. 2. Differences Between Online and Face-to-Face Courses
<table>
<thead>
<tr>
<th>Issue</th>
<th>Face-to-Face Instruction</th>
<th>Online Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>role of instructor</td>
<td>leader and lecturer</td>
<td>planner, designer, guide, instruction</td>
</tr>
<tr>
<td>technology skills required</td>
<td>not necessary (class can be taught with chalk)</td>
<td>essential</td>
</tr>
<tr>
<td>time devoted to course</td>
<td>in class and office hours</td>
<td>receive requests for help at all hours of the day, seven days a week</td>
</tr>
<tr>
<td>communication with students</td>
<td>mostly verbal and some e-mail messages</td>
<td>all communication is written</td>
</tr>
<tr>
<td>instructional innovations</td>
<td>not necessarily technology based</td>
<td>all innovations involve some use of technology to implement</td>
</tr>
<tr>
<td>concerns about copyright and intellectual property issues</td>
<td>low to high</td>
<td>high (due to the greater distribution the web affords)</td>
</tr>
<tr>
<td>pedagogical training</td>
<td>possibly learned in graduate school</td>
<td>self-taught for many current instructors (must find the information on one’s own because it was not taught in graduate school)</td>
</tr>
<tr>
<td>pedagogical approach</td>
<td>traditional or contemporary (instructor's choice)</td>
<td>requires a paradigm shift because of the nature of the learning environment</td>
</tr>
<tr>
<td>course setting</td>
<td>occurs in the same physical space for learners and teacher</td>
<td>varies because students may be geographically separated</td>
</tr>
<tr>
<td>sensory input for students</td>
<td>multi-sensory (auditory, visual, tactile)</td>
<td>primarily visual (text and images), unless instructor has advanced software skills and experience</td>
</tr>
<tr>
<td>response time to students</td>
<td>immediate (when class is in session)</td>
<td>delayed (student and instructor may not be online simultaneously)</td>
</tr>
<tr>
<td>learning environment</td>
<td>familiar to students and instructor</td>
<td>unfamiliar for many students and instructors</td>
</tr>
<tr>
<td>student expectations</td>
<td>students know what to expect based upon past experience</td>
<td>students may expect the course to be just like face-to-face instruction</td>
</tr>
<tr>
<td>learning activities</td>
<td>easy to develop and deploy (use of videos, group activities, discussions, hands-on activities)</td>
<td>difficult to develop and deploy</td>
</tr>
</tbody>
</table>

- videos cannot be shown easily—requires special software and copyright permission may be an issue
- group discussions may be asynchronous
- interactive activities require advanced computer skills by instructors
- interactive activities are experienced by an individual student not a group of students
Reference

Southard, S., & ECU Continuing Studies (2000). Discussion of characteristics contributing to success in online courses plus comparison of conventional classrooms vs online settings. Retrieved April 8, 2003, from

http://core.ecu.edu/engl/eblem/help/success.htm

V. C. Instructional Considerations

V. C. 1. Instructional Frameworks of Online Courses

Deciding what should be included in an online course is a difficult process. Bannan-Ritland, Harvey, and Milheim (1998) designed an instructional framework that categorizes instructional elements commonly used in online courses.

This framework can also be viewed as a continuum for the following factors:

- information delivery to cognitively immersive instructional experience
- least powerful instructional category to most engaging instructional category
- behaviorist to constructivist philosophy

Table A.14 is adapted from a table by Bannan-Ritland et al. (1998, p. 78) as a succinct way to summarize their instructional framework. As you move down the table, keep in mind that each progressive framework encompasses the characteristics of the previous framework(s); only features not contained in previous frameworks are listed. The purpose of presenting this table is to encourage you to think about how your current/proposed online course(s) would be categorized and if this categorization is acceptable to you.

Please keep in mind that Bannan-Ritland and her colleagues subscribe to a constructivist (HYPERLINKS TO THE “CONSTRUCTIVIST APPROACH” PAGE)
philosophy of education, so naturally the highest level of the table espouses more constructivist ideas than the lowest level. Their ranking, however, should be viewed as only one possible way of looking at online instruction because with some student populations a constructivist approach may not be appropriate or successful. *Click on the “i” icon in each row for a description of that particular type of framework.*

Table A.14  
*A Comparison of Instructional Frameworks*

<table>
<thead>
<tr>
<th>Type of Framework</th>
<th>Instructional Description</th>
<th>Online Activities</th>
<th>Components and Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information delivery</td>
<td>• information is presented to students</td>
<td>• course-related information (syllabus, assignments) is posted</td>
<td>• web links chosen by instructor</td>
</tr>
<tr>
<td>Information delivery with pre-defined resources</td>
<td>• pre-designed links for students to explore</td>
<td>• instructor organizes web resources and links</td>
<td>• web links chosen by instructor</td>
</tr>
<tr>
<td></td>
<td>• outside resources provided</td>
<td>• handouts and presentation slides posted</td>
<td>• web-converted presentation slides</td>
</tr>
<tr>
<td></td>
<td>• organization and delivery of instructional activities</td>
<td>• links to external digital literary texts</td>
<td>• web-based digital literary texts</td>
</tr>
<tr>
<td>Information delivery with online interaction</td>
<td>• asynchronous and synchronous communication</td>
<td>• interactive, online communication between students and instructor including guidance, discussion, and answers posted to questions</td>
<td>• e-mail</td>
</tr>
<tr>
<td></td>
<td>• primarily text-based interaction</td>
<td></td>
<td>• listservs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• computer conferencing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• internet relay chat</td>
</tr>
</tbody>
</table>
Table A.14 (Continued)  
*A Comparison of Instructional Frameworks*

<table>
<thead>
<tr>
<th>Type of Framework</th>
<th>Instructional Description</th>
<th>Online Activities</th>
<th>Components and Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-designed instructional delivery</td>
<td>- self-contained instructional modules for student access and downloading</td>
<td>- instructional modules including presentation of information, interaction and feedback related to specific content</td>
<td>- web-based tutorials</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- multimedia modules (via the internet)</td>
</tr>
<tr>
<td>Information synthesis and creation of resources</td>
<td>- student-based information synthesis and creation of resources</td>
<td>- student development of web pages related to course material</td>
<td>- student-created web links</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- location and creation of web resources and links</td>
<td>- student-created web sites</td>
</tr>
<tr>
<td>Immersive collaborative environments</td>
<td>- text-based and visual environments</td>
<td>- assumption of roles by students and instructor for interaction within collaborative environments</td>
<td>- computer conferencing tools</td>
</tr>
<tr>
<td></td>
<td>- facilitation of collaborative learning</td>
<td></td>
<td>- text and visual chat rooms</td>
</tr>
<tr>
<td></td>
<td>- accessible by multiple users</td>
<td></td>
<td>- MUD and MUSE environments</td>
</tr>
</tbody>
</table>

CLICKING ON THE “i” ICON IN TABLE A.11 TRIGGERS A POP-UP WINDOW WITH THE FOLLOWING DESCRIPTIONS OF THE FRAMEWORKS:

- **Information delivery:** The primary focus is on simple communication of essential course information, such as a syllabus and homework assignments.

- **Information delivery with pre-defined resources:** This framework provides course information and directs students to other resources on the internet that are instructive, but usually supplemental to course material.
• *Information delivery with online interaction:* In addition to the instructional elements of the previous two frameworks, this framework includes online communication between students and the instructor (typically asynchronous or synchronous communication).

• *Pre-designed instructional delivery:* These online courses utilize pre-designed instructional modules (e.g., HTML-based web pages, CGI/Perl scripting, Flash-based applications) that students can use online or download. These modules are typically tutorials that may or may not allow learner input and instructional feedback.

• *Information synthesis and creation of resources:* This category utilizes a constructivist orientation to instruction that requires students to locate, organize, and synthesize information related to course content. Typically students are expected to present their information in a web format, such as a web site or series of web pages they created.

• *Immersive collaborative environments:* A framework that involves communication among numerous students in a text and/or visual-based thematic environment. Within this environment students adopt roles (such as characters in a Shakespearean play) and interact with each other in order to learn more about a given topic (such as a Shakespearean play).

**Reference**

V. C. 2. Pacing of an Online Course

When designing an online course instructors may not think much about the pacing of the course. They may decide that it should follow the same pacing as their face-to-face courses. Online courses, however, do not have to be restricted to the tradition of the academic calendar because time and space are less of a concern in cyberspace. If self-paced learning is a desired attribute for your online course(s), Kemp, Morrison, and Ross (1998, p. 152) suggest instructors use the following checklist to help them evaluate how well they planned their self-paced course:

1. Can the course be adapted to the characteristics of students from different cultural and ethnic backgrounds?
2. Are students who may need remedial help identified before they start a given unit?
3. Can students skip ahead if they already possess the knowledge and skills of a given unit?
4. Do students master low-level cognitive knowledge [a reference to Bloom’s taxonomy] before they are expected to engage in higher level learning experiences and practical applications of course material?
5. Does instruction facilitate the development of a positive attitude toward the subject matter and the field of study itself?
6. Are students allowed to choose learning activities and resources (e.g., having a choice among homework assignments for a given chapter)?
7. Can students progress through the course at their own pace?
8. Can students check their progress as they proceed through the course?
9. Do students have the opportunity to share what they have learned with other students, and do they have the opportunity to interact with other students?

Strengths of Self-Paced Learning

- Both slow and advanced learners can complete instruction at a rate that fits their abilities.

- The self-reliance and personal responsibility necessary to complete a self-paced course may follow students to other courses or to the workplace (Kemp et al., 1998).

- Students can receive more one-on-one attention from the instructor.

Limitations of Self-Paced Learning

- Students who lack self-discipline and tend to procrastinate may not be successful in this learning format.

- Students are not all at the same point of the course at any given time, which may cause confusion for the instructor.

- A self-paced design may not allow group projects/activities because students are at different points in the course.

Reference


V. C. 3. Social Presence in Online Course

What is Social Presence?

Social presence theory suggests that the degree to which another person involved in mediated communication (e.g., e-mail, discussion boards, chat rooms) is perceived as “real”
plays an important part in communication (Richardson & Swan, 2003). In other words, when students are communicating with other online students or the instructor, how much does the communication resemble the interaction they would have face-to-face (e.g., a sense of one’s personality, feedback from facial expressions)? Social presence can also be viewed as one’s sense of being in and belonging to a group, such as an online class (Picianno, 2002). The concept of social presence has attracted attention because of concerns about social isolation, satisfaction with learning experience, and the amount of interpersonal interaction in online courses. Part of this concern about social presence comes from research on the impact computer use (especially internet use) can have on people’s social involvement with their families and communities, as well as their psychological well-being. (For more information see Kraut et al.’s (1998) article on this topic.)

Typically the impact of social presence on student perception on various aspects of online education is measured through the use of surveys given to students at the end of a course. An example of a social presence survey created by Anthony Picianno (2002) can be found at http://www.sloan-c.org/publications/jaln/v6n1/v6n1_picciano.asp. An important point to bear in mind is that student surveys are a subjective measure and thus can be influenced by many factors (e.g., current mood, personal feelings toward the instructor, current grade in the course), not all of which are related to the focus of a given survey. Nonetheless, student perceptions of such things as social presence are important because these perceptions may make a difference as to whether students participate in an online course (Picciano, 2002). All courses, whether online or face-to-face, have a social component to them through either student-to-student interaction or student-to-instructor interaction.
How Can Social Presence be Measured?

Rourke et al. (2001) developed a way of assessing social presence in asynchronous, text-based computer conferencing. The three categories of responses they created: affective (expression of emotion), interactive (building and sustaining relationships; maintaining contact between individuals), and cohesive (building and sustaining a sense of group cohesion), can serve as techniques instructors can use to increase social presence in online courses. Table A.15 contains the items they assessed under each category when they looked at text-based communication (such as in a threaded discussion board).

Table A.15
Examples of Responses from the Three Categories that Indicate Social Presence

<table>
<thead>
<tr>
<th>Affective</th>
<th>Interactive</th>
<th>Cohesive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expression of emotion</td>
<td>Continuing a thread (i.e., replying directly to another student’s posted comment)</td>
<td>Vocatives (addressing or referring to other people by name)</td>
</tr>
<tr>
<td>Use of humor</td>
<td>Quoting from another person’s posted comment</td>
<td>Addressing or referring to the group using inclusive pronouns (we, us, our)</td>
</tr>
<tr>
<td>Self-disclosure</td>
<td>Referring explicitly to another person’s comments</td>
<td>Phatics (communication that serves a purely social function; greetings; closures)</td>
</tr>
<tr>
<td></td>
<td>Asking questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complementing, expressing appreciation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expressing agreement</td>
<td></td>
</tr>
</tbody>
</table>

References


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**V. C. 4. Learning Through the Use of Hypertext**

The use of hypertext in a body of text allows students to branch off the main body of a text passage and explore specific topics in greater detail. The chief advantage of text with hyperlinks versus just plain text is that learners have control over the amount of information to which they are exposed and, to varying degrees, the sequencing of that information. For example, hypertext can be used to provide novices with additional information about a given text passage (such as definitions, charts, and pictures) that students with greater knowledge in a given discipline would not need. Conversely, hypertext can also provide more knowledgeable learners with information that novices would find confusing. Thus, the use of hypertext can make a learning environment flexible to individual learner needs.
Reading hypertext requires learners to constantly integrate new information with existing information and monitor their understanding of new material in order to decide what should be read next (Niederhauser et al., 2000). Moving back and forth between text passages using hyperlinks can help learners gain a deeper level of comprehension by comparing and contrasting the information presented in different passages. However, the degree to which hypertext aids comprehension depends upon reading goals and the way students read the hypertext. Students who have a clearly defined goal (e.g., discovering what year President Eisenhower changed the wording of the Pledge of Allegiance) when reading tend to be more focused and systematic in their reading, whereas students with a less defined goal tend to be less systematic in their reading approach (Niederhauser et al., 2000).

**Reference**


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**V. C. 4. a. Three Types of Hypertext Navigation Patterns**

College students can be divided into three groups based upon their hypertext navigation patterns (Niederhauser et al., 2000):

- **“Knowledge seekers”** systematically progress through the text to locate specific information and may learn more because of their structured approach.

- **“Feature explorers”** click on hyperlinks not to acquire more information, but to see what happens when the link is clicked. Researchers have found that this group tends
to learn less from hypertext because their “playing” behavior interferes with actual learning.

- “Apathetic users,” looks at hypertext at a superficial level and quit altogether after proceeding through a few screens.

Reference


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**V. C. 4. b. Cognitive Load (Thinking Burden) and Hypertext**

The amount of hyperlinks to include is an important consideration when designing online instruction. The amount of hyperlinking in an instructional unit depends on the complexity of the material. Specifically, more complex material places a larger cognitive load on learners. *(Cognitive load* is a construct that represents the thinking burden placed upon the mind by a given task.) The larger the cognitive load on learners, the more difficult it will be for them to understand the material because of the drain placed on working memory. Perhaps the easiest way to understand working memory is to think of it as the mental mechanism that is actively processing the information at the forefront of your conscious awareness. From your personal experience you know that you cannot focus on too many tasks at once. The reason for this difficulty is that working memory has limited attentional and processing resources so it must decide on the amount of resources each cognitive task should receive. If you are trying to think about too many things simultaneously (i.e., a high cognitive load), the mental resources of working memory will be
spread too thin. (For a more detailed explanation of how working memory operates, refer to Working Memory. HYPERLINKS TO THE “WORKING MEMORY (GATEKEEPER TO LONG-TERM MEMORY)” PAGE)

When learners encounter new information they utilize their working memory to access their existing knowledge and attempt to integrate the new information with the old. If the cognitive load is high for the learners and they need to repeatedly use hypertext to understand the material, their comprehension may be hindered because the decision to access the hypertext and the physical act of doing so may drain some of working memory’s resources away from comprehension (Niederhauser et al., 2000). Hypertext can promote a deeper processing and understanding of course material, but only when there are sufficient cognitive resources available. Thus, when using hypertext in instruction, you must take into consideration the pre-existing knowledge of students to determine the correct balance between plain text and hypertext. Providing students with suggestions on how to best utilize the hypertext may help steer “feature explorers” and “apathetic users” to see hypertext as a source of information that can help them better understand course material. As an example of how too much hypertext can detract from learning, see Figure A.11.

At first glance the page is well organized with the ingredients on the left side and the instructions for preparation on the right side of a gray box. The ingredients are also nicely arranged in a table for easy reading. The problem with this page, however, is the excessive use of hypertext in the method section. A visitor to this web site probably already has some experience with cooking, so having hypertext to explain the terms “sausage” and “apple” is probably not necessary. (Some of the hypertext, such as bake and skillet, do not provide any useful information.) If you click on all of the hypertext in the method section you will find
most of the information useless, but you did spend time exploring these links. This time
could have been better spent reading through the recipe and deciding if you want to make it.
If you utilized the hypertext as you read through the instructions, you probably noticed your
understanding of the procedure was interrupted and you may have had to read through the
recipe again to fully understand what to do. The instructions for this recipe could be
improved by removing all of the hypertext except for the term “baste” because some people
may not be familiar with this cooking term.

Reference

of cognitive load on learning from hypertext. *Journal of Educational Computing
Research, 23* (3), 237-255.
V. C. 5. Do You Need an Orientation Session for Students?

A common frustration for online instructors is answering technology questions rather than course content questions. Many instructors have complained, “I only want to teach my course. Why do students with little computer experience take online courses and why am I expected to teach computer skills as well as my discipline?” Unfortunately, not all students enrolled in online courses have an adequate computer experience background for taking an online course, despite warnings by college personnel that they will struggle unnecessarily without these skills.

Rather than trying to restrict enrollment to online courses, instructors can create a student orientation session for online students. Some colleges have created web-based tutorials to familiarize online students with the course management software used by the college (e.g., Blackboard, WebCT), but it may not be specific enough. (For an example of such a training course, see Iowa State University’s “WebCT 101: Student Boot Camp.”)

V. C. 5. a. Contents of an Orientation Session

What should be in an online student orientation? Perhaps the best way to answer this question is to conduct a learner analysis of your students (or the students in other online courses at your institution if you are new to online teaching) to find out what skills they currently possess, what skills they are lacking, and their concerns about taking a course online. If conducting a learner analysis is not feasible or possible, Palloff and Pratt (2003) offer some suggestions on what should be in a student orientation.
Key Features of an Orientation Session for Online Students:

- computer skills necessary for the course (e.g., internet browser basics, course management software basics, how to access the course)
- what it takes to be a successful online student (HYPERLINKS TO THE “SUCCESSFUL ONLINE STUDENT CHARACTERISTICS” PAGE)
- explain the difference between online and face-to-face courses (HYPERLINKS TO THE “DIFFERENCES BETWEEN ONLINE AND FACE-TO-FACE COURSES” PAGE)
- explain the nature of interaction between students and the instructor (e.g., e-mail, asynchronous discussion boards, chat rooms, group projects)
- explain how to give appropriate feedback to other students
- how to get help when needed

Reference


V. C. 5. b. Delivery of the Orientation Session

Once you have assembled your orientation material, you must decide the best way to present to students. There are at least three ways an orientation session could be conducted, a face-to-face meeting at the beginning of the term, sending the information in a letter welcoming students to the course, or an online orientation session. Meeting with students face-to-face is a great way to answer questions or concerns they may have, as well providing the class members (including the instructor) a chance to get to know each other. Sometimes,
however, meeting face-to-face may not be possible because of schedule conflicts or geographical separation. In these cases sending a letter or creating an online orientation session is more practical. Of these last two options, the online orientation is the best option because the orientation can be more extensive and dynamic by utilizing the power and flexibility of web pages. An example of a simple online orientation session can be found at http://staff.niacc.edu/jplatt/WebCT.htm. This sample orientation primarily focuses on the course management software and the functions of it that students will need to utilize for the course.

Regardless of how a course orientation is presented, determining whether students understand the material is important, especially if the orientation is not conducted face-to-face. One way to accomplish this goal is to have students sign a form indicating their understanding of the course expectations and their understanding of the material in the orientation session. Advocates of this approach believe that using such a form creates a learning “contract” and if students later claim they were unaware of certain requirements or facts, instructors can point to the contract that suggests they were aware of this information. Another approach is to create a quiz over the orientation material to test student knowledge of the orientation material. The author of the above sample orientation uses a quiz to determine student understanding of the orientation material and the course syllabus. Students must earn a perfect score on the quiz before they can take the first unit test over course material. (Students can take the quiz as many times as necessary to earn a perfect score.) The instructor has found that students are more likely to completely read through the orientation material and they have few questions about how to complete basic course functions such as submitting homework assignments.
V. D. Design Usability/Ergonomics

V. D. 1. Principles of Design (that Transform Difficult Task into Simple Tasks)

Donald A. Norman has long written on the topic of what constitutes good design. Although his various books (e.g., The Design of Everyday Things, Emotional Design: Why We Love (or Hate) Everyday Things, and Things that Make a Smart: Defending Human Attributes in the Age of the Machine) focus on the design of consumer products such as toasters and videocassette records, the elements that result in good product design are the same as those elements in a well-designed online course. Norman (1988) suggests seven principles of good design, but only four principles are applicable to online instructors. The other three principles are important for online courses, but they require the ability to rewrite course management software, which instructors do not have the ability to do.

References


V. D. 1. a. Design Principle #1: Good Design Utilizes Both Knowledge in the World and Knowledge in the Head

The Location of Knowledge

By the location of knowledge Norman is referring to where users must go to find information on how to work in an online course. Knowledge that is in the world is information readily available visually when users log into an online course. A good navigation system makes it easy for students to locate the information they need as they complete the course. Conversely, knowledge in the head is information that a user must remember in order to complete coursework because there are no visible cues within the course’s structure to aid them. For example, if the only way for students to check on their current grades in a course is to look in the “Student Tools” section and then click an icon entitled “Progress,” they will have to rely mainly on their memory to find their grades because “Student Tools” may not be an intuitive marker for this information.

Conceptual Models

A conceptual model is the way in which we mentally represent and understand the operation of something. Good conceptual models allow us to predict the effects of our actions. A good example of a conceptual model is the visual representation of the mouse pointer when using the internet. Computer users know that if the mouse pointer turns into a hand with a pointing index finger this change in appearance means that more information can be accessed by clicking the mouse. A related conceptual model that is important for online instructors is the implied meaning behind underlined text. A common mistake instructors commit when making the transition from teaching in the classroom to teaching online is to underline text as a means of emphasizing its importance. The reason this practice is
problematic is that experienced web users are employing a conceptual model that considers
underlined text as a hyperlink to more information. Thus, student may try clicking on the
text and not understand why nothing happens.

Reference

V. D. 1. b. Design Principle #2: Simplify the Structure of Tasks

Keeping tasks simple in an online course is not always possible because of the built-in architecture of course management systems (e.g., Blackboard, ANGEL, and WebCT). The simple task of submitting homework assignments, for example, may require several steps because the course management system is designed to make it more difficult for students to make mistakes while doing this task. Unfortunately, once students become skilled at submitting assignments electronically, these safeguards are no longer necessary, but cannot be bypassed, which makes the task more cumbersome and time consuming. Other aspects of the course, however, can be kept simple (especially content material created by the instructor). When creating material for online courses, try to use a consistent means of organizing this material. For example, the course depicted in Figure A.12 has most of the material students need listed under each chapter (e.g., learning objectives, lecture notes, homework assignments). Information that is not included, such as discussion topics, can be easily accessed by the navigation menu on the left.
Figure A.12. An example of how to simplify students’ searching for course material.

Reference


V. D. 1. c. Design Principle #3: Make as Much Information Visible as Possible

Norman (1988) defines a gulf as the distance between one’s mental representations of a task and the actual physical aspects of the task. In terms of an online course, a gulf is the difference between how students think they should be able to interact with the course material and the way in which interaction with the course material must occur. For example, suppose an instructor wants students to post a copy of their homework assignment to the presentation area of the course so all students can read and evaluate each others’ work. A student’s mental representation of how to do this task may be to simply upload his/her assignment to the presentation area. The actual way of posting an assignment within the presentation area (because of the way the course management software is designed) requires
that student to convert his/her assignment into an HTML file and call the file “index.html.”

If this “gulf” is too large, students may become confused and frustrated. Norman identifies two types of gulfs, gulf of execution and gulf of evaluation.

Gulf of Execution

A gulf of execution refers to the difference between what an individual intends to do and what she is allowed to do by the way the software interface is designed. For example, a student may want to quickly send an e-mail message to a fellow classmate by typing the student’s name into the “To:” box, but the course management system requires that she either select the student’s name from a dropdown box or enter the student’s ID number.

Gulf of Evaluation

A gulf of evaluation refers to how much effort is required of an individual to determine by the response of the software if his intentions have been met. For example, a student is reading the comment of another student in the discussion section of the course. The student decides he wants to elaborate on the other student’s comment and clicks on the “reply” button to compose his response. Once he is finished with his response he clicks on the “post comment” button and his response disappears. Did his comment get posted to the discussion section? The student is unsure because there is no apparent change in his screen. If the student is new to posting comments (thus, a large gulf of evaluation), he would not know that he has to get out of the discussion section and then go back into it to see his comment appear. A student who is familiar with posting comments (small gulf of evaluation), will automatically know how to check whether his comment was posted.

Unfortunately, most of the course management systems (e.g., Blackboard, WebCT) cannot be modified enough to completely eliminate the gulfs of execution and evaluation.
The best an online instructor can do is to go through the Seven Stages of Action in order to better understand how students will approach a given task within the course and then write instructions or tutorials for students.

7 Stages of Action (How People do Things; Norman, 1988)

1. Forming the goal  *(What does the student want to accomplish?)*
2. Forming the intention  *(What are the possible ways the student can accomplish this goal?)*
3. Specifying an action or sequence of actions  *(What specific action(s) must the student perform and in what sequence in order to meet the goal?)*
4. Execute the action or sequence of actions  *(The student engages in a specific behavior to accomplish the goal.)*
5. Perceive the state of the world  *(What happens when the student tries to accomplish the goal? Did anything on the screen change?)*
6. Interpret the state of the world  *(What do the results of the student’s actions mean?)*
7. Evaluate the outcome  *(Did what actually happen match the student’s original goal?)*

For an example of an instruction sheet developed from the application of the above steps, see the Discussion Page Example. (HYPERLINKS TO THE “EXAMPLE OF USING THE SEVEN STAGES OF ACTION” PAGE)

Reference

V. D. 1. c. i. Example of Using the Seven Stages of Action

Discussion Page

Every chapter has an open-ended question for the whole class to discuss. The main page for the discussion topics (see Figure A.13) can be accessed through the "Communication Tools" icon on the homepage or by using the left navigation menu.

Figure A.13. The main page of the discussion tool.

When you are ready to contribute to the class discussion for a particular chapter, just click on the title for that chapter from the main discussion page. A new page will appear listing the discussion topic title and all of the people who have responded thus far. (See Figure A.14.)
Figure A.14. A specific discussion topic page.

In Figure A.14 there is only one posting for chapter 2. In order to view the posting, click on the small button with a magnifying glass on it. The first name under the discussion topic title will always be the individual who created the topic (typically the instructor). If you click on that person’s name, a small window will appear with the person’s comments. (See Figure A.15.)

From this window, you can read the person’s comments and then directly reply to that person by clicking the “Reply” button. Unless you are directly responding to someone’s posted comment, do not click reply unless you are viewing the comments of the person who started this discussion thread. The reason for following this guideline is so other people will know if your posting is in reply to the overall discussion topic or to a specific person’s comments about the overall topic. (WebCT indents your comments below the message to which you replied.) If you start your own discussion topic by clicking on the “Compose Message” you will be presented with the “Compose Discussion Message” window. (See Figure A.16.) Be sure to link your discussion topic to the proper discussion area by making the proper choice in the “Topics” drop-down menu.
Recently, reality TV shows (such as Survivor, Temptation Island, Big Brother, American Idol, and Fear Factor) have become extremely popular. If Survivor was a research experiment rather than a television show, it would probably not be approved due to ethical concerns. (Review some of the APA’s ethical guidelines are found in your textbook.) For example, on an episode of Survivor: Thailand loved ones came on the show to compete for the right to spend a day with their loved ones. In order to win this right, these loved ones (who were not one of the show’s contestants) had to eat a huge dead cockroach, live grubs, a dead tarantula, and dead scorpions. Individuals who did not win could not even hug their loved ones goodbye. Throughout this eating competition these people were taunted by being asked how much do they really love the person they want to spend the day with.

Thus, the discussion questions for this chapter are:

1) Do you believe that similar ethical standards should be applied to reality-based television shows such as “Survivor,” “Temptation Island,” “American Idol,” and “Big Brother?” Why or why not?

2) What kind of concerns about the participants’ psychological well-being should be considered during the development stages of these shows?

**Figure A.15.** Example of an individual’s posted comments for a specific discussion topic.

**Figure A.16.** The “compose discussion message” window.
V. D. 1. d. Design Principle #4: Get the Mapping (Relation Between Things) Right

Mapping is the relation between two things, such as the way something looks and the way it must be used. A computer mouse’s location on the screen, for example, is represented as an arrow when a person is using the internet, which is appropriate because typically the mouse is used to point at something on the screen. When one encounters hypertext, the mouse turns into a finger that can be used to “push” on the text as if it was a button. In this example, there is good mapping between the appearance of the mouse cursor and its function. Good mapping ensures that while working in an online course students can determine the relationships between:

- what they intend to do and what actions are possible
- their actions and the effects of these actions on the software
- what is actually occurring with the software and what can be perceived through the senses (sight, sound)
- what one thinks is occurring with the software and one’s actual needs or goals

Designing an Online Course with Good Mapping in Mind

- use icons that represent most people’s mental representation of that function (e.g., a mailbox for e-mail, two people talking for a chat room)
- use intuitive names for the various sections of your course (e.g., discussion, lecture notes, tests) rather than esoteric names, such as “Content Module”
  - Course management systems (e.g., Blackboard, WebCT) typically provide names for sections/functions that may not be intuitive for students. WebCT, for example, has a tool called “Student Tips” that can be used to post announcements that students will see as soon as they log into the course. If
you are going to use this tool to make announcements, you would be better off
renaming it “Announcements.”

- organize tools and information under a logical section/group (e.g., e-mail and chat
  room under a section called “Course Communication Tools”)
- follow internet conventions, such as only using underlined text for hyperlinks
- indicate when students will need additional software to access course material (e.g.,
  Adobe Acrobat reader, Flash player, Quick Time, headphones or speakers to hear
  audio)

**Reference**


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**V. D. 2. What is Usability?**

Usability is a term referring to how easy the user interface of a product (or website) is
to use. Jakob Nielsen (2003), an expert on website usability, suggests usability is composed
of five quality components:

- **Learnability**: Can users easily accomplish basic tasks the first time they access a
  website?
- **Efficiency**: Can users quickly interact with the user interface to accomplish tasks?
- **Memorability**: Can users easily remember or quickly relearn how to interact with the
  user interface to accomplish their goals?
- **Errors**: What kind of mistakes do users make when interacting with the website?
  Are these mistakes serious or trivial? Once a mistake is made, can users easily figure
  out how to correct it?
• **Satisfaction:** How happy are users with the appearance and functionality of the user interface?

Ensuring that an online course is high in usability is important because students may become frustrated with the technology of a course and drop out of the course. As Nielsen (2003) so succinctly put it, “On the Web, usability is a necessary condition for survival. If a website is difficult to use, people leave.” [emphasis in the original article] Some of our most capable students may be scared off from taking an online course because of their limited technological knowledge/abilities. Therefore, as instructors, we must endeavor to make the user interface as transparent as possible. (The ability to do this, however, is constrained by the limitations of the course management software used to house the course.)

**Reference**


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**V. D. 3. Testing Online Course Usability**

Although the following suggestions by Nielsen (2003) were not targeted toward online courses, his method of testing usability is still appropriate. The steps outlined by Nielsen for testing the usability of a website will be modified to fit online courses:

1. Locate students who are representative of the student population taking your online course and ask them to help you evaluate the usability of your online course.

Remember, students will not be evaluating the course material; instead they will be accessing the five quality components of usability.
• Nielsen’s (2000) research asserts that only five students are necessary to test the usability of an online course.

• An online course does not have to be completely designed in order to test its usability. In fact, Nielsen suggests testing the usability at various stages of development because problems are easier to fix when the course is still a prototype than when it is in its final form.

2. If you are redesigning an existing online course, have the users evaluate the existing course to determine what features work well and what features must be improved.

• If you have access to an online course developed by the publisher of your textbook (these pre-made courses are typically called “course packs”), you should consider evaluating it as well so you can compare it to the online course you created.

3. Ask the students to perform tasks that your students would typically do in an online course, such as:

• check e-mail (reading and sending a message)

• post a comment to the discussion board

• access and submit homework assignments

• take a test/quiz

• check grades

• use the chat room

4. Observe the students performing these tasks and do not provide any assistance to them. (Remember, your actual students will probably not have you in the room with them when they are interacting with the course’s user interface.) If your test students
make mistakes using the interface, make sure you observe their attempts at correcting the mistakes because your actual students may take similar solution approaches.

References


V. D. 3. a. Sample Usability Rating Form

The Information Services and Technology department at the Massachusetts Institute of Technology has created (and continuously updates) a usability rating form that can be used to test a web site. Here is summary of this guideline, modified for the purpose of evaluating an online course:

Navigation

- current location within the site is readily apparent (Some course management software programs such as WebCT have a bread crumb menu showing one’s location)
- a link to the homepage is clearly visible
- the major sections/divisions of the course are accessible from the homepage
- there is a comprehensive site map
Functionality

- course can be used by students of varying computer knowledge/skills
- functions/tools are clearly labeled
- functions/tools are located within the course (no need to leave the course)
- only plug-ins (e.g., Flash, Adobe Acrobat Reader) that are essential to learning are required

User Control

- students can stop any operation they started (e.g., canceling the composition of an e-mail message, canceling the posting of a comment to a threaded discussion)
- exit points (e.g., “Log out”) from the course are available on every page
- the file size of each web page is 50K (kilobytes) or less so the page loads quickly
- all web browsers are supported

Language and Content

- important information and tasks are more prominent
- only important information is included
- related information or tasks are located on the same page or area of the website (e.g., chat rooms, e-mail, and discussion boards are grouped together under a section entitled “Course Communication”)
- hyperlinks are clearly visible and accessible

Online Help and User Guides

- course is designed to require little help or instructions on how to complete tasks
- any instructions or user guides are clearly identified and easily accessible
VI. COURSE EVALUATION

VI. 1. Course Evaluation Introduction

Course evaluation is probably the most important thing instructors can do to ensure their courses are of the highest quality possible. The term “course evaluation,” is rather generic and includes such activities as student evaluation, peer evaluation, and self-
evaluation by the instructor of the course. This section will focus on course evaluation by students and the instructor.

VI. 2. End of Course Evaluations by Students

Achtemeier, Morris, and Finnegan (2003) reviewed the literature concerning the various methods of evaluating online courses. They then collected the end-of-course evaluation instruments from several colleges to determine if the recommendations from the literature were actually being used by online instructors. These evaluation instruments were studied to see if they assessed the Seven Principles for Good Practice in Undergraduate Education because these principles are widely cited in online and higher education literature. Achtemeier, Morris, and Finnegan found that only one of these principles (principle one concerning student-teacher contact) was addressed on most course evaluation instruments.

In the process of evaluating these instruments, Achtemeier et al. developed 11 questions that can be used in course evaluations:

1. “Were the course goals, learning objectives and outcomes made clear to you at the beginning of the course?
2. Did you have the necessary technological equipment and skills required for this course?
3. Was there adequate technical support if you encountered difficulties?
4. Was the format and page design of the online course easy to use?
5. Were there sufficient instructions given for you to complete all assignments?
6. Did you feel hindered in your online course experience any way? Please describe.

7. Were standards for evaluation of assignments made clear?

8. Did you receive prompt feedback on your completed assignments?

9. Did you participate in online conversations with your instructor during the course?

10. Did you participate in online conversations with your classmates during the course?

11. What learning activities most influenced your learning in this course?”

   (Achtemeier, Morris, & Finnegan, 2003, p. 8)

Additional course evaluations questions suggested by Ken Bain and the New York University Center for Teaching Excellence (using a six-point scale ranging from 1 = lowest to 6 = highest):

- “Provide an overall rating of the instructor.
- Give an overall rating of the course.
- Estimate how much you learned in the course.
- Rate the effectiveness of the instructor in stimulating your interest in the subject.
- Rate the effectiveness of this course in challenging you intellectually.”

References


VI. 3. Online Course Benchmarks

The Institute for Higher Education Policy (2000) developed a list of 24 benchmarks that they considered crucial to ensure quality in online courses. This research grew out of a request by Blackboard, Inc. and the National Education Association to validate the various benchmarks present in the research literature. After sorting through all the guidelines found in the literature, the Institute for Higher Education Policy consolidated these guidelines and then used them to evaluate online courses at six higher education institutions that have been identified as leaders in online education. The Institute’s study of these institutions yielded 24 benchmarks divided into seven categories. These benchmarks can be used as a rubric for evaluating the quality of an individual online course or the overall quality of online course within a department or college. For the purpose of brevity, these benchmarks will be simplified; the complete report of the Institute for Higher Education Policy can be found at http://www.e-guana.net/organizations.php3?action=printContentItem&orgid=104&typeID=906&itemID=9239&templateID=1418&User_Session=5e097336cef2a8557cd67b509fb0e14f

Institutional Support Benchmarks:

- a documented technology plan
- a reliable technology delivery system
- a centralized system that supports the online infrastructure

Course Development Benchmarks:

- minimum standards for developing an online course
- periodic review of courses to ensure they are meeting these standards
- courses require students to analyze, synthesize, and evaluate information
Teaching/Learning Benchmarks:

- facilitation of student-instructor and student-student interaction
- timely, constructive feedback for students
- students are taught how to research/investigate a topic

Course Structure Benchmarks:

- students are advised about what it takes (motivationally and technologically) to succeed in an online before the course starts
- students receive supplemental information about the course (e.g., learning objectives)
- students have access to library resources
- student-instructor agreement on assignment deadlines and instructor response time

Student Support Benchmarks:

- students receive course/program information
- students are trained how to use electronic library databases/resources
- students have access to technological support
- student support personnel answer questions quickly and accurately

Faculty Support Benchmarks:

- technical assistance for faculty during course development
- support for instructors transitioning from face-to-face teaching to online teaching
- instructor training and assistance
- instructors are given instructions for how to help students having difficulty accessing electronic data
Evaluation and Assessment Benchmark:

- there is a standard process for evaluating the educational effectiveness of a course/program
- course/program assessment uses enrollment, financial, and technological innovativeness
- learning outcomes are reviewed

Reference


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**VI. 4. 14 Pedagogical Dimensions of Course Evaluation**

Evaluation of online courses should be performed from multiple perspectives. The most common perspective, end-of-term student evaluations, is discussed elsewhere. (HYPERLINKS TO THE “END OF COURSE EVALUATIONS” PAGE) An often overlooked approach is to evaluate a course from a pedagogical perspective. Reeves (1997) advocates the use of 14 pedagogical dimensions to understand, describe, and evaluate online courses. By “pedagogical dimension” Reeves means the ability of an online course to “initiate powerful instructional interactions, monitor learner progress, empower effective teachers, accommodate individual differences, or promote cooperative learning.” Each dimension should be viewed as a continuum with two opposing values. Table A.16 lists
these 14 dimensions along with the two endpoints for each dimension. A brief description of each dimension is presented below the table.

Table A.16
Reeves’ (1997) 14 Pedagogical Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>objectivism</th>
<th>constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedagogical Philosophy</td>
<td>instructivist</td>
<td>constructivist</td>
</tr>
<tr>
<td>Underlying Psychology</td>
<td>behavioral</td>
<td>cognitive</td>
</tr>
<tr>
<td>Goal Orientation</td>
<td>sharply-focused</td>
<td>unfocused</td>
</tr>
<tr>
<td>Experiential Value</td>
<td>abstract</td>
<td>concrete</td>
</tr>
<tr>
<td>Teacher Role</td>
<td>didactic</td>
<td>facilitative</td>
</tr>
<tr>
<td>Program Flexibility</td>
<td>teacher-proof</td>
<td>easily modifiable</td>
</tr>
<tr>
<td>Value of Errors</td>
<td>errorless learning</td>
<td>learning from experience</td>
</tr>
<tr>
<td>Origin of Motivation</td>
<td>extrinsic</td>
<td>intrinsic</td>
</tr>
<tr>
<td>Accommodation of Individual Differences</td>
<td>non-existent</td>
<td>multi-faceted</td>
</tr>
<tr>
<td>Learner Control</td>
<td>non-existent</td>
<td>unrestricted</td>
</tr>
<tr>
<td>User Activity</td>
<td>mathemagenic</td>
<td>generative</td>
</tr>
<tr>
<td>Cooperative Learning</td>
<td>unsupported</td>
<td>integral</td>
</tr>
<tr>
<td>Cultural Sensitivity</td>
<td>non-existent</td>
<td>integral</td>
</tr>
</tbody>
</table>

1. **Epistemology**: How is the nature of knowledge viewed?
   
a. An *objectivist* perspective reflects a belief that there is an absolute truth concerning a given topic (derived from the research of experts in the field) and the purpose of instruction is to provide students with these truths.

   b. A *constructivist* perspective reflects a belief that knowledge is acquired by looking at a topic from multiple perspectives. Instruction should provide students with multiple perspectives in order for students to construct their own knowledge.

2. **Pedagogical Philosophy**: What is philosophical perspective of instruction?
a. *Instructivists* believe that course material should be clearly defined and instruction should focus on predetermined content.

b. *Constructivists* focus less on direct instruction and instead, focus on creating a learning environment that encourages self-directed exploration and discovery learning.

3. **Underlying Psychology:** How do students learn?
   a. A *behavioral* approach focuses on using stimuli, responses, and consequences (e.g., reinforcement) to mold the way learning occurs for students. This approach (based upon B. F. Skinner’s operant conditioning; HYPERLINKS TO THE “OPERANT CONDITIONING OVERVIEW (THE ROLE OF REINFORCEMENT” PAGE) focuses mainly on the behavior of students rather than the thinking of students.
   
   b. A *cognitive* approach focuses primarily on the thought processes of students and how to help students use cognitive strategies to facilitate their intellectual development.

4. **Goal Orientation:** How prescribed are the goals and objectives of an online course?
   a. Courses that have *sharply-focused goals* are appropriate for disciplines, such as chemistry and math, where there is less debate on the procedures practitioners follow.
   
   b. Courses that have more ambiguous subject, such as music appreciation and ethics, typically have more *unfocused goals*.

5. **Experiential Value:** To what degree does learning represent real-life activities?
a. An *abstract* learning environment typically involves lecture or reading text without providing students with information on how they would use the course material to solve real-world problems.

b. A *concrete* learning environment presents real-world problems that challenges students to apply the course material to solve these problems rather than just engage in rote memorization of the course material.

6. **Teacher Role:** What role does the instructor play in student learning?

   a. A *didactic* teaching role involves the instructor presenting information to students; sometimes referred to as the teacher being the “sage on the stage.” With this approach, students are passively receiving the information rather than playing a more active role in their learning.

   b. When an instructor plays the role of *facilitator*, he/she serves as more of a resource person for students who must play a more active role in their learning and help each other learn. Students will consult with the teacher/facilitator when they need information or help.

7. **Program Flexibility:** Can instructors make changes to how the course is taught?

   a. A *teacher-proof* course is a course where the instructor cannot make any modifications of course material or the manner in which the course is delivered. Typically teacher-proof courses are pre-designed courses where instructors are basically hired to grade pre-designed assignments and tests and answer student questions.

   b. An *easily-modifiable* course is one where either the teacher has designed the course her-/himself or a pre-designed course that allows the teacher to customize
the course to a specific group of students. A good example of a pre-designed course that can be modified is the course packs/cartridges offered by textbook companies that can be installed into a course management system (e.g., Blackboard, WebCT).

8. **Value of Errors:** What role do errors play in learning?

   a. In an *errorless learning* approach, student errors are unwanted because they interfere with learning. This type of approach tries to structure the learning environment in such a way (e.g., step-by-step activities where students cannot proceed to the next step if an error was made) that errors are corrected immediately.

   b. A *learning-from-experience* approach views errors as instructive rather than problematic. Any errors that students make can be turned into a learning experience.

9. **Origin of Motivation:** Where do students derive their motivation to learn?

   a. *Extrinsic motivation* means that students are motivated to learn by factors outside of the course (e.g., desire to succeed, course is required for one’s major).

   b. *Intrinsic motivation* means that course itself provides the motivation to learn (e.g., the course activities capture student interest and/or are enjoyable to complete).

10. **Accommodation of Individual Differences:** Is the course designed for the needs of the average student or can students with various needs also benefit from the course?

    a. If students with differing needs (e.g., different learning/cognitive styles, learning disabilities, prior knowledge/experience) cannot be as successful as students
without these needs, then the course’s ability to accommodate individual differences is considered non-existent.

b. If students with differing needs can be as successful as students without these needs, then the course’s ability to accommodate individual differences is considered multi-faceted.

11. **Learner Control:** To what degree can learners make decisions about what they learn or the order in which they learn?

   a. *Non-existent* learner control means that students take more a passive role in learning because all of the decisions about content and order have been made for them.
   
   b. *Unrestricted* learner control means that students have complete control over what they learn and the order in which they learn it.

12. **User Activity:** Are students allowed to create their own knowledge through course activities?

   a. A *mathemagenic* environment allows users to access pre-designed material they need to learn.

   b. A *generative* environment provides students with the opportunity to create and elaborate material they need to learn.

13. **Cooperative Learning:** Is cooperative learning supported?

   a. Cooperative learning is *unsupported* if students are not allowed to work together in pairs or small groups to complete a project.

   b. Cooperative learning is considered to be *integral* if students are allowed to work together in pairs or small groups to complete a project.
14. **Cultural Sensitivity**: Does the course take cultural norms and values into consideration?

   a. *Non-existent* cultural sensitivity refers to courses where no effort has been made to include cultural diversity in the learning experience or make sure that none of the course materials/activities are offensive/going against the cultural norms/values of students.

   b. *Integral* cultural sensitivity refers to courses where great effort has been made to include cultural diversity in the learning experience and make sure that none of the course materials/activities are offensive/going against the cultural norms/values of students.

**Reference**


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*VI. 5. Sonwalkar’s Pedagogical Rating System*

Nishikant Sonwalkar (2001a) believes that many pedagogical models for online education do not take full advantage on the online medium. If online courses are not designed to utilize the capabilities of this environment, then online courses just become poor, carbon copies of face-to-face courses. Sonwalkar (2002) has developed a pedagogical rating system that consists of two components, the pedagogy effectiveness index (PEI) and the summative rating score, to help instructors and course designers evaluate how well their courses take advantage of the online medium.
Pedagogy Effectiveness Index (PEI)

The PEI basically indicates the “pedagogical richness of a course” (Sonwalkar, 2002, p. 20) and is the summation of three factors, learning styles, media elements, and interactivity, which form what Sonwalkar calls “the learning cube.” (See Figure A.17 for a depiction of the learning cube.)

![Figure A.17. Sonwalkar’s (2002, p. 18) learning cube.](image)

Sonwalkar (2001a & b) proposes there are five cognitive-based learning styles for online asynchronous instruction:

- Apprenticeship (L1)
  - The apprenticeship learning style is where concepts are organized in a step-by-step procedural manner (a “building blocks” approach) that works well for a task-oriented topic.

- Incidental (L2)
Learning in the incidental style occurs when a concept is presented that creates questions in the minds of learners that trigger the learning process to answer these questions.

- **Inductive (L3)**
  - In the inductive style, students are presented with specific examples of a concept representing a broader topic. These examples provide a means for students to develop their own understanding of the concept by being able to explain how the examples illustrate the concept.

- **Deductive (L4)**
  - The deductive style presents learners with data, graphs, or simulations and asks them to infer the concepts or principles behind this information.

- **Discovery (L5)**
  - The discovery style presents students with an interactive experience that tests their current level of knowledge and allows them to learn concepts and principles through hands-on experience.

The other two factors of PEI are the media elements and interactivity. There are six media elements:

- text (Te)
- graphics (Gr)
- audio (Au)
- video (Vi)
- animation (An)
- simulation (Si)
These media elements represent the various formats that content appears within an online course, ranging from the simplest (text) to the most complex (simulation). The interactivity aspect focuses on the degree to which learning is learner-centered versus teacher-centered (Sonwalkar, 2001a). Interactivity can be further divided into five elements:

- system feedback
- adaptive remediation and revision
- e-mail exchanges
- discussion groups
- bulletin boards

The PEI varies from zero to one and is based upon a probability distribution that assumes each learning style, media element, and interactive element has the same probability \( p \) of occurrence as any other learning style, media element, and interactive element. Thus, a probability multiplier is created for each component of the PEI based upon the number of elements under a given component (i.e., \( p = 0.068 \) for learning styles, \( p = 0.055 \) for media elements, and \( p = 0.066 \) for interactive elements). Once the number of elements of each component that are present in a given online course is added up, each element is multiplied by its respective probability multipliers. The equation for the PEI can be stated as 

\[
\text{PEI} = \Sigma S_i * p_i + \Sigma M_j * p_j + \Sigma I_k * p_k,
\]

where \( S \) = learning style, \( M \) = media element, \( I \) = interactive element, and \( p \) = probability. If, for example, an online course has one learning style, four media elements, and two interactive elements the resulting PEI would be 

\[
0.068 + (4*0.055) + (2*0.066) = 0.42.
\]
**Summative Rating Score**

The summative rating score is comprised of five factors, content, learning, delivery support, usability, and technological factors (Sonwalkar, 2002). Each of these factors can be rated on a zero to four, Likert-type scale, where 0 = absent, 1 = poor, 2 = average, 3 = good, and 4 = excellent. The summative rating score is determined by adding up all of the ratings on the five factors.

- **Content Factors:** No pedagogy can improve a course that has poor content. Thus, a course should be evaluated by outside experts (e.g., other instructors with expertise in the given domain) to ensure that the quality of the content is high and is at an appropriate level for students.

- **Learning Factors:** The effectiveness of a given course depends upon the quality of the pedagogical principles behind the instruction. Important learning factors include:
  - concept identification
  - pedagogical styles
  - media enhancements
  - interactivity with the instructional content
  - testing and feedback
  - collaboration

- **Delivery Support Factors:** There needs to be adequate delivery support for instructors, students, and administrators, including quality computer servers (e.g., HTML, video streaming), good records of user activity, and Americans with Disabilities Act compliance.
• **Usability Factors:** The graphical user interface and overall organization of the course must be easy for students to access the information they need to complete the course.

• **Technological Factors:** Important technological factors include adequate internet bandwidth, adequate server capacity, and good interface with popular web browsers (users should not have to use a specific web browser to access course material).

*Overall Rating*

An overall rating for an online course can be derived by multiplying the PEI by the summative rating score. This overall rating provides an effectiveness rating of the course as a whole. An advantage of using Sonwalkar’s pedagogical rating system is that courses can be compared to each other regardless of their subject matter.

**References**


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**VI. 6. Discourse Analysis of Chat Rooms as a Means of Course Evaluation**

The use of chat rooms in an online course is one way to create interaction between students and replicate some of the advantages of classroom discussion typically found in
face-to-face courses. Chat rooms can also be used as a means of evaluating an online course.

Course management software, such as Blackboard and WebCT, create transcripts of all public conversation that occurs in a chat room, including who made a particular comment. This feature of course management software applications can be used to perform a discourse analysis. Figure A.18 provides an example of a typical chat room transcript.

```
New session has begun in CI603_Room1.
Saturday, February 28, 2004 11:35am

+**** Sonmez entered CI603_Room1. Saturday, February 28, 2004 11:35am
+**** Jeff entered CI603_Room1. Saturday, February 28, 2004 12:01pm
Sonmez>>Hello
Jeff>>Hello.
Sonmez>>This Sonmez
Jeff>>This is Jeff.
Sonmez>>Hi Jeff, I tried to catch you
Jeff>>catch me when?
Sonmez>>now, I have just read your e-mail
Jeff>>what are your ideas about tools to include?
Sonmez>>Jeff, What i'm thinking is this site should include Chat, discussion board, Presentation area
Jeff>>what do you think about getting rid of the videos and using student homepages instead?
Sonmez>>That would be good idea, the other think that I'm thinking to require student to create group web site
Jeff>>good idea
Sonmez>>and put their ideas, project outline, issues etc.
Jeff>>would that be part of the group's presentation area?

Figure A.18. Example of a typical chat room transcript.
```
Wang, Newlin, and Tucker (2001) conducted a discourse analysis as a means of predicting the performance of students in an online statistical methodology course. The chat room was used as a means of lecture and class discussion in this course, with each chat session lasting approximately 1.5 hours each week of the semester. Wang et al.’s procedure will be described below because their approach can be easily modified to meet various course evaluation needs.

Two people were trained to rate the remarks of students in the chat sessions using 13 discourse analysis categories created by Wang et al. (See Table A.17). Raters could only rate a given remark by a student in one of the categories even if the comment could be classified as belonging to more than one category. Once all of the remarks had been categorized, the mean and standard deviation was computed for each of the 13 categories.

Wang et al. (2001) then performed a correlational analysis of all the discourse analysis categories to determine whether any of them correlated with class performance by the end of the semester. The four categories listed in Table A.17 that are displayed in blue were the categories most consistently correlated with graded course material. The researchers were also interested in determining if a discourse analysis performed early in the semester could predict final class performance. They selected the student remarks made during week three of the semester and performed a separate discourse analysis on these remarks using the 13 categories described in Table A.17 and then performed another correlational analysis. Wang et al. (2001) found that the total number of remarks and the student response rate frequency to a problem/example provided in lecture that week both correlated with the overall grade in the class ($r(20)=.55, p<.01$, and $r(20)=.65, p<.01$, respectively).
### Discourse Analysis Categories Used by Wang et al. (2001, p. 224)

<table>
<thead>
<tr>
<th>Discourse Analysis Category</th>
<th>Example Chat Room Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks concerning lecture problems/examples discussed in chat lecture</td>
<td></td>
</tr>
<tr>
<td>1. Unsolicited statement by the student about lecture</td>
<td>1. “Is this covered on page 330?”</td>
</tr>
<tr>
<td>2. Question by the student about the lecture</td>
<td>2. “The standard error refers to the sampling distribution, right?”</td>
</tr>
<tr>
<td>3. Student response to a lecture issue or question</td>
<td>3. “Sigma is a population parameter.”</td>
</tr>
<tr>
<td>3a. Student response to a problem (example) given in lecture</td>
<td>3a. “The critical z-score is 1.96.”</td>
</tr>
<tr>
<td>3b. Student was the first to respond to the instructor’s question</td>
<td>3c. “I got it.”</td>
</tr>
<tr>
<td>Remarks concerning course administration</td>
<td></td>
</tr>
<tr>
<td>4. Unsolicited statements by the student about homework</td>
<td>4. “What are you asking in Problem 3?”</td>
</tr>
<tr>
<td>5. Question by the student about the homework</td>
<td>5. “So we use operational definitions in the Method Section?”</td>
</tr>
<tr>
<td>6. Student response to a homework issue or question</td>
<td>6. “So we use SD in the denominator?”</td>
</tr>
<tr>
<td>Homework-related remarks</td>
<td></td>
</tr>
<tr>
<td>7. Technology issue</td>
<td>7. “Do I need WinZip to download that file?”</td>
</tr>
<tr>
<td>8. Administrative policy</td>
<td>8. “How much is the homework worth?”</td>
</tr>
<tr>
<td>Social remarks</td>
<td></td>
</tr>
<tr>
<td>9. Social statement, question, or comment</td>
<td>9. “Did anyone see the playoffs last night?”</td>
</tr>
<tr>
<td>9a. Emoticon (i.e., emotional icon)</td>
<td>9a. :)</td>
</tr>
</tbody>
</table>

### Importance of Wang et al.’s Study

Even if instructors do not have the time or desire to conduct such a complex analysis of their online courses, the spirit of their approach can still be useful. Essentially, it is the tracking ability of course management software that made Wang et al.’s discourse analysis possible, and this tracking feature can be used in other ways to help instructors evaluate their online courses. For example, Wang and Newlin (2000) used the tracking feature to
determine how many times students accessed the homepage of the course during the first week of the semester. They then correlated these data to final course grades and found the homepage hit rate during the first week of class to be predictive of final course grades. This prediction could serve as an early alert for students at risk to perform poorly. Wang and Newlin (2000) also tracked the number of threaded discussion posting read and written by students; both of which correlated with final course grades.

References


## APPENDIX B. PHASE I USABILITY EVALUATION FORM

<table>
<thead>
<tr>
<th>Topic</th>
<th>Score (1 is the lowest, 10 is the highest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity of content</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Topics are narrow and manageable (not an overwhelming amount of info)</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Reader’s questions are anticipated and answered</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Organization enhances and showcases the central idea or theme</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Sequencing of information is logical</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Transition between topics is smooth</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Elaborates statements with explanations, reasons, or evidence</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Readability</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

**Additional Questions:**

1. What are the best features of Ped·a·GO·gy?

2. What are the least effective features of Ped·a·GO·gy?

3. What are the main stumbling blocks for the user?

4. Comments?
APPENDIX C. PHASE II INITIAL QUESTIONNAIRE

Welcome! Thank you for your interest in using Ped·a·GO!·gy to further develop your knowledge of the theory and research about teaching in an online environment. Ped·a·GO!·gy is currently in a beta testing phase so I am asking everyone who is interested in using this resource to complete a simple questionnaire. Once the beta testing phase is complete, Ped·a·GO!·gy will be more widely available.

The following screens will pose a series of questions to help me learn more about your professional experience and educational philosophy, so please be completely honest. The only purpose of these questions is to fine tune Ped·a·GO!·gy so it will be a useful tool for people of all experience levels. Thank you for your time, patience, and consideration. This questionnaire will take approximately 15 minutes to complete so please allow enough time to complete it because you cannot come back later and pick up where you left off (due to software limitations).

Once you complete the questionnaire, I will send you instructions via e-mail on how to get into the actual Ped·a·GO!·gy website.

Section 1: Demographic Information

This section contains 14 questions about yourself and your professional experience. Again, the purpose of these questions is to collect some basic background information on the people who use Ped·a·GO!·gy so improvements can be made.

1. Name: ___________________
2. Sex: □ Male □ Female
3. Age: ____
4. Academic Institution: ______________________________
5. Academic Discipline: ____________________
6. E-mail Address: ____________________
7. Education level: (Click on the letter option that best describes your current educational level.)
   A. Associate Degree
   B. Bachelor Degree
   C. Masters Degree
   D. ABD (All But Dissertation)
   E. Doctorate Degree
8. I am *(Click on the letter option that best describes your current employment status.)*
   A. tenured
   B. non-tenured (but on a tenured-track system)
   C. full-time non-tenured track
   D. part time/adjunct instructor
   E. graduate student with teaching assignments
   F. other

*Please indicate your level of experience with the following types of software applications using the following scale:*

<table>
<thead>
<tr>
<th>No Experience</th>
<th>Novice (Beginner)</th>
<th>Basic Level User</th>
<th>Midlevel User</th>
<th>Advanced User</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

9. web authoring programs (e.g., Dreamweaver, FrontPage)
   □ 1 □ 2 □ 3 □ 4 □ 5

10. animation software (Flash, SWISHmax)
    □ 1 □ 2 □ 3 □ 4 □ 5

11. creating computer-based videos (e.g., QuickTime movies, RealPlayer movies)
    □ 1 □ 2 □ 3 □ 4 □ 5

12. knowledge of computer programming languages (e.g., Java, JavaScript, Perl)
    □ 1 □ 2 □ 3 □ 4 □ 5

---

Section 2: Technology Adoption

This section contains 19 questions about yourself and your use of technology. Again, the purpose of these questions is to collect some basic background information on the people who use Ped·a·GO!·gy so improvements can be made.

**Innovation Adopter Status Scale** *(This title does not appear on the actual questionnaire.)*

Please rate the degree to which the following statements best describe your disposition toward the adoption of a new educational technology/idea based upon the following scale:

<table>
<thead>
<tr>
<th>Very Much Like Me</th>
<th>Somewhat Like Me</th>
<th>Uncertain</th>
<th>A Little Like Me</th>
<th>Not at all Like Me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
1. I am able to understand and apply complex technical knowledge. (innovator) □ 1 □ 2 □ 3 □ 4 □ 5

2. I refer to what has been done in the past for guidance when making decisions. (laggard) □ 1 □ 2 □ 3 □ 4 □ 5

3. I make judicious decisions about trying innovative technologies/ideas. (early adopter) □ 1 □ 2 □ 3 □ 4 □ 5

4. I require convincing of the economic necessity of a change. (late majority) □ 1 □ 2 □ 3 □ 4 □ 5

5. I am traditional in my approach to education. (laggard) □ 1 □ 2 □ 3 □ 4 □ 5

6. I consider fully all consequences. (early majority) □ 1 □ 2 □ 3 □ 4 □ 5

7. I am fascinated with trying new things. (innovator) □ 1 □ 2 □ 3 □ 4 □ 5

8. I interact frequently with my peers about a new technology/idea. (early majority) □ 1 □ 2 □ 3 □ 4 □ 5

9. I am a seeker of information about a new technology/idea outside of my institution. (innovator) □ 1 □ 2 □ 3 □ 4 □ 5

10. I resist new innovations until I am certain that they will not fail. (laggard) □ 1 □ 2 □ 3 □ 4 □ 5

11. I am willing to change to a new way or method, but I am not willing to be a leader in the process. (early majority) □ 1 □ 2 □ 3 □ 4 □ 5

12. I am considered by other faculty members as the “person to check with” before adopting an innovative technology/idea. (early adopter) □ 1 □ 2 □ 3 □ 4 □ 5
13. I feel better about trying new things when my colleagues or friends show strong support.  
(late majority)  
□ 1 □ 2 □ 3 □ 4 □ 5

14. I am venturesome.  (innovator)  
□ 1 □ 2 □ 3 □ 4 □ 5

15. I am cautious about change.  (late majority)  
□ 1 □ 2 □ 3 □ 4 □ 5

16. I am able to cope with a high degree of uncertainty.  (innovator)  
□ 1 □ 2 □ 3 □ 4 □ 5

17. I am uncomfortable with uncertainty.  (laggard)  
□ 1 □ 2 □ 3 □ 4 □ 5

The following two questions are concerned with your experience with the technology (i.e., computer software programs) you use (or plan to use if you have never taught online before) to teach online courses.

18. What type of technology do you primarily use (or plan to use) to deliver your online course?
   A. a commercial course management system (e.g., ANGEL, Blackboard, Moodle, WebCT)
   B. an independent course management system (e.g., Kaplan, college-designed system)
   C. a personally developed web site (i.e., a web site YOU designed from scratch)
   D. a web site developed for you by the computer technical support staff at your college

19. If you currently teach an online course(s), which one of the following statements best describes how you constructed your course(s)?
   A. I exclusively use a content module provided by the publisher of the textbook I use for my course(s).
   B. I use a content module provided by the textbook publisher, but I have added a little of my own content.
   C. I use a content module provided by the textbook publisher, but I have added quite a bit of my own content.
   D. I designed all of the content for my online course(s) without the aid of a textbook publisher-provided content module. (Use of test bank questions from a textbook publisher does not constitute a content module.)
Section 3: Comfort with Technology *(Technology Acceptance Model 2 Scale)*

This section contains 26 questions about yourself and your comfort with the technology you use to construct your online course(s). Again, the purpose of these questions is to collect some basic background information on the people who use Ped·a·GO·gy so improvements can be made.

When you encounter the word “technology” in the following statements, think about the technology you identified in the above question and use the following scale to identify your agreement/lack of agreement with the statements:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The titles above each subsection did not appear on the actual questionnaire.

Perceived Usefulness of Technology

1. Using technology can enable me to accomplish tasks more quickly
   □ 1            □ 2            □ 3            □ 4            □ 5

2. Using technology can improve my instructional performance
   □ 1            □ 2            □ 3            □ 4            □ 5

3. Using technology can make it easier to do my instructional tasks
   □ 1            □ 2            □ 3            □ 4            □ 5

4. Using technology in my job/school can increase my productivity
   □ 1            □ 2            □ 3            □ 4            □ 5

5. Using technology can enhance my effectiveness
   □ 1            □ 2            □ 3            □ 4            □ 5

6. I find technology useful in my job/school
   □ 1            □ 2            □ 3            □ 4            □ 5

Perceived Ease of Use

7. Learning to use technology is easy for me
   □ 1            □ 2            □ 3            □ 4            □ 5
8. I find it easy to get what I need from technology
   □ 1  □ 2  □ 3  □ 4  □ 5

9. My interaction with technology is clear and understandable
   □ 1  □ 2  □ 3  □ 4  □ 5

10. I find technology to be flexible to interact with
    □ 1  □ 2  □ 3  □ 4  □ 5

11. It is easy for me to become skillful at using technology
    □ 1  □ 2  □ 3  □ 4  □ 5

12. I find technology easy to use
    □ 1  □ 2  □ 3  □ 4  □ 5

**Attitude Toward Using Technology**

13. I have fun interacting with technology
    □ 1  □ 2  □ 3  □ 4  □ 5

14. Using technology provides me with a stimulating challenge
    □ 1  □ 2  □ 3  □ 4  □ 5

15. Using technology restricts my ability to design effective instruction
    □ 1  □ 2  □ 3  □ 4  □ 5

16. Using technology bores me
    □ 1  □ 2  □ 3  □ 4  □ 5

**Behavioral Intention to Use Technology**

17. I always try to use a technology application to do a task rather than do it manually
    □ 1  □ 2  □ 3  □ 4  □ 5

18. I use technology with my face-to-face courses
    □ 1  □ 2  □ 3  □ 4  □ 5

19. I plan to use technology in the future
    □ 1  □ 2  □ 3  □ 4  □ 5
Perceived Complexity of Using Technology

20. Using technology can take up too much of my time when performing many tasks
□ 1 □ 2 □ 3 □ 4 □ 5

21. When I use technology, I find it difficult to integrate the results into my existing instructional work
□ 1 □ 2 □ 3 □ 4 □ 5

22. Using technology exposes me to the vulnerability of computer breakdowns and loss of data
□ 1 □ 2 □ 3 □ 4 □ 5

Experience

23. I have a great deal of experience using technology
□ 1 □ 2 □ 3 □ 4 □ 5

24. Number of years using technology __________

Voluntariness of Using Technology

25. Using technology for my online course(s) is voluntary
□ 1 □ 2 □ 3 □ 4 □ 5

26. My college requires all online instructors to use technology
□ 1 □ 2 □ 3 □ 4 □ 5
APPENDIX D. EXIT EVALUATION

Now that you are finished using Ped·a·GO!·gy, please take a few minutes to provide feedback about your experience with this website. Please answer the questions that follow as completely and honestly as possible. Again, thank you for your participation and assistance.

Please indicate your agreement with the statements below using the following scale:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Somewhat Disagree</th>
<th>Unsure</th>
<th>Somewhat Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

The titles above each of the following scales did not appear on the actual questionnaire.

Relative Advantage

1. The information found in Ped·a·GO!·gy enables me to see how my online teaching could be more efficient.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

2. The information found in Ped·a·GO!·gy will improve the quality of my teaching.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

3. The information found in Ped·a·GO!·gy will make it easier to do my job.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

4. The information found in Ped·a·GO!·gy will improve my job performance.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

5. Overall, I found using Ped·a·GO!·gy to be advantageous in my job.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

6. The information found in Ped·a·GO!·gy will enhance my effectiveness on the job.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

7. The information found in Ped·a·GO!·gy gives me greater control over my work.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

Compatibility

8. The information found in Ped·a·GO!·gy is compatible with all aspects of my teaching.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7
9. I think that the information found in Ped·a·GO!·gy fits well with the way I like to work.
   □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

10. Using the information found in Ped·a·GO!·gy fits into my teaching style.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

**Complexity**

11. I believe that Ped·a·GO!·gy is cumbersome to use.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

12. Using Ped·a·GO!·gy required a lot of mental effort.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

13. Using a Ped·a·GO!·gy is often frustrating.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

14. I believe that it is easy to get Ped·a·GO!·gy to do what I want it to do.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

15. Overall, I believe that Ped·a·GO!·gy is easy to use.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

16. Learning to navigate Ped·a·GO!·gy is easy for me.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

**Result Demonstrability (part of Observability)**

17. I would have no difficulty telling others about the results of using Ped·a·GO!·gy.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

18. I believe I could communicate to others the consequences of using Ped·a·GO!·gy.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

19. The results of using Ped·a·GO!·gy are apparent to me.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

20. I would have difficulty explaining why using Ped·a·GO!·gy may or may not be beneficial.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7

**Trialability**

21. I’ve had a great deal of opportunity to try various Ped·a·GO!·gy applications.
    □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  □ 7
22. Before deciding whether to use any pedagogical approaches, I was able to properly try them out.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

23. I am able to experiment with the ideas in Ped·a·GO!·gy as necessary.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

24. I did not have to expend very much effort to try out the ideas found in Ped·a·GO!·gy.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

25. There are enough people at my institution to help me try the various uses of the information found in Ped·a·GO!·gy.
   □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7

Additional Questions

1. Was your overall experience with Ped·a·GO!·gy positive or negative?

2. How did you use Ped·a·GO!·gy to design/redesign your course?

3. What topic(s) did you find most useful?

4. What topic(s) did you find least useful?

5. What were the strengths of Ped·a·GO!·gy?

6. What were the weaknesses of Ped·a·GO!·gy?

7. Did your use of Ped·a·GO!·gy affect the final design of your online course? If so, how? If not, why do you think it did not affect your final design?

8. If you could change anything about Ped·a·GO!·gy, what would it be?
APPENDIX E. PHASE I EVALUATOR RESPONSES TO Ped·a·GO!·gy

This appendix includes the responses to the open-ended questions on the evaluation form (see Appendix B) by the five evaluators in Phase I of the present research study. For the sake of simplicity, the questions and responses are displayed in an outline format. Each “additional question” on the evaluation form appears as a Roman numeral and each evaluator is represented by a specific capital letter that is the same for each Roman numeral. For example, the “B” for Roman numeral II contains the responses of the evaluator designated as evaluator “B” for Roman numerals I, III, and IV. The Arabic numbers under each capital letter are the responses of a given evaluator regarding the question displayed after the Roman numeral.

I. What are the best features of Ped·a·GO!·gy?

A. Evaluator A’s response

1. The topics are clear and straight forward, they are important to someone considering on-line instruction and they are well referenced.

B. Evaluator B’s responses

1. The quizzes.

   a. They make it interactive.

   b. Without the quizzes, this might as well just be a document to read.

   c. I would actually like to see more quizzes—either in the form of more quizzes per section, say on sub-topics, or have the quizzes set up so that the user gets a different variety of questions when taking the quiz multiple times—this way the user could use the quiz as a pre-test or preview and again, after reading the material, as a follow-up.
2. Aside from features, the class has a nice clean and streamlined appearance and organization.

C. **Evaluator C’s response**

1. No response

D. **Evaluator D’s responses**

1. The readability is outstanding – it is clear, concise, and uses diagrams where appropriate to illustrate points and concepts.

   a. For beginning online instructors, it effectively outlines the differences between distance students and their classroom counterparts.

2. I found that the quizzes after each section not only helped to reinforce the material presented, but were enjoyable to take.

3. It is also very simple to navigate.

4. I also appreciated the links to other resource material, as well as the bibliographic listings. If I were a new distance learning professor, this would have been an extremely helpful introduction into this area.

E. **Evaluator E’s responses**

1. current information that is user friendly

2. The site is easy to navigate

3. Pictures are used to enhance what is presented

4. Students have the option to evaluate their learning

5. Glossary provide easy access to terms

6. Homepage content easy to navigate
II. What are the least effective features of Ped·a·GO!·gy?

A. Evaluator A’s responses

1. Only one perspective is presented.
   a. There is other evidence, there are other ideas.
   b. I would prefer to see the pros and cons, not just the pros as it were.

2. Further, many people dislike reading on screen.
   a. A print version would be helpful.

3. And, above all else, topics should be linked.
   a. You should not expect every reader to progress linearly through the material.
   b. Rather, they should be able to follow key concepts through several pages.

B. Evaluator B’s responses

1. For now, the discussion boards.
   a. Since it’s not clear what the user should be discussing, for what purpose, with who, or with what expectations that someone will read/reply to their message.
   b. But it does have potential for making the course more interactive if you were to have several people using it during the same time frame and motivated to participate in the discussion (or at least an instructor or moderator responding to comments/questions).

2. Also, I’m not sure if the glossary is all that useful.
   a. But it doesn’t necessarily hurt to be there.

C. Evaluator C’s response

1. No response
D. Evaluator D’s responses

1. Although it may not actually be a feature per se, I felt that the section on design could be eliminated.
   a. Based on my experience as both a distance education professor and student, many instructors do not design their own courses and adhere strictly to a predetermined syllabus provided by their institutions.
   b. Even if they will be designing their own course(s), I feel it is likely that it would be with the guidance and directives of their institutions.
   c. The design concepts presented may also be somewhat advanced for an “Intro to online teaching” course.

E. Evaluator E’s response

1. None—the author made the site easy to navigate through the use of different hot keys.

III. What are the main stumbling blocks for the user?

A. Evaluator A’s responses

1. I am frustrated that the quizzes do not work.
   a. I rely heavily on quizzes in my interaction with on-line students.
   b. The quizzes tell me what the student is doing correctly, and incorrectly.
   c. Thus, not to be able to see the types of questions asked was really frustrating—I cannot tell if you ask good questions, nor can I tell if you ask questions correctly (randomized, for example).

B. Evaluator B’s responses

1. No major stumbling blocks.
a. Overall it’s well done.

b. But I think it should have something like a “Start Here” (or welcome, or introduction) link on the home page, to answer questions like What is this, how should I use this site, and what is here?

C. Evaluator C’s response

1. No response

D. Evaluator D’s responses

1. In this user’s experience, the time it took to peruse all the material.

   a. In some sections, there were, in my perception, many pages and although the content of each page was very manageable, the total number may appear overwhelming to some users – particularly newcomers who may be confused and apprehensive about distance learning.

E. Evaluator E’s responses

1. I did not find any stumbling blocks.

2. The site is easy to navigate, it provides instant feedback on any quiz that is taken and the learner has the ability to review and discuss pertinent information.

IV. Comments?

A. Evaluator A’s responses

1. This would have been helpful to me years ago.

   a. I can see its use by faculty who are just getting started.

   b. But I would really like more information, conflicting ideas, rather than a “rah rah” this is great teaching type of thing.
B. Evaluator B’s responses

1. Here are some specific suggestions I wanted to provide. Some are quite particular and technical! I think the class is overall well done, but just a few little things to clean it up and make it even better.

   a. Would turn off the numbering system within the content modules. All those numbers (e.g., 1.2.1.1) add no useful information for the user, but do clutter up its appearance and reduce ease of browsing.

   b. The first discussion prompt doesn’t really invite discussion (“Welcome to Ped a GO! gy, I hope you will find the information in this website useful in your professional life. I have set up discussion areas for each of the major units in the website. Feel free to use these discussion boards to communicate with other instructors who are also using the website.”) but is more like an announcement—can it be moved elsewhere? Actually I would delete/hide the “main” and “notes” discussion topics. And then for each of the specific discussion topics, put a prompt for discussion in there—for each of those topics, it’s not clear what the user is supposed to do, or how to use them, or even who will be discussion with who, and in what time frame?

   c. Maybe hide the “My Progress” tool, unless that is something useful for the user.

   d. In the table of contents in the Content, the organization is sometimes confusing, because many of the headers are duplicates to the articles/titles immediately below. A couple of examples: items 1 and 1.1 are really the same thing, 1.2 and 1.2.1, as well (and so on). I’d get rid of those duplicate
headers and just let the article/link serve as a header. (This problem mostly shows up when the table of contents items are expanded).

e. Don’t use blue to highlight non-link items, since blue is also used to indicate links. (For instance, in “Scales to Measure…” like the Description and Source labels should be links.)

f. Some of the Case Study links don’t work (go to not available pages). Also, it would be nice if before the user ends up going out to the case study exercise, there could be some kind of explanation of what the exercise will involve and its purpose.

g. Where there is “more information” at the bottom of the pages, I would suggest putting these links in a list that goes down the page (rather than reading across, because they get all jumbled). Also, at first I thought these were links to more information from outside sources—need to clarify that these are within-course links (maybe label them as something like “Other Articles in this Section”—or even get rid of it, because with the other organizational elements, it’s easy enough to navigate between topics without all the links having to be at the bottom each page).

C. Evaluator C’s responses

1. My main criticism is that the package seems to [be] written purely and simply by an academic to impress other academics.

   a. If that is the purpose, it works.

   b. If not it doesn’t.
c. If the purpose is to produce a package that would actually be used to make somebody a functional on-line instructor with a better course than the person could design by them self, then I am not sure the direction you are going works very well.

2. For functional purposes “On-line Education for Dummies” is what is needed.
   a. Get rid of words like **Epistemological** Beliefs of Students. That is fine for any documentation that accompanies the package or as an appendix to the package but get it out of the package itself. That kind of stuff is a turn-off to most people.
   b. On the other hand if the purpose is to impress your professors with your knowledge of ed psych…I don’t know what you need to do to get through the program. But personally, I would split my approach into two components, academic and functional.

D. Evaluator D’s responses
   1. Again, based on my own extensive experience as a distance learner and professor, it has been my perception that many distance learners are in the military, quite a few actually deployed overseas.
      a. Perhaps some material could be provided on this population in section 1.2 – Profile of Online Learners.
      b. My online students have been exclusively military (although I teach for a private non-profit institution open to the general public), and they have unique motivations, needs, and often require special accommodations.
c. The Armed Forces appear to be contracting with a growing number of online institutions to provide higher education for their personnel.

2. A brief overview of the different learning platforms (e.g., WebCT, Blackboard, self-paced courses) might be useful in orienting those new to distance teaching.

3. Under the “Time Management” section, the subcategory of “Not Important but Urgent” was a confusing title for me.

4. As stated earlier, I found Ped-a-GO!-gy to be a great, user friendly orientation to the world of distance learning.
   a. I can honestly state that I wish I had access to such a resource before teaching my first distance course (all I had was a primer on the use of WebCT).
   b. Beyond the mechanics of how to use a particular course delivery system, I feel that it is vital to have a sense of the characteristics of distance learners, as well as the theories that have been developed in this rapidly evolving area.
   c. Used in tandem with such a “how-to” course in say, WebCT, new distance learning faculty can begin with a solid grounding.

E. Evaluator E’s response

1. This is a fantastic site! Thank you for sharing it.
APPENDIX F. FOLLOW-UP QUESTIONNAIRE FOR NON-COMPLETERS

During the summer and fall of 2007, you participated in a research project entitled Ped·a·GO!·gy. Not all participants completed the study, which is fine because participation was voluntary and participants could discontinue participation at any point. However, I am in the process of analyzing the data for my doctoral dissertation, and would like you to complete a brief questionnaire (four questions) to help me understand why people discontinued participation. I am not making any judgment values about people’s attrition, I am merely trying to explain the collected data so I can finish my dissertation and graduate.

Questions to Answer:

Name: (The sole purpose of providing your name is allow me to link your answers to the following questions to your data from the Ped·a·GO!·gy website.)

1. Select all of the answer choices that best represent why you were unable to explore/complete more of the Ped·a·GO!·gy website.
   a. too busy with other things (not enough time)
   b. the material in Ped·a·GO!·gy was not useful to me
   c. the writing style was not engaging (a little dry and boring)
   d. there was no incentive for completion
   e. there was no interaction with other participants—I prefer to share ideas with colleagues in a discussion format
   f. too much material
   g. other reasons? (please specify): ______________

2. If you had received course credit or some other kind of compensation, would you have completed more of the Ped·a·GO!·gy website?
   a. yes
   b. no

3. Have you ever taken an online course (as a student) before?
   a. yes
   b. no

4. Comments or suggestions?
REFERENCES CITED


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