# Theory into practice: The design of an online technology skills course for nontraditional nursing students

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## Abstract

*Nontraditional students in an upward mobility nursing track delivered largely through distance learning technologies enroll in a one-hour credit elective course to learn skills required for success in the online learning environment. The course, "Introduction to Technology in Nursing Education," began as a traditional classroom course. Its transformation to an online course reflects strengths inherent through using a systematic instructional design process in course development. An overview of the Dick, Carey, and Carey (2002) model of instructional design, examples of design components reflected in the course, and illustrations of instructional objectives and strategies from the lessons are presented.*

## Introduction

Designing and developing online learning environments for purposes of allowing students access to course materials, methods in which they can interact with content, and mechanisms for communication with faculty and peers is the focus of many practitioners, researchers, and administrators within the educational environment. While many publications serve to bridge the "theory to practice" gap when developing online education (e.g., Clark & Mayer, 2003; Mantyla, 1999; Stephenson, 2001) this paper attempts to bring into focus practical issues surrounding theory-based design and development of an online course for nurses. Consequently, it will provide a discussion of the development of an online basic technology skills course in the nursing program at a mid-sized comprehensive institution in the southeastern United States.

Providing online, web-based learning is the primary method of instructional delivery for students enrolled in a Registered Nurse (RN) to BSN-MSN degree track within the School of Nursing. The purpose of this degree track is to allow Registered Nurses who have earned the Associate of Science in Nursing degree to complete the nursing sequence required for the Bachelor of Science in Nursing degree in one academic year and, if desired, move seamlessly into the Master of Science in Nursing degree program. Registered Nurse students in this track are typically full-time nurses living in the predominantly rural southeastern quadrant of Alabama. Time and location constraints imposed by work, family, and community involvement make the choice of a distance learning program appealing. Because of the unique nature of nursing education, the program is delivered via a blended methodology. Theory courses are delivered in an online, web-based mode while clinical experiences are personalized to meet individual needs and are conducted in facilities in students' locales. Additionally, students have their choice of three branch campus sites at which they can receive student services, attend course orientation sessions, and take selected written and skills examinations.

Because of the heavy online component of the degree track, nursing program administrators committed themselves to preparing these nontraditional students for success in the program and satisfaction with their educational experiences. Results of studies by McCoy (2001) and Stokes (2001) indicate that students who have prior experience with using the World Wide Web are more likely to be satisfied with their online educational experiences. Recommendations from McCoy's investigation of technological self-efficacy of nontraditional nursing students include developing strategies to enhance students' technology skills and techniques for self-directed learning. Earlier work by Stokes (1999) found that public school teachers entering a graduate program with online components including an introductory technology skills course

were able to identify their technological weaknesses, and through guided coursework, develop skills important to success in the degree program. The results of these studies therefore provided the basis for the development of an introductory technology course in which nursing faculty could equip students with the technology skills necessary for them to succeed in a primarily online learning environment. The "NSG 1160 – Introduction to Technology in Nursing Education" course (shortened to "Introduction to Technology" in this paper) was then designed, developed, and delivered to entry level students enrolled in the RN to BSN-MSN track.

## Overview -- NSG 1160 – Introduction to Technology

The catalog description for the course, "Introduction to Technology in Nursing Education," states that the course:

> Provides a foundation for using computer technology in learning; addresses digital communication, resources, and research. General topics include communication through electronic mail and course discussion, using the World Wide Web as an information tool, online scholarly research, and digital presentations. Course focus is the application of technology skills in learning (Troy State University, 2003, p. 291).

The general course objectives state that upon successful completion of the course, the student will be able to:

- demonstrate basic competency in core information technology skills;
- communicate using synchronous and asynchronous electronic processes;
- conduct Internet inquiry sessions for retrieval of nursing information;
- manage communication and information files in a digital environment, and
- develop electronic presentations for educational use.

There is no text for the course since all materials are available through the Internet. However, students are required to purchase a three-ring notebook, divider tabs, and a diskette. In addition, students are required to have access to a computer with an Internet connection, a printer, Web browser (Microsoft Internet Explorer or Netscape Navigator, version 4 or higher), Microsoft Word, and Microsoft PowerPoint. Downloading Acrobat Reader and obtaining current

virus protection software are covered in the course lessons. Access to course materials is through

the university's course management system via University-assigned usernames and passwords.

*Table 1.* **Basic lessons and examples of corresponding instructional objectives for "Introduction to Technology."**

| Lesson | Examples of Lesson Objectives<br>*Upon completion of the lesson, the student will be able to:* |
|---|---|
| 1. Acrobat Reader | ▪ Download Acrobat Reader to a personal computer;<br>▪ Install Acrobat Reader on a personal computer;<br>▪ Print a .pdf document using a local or network printer; |
| 2. Course Syllabus | ▪ Locate a course syllabus through a Blackboard course web site;<br>▪ Identify required course hardware and software;<br>▪ Identify University student support services. |
| 3. Course Portfolio | ▪ Develop an organized notebook of course materials;<br>▪ Maintain course records including assignment receipts and copies of submitted work as directed in lesson instructions;<br>▪ Use archived course materials for future reference. |
| 4. TSU Email | ▪ Login to the University's email system from any computer with Internet access;<br>▪ Organize program, course, and personal email communications in appropriate folders;<br>▪ Send email file attachments to course instructors and classmates. |
| 5. Blackboard (Bb) | ▪ Navigate through a Blackboard course site;<br>▪ Maintain current personal information in the appropriate area of Blackboard throughout the degree program;<br>▪ Use the Blackboard online manual for assistance when needed. |
| 6. Virus Protection | ▪ Maintain up-to-date virus protection software on a personal computer;<br>▪ Describe how computer viruses and worms spread;<br>▪ Recognize an Internet hoax. |
| 7. TSU Technology Policy | ▪ Locate the University's technology use policy;<br>▪ Acknowledge obligations of users of University technology resources;<br>▪ Recognize violations of the technology use policy; |
| 8. Netiquette | ▪ Identify objectionable behaviors frequently observed in electronic communication;<br>▪ Practice Internet etiquette / netiquette in all electronic communication;<br>▪ Follow guidelines for email communication specific to particular courses i.e., email subject line, body format, and signature. |
| 9. Internet Terms | ▪ Define words and abbreviations commonly used in technology-based environments;<br>▪ Look up unknown words and abbreviations encountered in web-based courses;<br>▪ Use Internet terms properly in verbal and written communication. |
| 10. School of Nursing web site | ▪ Use the School of Nursing web site as a primary resource for University and program information.<br>▪ Find tutorials for technology skills required for nursing courses in the Student Technology Help Pages.<br>▪ Direct nursing-related communication to the appropriate individual. |
| 11. Web Resources | ▪ Use search engines to locate resources on the Internet for course work;<br>▪ Maximize Internet searches by using advanced search techniques and specialized search engines;<br>▪ Explain the elements of a URL. |
| 12. Evaluating Web Resources | ▪ Evaluate a web site according to authority, purpose, currency, objectivity, and support;<br>▪ Identify the preferred domains for acquiring sound health information;<br>▪ Use a standardized form for evaluating web resources. |

| 13. CINAHL | <ul><li>Locate full-text scholarly articles in CINAHL through the TSU Library's Remote Services area from a computer with Internet access;</li><li>Use the library's InterLibrary Loan (ILL) service to obtain copies of articles not available through CINAHL;</li><li>Access the library's online librarian service when questions or problems arise.</li></ul> |
|---|---|
| 14. APA Style | <ul><li>Produce a reference page of scholarly research formatted according to the Publication Manual of the American Psychological Association (APA), 5th edition;</li><li>Identify errors common in using APA formatting for reference pages;</li><li>Consult the University's Writing Center for assistance with questions regarding APA formatting requirements.</li></ul> |
| 15. Trojan Web Express | <ul><li>Use Trojan Web Express for accessing individual University records;</li><li>Maintain up-to-date personal information in the University's database through Trojan Web Express;</li><li>Manage course enrollment through Trojan Web Express.</li></ul> |
| 16. Discussion Board | <ul><li>Access course-specific Blackboard discussion forums;</li><li>Interact with classmates in an asynchronous discussion setting;</li><li>Follow established rules of discussion forums.</li></ul> |
| 17. Virtual Chat | <ul><li>Access course-specific Blackboard chat rooms;</li><li>Interact with classmates in a synchronous discussion setting;</li><li>Search chat session archives for specific information.</li></ul> |

The course is comprised of 17 basic lessons, two projects, a written examination, and a skills demonstration, all of which were derived from and correlated with the instructional objectives of the course (see Table 1 above). Table 2 provides a summary of each lesson's purpose and selected activities. The two course projects are the development of a reference page that is comprised of resources from the World Wide Web and the CINAHL database (Cumulative Index of Nursing and Allied Health Literature) formatted according to APA style, and the development of a PowerPoint slide show that incorporates basic elements of an electronic presentation. Using APA format and the CINAHL database are components of the BSN and MSN curricular requirements, and because baccalaureate nursing graduates are expected to be producers of knowledge as well as consumers of knowledge, PowerPoint software was chosen as the medium for simulating information transfer from the nurse to the client community. Each student selects a health topic to use for both projects; this strategy helps students learn to take a single topic, locate consumer and scholarly resources, evaluate resources

related to the topic, and incorporate information into a classroom presentation with an accurate reference list.

**Table 2. Examples of lesson components for "Introduction to Technology."**

| Lesson | Purpose (Condensed) | Examples of Activities |
|---|---|---|
| 1. Acrobat Reader | Acrobat Reader software is required to view and print many documents including syllabi, PowerPoint course enhancements, scholarly reading material through the TSU Library, and University documents. | ▪ Determine if Acrobat Reader is installed by opening a .pdf file on the course web site.<br>▪ Download Acrobat Reader if needed.<br>▪ Print the poem in the .pdf file for the course portfolio |
| 2. Course Syllabus | The syllabus is the guide for course requirements, grading criteria, calendar, and general course information including course and program policies. | ▪ Locate and print the course syllabus for the course portfolio.<br>▪ Identify specific course elements including the course description, course objectives, evaluation components, and calendar.<br>▪ Submit the online lesson completion form. |
| 3. Course Portfolio | The course portfolio is a notebook for course documents; assembling the portfolio is a strategy for organization of materials in this and future courses. | ▪ Purchase a 1" notebook with a clear sleeve on the front, 5 tab dividers, and a 3.5" diskette.<br>▪ Label the tabs according to instructions and file papers in the appropriate sections.<br>▪ Create a cover page for the notebook using PowerPoint. |
| 4. TSU Email | TSU email is the official account used in this course and throughout the nursing program. Developing email management skills enhances organizational skills. The attachment portion of this lesson checks the compatibility of the students' word processing programs with Microsoft Word, the standard word processing program used by University faculty. | ▪ Login to Trojan WebMail.<br>▪ Create a personal email profile.<br>▪ Create a class folder for all email correspondence.<br>▪ Practice sending a message to self with BCC to self; store the copy in the class folder.<br>▪ Send an email with a Word file attachment to the instructor; open an attachment from the instructor. |
| 5. Blackboard (Bb) | TSU uses the Blackboard (Bb) course management system in all courses. All School of Nursing courses use a uniform pattern for posting course materials. | ▪ Browse each of the following Bb areas: announcements, faculty information, course material, communication, web sites, and user tools.<br>▪ Update personal information in the User Tools area.<br>▪ Use the online Student Manual in the User Tools area to find out how to access old announcements. |
| 6. Virus Protection | Understanding types of computer infections and taking measures for protection is essential when working in an online environment. | ▪ Read selected materials about infections and hoaxes.<br>▪ Verify that the computer you are using has virus protection software installed.<br>▪ Check the date when your virus protection software was last updated. |
| 7. TSU Technology Policy | All users of TSU technology resources must comply with this official University policy. | ▪ Locate the TSU Technology Use Policy in the online version of the student handbook.<br>▪ Read the policy.<br>▪ Submit the online form indicating that the policy has been read. |

| Lesson | Purpose (Condensed) | Examples of Activities |
|---|---|---|
| 8. Netiquette | Using proper Internet etiquette (netiquette) is essential in professional communication. | ▪ Read the "Core Rules of Netiquette" at www.albion.com/netiquette/<br>▪ Take the "Netiquette Quiz."<br>▪ Send the instructor an email that correctly portrays the three basic elements: email subject line, body format, and signature. |
| 9. Internet Terms | Understanding words and abbreviations encountered when using technology is important for getting the most out of lessons and making the best use of time spent interacting with technology. | ▪ Look up the meanings of selected terms and abbreviations in http://whatis.techtarget.com/ (a list of terms is provided).<br>▪ Respond to lesson questions that incorporate these terms. |
| 10. School of Nursing web site | The school's official web site provides key information for students and links to resources important for success in the degree programs and tracks. | ▪ Add the SON home page to Favorites (Internet Explorer) or Bookmarks (Netscape).<br>▪ Visit each area linked from the home page.<br>▪ Identify selected items in the site (a list is provided). |
| 11. Web Resources | Learning to find and evaluate information available through the web are essential skills in using technology in learning. Information located in this lesson will be incorporated into the Reference Page project and PowerPoint presentation. | ▪ Review search engine types through "Search Engine Watch"<br>▪ Practice finding specific sites using techniques found in "Search Engine Math."<br>▪ Participate in the lesson's scavenger hunt. |
| 12. Evaluating Web Resources | A common error made by Internet users is to accept information found on the Internet as fact; applying criteria for resource evaluation is important in nursing education. | ▪ Read selected materials about evaluating web resources.<br>▪ Evaluate three sites according to a check sheet provided in the lesson.<br>▪ Identify three quality sites related to course research topic to use in the course projects. |
| 13. CINAHL | CINAHL (Cumulative Index to Nursing and Allied Health Literature) is a major source of scholarly nursing resources; students are expected to use material found through CINAHL in the theory portion of all nursing courses. | ▪ Access the CINAHL database through the remote services area of the TSU Library's web site<br>▪ Practice finding selected articles when given citations or subjects<br>▪ Locate three full text articles related to course research topic to use in the course projects. |
| 14. APA Style | The School of Nursing requires students to use APA format when writing papers and submitting references for any project. | ▪ Bookmark selected online APA style information pages to use as resources when working with APA style.<br>▪ Visit the University's Writing Center web site.<br>▪ Answer lesson questions about APA formatting in references pages. |
| 15. Trojan Web Express | TSU students use TWE for course registration, accessing grades, viewing transcripts, and gaining access to other official personal University information. | ▪ Login to Trojan Web Express.<br>▪ Change the default or current password and specify a hint for the new password.<br>▪ Look at your latest transcript. |
| 16. Discussion Board | The Blackboard discussion board feature is a component of all online classes; navigating through forums and maintaining discussions in established threads is essential for maximum asynchronous interactivity. | ▪ Enter a discussion board forum.<br>▪ Participate in an instructor-lead thread.<br>▪ Begin a new thread within a designated forum. |
| 17. Virtual Chat | The Blackboard chat area provides a synchronous forum for formal and informal class meetings. | ▪ Participate in one scheduled class chat session.<br>▪ Resize the chat screen so that at least twenty lines of chat are visible.<br>▪ Review your comments in the archive of the chat session in which you participated. |

Although the skills demonstration at the end of the course provides a performance assessment opportunity from which the instructor can evaluate the cumulative skills of each student, the instructor's observations of students' work and their questions as they progress through the lesson tasks are key formative evaluations of the instructional materials design. In addition, these observations serve as a lesson to the instructor of the many means that students discover to reach the end product. Because the instructor is the course designer, these observations assist in refining instructional materials and related tutorials to guide students in the best methods of executing skills related to learning in an online environment.

## Instructional Design Model

The "Introduction to Technology" course that has been described was designed and developed to meet specific needs within the nursing program. The course designer and developer utilized the Dick, Carey, and Carey (2002) model of instructional design as a basis for designing a pedagogically-sound course that could be delivered via an online environment to meet the needs of the nursing students. The following paragraphs describe how each phase of the design model was addressed as the course was redesigned from a traditional to a web-based format, therefore addressing both the theoretical and practical aspects of delivering a technology skills course in an online environment to nursing students.

The Dick, Carey, and Carey (2002) model of instructional design is based on a systems approach to designing instruction which identifies many components of a learning system as being crucial to developing successful learning environments. Instructional design models that are based in a systems approach generally assume that a large amount of instruction, such as an entire course, will be developed and that a significant amount of resources will be devoted to the

development process (Gustafson and Branch, 1997). Other instructional design models that are based on the systems approach are the Smith and Ragan (1999) model and the Interservices Procedures for Instructional Systems Development (IPISD) (Branson, 1975) model. Although all models vary in their levels of specificity and complexity, each is based on the typical processes of the major phases of instructional systems design; these are analysis, design, development, implementation and evaluation (Dick, Carey, and Carey 2002). The Dick, Carey, and Carey model consists of the following specific phases:

- Assess needs to identify goals

- Conduct instructional analysis

- Analyze learners and contexts

- Write performance objectives

- Develop assessment instruments

- Develop instructional strategy

- Develop and select instructional materials

- Design and conduct formative evaluation of instruction

- Revise instruction

- Design and conduct summative evaluation

Each of these phases of the model was critical to the design and development of the "Introduction to Technology" course as it now exists. What follows is a discussion of how each phase was applied to the development of the course.

*Assessing Needs to Identify Goals*

Dick, Carey, and Carey (2002) identify the most critical event in the instructional design process as being that of the identification of the instructional goal. This goal, derived from

processes of assessing needs, can be developed and articulated by using a subject matter expert approach in which designers develop instruction in their areas of expertise, or the performance technology approach, in which the designers develop instruction in response to a set of problems or opportunities. Regardless of the methods, course designers engage in a process to determine the needs that will be addressed by the instruction, therefore forming the instructional goal.

The instructor who developed the "Introduction to Technology" course was a subject matter expert, therefore the methodology employed to determine the needs that shaped the instructional goal was both content generated and generated via the performance technology approach. Nursing faculty members who contributed to the needs assessment recognized the importance of student success and satisfaction from a student-centered, programmatic, and institutional perspective, and understood the need to develop a technology-based course that would attempt to facilitate the success of students who would be learning via a technology-based medium. Learner satisfaction is an important factor in the effectiveness of instruction and in program-related benefits (Biner, Dean, & Mellinger, 1994; Chute, Thompson, & Hancock, 1999). High levels of satisfaction with distance learning, regardless of the medium, influence students' willingness to continue in a program. This willingness is evidenced by lower attrition rates, more referrals from enrolled students, greater motivation, better learning, and increased commitment to the program. The need to develop technological skill and competence in an online learning environment was therefore responded to by creating a course in which the instructional goal was to provide the students with a foundation for learning in a technology-based environment.

*Instructional Analysis*

Once the goal of promoting student success and satisfaction in an online environment was established, the process of conducting the instructional analysis was undertaken. This process, which involves identifying the specific skills and knowledge base that should be included in instruction, requires breaking the instructional goal down into discrete units in order to identify skills and the relative subordinate skills learners will need to possess to achieve the goal. According to Dick, Carey, and Carey (2002), when conducting the instructional analysis, the designer should ask, "what exactly would learners be doing if they were demonstrating that they already could perform the goal?" (p. 37). This process led to the identification of skills that students would need for tasks such as accessing course materials, communicating through email, locating Internet and library resources, completing online forms and quizzes, and developing class presentation materials. In addition, skills important for accessing University services such as the Writing Center, basic computer skills assistance, and administrative elements including grades and transcripts were determined. Each skill area was examined in a step-by-step manner in an attempt to identify all relevant subordinate skills and eliminate assumptions of prior knowledge or experience. Areas where experience was expected but not assured were linked to subject area experts for individual student assistance. Table 1 outlines the specific lessons that were developed as a result of the goal analysis phase that identified the skills needed to succeed in the online learning environment of the RN to BSN-MSN track.

*Learner and Contextual Analysis*

After determining the specific set of skills that need to be taught in order for the learners to be able to achieve the instructional goal, Dick, Carey, and Carey (2002) recommend conducting a learner and contextual analysis in order to determine "the characteristics of the

learners, the contexts in which the instruction will be delivered, and the contexts in which the skills will eventually be used" (p. 95). They acknowledge that at times the designer may have sufficient knowledge of the target population to forego formal data collection, but they recommend areas in which designers should have knowledge of their target population. The authors (2002) recommend gathering information such as entry behaviors and prior knowledge, attitudes and motivational levels, general learning preferences, and group characteristics. This information serves to assist designers with developing instruction that will meet the needs of their students and will transfer to appropriate contexts.

Learners' needs in the "Introduction to Technology" course were identified based upon prior experiences with students in traditional and online learning environments, and through discussions with program faculty who requested the course option for RN students. This anticipatory analysis indicated that some students would have minimal prior experience with using computers while others would have high levels of expertise and confidence. The wide variation expected in learners' abilities and attitudes was the determining factor in developing formative assessment activities. Because the targeted students were adult learners, the necessity for relevant activities was emphasized. Additionally, it was believed that most prior educational experiences were traditional in which the classroom situation was teacher-centered rather than learner-centered. Transferring the responsibility for learning to the student was perceived as a key need as well as a major course purpose. The emphasis on self-directed and problem-centered learning, fundamental in Knowles's (1970) theory of androgogy, is consistent with the constructivist model that is particularly appropriate for teaching and learning using emerging technologies (Lunenberg, 1998).

*Writing Instructional Objectives*

The writing of instructional objectives, or behavioral objectives as they are sometimes referred to, is a process that is seen as being central to designing instruction. Authors such as Robert Mager have greatly influenced the educational community by publishing books that provide instructions for writing clear and precise statements of what learners should be able to do when they complete the instruction (Mager, 1975). The objectives written for "Introduction to Technology" followed the model set forth by Mager and described in other instructional design models. The lesson objectives (see Table 1) contained clear, concise statements of what learners would be able to do as a result of their participation in the instructional activities of the course.

The course objectives were established when the original traditional section of the course was approved by the University and therefore were not altered for the online course section. The course sections are the same course, differing only in the method of delivery. Because the objectives were well developed for the traditional section of the course, no problems existed in their use as the online section was developed. The outcomes specified by the objectives guided the plans for measuring achievement  Course activities were planned so that areas of weakness would be evident, and opportunities for corrections to work submitted were given throughout the course (see Table 1 for examples of lesson objectives).

*Assessment strategies and instruments*

After developing sound instructional objectives, Dick, Carey, and Carey (2002) recommend the development of assessment instruments that evaluate learners' progress and instructional quality, and that are both learner-centered and criterion-referenced. Basing the assessment measures on the instructional objectives and goals of the course provides learners with a clear conception of what skills they will need to master, and provides instructors with

information as to how well the students are mastering the skills and how effective instructional materials are at facilitating learning. "Introduction to Technology" relies on performance-based assessment measures to assess the learners' levels of progress toward obtaining the instructional goal. Projects were designed to allow both direct and indirect demonstrations of skills. The summative assessment is comprised of an individual timed skills demonstration and a computer-based exam.

*Instructional Strategies*

Dick, Carey, and Carey's (2002) discussion on developing instructional strategies – the chunking, sequencing, and presentation of materials – relies on a primarily prescriptive approach in which the learning components are tied directly to the content structure. Dick, Carey, and Carey, however, recognize alternative approaches such as constructivism as being viable alternatives for presenting and facilitating instruction. Tapscott (1998) described learning based on digital media as interactive learning that is learner-centered with a focus on the construction of knowledge, as compared to the broadcast learning that is teacher-centered and focuses on instruction. The designer of the "Introduction to Technology" course blended both prescriptive and alternative approaches to developing instruction in order to tie learning to the stated objectives and engage learners in authentic problem-solving tasks. The instructional strategies employed within the course followed a pedagogical model advocated by Jonassen (2003) in which learners are engaged in meaningful learning tasks and are actively learning *from* technology and *with* technology.

Course lessons were planned to guide each student individually through tasks. Each lesson ended with students submitting forms indicating that the lesson had been completed; completing a lesson carried no point value. However, because students were aware that skills

from each lesson would be evaluated at the final exam, those who needed help in completing the lessons requested received assistance from the instructor before leaving the lesson. The course was divided into three sections to reflect the overall instructional strategy of learning skills, applying knowledge through activities and projects, and evaluation of skills and knowledge through summative assessments. Course sections were basic lessons, projects, and evaluation. Lesson and project component pages stated the purpose and objectives of each component, followed by sequential tasks to acquire or improve skills needed to accomplish each objective. Students were then asked to work through the material in a self-directed manner. Because students determined for themselves when lessons had been completed, accountability for learning was transferred from the instructor to the student, therefore engaging the students in authentic, problem-solving tasks, which are more typical of the constructivist paradigm of learning.

*Instructional Materials*

Dick, Carey, and Carey (2002) describe the "developing instructional materials" phase of their systematic design process as being one in which the designer decides on the delivery system and media selection, the amount of instructor facilitation, and the components of the instructional package (e.g., instructional materials and assessments). While the authors discuss many of the options and constraints inherent in choosing a delivery system, they also acknowledge that at times those choices are assumed and such related choices will be fairly stable.

Since the goal of "Introduction to Technology" was to engage students in a technology-based learning experience in an online learning environment, the media choice and options regarding subsequent materials development procedures were assumed and thus stable.

Instructional materials development therefore was based upon the medium, which in this case was the course web site. This was the appropriate format in that students were preparing for entry into an online instructional track of the nursing degree program. The department in which the course was developed and delivered already employed the Blackboard course management system as the primary mechanism for the delivery of course materials.

*Formative Evaluation, Revision of Instruction, and Summative Evaluation*

The final stages of the Dick, Carey, and Carey (2002) systematic model of instructional design involve designing and conducting formative evaluations, revising instruction, and designing and conducting summative evaluations. The goal of the formative evaluation process is to develop materials and methods through which learners can provide information to the instructor or designer relative to the effectiveness of the course materials. Dick, Carey, and Carey recommend that evaluation instruments be designed to gather information related to the clarity of instruction, the impact of the instruction on the learner, and the general feasibility of the instruction. The data gathered from this evaluation process is intended to inform the process of revising materials to better meet students' needs. Consequently the final stage of summative evaluation becomes a stage in which data is gathered to make decisions about the continued use of the instruction.

Although formal data collection measures were not developed within the "Introduction to Technology" course, questions and comments from students provided data for formative evaluation of instruction throughout the delivery of the course. As students worked through activities, areas where instructions or descriptions were unclear or where assumptions of prior knowledge were made became the key indicators for instructional design improvements and necessary revisions to materials. A course evaluation submitted after completion of the final

skills and written exams provided information regarding overall strengths and weaknesses of the instructional design. These end-of-term evaluations graded the course with high marks, which are believed to be due to the high level of communication throughout the term.

## Conclusion

Using sound instructional design theory is important in any educational setting to insure that learning objectives are met. Although all steps in systematic instructional design are important, evaluation of the course's design has yielded important results in building and maintaining the quality of this introductory technology skills course for students in this track of the baccalaureate nursing degree program. Reliance on a formal system for design during the redesign of this course yielded not only a fine product, but provided the instructor/designer with a sound theoretical base for further development.

## Contributors

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