Instructional Technology and Patient Education: Assimilating Theory into Practice

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Abstract

In the last 20 years, instructional technology has revolutionized patient education. It is argued here that the educational programs most likely to succeed are those developed with a strategic plan based on theory of instruction, design, and learning. This paper discusses the rationale for basing patient education on appropriate theory, and briefly reviews the most frequently referenced theories impacting the integration of instructional technology and patient education.

Introduction

Today's health care demands that consumers of health care participate in their own care through prevention and treatment. Health care providers recognize that patient education is a key component to prevention within a community and with individual patients. For this reason, a revived interest exists in patient education and methods to deliver effective instruction.

The expansion of instructional technology in patient education as a method to deliver effective instruction is well documented in recent literature. The advantages, disadvantages, strategies, and cost effectiveness of instructional technology are detailed within various specialties of patient education. But, discussion of the theory influencing the assimilation of these two converging concepts is limited. Social and behavioral learning theory has figured prominently in patient education (Redman, 1993). However, programs that do not consider the underlying values, philosophy, objectives, orientation of the educational processes, plans, and methods are less effective and possibly counterproductive (Deccache, 1995). Instruction utilizing technology must be based on theory to be effective (Foshay, 1995). Posel (1998) urged health care providers to adopt theories of instructional design into patient education to enhance patient outcomes.

Today, instructional technology is revolutionizing patient education through decision support systems, computer based learning, and web based instruction. With the expanded growth of instructional technology in patient education, it is necessary for educators to utilize educational models based on learning theory, health models, and instructional design while delivering patient education.

The purpose of this paper is to discuss the rationale for basing patient education on appropriate theory, and briefly review the most frequently referenced theories directly impacting the integration of instructional technology into patient education. Suggested strategies for integrating theory into practice are included.

Theory and Patient Education

The goal of patient education is to promote healthy behaviors. Educational programs that are most likely to succeed utilize strategic planning models and meaningful evaluation with a theory foundation. Theories which are "concepts, constructs, principles, and propositions that contribute to a body of knowledge" (Seels & Richey, 1994, p. 11) guide the various stages of planning, implementing, and evaluating an intervention. Program planners use theories to determine the instructional needs, why it must be taught, and how the instruction should be delivered, monitored and evaluated (Theory at a Glance, 1997). Theory explains the dynamics of behavior, the processes for changing behavior, and the effects of external influences on behavior. It also suggests strategies to achieve behavior change. Theories are essential in patient education for identifying the most suitable targets for programs, methods for accomplishing change, and outcomes for evaluation (Theory at a Glance, 1997).

Patient education and instructional technology are based on social and behavioral science theories, theories of learning and instruction, and instructional design. Over 50 major theories of learning, instruction, and instructional design exist[1]. The social-behavioral science theories influencing patient education address the extraneous variables that influence learning, the motivation of patients, and the concept of patient control over individual health. An understanding of the theories influencing patient education and the

integration of instructional technology into patient education is necessary while developing quality instructional programs. A brief overview of related theories and examples of applications are reviewed in Table 1 and 2.

Patient Education and Social-Behavioral Sciences Theories

In order to employ healthy behaviors in a patient, it is necessary to determine those factors that motivate an individual. Once those factors are identified, the patient educator must implement strategies that permit, or empower the patient to exercise healthy behaviors while not conflicting with the individual's value system. Those patients that perceive a degree of control and input in their own care (patient empowerment) and value the desired behaviors are more likely to perform the desired health promotion behaviors. The themes of patient empowerment, and patient value systems emerge from the following social-behavioral theories: Health Belief Model, Self-Efficacy, Locus of Control, Cognitive Dissonance Theory, Stages of Readiness, and Adult Learning Theory (Doak, Doak, & Root, 1996). Examples of patient education and the integration of the above mentioned theories are reported in patient education literature (Armstrong, 1989; Becker & Rosenstock, 1986; Beerman, 1996; Beitz, 1998; Case, 1996; Hahn & Nicholson, 1986; Posel, 1998; Prochaska & DiClemente, 1985; Rhodes, Fishbein, & Reis, 1997; Strecher, DeVellis, Becker, & Rosenstock, 1986; Vanetzian, 1997) . Each of these theories and their assumptions are discussed within the context of empowering the patient to perform activities leading to health promotion and selecting activities that promote the individual's value system. Instructional strategies that empower the patient through learning and behavior modification and recognize value systems are outlined in Table 1.

Patient Empowerment

The ability to empower a patient in practicing health promotion is influenced by the motivating factors of an individual. The health belief model asserts two main factors in motivating individuals to adopt preventive behaviors or reduce risks. First, an individual must perceive personal susceptibility to the disease. Second, the disease or individual behaviors must have serious consequences (Rhodes, Fishbein, & Reis, 1997). The health belief model has stimulated the largest number of theoretical studies in patient/health education (Padilla & Bulcavage, 1991). For example, Arborelius and Bremberg (1994) reported that the likelihood of health enhancing activities increased if patient education and counseling were directed toward a health activity that patients perceived was a personal risk. An instructional program applying the concepts of the health belief model provides motivation for change, focuses on behavior necessary to promote change, and provides a mechanism to promote patient empowerment.

Another factor that influences the ability to empower a patient is the individual's perceptions of his or her abilities. A patient's perception of competence, typically referred to as self-efficacy, is a term developed by Bandura while describing social learning theory. Bandura argued that perceived self-efficacy influences all aspects of behavior (Strecher, DeVellis, Becker, & Rosenstock, 1986). Appraisal of self-efficacy in patients is important because the interpretation of information by an individual is mediated by efficacy expectations and patient control. For example, an individual may focus on the positive aspects of performance and attempt tasks beyond his or her capabilities. Conversely, another individual may dwell on failures, underestimate his or her abilities, and reluctantly attempt new behaviors that result in failure (Strecher, DeVillis, Becker, & Rosenstock, 1986). The self-efficacy concept in social learning theory supports interventions such as repetition, reward, and reinforcement (see Table 1) that build self-esteem and self-confidence thereby promoting patient empowerment.

Locus of control describes an individual's belief regarding the causes of his or her experiences, successes, and failures based on either intrinsic or extrinsic variables (Locus of Control, November 11, 1998). Locus of control affects learning outcomes through the learner's expectations of success and the individuals desire to assume responsibility for his or her own health. Individuals with internal locus of control attribute success or failure to themselves, whereas patients with external locus of control attribute success and failure to external forces. Therefore, patients with an intrinsic locus of control assume responsibility for learning and behavior change while patients with an external locus of control are more difficult to motivate because the responsibility of his or her wellness is shifted to the care provider (Doak, et al., 1996). It is necessary to identify a patient's locus of control initially (Table 1), so that

Table 1: Theoretical Based Instructional Strategies for Patient Education based on review of cited literature

Patient Empowerment & Patient Value Systems	
Instructional Strategies	Theoretical Basis
Assist learner in assessing individual needs and preferred learning style • assess patient's ability to learn, readiness to learn, • offer learning options • provide menu options if computer technology is preferred	Adult Learning Theory Health Belief Model Self-Efficacy Stages of Readiness
Encourage learner to identify their own risks to determine the motivation of learning • use these risks for concrete situations in learning & arrive at own conclusions • Provide concrete examples and rationale for risks • Reinforce the responsibilities of the patient	Health Belief Model Adult Learning Theory Locus of Control
Create content that is relevant to the patient's needs based on their perceptions and interest • Decision support systems, Intelligent Support systems to identify the patient's needs • Establish dissonance within patients through role-modeled behavior via group activity, videos, web-based instruction	Adult Learning Theory Health Belief Model Locus of Control Cognitive Dissonance Theory
Reinforce, and reward learned behaviors and provide contact points • establish email, newsgroups, listservs	Self Efficacy Cognitive Dissonance Theory Stages of Readiness Adult Learning Theory

realistic goals and appropriate patient involvement while creating the program are established. A patient's locus of control influences the level of involvement or empowering strategies that the patient desires.

Promoting learner control or empowering the learner is a major goal of adult learning theory. Developed by Knowles (1980), adult learning theory is heavily documented in patient education and assumes that adult learners desire learning, and become self-directed with maturity. Adult learning theory highlights the need for adults to be actively involved and self-directed in learning (Case, 1996). Many learning theorists develop principles and strategies that reinforce the concepts of adult learning[2]. For example, Leonard (1993) described the following active learning principles: collaboration, reflective thinking, learning for action, learning in a participative environment, empowering learners, dialoguing in the educational process and self-directed learning. Empowering the patient with his or her own self-directed learning promotes patient satisfaction and compliance.

Patient Value Systems

In order to encourage health promotion behaviors, it is not only important to involve the patient in decision-making and planning but to ensure that programs do not conflict with the value system of the patient. Several theories address the role of attitudes and values in behavioral change. According to cognitive dissonance theory, individuals seek consistency between values and behaviors (Kearsley, 1998). If inconsistency or dissonance between attitudes and behaviors exist, patients eliminate the differences. In the case of a discrepancy between attitudes and behavior, it is most likely that the attitude will change to accommodate the behavior (Kearsley, 1998). "Dissonance occurs most often in situations where an individual must choose between two incompatible beliefs or actions" (Kearsley, 1998, 3). While developing patient education, dissonance theory applies to situations involving attitude formation and change. It is especially relevant to decision-making and problem solving (Kearsley, 1998). Applying cognitive dissonance theory is done by creating patient dissonance or discomfort (See Table 1) so that the desired behavior is valued and the individual adopts the desired change to re-establish harmony within the patient.

Prochaska and DiClemente (1985) proposed that adoption of beliefs or behaviors occurs in what they call stages of readiness. In the first stage, the individual is unaware of change or not considering a change in beliefs or behaviors because there is no perceived conflict. Once a change in value systems occurs, a person entertains the idea of behavior change then progresses to taking action. The process of no longer viewing new behaviors as change and adopting the behavior as a part of life is the last stage of readiness (Doak, et al., 1996). Health promotion which reinforces behavior change throughout these stages and does not conflict with one's own value system are more likely to succeed than programs without phased strategies over time. Examples of strategies that engage patients in each phase of readiness include group support and frequent communication with a health care provider. Table 1 summarizes strategies that support the common themes of patient empowerment and patient value systems found in the above mentioned theories.

Instructional Technology Theories Related to Patient Education

The overall goal of integrating instructional technology with patient education is to enhance learning and foster life-long health promoting behaviors. Although there are many theories influencing instructional technology, common themes exist that impact the success of patient educational programs. The capacity to remember, or retention, requires an educational strategy that complements the expected level of performance. Retention is addressed in various methods by most of the instructional theories. Another theme identified in instructional theories is the level of cognition required to encourage behavior change. Edgar Dale's cone of experience, Gange's conditions-based instruction, Merrill's component display/instructional transaction theory, and Reigeluth's elaboration theory all acknowledge the various levels of retention and cognition through perception, reasoning, and intuition. In each of these theories, retention and cognition are basic underlying concepts that predicate the assumptions of the reviewed theories. Instructional strategies supporting the principles of retention and cognition as discussed in the following theories, are outlined in Table 2.

Retention and Cognition

Edgar Dale developed one of the first theoretical models known as the cone of experience theory (Dale, 1969). This theory proposes that individuals retain learned knowledge at various levels depending on the

Table 2: Theoretical Based Instructional Strategies for Patient Education based on review of cited literature

Retention & Levels of Cognition	
Instructional Strategies	Theoretical Basis
Establish the patient's baseline knowledge and build on baseline from familiar to unfamiliar information. • reinforce the baseline knowledge • simple to complex topics with frequent reinforcement through: key points, mini quizzes, and integrated multimedia in instruction	Elaboration Theory Conditions-Based Instruction Cone of Experience
Establish patient contracts developed by the patient to include: • objectives, time line, and rewards based on what the patient feels he/she needs to know • develop modules that build on one another • organize objectives with content, recall, and feedback to directly follow before progressing to more difficult objectives	Component Display Theory Conditions-Based Instruction Elaboration Theory Cone of Experience
Create a teaching moment by utilizing down time • Provide instruction in waiting rooms & reception areas with tutorials, KIOSK based decision support systems • Create impromptu group discussions and learning in waiting or reception areas • Provide information about on-line group discussions.	Elaboration Theory Component Display Theory Conditions-Based Instruction
Establish phased educational plan • embed case scenarios of health promotion and risk behaviors	Cone of Experience Elaboration Theory

educational strategy used. For example, individuals retain approximately 10% of read material while retention increases to almost 50% if the learner observes a demonstration in addition to reading material and listening to a presentation (Comp Strategies, 1997). The need for behavior modification is common in patient education therefore, patients must analyze data and information that contributes to behaviors. This form of learning requires, reading material, observing behaviors, designing plans to implement change and actually performing the desired behavior as demonstrated in Table 2.

While developing instructional programs, educators must assess the patient's cognitive abilities and previous knowledge so that material is logically organized and builds on previously acquired knowledge as suggested by Gagne's conditions-based instruction (See Table 2). The essence of Gange's theory is that learning is observable, skills must be learned one at a time and must build on previously acquired skills, and learning and knowledge are both hierarchical in nature (Braxton, Bronico, & Looms, 1997). Conditions-based instruction consistently focuses on types of learning and those strategies necessary to enhance learning, retention, and acknowledge various levels of cognition. The theory supports a prescriptive plan for delivering instruction which includes goal setting, directing attention, presenting content, eliciting responses, providing feedback, and evaluation (Ragan,& Smith, 1996).

Component display theory builds on Gagne's conditions-based instruction theory assuming that different classes of learning outcomes require different procedures for teaching and assessment (Braxton, Bronico, & Looms, 1998) The purpose of the component display theory is to provide a basis for making decisions about instructional strategy (Seels, 1997). This theory supports individual concepts, objectives, and formats instruction so that the learner controls the instruction. Within the tenants of the theory are three components: level of student performance, type of content, and presentation forms. A quality patient education program designed to enhance retention consists of objectives followed by a combination of rules, examples, recall, practice, and feedback, appropriate to the subject matter and learning task (Kearsley, 1998). This instructional design model guides the patient educator in identifying problems, developing instructional strategies that correlate with the level of cognition, and improve retention.

Reigeluth's elaboration theory builds on the notions of Dale, Gagne, and Merrill. The theory reiterates the value of developing instruction that validates previous knowledge thereby improving retention. The purpose of elaboration theory is to guide the development of large segments of instruction (Ragan, & Smith, 1996). This theory specifies a general model for selecting, sequencing, synthesizing, and summarizing content in a simple to complex structure supporting the level of cognition concept. Elaboration theory proposes that instruction must start with an overview that summarizes what is to be taught with each level of instruction building on previous ideas (Seels, 1997). Wilson and Cole (1992) proposed the following strategies in order to build instruction based on elaboration theory: (1) progress from familiar to less familiar content, (2) create a teaching moment, (3) use content with high interest and perceived relevance and, (4) utilize immediate concrete situations or problems with feedback. These strategies are proposed in detail in Table 2.

For instructional technology to enhance learning and foster life-long health promoting behaviors, the patient educator must attend to the social factors that influence instructional technology. The socioeconomic and gender inequality that instructional technology perpetuates is the central focus of the diffusion of innovation theories literature. Diffusion of innovation theories encourage instructional developers to consider educational needs, user and content characteristics, technology considerations, and organizational capacity (Surry, 1996). Child and adolescent health education utilizes various forms of instructional technology including multimedia, Internet based tutorials, KIOSK programs, and digital games. The child and adolescent population, regardless of socioeconomic status, appears to be receptive to various forms of instructional technology possibly due to the increased exposure to technology through public and private school systems. If this is the case, then one might expect all patient cohorts, regardless of race, socioeconomic status, gender, and age, to be accustomed to instructional technology components as a form of patient education over time. However, this assumption should not discount the present inequality of technology access, interest, and knowledge in various groups of individuals. Therefore, it is essential to examine the

characteristics of users before adopting technology. Surry, (1996) suggested performing an adoption analysis which is the process of identifying factors that influence the adoption of the technology.

Patient Education Strategies Grounded in Theory

Patient education literature is replete with examples of social and behavioral sciences theory integrated in patient education. However, literature that assimilates instructional technology theory with the more commonly cited patient education theories may be nonexistent. Due to the numerous theoretical perspectives on instruction and health models, interrelation and overlap inevitably occur. Common themes include patient empowerment, patient value systems, retention, and cognition. Each of these concepts impact the learning that takes place, therefore, the educator must identify and address each theme. This is accomplished through instructional strategies grounded in theory. A patient educator may incorporate a single strategy that addresses assumptions or concepts from more than one theory as demonstrated in Table 1 and 2.

Patient education requires as much individualized and patient centered planning as the care itself. Initially, the patient's learning style, and motivating factors must be assessed to determine the focus and strategy of the patient education. Goals that are established with the patient encourages education that is based on the patient's own values and perceived needs. It may be necessary to reinforce the dissonance between a patient's value and the behavior producing a health risk. This is accomplished by reviewing statistics, case scenarios, or health information regarding the risk behaviors and the outcomes. Once the patient is motivated to learn, the desired outcome and strategies to promote health behaviors are introduced, rehearsed, practiced and tested for comprehension and accuracy.

Individualized patient education builds on previous knowledge and progresses from simple to complex concepts with frequent opportunities to review the information through key points or mini quizzes. The educational material may be delivered through various forms including but not limited to written materials, audio tapes, videotapes, KIOSK programs, multimedia tutorials, and web-based instruction. Reinforcement of learning and resources are equally important to the success of patient education. Instructional technology such as virtual discussion groups, newsgroups, listservs, e-mail, and web pages provide support and resources for patients.

Conclusion

Instructional technology aids in the delivery of patient education in a variety of ways. Creative instructional programs grounded in theory support educational materials, deliver instruction, provide follow-up, and evaluate methods of instruction. There are many creative opportunities for the patient educator interested in integrating instructional technology into patient education. Designing quality patient instruction that is purposeful and cogent requires the integration of strategies that support theoretical concepts based on social-behavioral science and instructional technology theories because they provide a predictable framework for successful interventions, and offer a systematic process to analyze success or failure (Doak, et al, 1996). Assimilating theory into patient education practice provides a scientific foundation for development and predictable quality outcomes for the patient.

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Endnotes

1. For a comprehensive review of learning and instruction theory, visit the following web sites:

Explorations in learning and instruction: http://www.gwu.edu/~tip/
Learning and instruction: http://www.scican.net/~harnish/mtheory.html,
Theoretical sources: http://www.cudenver.edu/~mryder/itc_data/theory.html.
For a review of social and behavioral science theory related to health promotion visit:
National Institute of Health:
http://www.mfmdesign.com/NCI_WEBSITE/NCI_Pub_Interface/Theory_at_glance/HOME.html

2. A review of effective strategies for adult learning is located on the internet at:
http://www.wnp.ac.nz/onlinec/introcer/alpha/overmap.html