Combining Quality and Expediency with Action Research in ELearning Instructional Design

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Abstract

Recent research has posited that there may be a relationship between an organization's level of capability in electronic delivery of training and the barriers set up to detain it. One of the biggest obstacles is the entrenched culture of the organization itself. So often the challenges to the implementation of an innovation, such as electronic instruction, come from the establishment committed to its adoption. Embedded action research in electronic instructional design can provide observation of the innovation's implementation and what was successful or not, but can also provide crucial feedback on the culture and atmosphere of the organization and participants in the innovation.

Introduction

Researching the effects of team collaboration in electronic education instructional design can be beneficial in both commercial and educational environments. The importance of painstakingly noting each implementation effort, as well as noting each team's patterns, through action research, can provide valuable insights for future research on instructional system designs and also within similar areas of inquiry. Lessons learned along the way can shed new light on how to improve future design and adoption so that the climate evolves into a new culture of acceptance and collaboration. The existing mental silos are replaced by flowing communications across departments and disciplines that enhance creativity and interactivity, both electronically and face-to-face.

It is more important now, than ever before, to look at which new directions can be taken with respect to education, particularly with respect to technology and international influences. Marshall McLuhan (1964) predicted a global village over fifty years ago, and today, we are communicating electronically globally in seconds. In this large-scale community, it is crucial to develop education al curricula and training that deliver knowledge and expertise in new electronic media across many cultures to break down silos of isolation and resistance.

This study focuses on the lessons learned from combining action research and instructional design, particularly with respect to cross-disciplinary collaboration, in electronic (online) education. Collaboration in instructional design and in action research can be employed as a means to monitor the results of electronic rapid prototyping, both to accomplish innovation diffusion, and to provide valuable action research models for change integration that can have universal applications (Bourner, Katz & Watson, 2000; Gannon-Cook, 2005; Gladwell, 2002; Isgar, 1995, Larson & LaFasto, 1989).

Researching the affects of team collaboration can be beneficial in both commercial software and in educational environments. The importance of painstakingly noting each team's patterns, as well as each aspect of the team development, offered not only significant areas for analysis and research, but could also provide valuable insights for future research within similar areas of inquiry. This is why action research can be so important in higher education, science and

industry, because the researcher can actually be embedded in the design team and can make detailed observations and notes that may not be possible for the design team that is too busy to keep detailed audit trails of the failures and successes along the path to design implementation. This study followed four capstone project graduate students assigned to create instructional design programs for a year. Through the thick qualitative data provided by the action researcher, it was found that, while not all students emerged with an understanding of the dynamics of collaboration, all did seem to understand that they had been exposed to some part of the real world they would likely see again. They also emerged from the capstone projects with a better grasp of the importance of teamwork and the need for thoughtful integration of content knowledge and technology. Successful instructional design, while crucial, was not achieved in isolation. Through the capstone projects, they began to understand that it was not just the ability to design software, or instruction that would make a new innovation succeed; it took a committed team to introduce, infuse, and remain committed to the projects and the adopters, for the innovation to become a part of the fiber of the organization.

Some Definitions of Terms

Distance Education (DE) can be described as a planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements. (Moore & Kearsley, 1996, p.2)

Electronic Education, for the purpose of this study, represents a form of learning in which the instructor and student are separated by space or time where the gap between the two is bridged through the use of online technologies (Wikipedia, 2008a). Electronic education can represent any type of educational course material delivered via an electronic format, be it by the Internet, interactive video, synchronous delivery methods, such as *Wimba* (a provider of collaborative learning software applications) (Wimba, 2008) and services to the education industry. or *Skype* (a software program that allows users to make telephone calls over the Internet, use instant messaging, transfer files and do video conferencing) (Skype, 2008).

Online Education consists of any type of educational content delivered via Internet channels, such as the World Wide Web. (The term online education is often used interchangeably with electronic learning [eLearning]) (Wikipedia, 2008a).
Training deals with the design and delivery of learning to improve performance, skills, or knowledge within organizations. In some organizations the term Learning & Development is used instead of Training and Development in order to emphasize the importance of learning for the individual and the organization (Wikipedia, 2008b)

Webcasting is the use of a media file distributed over the Internet using streaming media technology. As a broadcast may either be live or recorded, similarly, a webcast may either be distributed live or recorded. Essentially, webcasting is "broadcasting" over the Internet (Wikipedia, 2008c).

Review of the Literature

This study will be based on instructional design, including research on rapid prototyping; organizational adoption of innovation, including collaboration, and action research theories.

Instructional Design

Instructional design (ID) is often incorporated into a system that both organizes and systematizes instruction and design (Gustafson & Branch, 1997; Seels & Glasgow, 1998). The origins of instructional technology emanate largely from learning and instructional theory and communications and technology theory. According to Seels & Glasgow (1998), instructional design is "the process of solving instructional problems by systematic analysis of the conditions for learning" (p.1) and is based on the "premise that learning should not occur in a haphazard manner, but should be developed in accordance with orderly processes and have outcomes that can be measured" (p.7). Traditional approaches of instructional design focus on the transmission of objective, external, information from experts, scholars, educators, journalists, to the non-experts, and in so doing, focus on source-using, not constructing, behavior and practical experiences to design effective training or education.

Basic definitions of what needs to be learned, what objectives need to be met, what needs to be planned, developed, delivered, and measured, are all critical elements to the design and delivery of instruction. The sequencing of some of these elements may vary, depending on the situations and environments in which the instruction is created and delivered, but all of these elements must be present in order to devise a successful instructional program. Instructional programs usually involve not only the designer, but the decision-making body that approves the ID program, and the departments and program participants, as well as the parties involved, and the program assessors, hence the importance of inclusion of communication and collaboration throughout the design and delivery process. In addition, there is often the use of technology in the delivery of instruction too, so there are multiple levels of activity involved in the ID process.
The inherent reason for ID is the delivery of instruction, and that remains paramount, regardless of whether the delivery method is via technology in online instruction or in face-to-face classroom settings.

Often the reasons why an ID program can have a disappointing outcome could go without ever being addressed unless one has a good understanding of instructional design. One weakness with many training programs is the lack of strong theoretical foundations (Driscoll, 1994; Reigeluth, 1999; Schreiber & Berge, 1998). Theory and research guide well-designed training programs. Two of the primary reasons why so many training courses fail to produce the intended results of improved performance are: (1) failure to base training on research and sound theory (note, there are many sound training theories [Bednar, Cunningham, Duffy, & Perry, 1995; Boutwell, 1979; Dick & Carey, 1996; Gagne, Briggs, & Wager, 1992; Gustafson, 1991; Hannum, 1983; Kemp, Morrison & Ross, 1994; Merrill, 2002, 2008; Reiser & Dick, 1996; Reiser & Dempsey, 2001; Schock, 1995; Seels,1989; Seels & Glasgow, 1998; Willis, 1995], however theory is often bypassed in the rush of many corporations and universities to pressure instructional designers to quickly produce new training); and, (2) failure to base training on a set of standards derived from a research-based philosophy of training (Bonk & Cunningham, 1998; Gannon-Cook, Crawford, Driskell, & Hirumi, 1999; Hirumi, 1996; Rosenberg, 2006; Seels & Glasgow, 1998). Omission of these two important aspects of ID may lead to uninformed decisions and poorly constructed programs.

The very nature of instructional design is dynamic, and as such, does not always lead to systematic, predictable, solutions. In fact, the solutions can be, in fact, can often be found in motivation. In 2001, Reiser and Dempsey arrived at a definition of instructional design that included all of these descriptions:

> 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…Research and theory related to each of the aforementioned areas is also an important part of the field. (Reiser & Dempsey, 2001, p.12).

The proper application of design strategies necessitates the use of knowledge gained from years of research on human learning, motivation, performance, and distance education. Successful training solutions do more than employ expedient quality control, or provide a good return on investment (ROI); they feature ongoing assessment, data collection, research and recursive evaluation, sound foundations of well-chosen design theories and instructional design to insure that success. Once a training program has been implemented, if designed appropriately, it eventually becomes assimilated into the culture of the corporate (or academic) environment (Fullan, 1991; Gufstafson & Branch, 1997; Robinson, 1995; Reiser & Dempsey, 2001; Seels & Glasgow, 1998).

But the path to cultural assimilation and collaboration may entail more than sound instructional design principles. If, as McLuhan (1964) posits, all of the communication tools from the last medium need to, somehow, be integrated into the new system, then there needs to be a way to converge the "old" knowledge with the new (McLuhan, 1976, 1968). To begin to truly integrate knowledge into the new media, according to McLuhan, the conveyances of knowledge should include the older forms of communication too, like text and symbols, integrated seamlessly or

ubiquitously into the new communication, like web logs (blogs), podcasts, or gaming simulations, to provide a foundation to scaffold the new learning.

Through the stages required to bring training to fruition as a successful ID project, the instructional designer will wear many hats, from serving as a team leader, researcher, content expert, diplomat (within organizational contexts), technology expert, and ID project evaluator, the instructional designer remains steadfast in focusing on the end result while staying flexible enough to revise and adjust the project to accommodate necessary changes and follow through to the success of the project.

Rapid Prototype Development

Rapid prototyping is the "automatic construction of physical objects using solid freeform fabrication. The first techniques for rapid prototyping became available in the late 1980s to produce models and prototype parts. Today, they are used for a much wider range applications" (Wikipedia, 2008c). The term rapid prototyping is also used in the field of instructional design and is applied to rapid software or product changes that are made as the project is developed and implemented (Gannon-Cook, 2005; Jones, Richey, 2000; Richey, 2005). Rapid prototyping allows for changes to be made quickly, without the need for elaborate setup or assembly; rapid prototyping systems reduce the construction of complex objects to a manageable, straightforward, and relatively fast process. This has resulted in their wide use as a way to reduce time-to-market in manufacturing (Castle Island, 2008, Yildrem, 2004). Rapid prototyping, if documented through the change processes, can help designers and engineers better understand and deliver products that have been improved while being beta-tested. The practice of rapid prototyping is no longer in the realm of manufacturing, but is now being used by surgeons, architects, instructional designers, even artists and individuals from many disciplines who routinely use the technology. Research on rapid prototyping for expert systems reveals knowledge transfer processes not readily seen prior to documenting the rapid processes but now clearly displayed through the thick narratives of action research. The combined processes of rapid prototyping with action research allow for a template of best practices to be created that can even display the pitfalls to avoid in the implementation process (Castle Island, 2008; Dey, Abowd, Salber, 2001; Kamrani, 2005; Klopfer, Squire, 2008; Richey, 2005).

Management Theories

Management theories not only cover corporations and organizations, they also cross over into the education and instructional design areas because management is such an overarching part of the process of operation for most organizations. Theories taken from organizational management research include: goal setting theories; motivational, performance, and improvement theories; delivery and assessment theories; and successful leadership theories (Blanchard & Johnson, 1982; Covey, 1990; Drucker, 1967; Kaufman, 1992, 1998, 2000; Kaufman, & Swart, 1995; Kaufman, Watkins, Triner, & Stith, 1998; Peters, & Waterman, 1986).

Motivation theories and technology (change) diffusion theories are also considered under business management theories, and have been covered in the next sections of this literature review.

In management teams, there is always an expectation that the product, such as, in this case internal or external training, will be delivered, but often little interaction occurs with management while the process occurs. The exceptions where management interacts are often in providing financial accountability, deadline and budget allocation reports. Research conducted over the last twenty years on successful corporate cultures, such as 3M, Hewlett Packard, and Southwest Airlines (Covey, 1990; Peters, 1982; Senge, 1990; Talbot & Cosgrove, 1984) and contemporary research on successful corporate cultures (Gladwell, 2002; Intel, 2008; Apple, 2008; Microsoft, 2008; Packard, 1995; Rosenberg, 2006; Wilson, Jonas, & Daugherty, 2006) indicate that these corporations effectively use participative management techniques to encourage employee creativity and provide training and development opportunities for participation in innovations.

The Development of Relevant Learning and Expertise

Expertise is difficult to define because it represents a high degree of proficiency by the person in a specific area to which the term is applied. Expertise is "the skill, knowledge, or experience of an expert, one who has special skill or knowledge" (Webster's Concise Dictionary, 2002, p.250). Expertise, is valued by both management and employees, but may not be as significant within

the reward framework of the organization (Bonk, 2001; Rogers and Shoemaker, 1971; Klopfer, Squire, 2008; Texas Higher Education Coordinating Board, 2000; Yildirim, 2004). Expertise should include content knowledge; years of practical experience in one's profession; technology skills; presentation skills, and communication and networking skills. Because expertise also entails a much greater use of technology in the Twenty-first century, technological proficiency is viewed as another aspect of expertise that is crucial to effective management. The graduate students in this study were very aware of the need to be technologically astute; their biggest revelations came with the realizations of the importance of communication and collaboration to the success of their teamwork ID projects. (Gannon-Cook and Crawford, 2004; Jones, Richey, 2000; Klopfer, Squire, 2008; Seels & Glasgow, 1998; Wagner and Leydesdorff, 2004).

Adoptive Behaviors

Adoptive Behaviors, self-determinism, competence, tendency for success and tendency to avoid failure, all contribute to successful participation in an innovation. The five attributes of innovation, developed by Rogers and Shoemaker (1971), are: relative advantage; compatibility; complexity; trialability; observability; and, the ability to assess the potential adoption capability of the innovation within the culture of the population sampled. The findings of their study suggest that one primary requisite to adoption of innovation is that the innovation must be perceived as simple if it is to be successfully implemented (Allan & Wolf, 1978; Robinson, 1995).

There are a number of research studies that suggest that online education is not simple and does take additional work and time to implement (Beggs, 2001; Bonk, 2001; Bower, 2001; Culp, Riffee, Starrett, Sarin, Sanjiv, Abrahamsen & Cobleskill, 2001; Johnston, Alexander, Conrad & Fieser, 2000). Since much of the online training theories and practices are derived from online educational theories (Dick, & Carey, 1996; Gagne, Briggs, & Wager, 1992; Reiser & Dempsey, 2001; Seels & Ritchie, 1994; Seels & Glasgow, 1998), there can be instructional design overlap in both arenas. The adoption process of integrating online training or education into the organizational culture is taking place rapidly at universities and corporations around the world, but without a universally-accepted process because the steps implemented in each university vary widely (Bonk, 2001; Broskoske & Harvey, 2000; Gannon Cook, 2001; Chronicle of Higher

Education, 2001; Green, 2000; Bourner, Katz, Watson, 1998; Kezar, 2001; National Education Association, 2000; Salomon, 1997). That is one of the reasons why the inclusion of comprehensive instructional design assures some measure of consistency in the implementation of the innovation. Adoption of the innovation then occurs when the innovation gets used by increasing participants and becomes assimilated into the culture of the environment (Fullan, 1991; Fullan, 1994; Robinson, 1995; Rogers, 1995; National Council for Educational Technology, 1995; Wu, 1988).

Organizational Adoption of Innovation

One study on obstacles to distance education (DE) in higher education posed that business and academic organizations are at different stages of maturity regarding their capabilities to conduct DE (Berge & Muilenburg, 2001). While DE and online learning may differ in the application and degree of technology use, the findings of this study suggest that both business and academic organizations are at different stages of maturity regarding their capabilities to conduct electronic training or education. Businesses are hurdling forward at a brisk pace to provide online training (so brisk that audit trails of testing are often jettisoned on the way to goal achievement); academic organizations often follow a similar path, racing to meet the certain online program goals (also without beta-testing or documented rapid prototyping), both in a desperate effort to meet the overwhelming demand for online training or education.

But research on organizations also indicates that innovations assimilate into the culture of the environment more quickly if they quietly are homogenized into the corporate culture without mandates (Fullan, 1991; Robinson, 1995). Once an innovation (in this case online training or education) becomes less threatening, there is a kind of contagion (Gladwell, 2002); the use of the innovation spreads to more employees, reaches a tipping point of critical mass, and eventually becomes ubiquitous. It is then seamlessly incorporated into the process and practice of the participants (Wolcott, 2002). Team management of online training projects can reinforce this shift to adoption and integration by encouraging the new adopters and by keeping a sustained commitment to the innovation until it becomes part of the fiber of the organizational culture (Kaufman, 2000; Robinson, 1995; Rogers, 1995; Rogers & Shoemaker, 1971; Stribiak & Paul, 1998; Wolcott, 2002).

Change Diffusion Theory

Change theory can help educators understand and locate their place within processes of technological innovation, but administrators must consider the need to understand and master change processes to maximize adoption of the innovation.

Planning change strategies for adoption of an innovation is essential (Culp, 2001). The Institute for Higher Educational Policy established several bookmarks for successful technology diffusion: technical assistance in course development; assistance in transition to DE; continued assistance and DE training (Bower, 2000; Institute for Higher Educational Policy, 2000). Rogers (1995) found that certain attributes predict adoption of technology: relative advantage, compatibility, complexity, trialability, and observability (Bourner, Katz, Watson, 2000; Rogers, and Shoemaker, 1971; Rogers, 1995; Wolcott, 2002). When the innovation is perceived to be better, and consistent with the adopter's needs and values, the potential adopter will be more likely to try the innovation. Once tried, if the result is successful, then it will be adopted. Vroom's expectancy theory (1964) purports that expectancy measured against the value of outcomes determines motivation to perform, in other words, expectancy leads to performance, performance to outcomes, and outcomes to satisfaction and adoption.

Incorporating change theory can help educators understand and locate their place within processes of technological innovation, but administrators must consider the need to understand and master change processes to maximize adoption of the innovation. The attention that has been successively focused upon hardware and software, then pedagogy, with little focus upon human factors in DE implementation may have been misplaced. Fullan (1991) suggests that educational innovation requires a change of teaching resources, strategies and beliefs. He warns that change must occur in all of these dimensions if educational innovation is to be successful. (Fullan, 1991; Rogers, 1995; Robinson, 1995). As the innovation becomes less threatening and more accepted within academia, participants become more comfortable and adapt to using it. Adoption becomes ubiquitous.

Motivation Theories

The meaning of the word, motivate, is "to provide with a reason to act, to cause or impel to action" (The Merriam Webster Dictionary, 2008, online). In the field of psychology, the term "motivation" is defined as "the desire and willingness of a person to exert effort in order to achieve a particular goal or outcome" (French, 1991, p. G-14). The origins of motivation theory emanate from the field of behavioral psychology, wherein the study of mind and behavior focuses on how humans act and the objective evidence of human behavior (Deci, 1985; French, 1991; Freud, 1966; Gannon-Cook, 1998; Herzberg, 1964; Lepper & Parker, 1992; Lepper, Keavney & Drake, 1996; Maslow, 1954; Medved, 1982; Pintrich & Schunk, 2002; Skinner, 1969). Motivation theories look at the factors that influence "an individual's willingness to exert effort to achieve the organization's goals, conditioned by this effort's ability to satisfy individual needs" (DeCenzo, 1996, p.327). Behavioral motivation theories look at response to stimuli and positively or negatively reinforcing behaviors (Pintrich & Schunk, 2002). Cognitive theories look at the "causal role of mental structures and the processing of information and beliefs. Motivation is internal; we do not observe it directly, but rather its products (behaviors)" (p.20).

Maslow (1954) posits that humans are motivated by two basic levels of human needs: lower level needs of physiological (food, sex, security), and then higher level needs (love, belonging, self-esteem, and self-actualization). These needs motivate humans to work, and develop relationships, based on each person's hierarchy of needs. The first level of basic survival needs extrinsically motivate a person to perform the actions of work (Maslow, 1954). Once the person's basic physiological needs are met, food shelter, safety, and money, then one moves on to desire the next level of needs, those of acceptance, love, higher self-esteem and self-actualization. The second level of needs (1970) intrinsically motivate a person to want to perform actions that will result in the rewards of acceptance, love, higher self-esteem and self-actualization, the intrinsic motivators of human performance. Accordingly, the specific responses that result from motivations can elicit responses that will (positively or negatively) influence individuals and their performance in specific situations. (Herzberg, 1964; Lepper & Parker, 1992; Lepper, Keavney & Drake, 1996; Maslow, 1954; Medved, 1982; Skinner, 1969).

Motivation theories cross over into the educational management arena and help motivate faculty and facilitate adoption of an innovation, such as technology, into instruction (Pintrich & Schunk, 2002). Aspects of motivation, such as goal setting; performance assessment and authentic participation; can nurture and reinforce motivation and establish practices that reinforce desired outcomes (Blanchard & Johnson, 1982; Covey, 1990; Drucker, 1967; Kaufman, 1995; Senge, 1990).

Goal Setting

Measures, such as goal setting, performance assessment and improvement can make the difference between the success of innovations and failed efforts for an organization (Bandura, 1988; Blanchard & Johnson, 1982; Covey, 1990; Drucker, 1967; Kaufman, 1995 Pintrich & Schunk, 2002; Senge, 1995). Goal setting includes goal choice, goal commitment, and goal attainment which "can be influenced by a number of personal and environmental factors" (Pintrich & Schunk, 2002, p.168). "Group goals can also have a positive (or negative) effect on personal (as well as group) goals" (p.167). Factors that affect group motivation include goal setting, having positive outcome expectations, and receiving feedback (2002). Goal setting offers "a comprehensive model of human motivation when personal beliefs and emotions are included in the model" (p.207).

Performance Assessment and Feedback Theories

Performance assessment can provide effective and long lasting motivational, organizational and educational change (Hall & Hord, 1987; Havelock & Zlotolow, 1995; Reigeluth & Garfinkle, 1994; Robinson, 1995, 1996; Rogers, 1995). Feedback and performance assessment can "build motivation and efficacy" (Pintrich & Schunk, 2002, p.319). Assessment can be done through behavioral tests and feedback, such as tests, quizzes, or formal evaluations; or assessments can be done through learner-centered authentic feedback through modeling, portfolios, projects and reflections. The feedback principle is "basic to all motivational and most general psychological theories"…Feedback provides information that can be used to judge progress, repair mistakes, and redirect efforts" (Pintrich & Schunk, 2002, p.210). Performance assessment and feedback must be provided in order for curriculum and training designers to determine whether design goals have been met and whether the students have learned the desired materials.

Authentic Participation

Authentic participation, particularly by administration, can go a long way towards engaging, motivating and retaining employees. The support of the administration, as regards activities to nurture the innovation, demonstrate that authentic participation is actually occurring and is not mere rhetoric (Anderson, 1998). Authentic participation by administrative role-modeling lets employees (or faculty in academic environments) know there is buy-in; but, more importantly, it conveys the message that the innovation is beneficial to both the organization and to the employee (or faculty) (Anderson, 1998; Clark & Kaurman, 2000; Herzberg, 1987; Stribiak & Paul, 1998; John-Steiner, Weber & Minnus, 1998; Weber & Perkins, 1992).

The administration must be an integral part of the innovation team, not just presiding over the team in a top-down management style. Authentic participation by administration creates an environment conducive to team building, nurturing and collaboration that extends throughout the university (Anderson, 1998). Hardi (2000) reports that the culture and obligation of the university rewards system must reflect administrative support, not just in rhetoric, but in reality.

Collaboration

Collaboration is defined as a structured, recursive process where two or more people work together toward a common goal—typically an intellectual endeavor that is creative in nature by sharing knowledge, learning and building consensus" (Encyclopedia Brittanica Online, 2007). Collaboration does not require leadership and can sometimes bring better results through decentralization and egalitarianism (Spence, 2006; Wagner and Leydesdorff, 2005) In particular, teams that work collaboratively can obtain greater resources, recognition and reward when facing competition for finite resources (Wikipedia, 2008d). Collaboration is not just valuable among peer groups, but among all members of an organization (Blanchard & Johnson, 1981; Hardi, 2000; Rosenberg, 2006).

A popular means of enhancing collaboration is the establishment of project teams that involve a variety of support professionals. The project teams can be of special significance in supporting the innovation, especially with the facilitators who are implementing the innovation, since feelings of confusion or isolation could, otherwise, be experienced by the adopters who are not

comfortable with the innovation. Collegial interaction, support, and collaboration become even more important to reinforce the organizational commitment to the innovation change (Byun, 2000; Robinson, 1995; Rogers).

Organizational commitment requires a set of strategies that focuses on ensuring that an organization and its people are committed to and capable of executing business strategies driven or enabled by innovation" (P.256). Rosenberg (2006) identifies certain factors that must be addressed to successfully introduce and sustain an innovation (in this case, online training or education): Get leadership onboard early; share success stories; focus on early- and second-wave adopters; avoid consequences and build incentives; build on a clear vision and attainable benefits; involve stakeholders (employees and constituents) throughout the process; set priorities; dispel fears of technology by providing ongoing training; and, give people time to adapt to the innovation.

Collegiality

In a study of new technologies, distance education and standards and assessments, (Bourner, Katz & Watson, 2000) looked at what new directions universities could take with respect to technology and education, especially, as regarding how universities could develop personal and professional development frameworks. The research did not analyze technology best practice, or which factors could influence participation in these technologies, but focused on collegiality, professional training of faculty, personal collaborations and professional collaborations. The researchers found that organizational maturity,complexity of an innovation, and motivational factors, all influenced adoption which was consistent with earlier research on adoption of innovations (Gladwell, 2002; Kaufman, 2000; Kaufman, Watkins, Triner, & Stith, 1998; Pintrich & Schunk, 2002; Robinson, 1995; Rogers and Shoemaker, 1971; Rosenberg, 2006). Authentic participation by administration, collaboration and collegiality, all offer very positive opportunities for lasting and positive innovation diffusion (Rosenberg, 2006). "Careful and deliberate change management is essential" (p. 256). The goal is to "move people from awareness (introduction)…, to understanding…, to preference…" (p.266). But what is most important for administration to remember is that, "at the end of the day, no new learning

initiative of any type can survive an organization that doesn't value it (or its employees)" (p.268).

Methodology

This study applied principles of action research, a qualitative research methodology, to chronicle the experiences of four graduate students taking an instructional design graduate capstone course at a large public (campus-based) university. The principal teacher and facilitator also served as action researcher, embedded in the ID project team, and kept detailed journals and records to document which aspects of the ID plan succeeded and which failed. Some of the biggest discoveries came from the action research, such as the feedback from the graduate students on what they learned as they participated in the capstone project. For example, they were surprised at the importance of establishing positive trust relationships among the team members. Collaboration and institutional support were also viewed as very important to the success of the team and of their ID plan. In addition, they discovered that a team management approach, a prioritized set of activities, and a vision statement had to be in-place and supported by all team members in order to realize their cumulative team vision.

Action Research

Action research is "the practical application of the scientific method or other forms of disciplined inquiry to the process of dealing with everyday problems" (Vockell & Asher, 1995, p. 445). The term action research evolved from classroom research conducted informally by teachers in kindergarten through twelfth grade who sought expeditious solutions to classroom problems (Gay, Mills, Airasian, 2002).The teacher served as researcher and tried to collect data while implementing lesson plans and interacting with students. While this proved to be an additional responsibility, the teacher was able to journal the process of discovery and to chronicle the steps taken to solve the problem.

Since the initial introduction of action research action research has been recognized as a viable qualitative methodology that can be used in many disciplines. It seems particularly appropriate for instructional design since it is a reflective process of progressive problem solving; it is also

uniquely appropriate because it can be included in research involving working with teams (Wikipedia, 2008e) or as part of a "community of practice" to look at ways to address issues and solve problems. The use of action research over the last twenty years has increased by large organizations to look at ways to improve their strategies, practices, and gain better knowledge of their marketplace.

Kurt Lewin (1946) coined the term “action research” in about 1944, and in 1946 he used the term in his paper “Action Research and Minority Problems”. He described action research as “a comparative research on the conditions and effects of various forms of social action and research leading to social action” (p201). Action research uses spiraling approach, each step of which is composed of planning, action, and fact-finding about the result of the action. It is an iterative inquiry process that balances problem solving with actions implemented in a collaborative environment; it also balances context with data-driven analysis to research and derive better inferences of which factors could cause problems and influence solutions. The findings of action research can, optimally, enable future predictions about personal and organizational change (Reason & Bradbury, 2001). French and Bell (1973) purported that organizational improvement could be attained through action research and Lewin (1946, 1958), posed that motivation to change was strongly related to action; if people were active in decisions affecting them, they would be more likely to adopt new ways.

After six decades of action research development, many arenas have evolved beyond Kindergarten through 12th grade educational action research. Researchers have been able to expand the principles of action research to focus more on the actions taken or results from the reflective understanding of the actions in a wide array of business and research venues (Ariizumi, 1998, 2005; Marquis Gordon, Edwards, & Hollye-Major, 2006; Shippers, 2008).

In action research, there is:

1. The researcher’s agenda that extends to include those more driven by participants;
2. The motivation of personal, organizational, or societal transformation; and

3. First to-second- to-third person inquiry (such as, the researcher's investigation that extends to the group's research; and on to 'scholarly' research primarily aimed at theoretical generalization or large scale change (Torbert, 2001, 2004).

Action research challenges traditional social science, by moving beyond exploration by external researchers who sample variables and write up the findings, to an active, moment-to-moment type of research that includes data collecting, inquiring, and analyzing the whole project environment, all while immersed in the midst of the emergent project. Knowledge is actually acquired through action, and from this starting point, scaffolded on the foundation to expand the knowledge base through genuinely well-informed action (Torbert 2001, 2004). Action Inquiry and research helps individuals, teams, and organizations become more capable of self-transformation (Torbert, 2004); it promotes timely learning with intentional awareness of individuals, human organizations and institutions, and the outside world of nature (Torbett, 2001).

One of the most helpful aspects of action research is the ability of the researcher to collect information, observations, and journal daily events while being an active eyewitness or participant (Gay, Mills, Airasian, 2002; Richey and Klein, 2007). While the action research studies with small numbers of participants, such as this one, may not produce findings that are generalizable, the findings do provide snapshots of the design teams and chronicles of events that affect the innovation implementations. More thick descriptions of events and action research, such as those described in narratives discussed in this study, can record the events and activities of instructional design and provide valuable insights on successful diffusion of innovations.

Background

The study followed four capstone project graduate students assigned to create instructional design programs for a year. One student was a computer science student; one student was a software engineer; one student was a management major; and one student was an instructional designer. The action researcher who was embedded in the ID team, provided thick qualitative data that was used to provide a narrative of each student's capstone experience.

One of the most helpful aspects of action research is the ability of the researcher to collect information, observations, and journal daily events (Gay, Mills, Airasian, 2002; Richey and Klein, 2007). While the studies with small numbers of participants, such as this one, may not produce findings that are generalizable, the findings do provide snapshots of the design teams and chronicles of events that affect the innovation implementations. More thick descriptions of events and action research, such as those described in narratives discussed in this study, can record the events and activities of instructional design and provide valuable insights on successful diffusion of innovations.

Action Research Embedded in Cross-Functional Teams

Cross-functional teams share a commitment and a purpose that offers each member a sense of ownership (Robinson, 1995; Sokolosky, 2002). One hurdle is that partners will never be equal in every way. Each member usually is a specialist in her or his field and often has difficulty communicating with people from other disciplines. So as they learn to work with their team members, they must learn to communicate to adjust to their inequalities (Farber& Green, 2001). As the team begins to function as a unit, the team's shared voice can become a critical ingredient to the design and delivery of a cohesive ID plan. A team leader that facilitates, not dominates, is also an essential key to the successful delivery of the ID team's innovation.

What succeeded in this study.

The two requirements for the capstone project were that the project be completed by the end of the academic school year and that each student provide a report on her or his experiences in the capstone team. The team ID project was completed by the team on time (by the end of the academic school year) and the project was implemented as a test site by the end of the fiscal year (December 31st). In addition, each student turned in a report on her or his capstone experience that contained a journal of events, her or his reactions to group members, and reflections on each of the implementation phases of the project. In addition, each member wrote her or his perceptions of how the lessons learned from the capstone project might affect future ID projects in their real world career environments.

The most telling feedback from each of the four students was that each student reported that she or he was not aware that her or his coursework and academic training would not be sufficient to embark on real-world projects in cross-functional teams. It came as a surprise to each student that just feeling confident in one's field of expertise would not necessarily help her or him to succeed in a project as a part of a team. What each member came to realize was the importance of the capstone project as a dress rehearsal for future experiences when they went to work in an organization where communication and collaboration would be crucial to the success of a project. There was no room for arrogance or one person being judgmental of another's skill or lack thereof in her or his field. There also was no room for tempers, refusal to cooperate, or sabotage—every member would be held accountable for the success of the capstone project, or for its failure.

Some of the members were actually shocked in the beginning of the project when other team members informed them that, just because they were the technology experts, did not mean that they were going to drive the design and delivery of the capstone project. Up until that point these two students actually thought that they would be brought into a cross-functional team and they would inform the other members of what needed to be done, then everyone would listen to them and comply with their mandates. They realized that their positions on the team were not isolated or lofty—they could not just tell the other members how they were going to control and run the project. They also quickly realized the importance of feedback and collaboration from the other group members who may have greater expertise or management skills.

After some difficult discussions and decisions about who would lead the team, each student seemed to realize how important it was to have each member on the team and why each member's skills facilitated the rollout and implementation of the capstone project. The members learned to work together, and although some members worked harder than others, each student emerged with a much better understanding of their own skills and where those skills could fit into cross-functional teams. They also learned a very important lesson, that one team member could not succeed without all of the team succeeding, so collaboration and collegiality gained a deeper meaning as a result of the capstone experience, that of being integral to the success of any type of group or team endeavor. Each member could never again look at a project and feel she or

he could take a top-down, take charge position, and simply dictate and disseminate the finished product for all to embrace. There was now a new understanding of the importance of one's place in the bigger picture of cross-functional teams in organizations and in the real world.

What failed in this study.

There could have been better interaction among team members. Students cited that there was seldom time for the team to include anything else besides concentration on the project, the deadline, and the outcome (Ferris & Skolnikoff, 1997; Havernik, J., Messerschmitt, D., Vandrick, 1998; Haverschmitt, 1997; Stribiak & Paul, 1997). But they learned that one of the keys to successful team projects seem to include not only adherence to deadlines, but also consideration and willingness to cooperate and collaborate with each other.

Some success factors present in the team project.

Consistency was an important factor in the success of the capstone program. The graduate students in the capstone project learned how to participate in cross-functional teams, how to communicate with team members, and how to collaborate to achieve a team goal and vision. The members worked together to create and deliver their promised deliverable, a training program, and designed the program to assure that their organization could deliver consistent and reliable service, and to encouraging the ongoing adoption of the innovation. The team members emerged with a more global perspective of the project instead of seeing just the one part they would have seen from their educational background and experience.

It was found that, while not all four students emerged with a much better understanding of the dynamics of collaboration. By the end of the project, every student seemed to understand that she or he had been exposed to some part of the real world they be participating in when they joined organizational teams in their career environments. They also emerged from the capstone project with a better grasp of the importance of teamwork and the need for thoughtful integration of content knowledge and technology. Before they did the capstone project, they did not feel the need to venture outside of their own academic discipline. But they learned that successful ID teamwork was not achieved in isolation. Each began to understand that it was not just the ability to design a software package, or instruction that would make a new innovation succeed; it took a

collaborative team to introduce, infuse, and remain committed to the ID project for the innovation to become a part of the fiber of the organization.

In demonstrating to the students the importance of collaboration and keeping commitments, the ID team achieved a plan for the development and diffusion of the innovation into the organization's cultures (Kaufman, 2000; Robinson, 1995; Rogers, 1995; Rogers & Shoemaker, 1971; Stribiak & Paul, 1998; Gannon-Cook, Crawford, and Varagoor, 1999; Varagoor, 1998; Wolcott, 2002). Results are consistent with Bourner, Katz & Watson's (2000) conclusions that collegiality and collaboration promote successful higher education technological initiatives. Future efforts would include more time with students to get to know each other and bring the cultural differences together of each member to help provide a richer environment that, in turn, can produce a more expansive capstone product.

Summary

This study looked at how embedded action research in electronic instructional design can provide valuable insights into what was successful and can also provide crucial feedback on the participants in the innovation and the changing culture of the organization. The graduate students learned more than how to use some of their expertise in their cross-functional team. They also learned how to communicate with each other, how to collaborate, and how to rapidly amend projects in order to achieve their goals. In addition, they learned how action research can be embedded in project design teams and used to chronicle electronic rapid prototyping, both to accomplish innovation diffusion, and to provide valuable action research models for change integration that can have universal applications (Bourner, Katz & Watson, 2000; Gladwell, 2002; Isgar, 1995, Larson & LaFasto, 1989).

While action research studies, such as this one, that have small numbers of participants, may not be statistically generalizable, the findings none the less do provide snapshots of the design teams and chronicles of events that affect the cross-functional teams and subsequent project implementations. These comprehensive and detailed accounts, provided by an action researcher, could provide valuable data previously overlooked in quantitative research studies, and,

moreover, could provide a bridge to crossover to more action research studies that could be applied for wider applicability. This study makes a case that studies, such as this one, can be reviewed to see evaluate whether there are discoveries that could be applied for broader use. The findings indicate there could be important contributions that could be made to the bigger picture of both qualitative research and elearning.

Action research can be important in higher education, science and industry, because the researcher can make detailed observations and notes that may not be possible for the design team because they are too busy developing and delivering the innovation to keep detailed audit trails of project successes or failures. In this study, thick qualitative data provided by the action researcher documented details that may not have, otherwise, been discovered. For example, it was found that, in the capstone project, the students learned more about the real world of design and development that they would encounter in their daily jobs. They also emerged from the capstone projects with a better grasp of the importance of teamwork and the need for thoughtful integration of content knowledge and technology. The students began to understand, through the course of the project, that it was not just the ability to design software, or instruction, that would make them succeed, nor would a new innovation succeed without teamwork. In order for the innovation, in this case, elearning, to become part of the fiber of the organization, the team had to work together and meet all of their objectives on time and on plan. The learning environments of the Twenty-First century could benefit from this study and other action research studies that spend time thoroughly analyzing the steps taken to successfully integrate innovations, such as elearning, and meet team goals.

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