# INTERNATIONAL JOURNAL OF INSTRUCTIONAL TECHNOLOGY AND DISTANCE LEARNING

**December 2006**
**Volume 3 Number 12**



**ISSN 1550-6908**

## PUBLISHER'S DECLARATION

Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

The Journal is monthly, refereed, and global. Intellectual property rights are retained by the author(s) and a Creative Commons Copyright permits replication of articles and eBooks for education related purposes. Publication is managed by DonEl Learning Inc. supported by a host of volunteer editors, referees and production staff that cross national boundaries.

IJITDL is committed to publish significant writings of high academic stature for worldwide distribution to stakeholders in distance learning and technology.

In 2 ½ years the Journal has over one million page views and 250,000 downloads of eBooks and monthly journals.

International Journal of
Instructional Technology & Distance Learning

**Vol. 3. No. 12.**

**ISSN 1550-6908**

# Table of Contents – December 2006

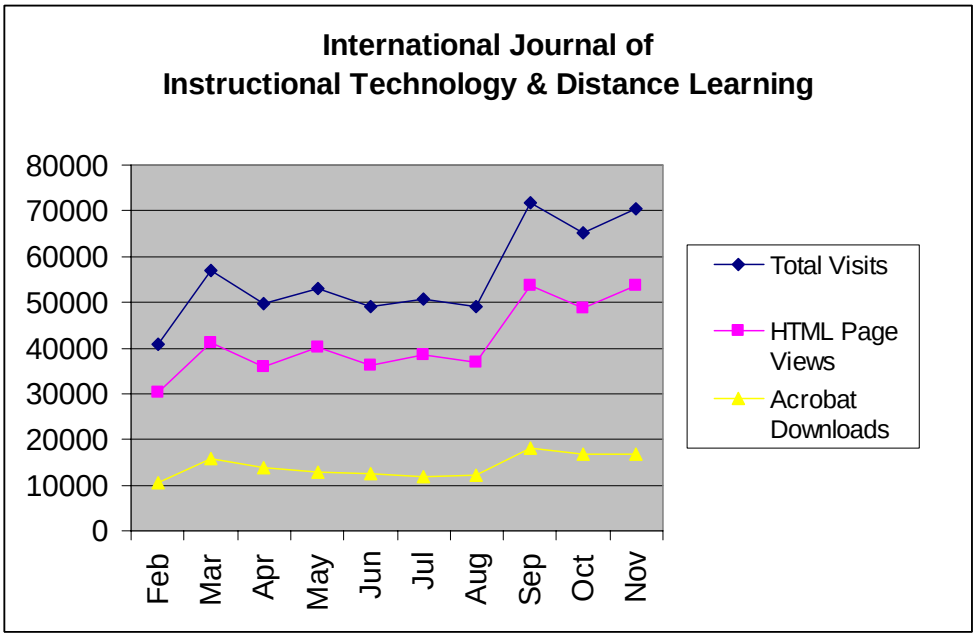
**Editorial**

# 36 Monthly Journals

**Donald G. Perrin**

Early in the fourth quarter of 2006 the Journal had its 1,000,000th visitor. The Journal has experienced steady growth this year after a melt-down and closing of its host site at the end of 2005. Statistics for November 2006 included 53,746 HTML page views and 16,656 downloads of Acrobat files representing almost 100% growth since February 2006. In the past year there have been over 30,000 downloads of ebooks.

North America (USA and Canada) accounts for 48% of readers and 64% of authors. Goals for next year are to raise overall quality, publish another ebook, increase number of authors outside North America to 50%, and increase readers to 100,000 visits per month. The editors and review team thank the authors for their contributions to the Journal and knowledge base of instructional design, instructional technology and distance learning and thank our readership in 140 countries who regularly visit this website.



**Editor's Note**: Guy Bensusan called it *Peer Learning*. Sengé called it *Communities of Practice*. Others label it *Communities of Learning*. Regardless of name, it is a way to motivate, energize and empower cohesive team effort in live and virtual workspaces. It is the basis of a "flat organization" compared to a hierarchy. In online education it stimulates interaction, learning from each other, and shared responsibility. This paper explores the role of interactive communications in distance learning.

# Mimicking Proximity: The Role of Distance Education in Forming Communities of Learning

**Elizabeth Hodge, Michael J. Bossé, Johna Faulconer, Martha Fewell**

**USA**

## Abstract

Distance education opportunities are growing at a phenomenal pace. With this rapid growth comes the challenge to ensure that distance education provides and promotes a learning community of trust and of quality for students. Transition to on-line instruction dictates the need to use technology to create a culture that allows for and encourages social aspects of human communication; a culture that takes into account both student learning and quality instruction. It is assumed that distance education most affects students learning when technology is integrated to facilitate communication—to mimic proximity. This paper explores the role of distance education and the importance of mimicking proximity by analyzing and reviewing social and psychological factors in facilitation of communication.

## Introduction

In an era of rapid technological change, educational opportunities for students are growing at an exponential rate. In the quest to incorporate innovative instructional strategies (Bannan-Ritland, *et al*, 2006), university faculty are navigating a steep and continuously changing learning curve. A variety of strategies are being investigated for use with both traditional and non-traditional distance education (DE) courses. Unfortunately, many of the DE courses being currently offered do not exemplify learning theories well recognized and accepted in the classroom. This discussion considers the importance of the application of communities of learning to DE environments and hypothesizes that DE most affects student learning when DE thoroughly integrates technology to facilitate communication and, thereby, mimics proximity among DE course participants. While the goal of this paper is to analyze and review the theoretical framework of the social and psychological factors (Cobb, Stephen, McClain, & Gravemeijer, 2001) in facilitating communication to mimic proximity in online learning, there is a need for continued research into the importance of the application of learning communities which mimic the social presence of on campus classroom experiences. Based on the theoretical framework provided, specific questions for future study are provided.

## Learning, Socialization, and Communities of Learning

Education is a theory-rich field of study and some theoretical constructs regarding learning, socialization, communication, and communities of learning are now finding confirmation through various applications of research. The following discussion provides a brief review of some salient notions regarding learning that will, in following sections, be linked to concerns regarding DE.

### Learning.

Vygotsky (1978, 1986) states that learning is a social process, and Swan and Shea (2005) believe that this process is primarily found in the interaction within groups. Interaction and communication among group members lead to the formation of community, the construction of knowledge, and student learning (Brown, *et al*, 1993; Cazden, 1988; Cobb, 1994; Wertsch, 1985). In addition to interaction and communication among group members, Bielaczyc and Collins (1999) believe that for a community of learning to form, all individuals must be accepted and valued by all others.

### Socialization.

Merten, Reader, and Kendall (1957) define socialization as the process of change by which "people selectively acquire the values and attitudes, the interests, skills and knowledge – in short the culture – current in groups to which they are, or seek to become, a member" (p. 287). Since education transmits and replicates the past while simultaneously connecting individuals in a manner in which new ideas are developed, Wenger (2002) argues that education transcends socialization.

### Communities of Learning.

Students learn through communication in, and participation within, a community. Educators have delineated a number of factors which lead to the development of communities of learning. Some of these are presented herein.

### Community.

Paloff and Pratt (1999) delineate five indicators of community. These include: active interaction of both content and personal communication; evidence of student-to-student collaboration rather than teacher-to-student communication; socially constructed rather than teacher dictated meaning; resource sharing between students; and encouragement, support and constructive criticism between students. Within formed communities, Rovai (2002a, 2002b) observes the active dimensions of: *learning*, that is related to the quality of individual construction of understanding; *shared beliefs*, concerning the attainment of learning goals and expectations; and *connectedness*, that relates to feelings of cohesion, spirit, trust and interdependence. Swan and Shea (2005) concisely synopsize the interrelation of knowledge and learning by stating that, "Knowledge … is inseparable from practice, and practice is inseparable from the communities in which it occurs" (p. 241).

Notably, as will be further discussed in respect to DE, when communities are effectively formed, a natural result is often the development of sub-communities within the whole. These sub-communities are often born from common interests, concerns, or goals. Thus, any member of a larger community may simultaneously be members of multiple additional sub-communities.

### Roles and Interaction.

In learning communities, Bielaczyc and Collins (1999) opine that all members must both participate fully and be accepted by all others. As all members in the learning community become interdependent and interconnected, roles of all members shift. While Bielaczyc and Collins observe change from instructor centrality to peripherality and student participation to centrality as necessary for student success, Dede (2004) observes additional shifts among members including roles, relationships, power, discourse, centrality/peripherality, and the ownership of knowledge. The pattern of group involvement then becomes circular, as participant involvement leads to an identity within the community and acceptance by the community, which then leads to the individual developing a greater sense of self identity and opportunities for greater involvement in the community. Thus, as participation and interaction increase through changing roles, so too

does learning by all members in the community. Summarily, the participation of all members plays a central role in the development and maintenance of any learning community.

Notably, the changing roles of students within a learning community also necessitate a change in the perspective of the instructor. If knowledge is socially mediated, the instructor is simultaneously a dispenser of information and a participant within the learning community responsible to interact with, listen to, and share with all others. As a participant within the community, the instructor also becomes a learner and should anticipate exiting the course with more information than he or she possessed when entering the experience. Therefore, throughout this discussion, the denotations "participant" or "member" refer both to students and faculty in learning communities.

### Communication.

Talk is the primary mode of communication within the communities in our culture (Wenger, 2002). However, since ideas are shared and knowledge is mediated through communication, mono-directional communication from the teacher to the students is insufficient to develop and sustain a community of learning. No less than tri-directional communication (teacher to student, student to teacher, and student to student) is sufficient to develop the level of interaction necessary to fulfill Paloff and Pratt's (1999) indicators of community. Therefore, learning communities must continually focus on maintaining and increasing avenues of communication among all participants.

### Summary.

Generally speaking, since learning is described as the process of becoming part of a community of knowledge (Lave and Wenger, 1991), educators need to explore the social relationships that develop between students who are involved in learning communities. Additionally, as more courses become provided through DE modalities, the understanding of communities of leaning, and its inherent dimensions of communication and roles of participants within the communities, must be applied to the development of DE structures.

## Distance Education

Distance education has been defined as "The process of extending learning, or delivering instructional resource-sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods" (ITC as cited in Tucker & Hodge, 2005). A number of factors have been defined by educators as significant concerns within the development and offering of DE courses. Many of these factors are closely associated with concerns mentioned above.

### Roles and Interaction.

The role of participants within DE course structures is central to the development of community. Interaction and communication among participants is necessary. Initially, in order to facilitate this participation and communication, an effective technological infrastructure must be both created by DE course developers and recognized by course participants. This infrastructure must first create an environment (social space) in which social activity is possible and then be adequately robust so to ensure that each participant has a voice (social presence).

### Social space.

Creating community uniting students with each other and with faculty is necessary to situate the learning in DE programs. While campus events, student associations, personal recognition, and proximity can unite on-campus students into a community of learners, no such links exist to unite online learners, many of whom are separated by hundreds or thousands of miles. Brigham (2003)

noted that online courses offered outside of a cohesive program lacked community, resulting in a higher rate of student failure than courses imbedded in a program with strong characteristics of community. As McPherson and Baptista-Nunes (2004) delineate, campus based learning environments create a multitude of student support networks. They provide health services, libraries, religious organizations, clubs, counseling and a variety of other social services to meet students' needs. However, online learning environments often lack the *social space* to create these connections and bond participants together as a unit.

Physical social space consists of an area limited by its physical boundaries. In a traditional classroom, it would be where individuals could meet face to face to interact. In an online environment, abstracted in many ways from the traditional boundaries of physical space, creating a social space must be carefully considered. Constructing a framework through which *virtual social space* can be conceptualized, a number of educators (Lefebvre, 1991; Wise, 1999; McPherson & Baptista-Nunes, 2004) present three constructs regarding social space: spatial practice, the DE learning community; conceptual constructs, the virtual environment supported by technology; and representational space, spaces through which inhabitants can associate by means of images and symbols. By creating a virtual social space educators are in fact mimicking proximity and creating communities of learning.

Most attempts to create real world spaces in the virtual world lack authenticity, resemble abstract data spaces envisioned by sci-fi authors, and fail to yield the results wanted by educators (Guynup, 2003). By creating a common, on-going, and informal virtual social space for students to share questions, personal or professional successes and challenges, resources, and other insights and perspectives, the online environment is constructing an area that mimics physical social space. By creating social metaphors that mimic the social spaces traditionally found on campuses such as cafes, hall talk, lounges, galleries and social calendars, students are able to develop meaningful social relationships with one another that will create another outlet to receive support. Through these collaborative tasks, students not only are encouraged to take ownership of the learning experience, but also to build meaningful relationships among themselves, their environment, and the content. Furthermore, in such a virtual social space, traditional barriers and assumptions that separate learners from important resources and social interactions are erased (Dickson & Segars, 1999).

### Social Presence, Roles, and Interaction.

All educators are familiar with students who only minimally interact in regular classrooms. These wallflowers are often nearly mute in respect to their instructors and some are sufficiently socially isolated so to make them almost invisible in the community at large. These students would be said to lack *social presence* in the classroom. Although this student may be physically present in the community, a *social distance* separates them from participation in the community.

In respect to social presence and distance, Moore hypothesized that "there is a positive relationship between distance as measured by individualization and dialogue, and autonomy" (Moore, 1972, 83 as cited in Jung 2001). Moore later argued that the degree of distance, or separation, between teachers and learners is a function of the extent of dialogue, rigidity, flexibility of course structure, and the extent of the learners' autonomy. Therefore, although students may be members in DE course, they may suffer from social separation from the group and my not experience a social presence.

Social presence is composed of two distinct, yet interrelated, directed recognitions of a person within a group: the individual must feel that he or she is a viable and valued community member and the community must accept the individual. The former is connected to the role individuals play within the community and the latter with the level of interaction and communication experienced among members. Within a community, learning by individuals is enhanced when

they experience empowered roles defined as independent (Wedemeyer, 1981) and learner-determined (Moore, 1988, 1994). Keegan (1986) states that the learner needs to have control and take responsibility for the pace of his or her own progress. Thus, the role of independence leads to social self-awareness within the community. Community acceptance of each individual evolves through high levels of interaction, discussion, and feedback within the community's social space (Perraton, 1988). Gorsky and Caspi (2005) integrate these two dimensions by stating that, while learning is an individual activity, it is mediated and facilitated by intra/interpersonal dialogue which is enabled by structural and human resources.

Social presence is inextricably interconnected with the roles of student participants in DE courses. In DE learning communities, student participation and interaction become the central concerns for the learning of all. As changing roles within DE learning communities place more onus for learning upon students, they are reciprocally empowered as learners and benefit from the interaction of all participants.

A number of research studies have examined the above principles surrounding distance education environments. These studies have focused on the various instructional strategies used to create a social environment rich with interaction. According to Jung (2001) these studies directly or indirectly substantiate that the emergence of online communities is reinforcing a social presence rather then furthering the students feeling of isolation.

### Community.

Meyer (2003) describes a three-stage process by which a community is formed in a computer-mediated asynchronous distance learning class: making friends, community conferment or acceptance, and camaraderie. Each stage represents a greater degree of engagement in both the class and the dialogue over the previous stages, and greater levels of interpersonal bonding or affiliation. The consequences for students of building community include improved confidence expressing oneself, learning from others, and feeling connected and accepted (Meyer, 2003). These stages coincide with the development of self-awareness and corporate acceptance within social presence.

### Sub-Communities.

When both dimensions of social presence solidly exist within a learning community, students feel the freedom to simultaneously participate in sub-communities within the whole. Within a DE environment, this phenomenon was observed by Fewell, O'Connell, Silvers, and Bossé (2006). Bossé and Rider (2005) further noted that, although a learning community could loosely form via online communication and could be solidified by members sharing increased numbers of common interests, no aspect more affected the solidity of community than did physical proximity.

### Communication.

As a DE infrastructure can be a vehicle for "electronic talk", the accompanying dialogue within a DE environment is necessary for supporting learning through the formation of concepts, ideas, and new understandings. Lave and Wenger (1991) discuss the concept of learning as not simply internalizing information and knowledge, but as a personal transformation defined by participation in a social community. This transformation requires extensive communication and interaction among members. Comments regarding the allowable and recommended content of the communication among DE course members are being postponed to following discussions.

### Obstacles to Creating Community in Distance Education.

Even with the variety of new instructional strategies available for teaching in a distance education environment, many educators still place their lecture-based content online (Palloff & Pratt, 1999). By not attempting new methodologies, (Besser, 1996; Carr, 2000; Kerka, 1996; Swan, 2001), the

traditional face to face material, has caused problems with retention, decreased levels of learning and low satisfaction rates.

Many educators believe that, with the inclusion of various asynchronous and synchronous computer-mediated communication (CMC) tools, they have alleviated a variety of barriers to communication among DE course participants. Unfortunately, most of these CMC activities neglect to focus on the social networks necessary for students to achieve (Wenger, 1998). By failing to address various factors associated with forming community in online learning, many educators are contributing to feelings of isolation among online students (Berge & Muilenburg, 2001). However by implementing various models (e.g., Pallof & Pratt, 1999), online courses can be designed around the concept of community, incorporating collaboration, focused and shared goals, teamwork, interaction and feedback, and engaged, constructivist learning activities.

## Proximity Through Communication

### Purpose for Communication and Challenge for Developers.

There appears to be a race among many DE developers to pack as many communication tools into the infrastructure of their course as possible. While email, phone communication, videoconferencing, posting biographical information to the internet, discussion boards, and online chats each have their successive strengths and weaknesses (Bossé & Rider, 2006), and altogether these and additional communication tools provide a robust framework through which participants within a DE environment can interact, the number of these tools which are employed is of lesser importance than the purpose for which they are to be used. Since communication and interaction are vehicles for creating community and proximity may most greatly affect the solidification of community (Bossé & Rider, 2005), the purpose for employing technology based means of communication must be to create an interactive environment which mimics proximity among participants.

The concept of creating an online community (Mann, 2005) assumes that there is a pedagogical focus on establishing social interactions to reduce alienation. Thus, building a technological infrastructure capable of facilitating the development of a learning community by mimicking proximity is the primary challenge of those who develop DE environments and courses. The tri-directional communication among students and teachers necessary for learning (Wenger, 2002) must be technologically replicated in DE. Establishing a sense of belonging by mimicking proximity in learning communities can counter students' common feelings of isolation. DE course developers must take advantage of synchronous and asynchronous communication technology to create a sense of community within the course structure.

### Content of Communication.

Research demonstrates the value of DE participants openly communicating about personal concerns. Students involved in a study focusing on learning communities (Anderson, 2004), cited various ways to overcome the isolation involved in distance education courses. For many students, the ability to engage in online interactions with one another provided positive effects that did not associate directly to learning. Instead, these interactions helped students to develop friendships and support groups and create bonds with students that last throughout their college career.

To ensure that communication promotes, rather than hinders, the formation of community within a DE course, instructors must be aware of the nature of common communication within any group. Communication in any group is rarely limited to the course content, or even the day's topic, and rarely is human interaction long devoid of extracurricular personal references. When instructors attempt to constrain all participant communication to academic pursuits alone, there is the possibility of creating a contrived environment which stymies the development of community.

It is important to develop an environment that establishes camaraderie, safety, collegiality and a feeling of belonging while reducing the sense of remoteness (Reil & Levin, 1990; Henri, 1992; Phillips, 1992). Incorporating social activities, interaction, and communication in an online learning environment helps to promote a sense of community. The social dimensions within any academic scenario must be considered. The social design of a course will have a significant impact on how students collaborate, share, discuss and reflect on course activities.

## Future Application

While creating an online environment that builds community among learners is a challenge, research demonstrates that it is worthwhile, develops camaraderie among students, and provides a strong network of support which fosters student learning and application. Students are able to work independently (fostering autonomy) while developing a sense of community which provides an outlet for thoughtful discussion and support from other community members.

As educators continue to generate new pedagogical methodologies for the delivery of online education, we may see a paradigm shift in the theoretical framework. No longer will educators focus on applying traditional lecture methodologies to online environments. Instead they will look to the social interactions that take place to ensure that students are not isolated in the learning process and they will focus on the need to provide a community of learners that wish to discuss, reflect and apply material to their own situations. It will be among these learners where distance education will shift from independent learning to mimicking the social presence of on campus communication among the various communities.

Utilizing the theoretical framework to address future application, specific research questions should be addressed:

- How do new online methodologies facilitate or hinder educator's ability to mimic proximity?
- Is mimicking proximity in online learning environments effective for all students?
- What type of instructional strategies best support mimicking proximity in online courses?
- What are student perceptions of online communities?
- Is adequate professional development provided for teachers to develop learning communities online?
- Is mimicking proximity in online environments cost effective for universities? What are the hardware/software requirements and costs associated with each component?

## Conclusions

As recommended in relevant literature, the challenge for educators is how to provide socially negotiated (Cobb, 1994) and authentically constructed (Brown et. al., 1993) online learning environments that mimic proximity. Within a DE environment, the social and collegial components play a critical role in learning. By technologically mimicking proximity, students are allowed to interact with one another emphasizing the social aspects of human communication, thereby contributing to the concept of trust, community building, collegiality, and socialization. These elements are necessary components of any successful learning experience and are even more important when a course is delivered primarily on-line.

Implementation of new technological approaches in online classrooms is challenging. With this rapid evolution, skills required of developers and users pose additional barriers to effective utilization (Dede, 2004). Integration of the technology used in any DE courses is only as valuable

as it meets the end of developing a learning community and lacks value when it does not. The solution is in creating technologically sophisticated environments that facilitate communication and mimic proximity.

## References

Anderson, B. (2004). Dimensions of learning and support in an online community. Open Learning, 19(2), 183-190.

Bannan-Ritland, B., Bragg, W. & Collins, M. Linking Theory, Educational Constructs, and Instructional Strategies in Web-based Course Development. Retrieved 07/14/06 from http://www.virtual.gmu.edu/EDIT611/BannanWBC.pdf

Berge Z and Muilenburg L (2001) Obstacles faced at various stages of capability regarding distance education in institutions of higher learning. Tech Trends 46, 4, 40-45. Retrieved 9/02/04 from http://www.emoderators.com/barriers/hghred_stgs.shtml

Besser, H. (1996). Issues and challenges for the distance independent environment. Journal of the American Society for Information Science, 47(11), 817-820.

Bielaczyc, K., & Collins, A. (1999). Learning communities in classrooms: a reconceptualization of educational practice. In C. Reigeluth (Ed.), Instructional-design theories and models. A new paradigm of instructional theory, vol. 2. (pp. 269-292). Mahwah, NJ: Lawrence Erlbaum Associates.

Bossé, M.J. & Rider, R.L. (2005). Investigating distance professional development: Lessons learned from research. Proceedings of the North American Chapter of the International Group for the Psychology of Mathematics Education, Roanoke, VA, October 20-23, 2005.

Brigham, D. (2003). Benchmark Information Survey. Unpublished presentation, Excelsior University.

Brown, A., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A., and Campione, J. C. (1993). Distributed expertise in the classroom. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations, pp. 188-228. Cambridge MA: Cambridge University Press.

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. Chronicle of Higher Education, 46(23), A39-41.

Cazden, C. B. (1988). Classroom discourse: The language of teaching and learning. Portsmouth, NH: Heinemann.

Cobb, P. (1994). Where is the mind? Constructivist and sociocultural perspectives on mathematical development. Educational Researcher, 23(7), 13-19.

Cobb, P., Stephen, M., McClain, K., & Gravemeijer, K. (2001). Participating in classroom mathematical practices. The Journal of the Learning Sciences, 10(1&2), 113-163.

Dede, C. (2004, September). Enabling distributed learning communities via emerging technologies - Part one. T.H.E. Journal, 32(2), 12-22. www.thejournal.com.

Dickson, G. W., & Segars, A. (1999). Redefining the high-technology classroom. Journal of Education for Business, 74(3), 152-156.

Guynup, S. (2003). A study of online virtual environments. Museums and the web 2003: Selected Papers from an International Conference. Retrieved on 08/15/06 from http://www.archimuse.com/mw2003/papers/guynup/guynup.html.

Gorsky, P., & Caspi, A., (2005). Dialogue: A theoretical framework for distance education instructional systems. British Journal of Educational Technology, 36(2), 137-144.

Henri, F. (1992). Computer conferencing and content analysis. In Kaye, A., (Ed) Collaborative learning through computer conferencing: The Najaden papers (pp. 117-136). Berlin: Springer-Verlag.

Hodge, E., (2006). If you can't beat um…join um! The quest to create a social presence in student's lives. Submitted for publication.

("ITC's Definition of"…n.d.). Retrieved 5/16/2005 from http://144.162.197.250/definition.htm.

Jung, I. (2001). Building a theoretical framework of web-based instruction in the context of distance education. British Journal of Educational Technology, 32(5), 525-534.

Keegan, D. (1986). The foundations of distance education. London: Croon Helm.

Kerka, S. (1996). Distance learning, the internet, and the world wide web. ERIC Clearinghouse on Adult, Career, and Vocational Education, Columbus, OH. (ED395214).

Lave, J. & Wenger, W. (1991). Situated learning: Legitimate peripheral participation. Cambridge, UK: Cambridge University Press.

Lefebvre H. (1991) The production of space. Cambridge, MA: Blackwell.

Mann, S.J. (2005). Alienation in the learning environment: a failure of community? Studies in Higher Education, 30(1), 43-55.

McPherson, M., & Baptista-Nunes, M., (2004). The failure of a virtual social space (VSS) designed to create a learning community: Lessons learned. British Journal of Educational Technology, 35(3), 305-321.

Merten, R.K., Reader, G.G., & Kendal, P.L. (Eds) (1957). The student physician. Cambridge, MA: Harvard University Press.

Meyer, K., (2003) The web's impact on student learning. THE Journal 30(10). www.thejournal.com

Moore, M. G. (1972). Learner autonomy: The second dimension of independent learning. Convergence, 5(2), 76-88.

Moore, M. (1988). On a theory of independent study. In D. Sewart, D. Keegan, & B. Holmberg (Eds.), Distance education: International perspectives (pp. 68-94). New York: Routledge.

Moore, M. (1994). Autonomy and interdependence. The American Journal of Distance Education, 8(2), 1-5.

Palloff, R.M., & Pratt, K. (1999). Building learning communities in cyberspace: Effective strategies in the classroom. San Francisco: Jossey-Bass Publishers.

Perraton, H. (1988). A theory for distance education. In D. Sewart, D., Keegan, & B. Holmberg (Eds.), Distance education: International perspectives (pp. 95-113). New York: Routledge.

Phillips, C. (1990). Making friends in the electronic student lounge. Distance Education, 11(2), 320-33.

Riel, M. & Levin, J. (1990). Building electronic communities: Success and failure in computer networking. Instructional Science, 19(2), 145-169.

Rovai, A. P. (2002) Development of an instrument to measure classroom community. The Internet and Higher Education, 5(3), 197-211.

Rovai, A. P. (2002) Sense of community, perceived cognitive learning and persistence in asynchronous learning networks, The Internet and Higher Education, 5(4), 319-332.

Swan, K. & Shea, P. (2005). The development of virtual learning communities. In. S. R. Hiltz & R. Goldman (Eds.), Learning together online: Research on asynchronous learning networks, pp. 239-260. Mahwah, NJ: Erlbaum.

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. Distance Education, 22(2), 306-331.

Tucker, S. & Hodge, E. (2005). Accreditation standards for distance education: A view of multiple assessment/instructional strategies. WSEAS Transactions on Advances in Engineering Education, 4(2), 368-374.

Vygotsky, L.S. (1978). Mind in society: The development of higher order psychological processes. Cambridge, MA: Harvard University Press.

Vygotsky, L.S. (1986). Thought and language. Cambridge, MA: MIT Press.

Wedemeyer, C. A. (1981). Learning at the back door: Reflections on nontraditional learning in the lifespan. Madison: University of Wisconsin.

Wenger, E. (1998). Communities of practice: Learning, meaning, and identity. Cambridge: Cambridge University Press.

Wenger, E. (2002). Communities of practice: Learning, meaning and identity. N.Y.: Cambridge University Press.

Wertsch, J.V. (1985). Vygotsky and the social formation of mind. Cambridge, MA: Harvard University Press.

Wise J M (1999) Culture and technology CULTSTUD-L Columns. Retrieved on 8/20/2006 from http://www.cas.usf.edu/communication/rodman/cultstud/columns/jw-24-10-99.html

Wood, C. (2005). Highschool.com. Edutopia, 2005(4), 32-37.

## About the Authors


### Elizabeth Hodge
Business, Career, and Technical Education
College of Education
East Carolina University
Greenville, NC 278585
(252) 328-6175
hodgee@ecu.edu

### Michael J. Bossé
Mathematics and Science Education
College of Education
East Carolina University
Greenville, NC 278585
(252) 328-9367
bossem@ecu.edu

### Johna Faulconer
Curriculum and Instruction
College of Education
East Carolina University
Greenville, NC 278585
(252) 328-5570
faulconerj@ecu.edu

### Martha Fewell
Mathematics and Science Education
College of Education
East Carolina University
Greenville, NC 278585
(252) 328-6736
fewellm@ecu.edu

**Editor's Note**: This study examines Seven Principles for Good Practice in Undergraduate Education when applied to online courses. It is important to validate that these findings developed originally for face-to-face instruction apply also to online learning.

# Online Courses Demonstrate Use of Seven Principles

**David Batts, Susan M. Colaric, Cheryl McFadden**

**USA**

## Abstract

The purpose of this study was to investigate the perception of students and instructors in selected online courses relative to the use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education. The principles were originally developed for face-to-face instruction, but may be applicable in a variety of instructional delivery methods (Chickering & Ehrmann, 1996). Results show that in online undergraduate education courses, the Seven Principles were perceived as evident by both students and instructors.

## Introduction

In 1987, Chickering and Gamson led a task force composed of university instructors, administrators, researchers, and students to examine the issue of quality undergraduate education. The goal was to utilize published research and personal knowledge to outline key components and instructional strategies that would lead to quality undergraduate education. Seven principles were derived to represent a simple and limited number of evaluation criteria and to provide a framework for practical application in the university classroom with the goal of improving undergraduate teaching (Chickering & Gamson, 1991). Since that time, the Seven Principles have set standards for undergraduate education and have been used by instructors in face-to-face classrooms to enhance the quality of instruction (The Ohio Learning Network Taskforce, 2002). Cross (1999) stated that "the best known, certainly the most widely distributed list, is the 'Seven Principles for Good Practice in Undergraduate Education'" (p.256). These principles have also been the basis of a large number of research studies (Braxton, Olsen, and & Simmons, 1998; Buckley, 2003; Graham, Cagiltay, Craner & Lim, 2000; Taylor, 2002).

### Seven Principles

The Seven Principles assert that good practice in undergraduate education (a) encourages student-faculty contact, (b) encourages cooperation among students, (c) encourages active learning, (d) gives prompt feedback, (e) emphasizes time on task, (f) communicates high expectations, and (g) respects diverse talents and ways of learning (Chickering & Gamson, 1987). Each principle is reviewed below.

The first of the seven principles states that good practice encourages student-faculty contact. Chickering and Gamson (1991) stressed that faculty who encourage contact with the student in and out of the classroom enhance the motivation of the student, the student's intellectual commitment, and the students' personal development.

The second principle emphasizes that good practice encourages cooperation among students and is linked to the third principle that good practice encourages active learning. Working with others increases involvement in learning, and research demonstrates it can also increase productivity and enhance self-esteem (Johnson, Johnson & Smith, 1990). Active learning can be done individually, but can also be used in a cooperative setting and increases individuals' involvement in the

learning process. Research supports the growing use of both active and cooperative learning in higher education (Johnson & Johnson, 1989).

The next principle stresses that good practice includes prompt feedback. Prompt feedback refers to instructors' efficiently providing feedback on assignments, quizzes, tests, and questions. Chickering and Gamson (1991) reported "it is clear that the use of prompt feedback in college courses shows a clear and positive relation to student achievement and satisfaction" (p. 18). Feedback must be more than just the notification that the instructor received the assignment, but rather be corrective and supportive for it to be central to student learning.

The fifth practice emphasizes time on task. Most of the prior research on this principle was related to elementary and high school levels (Cross, 1987). Chickering and Gamson (1991) noted that, "there is some evidence that effective use of time in the college classroom means effective teaching for faculty and effective learning for students" (p. 20). There has been a large scale study conducted by Franklin (1991) that found a significant correlation between the effective use of class time and both amount learned and rankings of course and instructor.

The next principle states that good practice encourages high expectations. Chickering and Gamson (1991) reported that high expectations are crucial for all types of students. The principle maintains that instructors must develop high goals for the students, but these goals must be attainable. Chickering and Gamson highlighted research (Cashin, 1988; Cashin & Slawson, 1977; Marsh, 1984) that demonstrated students gave higher ratings to difficult courses in which they had to work hard.

The final principle states that good practice respects diverse talents and ways of learning. Chickering and Gamson (1991) noted that "Faculty who show regard for their students' unique interests and talents are likely to facilitate student growth and development in every sphere--academic, social, personal, and vocational" (p. 21). Students have different ways in which they learn and the instructor who can adjust his/her style of teaching has a better chance of reaching and developing these students (Chickering & Gamson, 1991).

These principles were developed by experts in higher education and from 50 years of research on good practices in undergraduate education. These principles have set standards for undergraduate instruction and have been used to enhance the quality of instruction in traditional face-to-face classrooms (The Ohio Learning Network Task Force, 2002); however, there has been an increase in the offerings of online education (National Center for Education Statistics, 1999; National Center for Education Statistics, 2003).

## Distance Education

While the principles were intended for face-to-face instruction, they were designed to be accessible, understandable, practical and widely applicable. Those design characteristics makes it plausible to apply these principles to forms of delivery other than face-to-face (Chickering & Ehrmann, 1996). There has been a recent increase in online instruction in higher education and there have been reports of how to implement the seven principles in online instruction (Chickering & Ehrmann; Graham, et al., 2001).

While undergraduate education has traditionally occurred with faculty and students situated in the same physical location, distance education has been growing over the last decade. According to the National Center for Education Statistics (2003), for the 2000-2001 academic year there were 2,876,000 students enrolled in distance education college level courses. Eighty-two percent were undergraduate level courses. This represents a 111% growth in total student enrollment from the 1997-1998 academic year (National Center for Education Statistics, 1999). With the increase in distance education courses, there is a need to ensure that distance instruction represents the same level of quality as traditional face-to-face instruction (Distance Learning, 2001).

## Research on the Seven Principles

With the increase in distance education, there has been an increase in studies that examined the Seven Principles in online instruction. Research has been conducted specifically using the seven principles in both undergraduate and graduate courses (Braxton et al., 1998; Graham, et al., 2000; Taylor, 2002). These research studies investigated different components of education; yet, all of the studies had the Seven Principles for Good Practice in Undergraduate Education as an indicator of quality instruction. These studies have been conducted with traditional face-to-face, Internet-enhanced, and online undergraduate and graduate courses.

In a 1998 study, Braxton et al. examined the Seven Principles for Good Practice in Undergraduate Education in relation to academic disciplines. The researchers hypothesized that disciplines with high paradigmatic development (the extent to which members of the discipline agree about theory, methods, techniques, and the importance of problems for the discipline to pursue) would be less likely to follow guidelines of the Seven Principles because there is a greater agreement on course content and degree requirements. Disciplines included in the high paradigmatic development area are biology, chemistry, and physics. Disciplines labeled as low paradigmatic are history, psychology, and sociology.

Participants included 167 instructors from a Research I University who had taught at least one undergraduate course within the last two years. Semi-structured interviews and a survey were used for data collection. The results showed that “high expectations” (3.97 on a 5-point scale), “time on task” (3.63), and “respect for diverse learning expectations” (3.2) ranked the highest for all disciplines. Ranking lowest was “student feedback” with a 2.76.

Next, a report completed by the Ohio Learning Network Task Force studied the quality of distance learning in Ohio (The Ohio Learning Network Task Force, 2002). The report stated that higher education has continually tried to improve itself and the push for quality is evident in today’s world. The report acknowledged the impact of online education and efforts made to ensure quality. “In 1999, the Ohio Learning Network (OLN) drew on Chickering and Gamson’s (1987) work and other carefully selected sources to draft their initial version of the OLN Principles of Good Practice for member institutions” (The Ohio Learning Network Task Force, p. 2). They continued to note that Chickering and Gamson’s seven principles of good practice for undergraduate education remains valid for online education.

The OLN report was an assessment of online education and recommendations for higher education institution for quality instruction (The Ohio Learning Network Task Force, 2002). The report stated that the recommendations of the OLN principles that were derived from Chickering and Gamson’s (1987) principles were to be used for the design, approval, assessment and revision of all courses (face-to-face, online, or blend of both). This report was of importance because it supported Chickering and Gamson’s principles as guidelines for delivering quality online education.

Another study examined four online graduate courses to provide feedback on strengths and weaknesses (Graham et al., 2000). The Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1987) were used as the primary criteria for the evaluation. The researchers assumed the role of the student perspective when analyzing the course. The researchers accessed the courses’ websites to read all course material as well as communication threads in discussion board chats. The researchers did not have access to email correspondence between instructors and students. Additionally, three of the four instructors were interviewed; however, no students were contacted.

In the four online courses evaluated, three of the Seven Principles were considered strong. These principles were (a) encouraging active learning, (b) encouraging student-faculty contact, and (c) respecting diverse talents and ways of learning. Yet, it was also reported that two areas needed

improvement and these were encouraging cooperation among students and giving prompt feedback.

The researchers noted that "our research was limited in scope and was more qualitative than quantitative; the evaluation should not be considered a rigorous research project" (Graham et al., 2000, p. 2). Although the research had limitations, it did provide useful information on the use of the Seven Principles in online courses, as well as including the student view as a research perspective.

A research study completed during the spring of 2003 investigated student perception and its correlation with the Seven Principles in graduate education (Buckley, 2003). In this study, relationships between instruction, instructional design, student interaction, and student learning experience were reviewed. In essence, instructors who utilized the Seven Principles in graduate education were perceived as experienced and cared about their instruction to the students. Buckley stated that "The implication of this finding was that it is not only important to create an interactive environment for learning, but it is also important to design discussion activities that can trigger rich and meaningful online discussion" (p. 11). The Seven Principles, if used in online education, will have a positive outcome in the learning experience of the student (Buckley). This study researched graduate education in regards to the principles that were initially developed for undergraduate education. The study demonstrated that the principles were not only applicable to graduate education, but to online education as well, as the students expressed positive learning experiences.

Finally, Taylor (2002) utilized the Seven Principles to evaluate the quality of teaching in fully online undergraduate courses across multiple disciplines. The population that was surveyed consisted of 500 instructors across the nation that taught an undergraduate course fully online with no delineation in reference to disciplines. Taylor developed an instrument that allowed the instructor to critique his or her own course. The survey instrument contained eight categories, one for each of the seven principles, and one for general information. Taylor's scale for the first seven categories ranged from rating of 1–Does not describe my class at all, to 5–Describes my class very well.

Taylor (2002) concluded that instructors are using the principles in their online courses although not all of the seven were fully used. Six of the seven principles ranged from 3.10 to 3.78, with 3.0 - 5.0 considered high. The six principles with the highest rating were: (a) contact between faculty and student, (b) feedback, (c) ways of learning, (d) expectations, (e) learning techniques, and (f) relations among students. Time on task was the only principle that was rated in the lower scores with a score of 2.94. There was no discussion of how the high versus low rankings were determined and as noted by the scores, they were all relatively around the 3.0 mid mark. Taylor reported that 71% of the respondents had been teaching for eight years or more and this may be a reason why certain principles are more extensively used than others. Taylor suggested future studies should be conducted. This study was the first of its kind using the Seven Principles and applying them to online instruction in a quantitative format. The study however, lent itself to biases since the survey was completed by the instructor and his/her opinion as to what he/she did or did not do in the course.

Many research studies have examined various attributes of the Seven Principles. Taylor (2002) was the first to do a comprehensive quantitative study to discover the relevance of the Seven Principles in online undergraduate courses. Taylor's research was subjective because of the self-assessment by the instructor. There is a need for a study that examines whether instructors are using the Seven Principles by comparing the instructors' responses with the responses of their students.

## Research Methodology

This study examined instructor and student perception of the use of proven principles for face-to-face instruction in online courses. The participants in this study were instructors and students in selected online undergraduate education courses at two southeastern universities. A survey instrument was used to collect data and address the following research questions:

1. Do students and instructors perceive the use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in select online undergraduate education courses?
2. Do students and instructors agree upon the perception of use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in select online undergraduate education courses?

### Participants

There were two groups of participants in this study. The first group included university instructors teaching online undergraduate education courses. The second group included undergraduate students enrolled in those selected online education courses that correspond with the first group of participants. Two universities were selected for inclusion; both were small, public universities granting baccalaureate and master's degrees with schools of education that were accredited by the National Council for Accreditation of Teaching Education (NCATE). The total possible population for the study was 548 students and 31 instructors.

### Instrumentation

The Online Teaching Practices (OTP) survey was developed by Taylor (2002) to identify the extent in which instructors incorporated the Seven Principles for Good Practice in Undergraduate Education into their online courses. Taylor used Chickering and Gamson's (1987) Seven Principles as a guideline when developing the OTP. The OTP was comprised of 49 items, and they were grouped into eight sections. The first seven sections corresponded to the Seven Principles for Good Practice in Undergraduate Education, and the eighth and final section was designed to collect selected demographic information from participants.

The first section of OTP included survey items that correspond to Chickering and Gamson's (1987) first principle for good practice in undergraduate education, encourages student-faculty contact, which included the processes used by instructors to communicate with their students. Therefore, items in section one of the revised survey addressed how students are encouraged to contact the instructor.

Section two included items associated with the second principle for good practice in undergraduate education described by Chickering and Gamson (1987), cooperation among students, which included the processes used by the instructor to facilitate communication among their students. These items in the revised survey addressed whether students were encouraged to work in groups or teams, if contact information for fellow students was provided, and whether students were required to use chat rooms or discussion boards as a method of communication.

Section three included items that corresponded to the third principle for good practice in undergraduate education by Chickering and Gamson (1987), active learning, which meant engaging the student in the activities of the course. Items in this section of the revised survey addressed specific methods of how course content was delivered which included the use of discussion boards and hypertext links on web pages.

The fourth section of this survey addressed the use of the Chickering and Gamson's (1987) fourth principle for good practice in undergraduate education, prompt feedback, which included processes in which instructors gave comments back to the student in a timely manner. Items on

the revised survey addressed turn-around time on assignments, tests, and quizzes as well as availability of grades online.

Section five items addressed Chickering and Gamson's (1987) fifth principle for good practice in undergraduate education, time on task, which included managing time to complete learning activities expeditiously. The tracking of frequency of use of chat rooms and discussion boards by students was included in the revised survey.

The sixth section paralleled Chickering and Gamson's (1987) sixth principle for good practice in undergraduate education, high expectations, which included the processes used by instructors to set challenging learning standards. Specifically, survey items from the revised survey asked about penalties for late assignments, assignments that reflected a stringent work load, and required revisions for unacceptable student work.

Section seven was the last section of the OTP that was related to Chickering and Gamson's (1987) to the seventh principle, diverse ways of learning, which included processes instructors used to address different learning styles of the student population. Items from the revised survey asked about students' learning styles and different instructional approaches.

Section eight, the final section of the revised OTP, requested selected demographic information. Data collected in this section were used to associate a particular course instructor with the students enrolled in that course.

In this study, Taylor's (2002) instrument was modified with permission. Taylor's original instrument directed participants to select either "1" which represented, "Does not describe my class at all" or a "5" which represented "Describes my class very well." In this study, participants were directed to select either "No" representing the statement "Does not describe my course" or "Yes" representing the statement "Describes my course". In other words, the coding was changed as well as the descriptors. In addition, the section headings on Taylor's original instrument did not mirror the exact wording of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education. For this study, the section headings were modified to mirror the exact wording of Chickering and Gamson's seven principles for undergraduate education. One other modification to Taylor's original instrument was the elimination of one survey question which addressed students' experimentation outside of class. More than likely, undergraduate courses in education would not require the completion of experiments outside of class. The last modification to Taylor's original instrument was substituting "course" for "class" which maintained continuity of word usage throughout the modified OTP. Permission was granted by Taylor to use and modify the survey instrument for this study.

### Validity and Reliability

The survey instrument that was created by Taylor (2002) was reviewed by two experts to validate the instrument at the time that Taylor conducted the original study. The two experts made suggestions and comments regarding the readability of the instrument as well as the relationship between the survey items and the research questions. Taylor then conducted a pilot study where three faculty members who taught online courses were asked to complete the pilot test and provide feedback on the instructions, questions, format, and the response options. Taylor used these responses to further refine the instrument and to establish the face validity of the instrument. To determine reliability, Taylor conducted a correlation test on each of the seven scales of the instrument to measure the internal reliability. The resulting correlation coefficient was not reported in Taylor's study; however, Taylor stated the instrument was valid and reliable. While modifications were made to the original instrument, these changes should not invalidate Taylor's certification of validity and reliability.

### Data Collection and Analysis

Data was collected in December 2004 and usable responses totaled five instructors and 28 students. The responses were analyzed using SPSS (Statistical Packages for the Social Sciences) software program. Data analysis compared the means for students and instructors for each principle. Correlated t-tests were used to analyze the data at an a priori alpha level of .05.

## Findings

Descriptive statistics (frequencies and means) and correlated t-tests (t statistic, probability, and degrees of freedom) were used to answer the research questions.

For each principle, there were a finite number of survey items that were asked of the respondent. The respondent could answer "no" they do not perceive this happening in the course or "yes" they perceive this is taking place in the course. The responses were coded as 0 and 1 representing "No" and "Yes", respectively. For each principle, the mean of the survey items was calculated for the students and the instructors. The means ranged from 0 to 1 indicating the overall perceived use of that principle in the course. In addition, the probability of a difference in perception of use by instructor and student was reported at an a priori alpha level of .05. In all instances, the count in each cell was well below the expected count; this indicates that caution should be used in examining the significance levels for the results.

*Principle One*. Chickering and Gamson's (1987) first principle refers to student-faculty contact. Scores for student-faculty contact could range from 0 to 1. Scores for student responses ranged from .67 to .83 indicating students found student-faculty contact evident in their course. Scores for instructor responses ranged from .71 to .86 indicating instructors also found student-faculty contact evident. A series of correlated t-tests was used to determine if there was a difference in perception of use of this principle by comparing the two groups' mean values. The resulting p values ranged from .400 to .742, above the significance level and thus there was not a significant difference in student and instructor perception of the first principle, student-faculty contact, in the course.

*Principle Two*. The second principle refers to student cooperation. Scores for student cooperation could range from 0 to 1. Scores for student responses ranged from .57 to .83 indicating students found student cooperation evident in their course. Scores for instructor responses ranged from .5 to .67 indicating instructors also found student cooperation evident. A series of correlated t-tests was used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .105 to .637, above the significance level and thus there was not a significant difference in student and instructor perception of the second principle, student cooperation, in the course.

*Principle Three*. Active learning is the third principle. Scores for active learning could range from 0 to 1. Scores for student responses ranged from .6 to .79 indicating students found active learning evident in their course. Scores for instructor responses ranged from .33 to .83 indicating instructors also found active learning evident in four or the five courses. A series of correlated t-tests was used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .014 to .845, four of the five courses were above the significance level and thus there was not a significant difference in student and instructor perception of the third principle, active learning, in four of the courses. Course Four had a significant difference in the means which indicates there was a difference between student and instructor perception of this principle, active learning.

*Principle Four*. The fourth principle refers to prompt feedback. Scores for prompt feedback could range from 0 to 1. Scores for student responses ranged from .44 to .86 indicating students found

prompt feedback evident in four of the five courses. Scores for instructor responses ranged from .43 to 1 indicating instructors also found prompt feedback evident in four or the five courses. Course three had a low perception of use by both the student and instructor. A series of correlated t-tests were used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .260 to .986, above the significance level and thus there was not a significant difference in student and instructor perception of the fourth principle, prompt feedback, in the course.

*Principle Five.* Time on task is the fifth principle. Scores for time on task could range from 0 to 1. Scores for student responses ranged from .42 to .75 indicating students found time on task evident in only three of the five courses. Scores for instructor responses ranged from .17 to .67 indicating instructors only found time on task evident in one or the five courses. A series of correlated t-tests was used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .106 to .638, above the significance level and thus there was not a significant difference in student and instructor perception of the fifth principle, time on task, in the course.

*Principle Six.* Sixth principle refers to high expectations. Scores for high expectations could range from 0 to 1. Scores for student responses ranged from .53 to .75 indicating students found high expectations evident in their course. Scores for instructor responses ranged from .57 to 1 indicating instructors also found high expectations evident. A series of correlated t-tests was used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .025 to .536, four of the five courses were above the significance level and thus there was not a significant difference in student and instructor perception of the sixth principle, high expectations, in four of the courses. Course One had a significant difference in the means which indicates there was a difference between student and instructor perception of this principle, high expectations.

*Principle Seven*. Chickering and Gamson's (1987) seventh principle is diverse talents and ways of learning. Scores for the diverse talents and ways of learning could range from 0 to 1. Scores for student responses ranged from .53 to .82 indicating students found diverse talents and ways of learning evident in their course. Scores for instructor responses ranged from .57 to .86 indicating instructors also found diverse talents and ways of learning evident. A series of correlated t-tests was used to determine if there was a difference in perception of use by comparing the two groups mean values. The resulting p values ranged from .040 to .473, four of the five courses were above the significance level and thus there was not a significant difference in student and instructor perception of the seventh principle, diverse talents and ways of learning, in four of the courses. Course Three had a significant difference in the means which indicates there was a difference between student and instructor perception of this principle, diverse talents and ways of learning.

## Discussion of Findings

Two findings emerged as a result of this study. First, students and instructors perceived the use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in select online undergraduate education courses. Second, the students and instructors agreed on the perception of use of Chickering and Gamson's (1987) Seven Principles in these select online undergraduate education courses.

1. **Perceived Use of Principles**. Students and instructors perceived the use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in select online undergraduate education courses. The mean scores of both the instructor and students were categorized into three levels, low (0-.35), medium (.36-.70), and high (.71-1). In six of the seven principles, the students and instructors means were medium to

high. These principles included (a) student-faculty contact, (b) cooperation among students, (c) active learning, (d) prompt feedback, (e) high expectations, and (f) diverse talents and ways of learning. This indicated that the principles are evident in these online courses.

The one principle that had a large proportion of low responses was time on task. The instructors had three low means and two medium means; however, the matching students had four medium means and one high mean. This result mirrored Taylor's (2002) findings that reported the lowest score of the seven principles was time on task and the only principle to report in the low score category.

2. **Agreement on Perception of Use of Principles**. Overall, the students and instructors agreed on the perception of use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in select online undergraduate education courses with no significant difference in perception of use found between the groups of participants. Although there were three different principles in distinct courses that found a significant difference in the perception of use, the remaining 32 principles showed no significant difference. Therefore, when the responses were viewed as a whole, the research question was answered by the agreement of perceived use of Chickering and Gamson's (1987) Seven Principles by students and instructors in online undergraduate education courses.

## Implications

Three implications emerged as a result of this study. These implications are listed below followed by a discussion of each implication.

1. Chickering and Gamson's (1987) principles are evident in online courses. These principles have been accepted by the academic community as quality instructional strategies in undergraduate education (Chickering & Gamson, 1991). This study provided further evidence that these principles can be evident in online courses.
2. Higher education administrators should consider institutionalizing the principles by training, assessment, and course design. If Chickering and Gamson's principles are viewed as evidence of quality instruction, then the inclusion of the principles in training sessions is warranted. Chickering (1991) and Poulsen (1991) reported that training on how to use the Seven Principles is needed. If the training is offered for faculty to learn about online teaching, instructors who typically would not attend training for face-to-face teaching may be exposed to the principles. Chickering also reported that the principles can be used for formal and informal review and self-assessment and the principles should be used in course design. The result of all of these efforts can lead to the institutionalization of the principles.
3. Instructors can use this study to consider improvement in the one principle, time on task, which had a low perception of use. Knowing this area of weakness can help instructors improve time on task in their online courses. Instructors can track the frequency of student posts in discussion board threads to help gauge the amount of time a student is spending in their online course. Instructors can also provide guidelines of minimum amount of time expected of students on class preparations and assignments. A need also exists for electronic platform technical advancements to improve the tracking of student activity; this would support the instructor in achieving this principle in their online course.

In summary, an analysis of the data indicated that students and instructors perceive Chickering and Gamson's (1987) Seven Principles are evident in selected online courses and the students and instructors agree on this perception of use. Higher education administrators should consider providing instructors with training on online instruction that includes these principles. Institutions and instructors must be attentive to the issues related to online course instruction. Additional studies related to online course instruction are warranted and would greatly add to the literature available.

## References

Braxton, J. M., Olsen, D., & Simmons A. (1998). Affinity disciplines and the use of the principles of good practice for undergraduate education. Research in Higher Education, 39(3), 299-318.

Buckley, K. (2003). How principles of effective online instruction correlate with student perceptions of their learning. Orlando, FL: University of Central Florida.

Cashin, W. E. (1988) Student rating of teaching: A summary of the research. IDEA Paper No. 20. Manhattan: Center for Faculty Evaluation and Development, Kansas State University.

Cashin, W. E., & Slawson, H. M. (1977). Description of data base, 1976-77. IDEA Technical Report No. 2. Manhattan: Center for Faculty Evaluation and Development, Kansas State University.

Chickering, A. W. (1991). Institutionalizing the seven principles and the faculty and institutional inventories. New Directions for Teaching and Learning, 47, 51-61.

Chickering, A. W., & Ehrmann, S. C. (1996). Implementing the seven principles: Technology as a lever. American Association of Higher Education Bulletin.

Chickering, A., & Gamson, Z. (Eds.). (1987). Seven principles for good practice in undergraduate education. AAHE Bulletin, 38(7) 3-7.

Chickering, A., & Gamson, Z. (Eds.). (1991). Applying the seven principles for good practice in undergraduate education. (47th ed.). San Francisco: Jossey-Bass.

Cross, K. P. (1987) Teaching for Learning. American Association of Higher Education Bulletin, 39(8), 3-7.

Cross, P. K. (1999). What do we know about students' learning, and how do we know it? Innovative Higher Education, 23(4), 255-270.

Distance Learning. (2001). Issues and controversies. Retrieved March 16, 2001, from http://www.2facts.com/ICOF/temp/36534tempi0600500.asp

Franklin, J. (1991). Technical report no. 2. Boston: Office of Instructional Research and Evaluation, Northeastern University.

Graham, C., Cagiltay K., Craner J., & Lim, B. (2000). Teaching in a web based distance learning environment. CRLT Technical Report, 13.Phoenix, AZ: The Oryx Press.

Graham, C., Cagiltay K., Lim B., & Craner, J. (2001). Seven principles for effective teaching: A practical lens for evaluating online courses. Assessment.

Johnson, D., & Johnson, R. (1989). Cooperation and competition: Theory and research. Edina, MN: Interaction Books.

Johnson, D., Johnson, R., & Smith, K. (1990). Cooperative learning: An active learning strategy. Focus on Teaching and Learning, 5(2).

Marsh, H. W. (1984) Students' evaluation of teaching: Dimensionality, reliability, validity, potential biases, and utility. Journal of Educational Psychology, 76.

Poulsen, S. J. (1991). Making the best use of the seven principles and the faculty and institutional inventories. New Directions for Teaching and Learning, 47, 27-35.

Ritter, M., & Lemke, K. (2000). Addressing the seven principles for good practice in undergraduate education with internet-enhanced education. Journal of Geography in Higher Education, 24(1).

Taylor, J. (2002). The use of principles for good practice in undergraduate distance education. Blacksburg, VA: Virginia Polytechnic Institute and State University.

The Ohio Learning Network Task Force (2002). Quality learning in Ohio and at a distance, a report of the Ohio Learning Network Task Force on quality in distance learning.

U.S. Department of Education, National Center for Education Statistics. (1999). Distance Education at Post Secondary Education Institutions 1997-1998, NCES 2000-13, by Laurie Lewis, Kyle Snow, and Elizabeth F. Westat. Project Officer: Bernie Greene. Washington, DC.

U.S. Department of Education, National Center for Education Statistics. (2003). Distance Education at Degree-Granting Postsecondary Institutions: 2000-2001, NCES 2003-017, by Tiffany Waits and Laurie Lewis. Project Officer: Barnard Greene. Washington, DC.

## About the Authors

**David Batts**

**Dr. David Batts**
Assistant Professor
East Carolina University
230 Slay Building
Greenville, NC 27858

battsd@ecu.edu Ph: 252-328-9673

**Dr. Susan M. Colaric**
Director of Instructional Technology
Saint Leo University
Saint Francis Hall
Saint Leo, FL 33574

susan.colaric@saintleo.edu Ph: 352-588-7375

**Dr. Cheryl McFadden**
Assistant Professor
East Carolina University
208 Speight Bldg
Greenville, NC 27858

mcfaddench@ecu.edu Ph: 252-328-6179

**Editor's Note**: To be successful and sustainable, transition from face-to-face instruction to e-learning requires new commitments from faculty, students and administrators. The extent of change is often underestimated. It involves learning methodology, delivery systems, technology, and new ways of planning, designing and implementing instruction. It also requires organizational changes and a new business plan. It is an opportunity to incorporate best practices and customize curriculum to meet the needs of multi-cultural and global communities of learners.

# Best Practices for Sustaining Distance Training in the Workplace

**Andrew Gibson, Zane L. Berge**

**USA**

## Abstract

eLearning initiatives, powered by cutting edge technology, have the ability to offer just-in-time and just-in-case training designed to facilitate performance improvement and creativity. When compared with time-consuming traditional training methods, elearning can offer immediate results and this has led many to implement it with haste. However, while proficient human resource management and financial planning can lead to the establishment of an elearning solution, failure to take further steps necessary to affect cultural change within the organization may, in the long term, seriously jeopardize the prospect of making such a strategy sustainable. This paper explores examples of best practice in managing the factors necessary for elearning sustainability, namely: detailed planning, creation of a sound business case, involvement of champions, harnessing of technology, transitioning, a blended solution, and sustained evaluation.

## Introduction

Berge and Kearsley (2003) state that in many cases, "even after distance training has been successfully implemented, sustaining it remains a struggle" (p.6). This need not be the case. The impact of elearning can be immediate (David, 2006). It can offer significant cost-savings. However, the move to elearning must be more than convincing executives to fund a pilot; more than succeeding in the short term, or boasting about initial financial rewards. Given that the organization has a goal of integrating elearning into their performance improvement arsenal, best practice exists to bring about long term success through a change in culture from *training* to one of *learning*. How an organization learns determines to a large extent how successful they are in creating strategic competitive advantage. As Brodsky (2003) states, "elearning is increasingly converging with other management tools, providing managers with a unified view of all financial, customer and employee considerations" (p.2). The impact on an organization's bottom line of sustaining elearning can be tremendous.

This article will examine crucial elements involved in transitioning from traditional training to elearning. Two synonyms of the verb *to sustain* are *to nourish* and *to feed*. Without the right amount of planning time on opportunities to nourish elearning, growth may be seriously diminished. Best practices are discussed as follows: detailed strategic planning, creation of a sound business case, involvement of champions, harnessing of technology, transitioning, a blended solution, and a sustained evaluation.

## Planning

To go from in-person classroom training to elearning represents no small shift within an organization. Copying print-based materials into electronic formats on an intranet is an

inappropriate strategy with little chance of success. Transition from traditional training to elearning requires a well-planned strategy (Berge & Smith, 2000). To be sustained requires an *innovation roadmap*, detailing how the project will run, who it will benefit, in what ways, and how it will be consistently funded in the years to come (Berge & Kearsley, 2003).

The significance of sound planning is equally relevant to those already offering elearning. Poor initial planning can fail even after a successful implementation. Going back to the drawing board may not be the worst thing that an organization can do. From the start, planning must involve representatives from all key stakeholder groups: executives, administrators, employees, and any outside parties such as elearning providers.

There must be a clear vision, aligned with the organizational vision and goals. This must be discussed openly if buy-in is to be successful. The value of the communal sense of ownership derived from openness at this stage cannot be overestimated. If staff are "landed" with a new training culture that they feel they have had no input in creating, the chances of sustaining it are limited. In a nutshell, elearning must be part of the organization's *strategic planning* if sustaining is a goal, not simply separate or sporadic elearning events that occur in the organization (Berge, 2001).

Plans cannot become a reality without funding and support. To that end those intent on transitioning from traditional training to elearning must gain support from the organization's senior staff. Because business leaders are used to thinking about business problems and opportunities, the transition to elearning requires a sound business case including some of the major cost projections for training.

## A Sound Business Case

Rosenberg (2001) states that a business case is a value proposition, and that the value of elearning to an organization is "the sum of its ability to save money, generate benefit to the business, be available to anyone – at any place and any time – and do all of this at the speed of business" (p.227). Several key incentives for choosing elearning over traditional training practices stand out. The opportunity to save money on travel expenses by offering courses on computers instead of physical locations that employees must travel to for varying lengths of time is clearly attractive, especially if large numbers of the workforce must attend such courses. The closely related diverted labor savings of having employees remain at their place of work, while also studying elearning materials, usually makes good business sense. It should be mentioned that the same savings are available to both those in small and large scale situations (Rosenberg, 2001).

Beyond the financial savings, time savings, in terms of course duration afforded by elearning are certainly appealing (5 day classroom courses take often take just 3 days with elearning). The efficiency of elearning can also be seen in the time it takes for course materials to be created or updated. With elearning software, when an organization sees a learning need, a training course or product can be developed and delivered much faster than is possible with traditional methods. Changes can actually be made to elearning materials seamlessly while courses are ongoing. These courses, or changes to them, may relate to new business practices, product innovations or critical market research. The impact on an organization's finances could be significant and speed offers competitive edge.

Armed with these reasons many organizations will be tempted to stake everything on performance improvement (Rosenberg, 2001), but they must go further. The opportunities elearning offers for community building, advancement of leadership potential, retention of staff and centralized knowledge management (Reamy, 2004) all have the potential to improve the bottom line for the organization in a positive fashion.

Organizations must also be aware of how much elearning is going to cost (Bersin, 2003; Brown & Voltz, 2005, ¶1). To do it right will take significant investment. eLearning's digital reach does not automatically make it cheaper than traditional methods, and cutting corners to reduce the scale of this investment may jeopardize sustainability. In addition, cost projections must reveal *total* costs. It is common for organizations to focus on the cost of developing course content, neglecting other significant costs. The cost of installing and maintaining the required technological infrastructure must be budgeted, as must oft forgotten costs like marketing (Weaver, 2003).

Those who put together a business case for elearning must work hand-in-hand with financial planners in the organization. They need to be certain that money to initiate elearning is available and they need to know that money will be there for long-term sustainability. As Weaver (2003) states, "elearning can be cost-effective, especially with a large number of users in multiple locations. But a meticulously planned, effectively implemented, well-marketed system that meets or exceeds expectations should not be expected to come cheap" (p.1). Therefore, a written business case for elearning should include sections related to people, time and money (Geolearning, 2006; Mayberry, 2001). The document should be developed by a small team of people. It should include graphical representations of cost and training time comparisons between elearning and traditional practices. Such frameworks can save time and improve the chance of success for companies new to change management. While return on training investment may be appropriate to be convinced and convincing for a particular training event or program, it usually is *not* an effective method on which to base the overall business case. There are simply too many intangibles to account for when changing the organization's culture to elearning.

## Champions

One of the most critical factors in sustaining elearning is to obtain support from senior management. Without champions at the top level, an overall culture shift will not happen (Arora, 2004, ¶ 5; Barron, 2003). Best practice suggests involving a variety of stakeholders from the beginning of the project, but senior managers, more than any other group, are required in order to validate this new training process.

Employee acceptance of elearning is often a bigger concern than management acceptance (Learning Circuits, 2005). Champions need to explain to employees why the organization is embarking on this new approach, how it will affect the workforce; and be seen as users of the technology. By making active use of elearning, champions demonstrate that cultural change is necessary and underway. Champions thus serve as role models, encouraging learners (Arora, 2004, ¶ 7).

This is easier said than done. Senior managers themselves need to be convinced of the value of elearning in the form of a sound business case. Even after this, some may not automatically adapt to it. If this is found to be the case, project managers must design situations in which to involve senior executives in elearning and reiterate the business case for training culture change.

## Technology

Best practice indicates that organizations think of technology as a facilitator in elearning. It is more important for the technology platform to be robust, secure, scaleable and accessible than to feature the most advanced multi-media elements. Success with technology in elearning has proved to come from products that are easy to access, easy to understand and feature a "low learning curve" (Arora, 2004, p.1). It is essential that the technology chosen has interactive functionality (both synchronous and asynchronous), for example, audio, web and video conferencing, a simulation engine and assessment tools. It must offer an equivalent service to traditional in-person training in terms of its potential for communication, feedback and support but does have the potential to offer much more (authoring and editing tools, for example).

Therefore, choosing technology platform is very important. Before talking with elearning providers, organizations must be clear on what they need and future capacity (Driscoll & Dennehy, 2002; Mortimer, 2002; Woodall, 2001).

## Transitioning

Successful transitioning to elearning involves the transition to learning and communicating online. The pedagogical potential of elearning is considerable but the transition must not be a quantum leap for staff. Often, people must be helped to become comfortable with it. Best practice in this area requires a proactive stance to be taken by a variety of stakeholders. The senior champions of the project need to be seen to be making use of the new system, as do those responsible for training. It is also important for employees to be part of the transition. The points raised by all these stakeholders during the development phase should be addressed and incorporated into the final delivery of the platform (Weaver, 2003).

To sustain elearning within an organization it is critical that users are offered well-designed, relevant and engaging materials (Boehle, 2006). It is equally crucial that they have effective support. As previously mentioned, this cannot be achieved by simply *computerizing* what was formerly offered in classrooms.

Materials must be suitable for the given audience and the existing technological infrastructure. In terms of instructional design, organizations can either develop instruction in-house or employ elearning providers. Instructional design is a skilled field and investment in experienced designers can be money well spent. Best practice requires in-depth knowledge of the audience and pedagogy. Different people learn in different ways, for example, story-based works for long term retention in some cultures (Boehle, 2006, p.34). In a survey of 350 elearning practitioners, Barron (2003) discovered that "greater use of custom-developed content and greater personalization capabilities" (¶ 25) would improve the effectiveness of elearning. As with any training, elearning is usually not a case of one size fits all. As Brown and Voltz (2005) state, this is particularly important when there are culturally sensitive issues (p.5). The sense of ownership that this gives the learners can have a positive impact on sustainability.

Course materials should feature clear instructions and intended outcomes, and be designed to encourage reflection and interaction. If research is used, it should be up-to-date and of high quality. To make learning materials effective, the activities should be rich, and provide opportunities of student engagement (Brown & Voltz, 2005, p.3).

eLearning technologies are highly effective at presenting automated simulations. Citing Gery, Brodsky (2003) states that simulation-based elearning can be an effective solution for developing more advanced skills such as decision-making (p.2), customer service, sales and coaching skills. Best practice involves making use of available technology but not be driven by it. Procedural training, featuring simulations, can be part of long courses; they can also take the form of short 'just in time' sound bites that employees can use like a reference manual while working. Such a strategy has been effective in reducing attrition at the Nike organization (Marquez, 2006).

The flexibility of elearning is both a great advantage and a significant challenge. The elearning environment can be a lonely place for many people. Learners need the right type and amount of motivation. They also need the right amount of feedback, and at the right time. To deliver such support takes skill. Organizations need to be keenly aware that if current members of their training department are to fulfill supportive roles in elearning they must be properly trained in order to do so. In situations where facial expressions cannot always be seen, misunderstandings can develop very easily if not for skilled mediation. Organizations can also employ virtual guest lecturers.

Feedback can also come from people other than trainers. Mutual feedback from fellow learners can help to reduce feelings of remoteness. Indeed, the interactive potential of most elearning technologies affords many opportunities for course and non-course related communication. Making friends around the organization, feeling part of a team, having others congratulate you on your ideas, can be highly beneficial. One of elearning's strengths is its potential for encouraging communities of practice; "by building communities of practice, you enable your organization to be more innovative" (Frazee, 2002, p.4).

## eLearning as Part of a Blended Solution

To sustain elearning, organizations need to know when to use it, and when to turn to traditional methods. The failure to recognize this is a common pitfall of organizations transitioning to elearning (Weaver, 2003). People often see things as all one thing or all another (Brodsky, 2003, p.2). Best practice in sustaining elearning suggests that replacing traditional practices for elearning practices completely is often misguided. It's like throwing the baby out with the bathwater.

Most organizations have a long history with in-person training, and they are good at it. Because they need the speed and versatility of elearning to compete in the 21st century should not preclude them from maintaining a capacity for in-person training. There are times, in spite of the abilities of elearning technologies to manage interactive training sessions, when in-person training will be the best solution. Humans are social learners. Instructor-led face-to-face sessions provide this in a way that web-based training often cannot (Rosenberg, 2001; Weaver, 2003).

It is also important to realize that blending classroom training with elearning is a way to increase acceptance of elearning (Woodall, p.4). Barron (2003) in a survey of 350 e-practitioners found that 70% cited blending as a beneficial aspect of their elearning program. The two can be used together. Indeed, their power is often magnified when used in combination (Rosenberg, 2001).

Best practice here is to truly *blend* the two methods, not to maintain them in isolation. Classroom sessions can involve elearning technologies designed to host guest lecturers, show the most up to date market information, or include employees unable to attend in person. Traditional methods, when used, must be used to generate contemporary results: innovation and creativity. Organizations should also assess the success of blending by interviewing participants and evaluating performance. Suggestions made can be incorporated into future learning sessions. Decisions regarding when to blend are crucial, however. It is not always the correct strategy. Organizations must be proactive—fully aware of the strengths and weaknesses of elearning when blending training methods (Brodsky, 2003).

### Evaluation and Improvement

Assessing the success of elearning programs is crucial to their long term success. Implementation is only the beginning (Weaver, 2003). Organizations need to know that elearning is meeting their stated goals. This is a tricky proposition. Elearning technology can be used to assess certain skills but human interaction is required to fully evaluate long term improvement. To evaluate learning results effectively takes time, but it is very important in sustaining elearning. If an organization is to sustain learner satisfaction with elearning they need to be aware what works and what can be improved. Barron (2003) in a survey of 350 e-practitioners found that 49% had developed quantifiable measures of the effectiveness of their program.

Many attempted to show success in terms of numbers of learners trained, or by comparing costs with traditional methods but this kind of quantitative analysis can only show so much. Reassuringly, 32% measured success in terms of learner self-reporting, something which can

result in bringing many varied issues to light. Twenty-seven percent (27%) measured the effectiveness of their program in terms of customer satisfaction.

It is important to note that staff operating in different parts of the world may have different things they believe would improve the effectiveness of elearning. Learning styles and culture play a great part in how people learn. Elearning must be responsive to its learners. Making this a reality will involve a combination of methods. Currently the personalization of elearning products and services is the direction in which elearning is going, because it is what learners want (Barron, 2003; Brockbank, 2006).

## References


Adkins, S. (2003). ROI from workflow-based e-learning. *Learning Circuits*. Retrieved November 14, 2006 from http://www.learningcircuits.org/2003/oct2003/Adkins.htm

Arora, R. (2004). E-learning boosts the bottom line. *ZDNet News*. Retrieved November 14, 2006 from http://news.zdnet.com/2100-9589_22-5378943.html

Barron, T. (2003). LoD survey: Quality and effectiveness of e-learning. *Learning Circuits.* Retrieved November 14, 2006 from http://www.learningcircuits.org/2003/may2003/qualitysurvey.htm

Berge, Z.L. (2001). *Sustaining distance training: Integrating learning technologies into the fabric of the enterprise*. San Francisco: Jossey-Bass.

Berge, Z.L. & Kearsley, G. (2003). The sustainability of distance training: Follow-up to case studies. *The Technology Source Archives.* Retrieved November 14, 2006 from http://technologysource.org/article/sustainability_of_distance_training/

Berge, Z.L. & Smith, D. (2000). Implementing corporate distance training using change management, strategic planning, and project management. In L. Lau (Ed.) *Distance learning technologies: Issues, trends and opportunities*. Hershey, PA: Idea Group Publishing. pp.: 39-51.

Bersin, J. (2003). E-learning analytics. *Learning Circuits.* Retrieved November 14, 2006 from http://www.learningcircuits.org/2003/jun2003/bersin.htm

Boehle, S. (2005). The state of the e-learning market. *Training, 42*(9), 12-16, 18.

Boehle, S. (2006). Putting the learning back in e-learning. *Training, 43*(1), 29-20, 32, 34-5.

Brockbank, B. (2002). Next-generation management systems – part one. *The CEO Refresher*. Retrieved November 14, 2006 from http://www.refresher.com/!brockbank8.html

Brockbank, B. (2006). The e-learning myth. *The CEO Refresher*. Retrieved November 14, 2006 from http://www.refresher.com/!bjbelearning.html

Brodsky, M. W. (2003, May). E-learning trends today and beyond. *Learning and Training Innovations*. Retrieved November 14, 2006 from http://www.elearningmag.com/ltimagazine/article/articleDetail.jsp?id=56219

Brown, A. R. & Voltz, B. D. (2005). Elements of effective e-learning design. *The International Review of Research in Open and Distance Learning, 6*(1). Retrieved November 14, 2006 from http://www.irrodl.org/index.php/irrodl/article/view/217/300

David, C. (2006). Revving up e-learning to drive sales. *Econtent, 29*(2), 28-32.

Driscoll, M. & Dennehy, M. (2002). Playing 20 questions. *Learning Circuits*. Retrieved November 14, 2006 from http://www.learningcircuits.org/2002/dec2002/driscoll.htm

Frazee, B. (2002, November). Corporate universities: A powerful model for learning. *Chief Learning Officer Magazine*. Retrieved November 14, 2006 from http://www.clomedia.com/content/templates/clo_feature.asp?articleid=51&zoneid=29

Geolearning (2006). *Building a business case for eLearning*. Geolearning. West Des Moines.

Learning Circuits (2005). E-learning trends 2005. *Learning Circuits*. Retrieved November 14, 2006 from http://www.learningcircuits.org/2005/dec2005/annualtrends.htm

Marquez, J. (2005). Faced with high turnover, retailers boot up e-learning programs for quick training. *Workforce Management, 84*(8), 74-75.

Mayberry, E. (2001). How to build a business case for e-learning. *Learning Circuits, July*. Retrieved November 14, 2006 from http://www.learningcircuits.org/2001/jul2001/mayberry.html

Mortimer, L. (2002). Check under the hood: Evaluating e-learnings developers. *Learning Circuits.* Retrieved November 14, 2006 from http://www.learningcircuits.org/2002/dec2002/elearn.html

Pan, C-C. & Sullivan, M. (2005). Promoting synchronous interaction in an elearning environment. *T.H.E. Journal 33*(2), 27-30.

Phillips, J. J. (2004). Twelve success factors for corporate universities. *Chief Learning Officer Magazine*. Retrieved November 14, 2006 from http://www.clomedia.com/content/templates/clo_businessint.asp?articleid=384&zoneid=13

Reamy, T. (2003). KM and e-learning: A powerful combination. *EContent, 26*(10), 18-22.

Rosenberg, M. J. (2001). *E-learning strategies for delivering knowledge in the digital age*. New York: McGraw-Hill.

Seufert, S. & Euler, D. (2004, January). Sustainability of elearning innovations findings of expert interviews. *SCIL Report 2.* SCIL, University of St. GAllen. Retrieved November 14, 2006 from http://www.scil.ch/publications/docs/2003-06-seufert-euler-sustainability-elearning.pdf

Tobin, D. R. (1998). The fallacy of ROI calculations. *Corporate Learning Strategies.* Retrieved November 14, 2006 from http://www.tobincls.com/fallacy.htm

Weaver, P. (2003). *Avoiding e-learning failure [white paper]*. Development Dimensions International. Pittsburgh: DDI.

Woodall, D. (2001). *Evaluating e-learning solutions choosing the right e-learning solution for your organization.* NC: Smartforce. Retrieved November 14, 2006 from http://www.internettime.com/itimegroup/woodall.htm

## About the Authors

Andrew Gibson

Zane L. Berge, Ph.D.

UMBC

1000 Hilltop Circle

Baltimore MD 21250

**Editor's Note**: In distance learning, authentication of student work poses some problems. This solution using cell phones provides an added level of protection. The authors provide a useful analysis of the options available to correctly identify the learner.

# Reliable Authentication Method by Using Cellular Phones in Web Based Training

**Hideyuki Takamizawa, Kenji Kaijiri**

Japan

## Abstract

Institutions of higher education that offer credits through distance learning using web based training (WBT) have increased recently. In these situations, an authentication model using the ID-password pair is generally used. However, this authentication model cannot prevent "identity theft" effectively. We propose a new authentication method that solves this problem by using cellular phones as an authentication token. The authentication accuracy is expected to be improved by combining the ID-password pair with the subscriber ID of cellular phones. We realized a prototype system and prepared a questionnaire in order to validate the effectiveness of our proposed method, and as a result, we demonstrated the effectiveness and realizability of our method.

**Keywords**: authentication, cellular phone, identity theft, WBT, e-learning, ID-password

## Introduction

In distance learning, it is difficult to identify students because ordinal distance learning is asynchronous and the teachers themselves cannot monitor the students directly. The students who ask other students to perform their tasks may lend their ID-password pair; therefore, authentication by using this pair cannot effectively prevent intentional identity theft (other students perform a task instead of the specified student). Several papers have addressed the problem of secure authentication for web based training (WBT) (e.g., A design of authentication: E. Suzuki 2004; Security and privacy technologies: Lin et al., 2004; and Securing web-accessible information systems: Lavery and Boldyreff, 2001); however, their main objective is the security of the ID-password pair, and thus they provide no solution for intentional identity theft.

On the other hand, the use of cellular phones has gained popularity. According to an investigation, in Japan, 96.3% of university students and 86.6% of high school students have their own cellular phones (e.g., Cellular-phone use situation: Hakuhoudou 2004). This situation is the same in other Asian countries. Figure 1 shows that the Internet connection infrastructure of cellular phones is particularly advanced in Japan and South Korea (e.g., Information and communications in Japan: Ministry of Internal Affairs and Communications, 2005). The popularization of cellular phones is very rapid, and it is expected that almost 100% of students will have cellular phones in the near future.

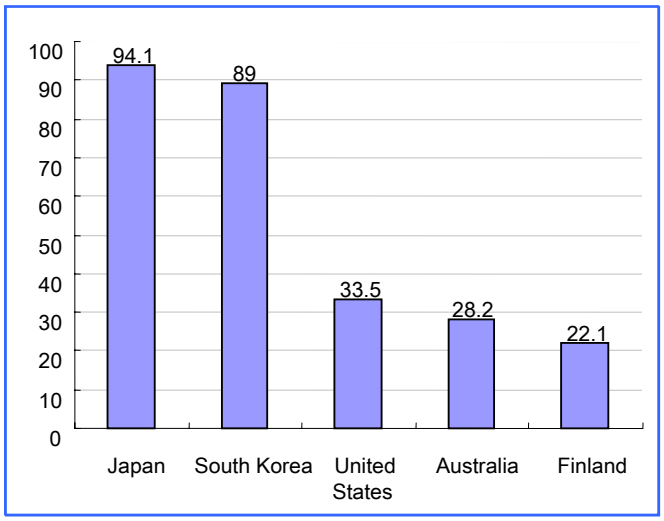



**Figure 1. Cellular Phone Internet Compatibility Rates in Leading Countries (September, 2004)**

It is very important to ensure that a student accessing the system is who he/she claims to be if the credits are to be given based on the WBT that uses this identification. Cellular phones are personal gadgets and lending them in order to ask other students to do their own tasks is supposed to be very rare; therefore, we propose a new authentication method based on cellular phones that has the following characteristics: (1) borrowing and lending authentication media is very difficult; (2) no additional hardware is needed; and (3) the burden is light both for the systems and users.

Min Wu proposed the cooperation of cellular phones and PCs to control the security of traffic through PCs (e.g., Secure Web Authentication: Min Wu et al., 2003). In this method, a randomly generated message is sent to both the target PC and the cellular phone from a security proxy server. By comparing these messages, users can trust the corresponding server. The purpose of his proposal is the confirmation of secure traffic and not user authentication.

However, this method uses SMS (short message service) or e-mail. In Japan, SMS cannot be received directly on PCs (SMS and internet e-mail use different technologies). Further, e-mail has variable latency. Therefore, immediate authentication, which is a major requirement of WBT, may become impossible.

Several authentication methods using cellular phones have been proposed and used (e.g., Enabling Pervasive Computing: George Roussos et al., 2005; Seeing-is-believing: McCune et al., 2005), but their main targets are the services on cellular phones. On the other hand, our target is WBT. In this paper, we propose an authentication method that uses cellular phones for WBT. The cellular phone is not an object of service, but is used as an authentication token.

In the next section we survey various authentication technologies and show the advantage of our method. This is followed by Implementation where we describe the sample implementation of and show the possibility of our method. Then we describe conclusions and future works.

# Authentication technology

## Authentication

We define authentication as follows: it is the identification of individuals using attributes that only the identified student knows or has. There are several authentication methods, as shown in Figure 2. All these methods have some merits and demerits; therefore, an adequate method will be selected based on the requirements for authentication.

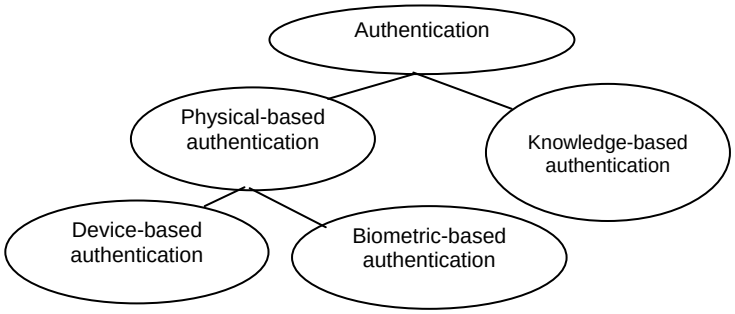



**Figure 2. Various Authentication Methods**

# Traditional Authentication methods and their Problems

Authentication by using the ID-password pair is knowledge based authentication and is the most popular authentication technique. The problem with knowledge based authentication is its dependency on the concealment of this pair. If students lend this pair to other students voluntarily, authentication can no longer be assured; further, easy and permanent lending is also possible. Q/A based authentication is a kind of ID-password authentication, but lending the Q/A pair to other students is also easy (e.g. Challenge-Question Systems: Mike Just, 2005).

E-mail based authentication using the e-mail account-password pair is also a variation of the ID-password authentication (e.g., Mobile technologies in the lecture room: Christian et al., 2005; and E-mail-based identification: Garfinkel et al., 2003). Illegal use of the ID-password pair can be controlled through e-mail to some degree and lending this pair is rare; however, e-mail lacks the real-time property.

Sharing the frequently used e-mail ID-password pair with the WBT ID-password pair is effective in the improvement of authentication accuracy. Typically, this sharing will be possible by using Lightweight Directory Access Protocol (LDAP), but this method includes some problems concerning platform dependent implementation architecture.

The alternative to using the ID-password pair is the use of IC cards, which is a kind of device-based authentication. It is very difficult to copy the contents from IC cards, and currently these cards are used for multiple purposes such as student ID cards and credit cards; therefore, students will hesitate to lend these cards. The main problem with IC cards is that special input devices are required, and this requirement tends to negate the main advantage of WBT: it is accessible anywhere and anytime.

Authentication by using biological information (e.g., User Authentication through Biometrics: Vaclav et al., 2003) is the most appropriate method for WBT (it is so for other purposes). The student to be identified must be present for the authentication. The most serious obstacle to this method is the cost. Special hardware and sampled data for each student are required. Authentication by using keystroke patterns is a kind of biometric based authentication, but the preciseness is not high (e.g., Learning to identify a typist: Nisenson et al., 2003; and A key to User Identification: Allen et al., 2004).

## Characteristics and Requirement for Authentication in WBT

As previously mentioned, authentication in WBT has different characteristics from that in other applications, particularly when WBT is used as a qualifying test. We clarify these characteristics as follows:

- Students intentionally lend authentication keys or media to other students who take the qualifying test in their place; thus, it should be difficult to lend the keys or the media.
- The main characteristic of WBT is that it should be accessible anytime and anywhere; therefore, it should not be essential to install any special media or software on the client machines.
- Authentication must be done simultaneously.

With the exception of the third one, the above mentioned characteristics are very special requirements for WBT; therefore, ordinal authentication methods cannot be used for our purpose.

## Authentication by Using Cellular Phones

As described in foregoing paragraph, ordinary authentication methods have several demerits; thus, we have proposed an authentication method that uses cellular phones. Authentication by using cellular phones has the following characteristics:

1. Each cellular phone contains a large amount of personal information and is used daily; therefore, lending it to other students, even for a while, is supposed to be rare.
2. Each cellular phone has a variety of distinctive information that can be used as authentication data.
3. Almost all students own cellular phones; therefore, no additional device is needed, and it is believed that distance learning with pervasive devices will become popular (e.g., Enhancing Synchronous Distance Education: Martin et al., 2001).
4. As current cellular phones have mail and web functionalities, no additional hardware and software, with the exception of authentication software, is required.

Therefore, authentication by using cellular phones satisfies our requirements.

The following information and/or data can be used for authentication: (a) telephone number, (b) sent and received e-mail data, (c) identification number for each cellular phone, (d) photo images by using the camera function, (e) location information by using the GPS function, and (f) real video by using the video phone function (the third generation cellular phones have this capability).

Some of these are already used in several applications, especially in pervasive computing (e.g., Enabling Pervasive Computing: George et al., 2005); however, we have proposed the use of this information in order to increase the preciseness of the authentication in WBT. Since this information is already contained in cellular phones, some combinations of this information are possible and its realization is not so difficult.

In order to confirm the effectiveness of the authentication by using cellular phones, we conducted questionnaire survey among 75 Japanese college students on “The information that you do not want to lend to other students in WBT.”

The first question is “Which media do you have the most resistance to lend in order to ask other student to do your homework instead of you?” Students are requested to select one of four choices: portrait, ID-password (for study portal sites including the ones for WBT), ID-card (student’s identification card), and cellular phone. Figure 3 shows the result of this questionnaire.

Portraits are used in face authentication, ID-cards in device-based authentication, the ID-password pair in knowledge-based authentication, and cellular phones in our proposed authentication method.

It is noteworthy that the percentage of students who have stated that they would not like to lend their cellular phones to others is the highest. On the other hand, a lower percentage would refuse to lend their ID-cards to others; therefore, the authentication by ID-cards is not effective in the prevention of identity theft.

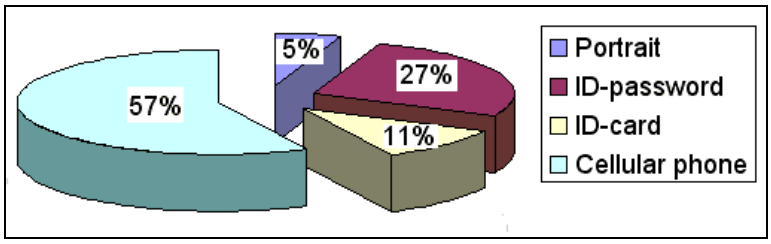



**Figure 3. Information that students do not lend to other students in WBT**

The next question is "How often do you use Internet?" Table 1 shows the answers that are classified according to the first question; for example, the fifth column shows the results of students who resist lending their cellular phones. This result reveals that the students dislike lending their cellular phones regardless of their Internet usage.

**Table 1**

**Relation to ratio of WEB access media and its frequency**

| | Portrait | ID-password | ID-card | Cellular phone | Sum |
|---|---|---|---|---|---|
| Often | 0 | 3 | 4 | 13 | 20 |
| Sometimes | 1 | 8 | 3 | 17 | 29 |
| Few | 2 | 9 | 1 | 11 | 23 |
| Never | 1 | 0 | 0 | 2 | 3 |
| Sum | 4 | 20 | 8 | 43 | 75 |

The next question is "How much do you dislike lending each media in order to ask other students to do your homework?" Table 2 shows the results of this question. In this case, the refusal rate of ID-password is as high as that of cellular phones. This is because the ID-password pairs are shared between WBT and e-mail in our university. If different accounts are used, the refusal rate of ID-password will not be so high.

**Table 2**

**The Degree of which students refuse to lend others each item (%)**

| | Portrait | ID-password | ID-card | Cellular phone |
|---|---|---|---|---|
| Refusal | 20 | 51 | 29 | 59 |
| Resistance | 16 | 17 | 24 | 20 |
| Unpleasant | 24 | 20 | 28 | 16 |
| No problem | 40 | 12 | 19 | 5 |

Table 2 also shows that students strongly dislike lending their own cellular phones to others. This is confirmed by the fact that "Refusal" has the highest percentage while "No Problem" has the lowest percentage.

Moreover, I emphasize that there is no resistance in lending others a portrait. Therefore, face authentication is not effective if portraits are used instead of real face images.

A large number of students stated that a reason for refusing to lend their own cellular phone is that personal mailing information, addresses, etc., are preserved in the phone.

This answer can be further classified into the following two categories.

- Because a large amount of their **own personal information** is included
- Because a large amount of personal **information of their friends** is included

The students who believe that the personal information preserved in cellular phones includes information about their friends show stronger rejection. We introduce other answers in order to show how students think about cellular phones

- Students feel uneasy about situations in which they are without their cellular phones.
- Students do not like that others use their own cellular phones inappropriately.
- While students have lent others their cellular phones, it will be a problem if they receive a telephone call.

These reasons confirm the fact that it is difficult for students to lend their cellular phones to others.

Cellular phones contain a lot of personal information. This personal information is not protected as in the case of the data in IC cards within cellular phones. This is one of the main reasons why students dislike lending others their own cellular phones. Therefore, cellular phones are suitable for use as an authentication token.

## Implementation

There are several possibilities in our method, and as a first step, we have implemented the authentication tool by using the identification numbers of cellular phones (subscriber ID) in order to validate the realizability and effectiveness of our method.

### Acquisition of identification number

We can acquire the subscriber ID of a cellular phone by using the active server pages (ASP) in a WWW server. In the case of Docomo and Vodafone in Japan, we can acquire the subscriber ID as the value of an environment variable "HTTP_USER_AGENT" by adding a "utn" attribute in the "a" tag, as shown in Figure 4.

```
<html>
<head>
<title>Authentication</title>
<head>

<body>
<p><a href="default.asp" utn>Click Here!</a>
</p>
</body>
</html>
```

**Figure 4. Sample Implementation of index.html**

```
<html>
<head>
<title>Results</title>
<head>

<body>
<p>
<%
Response.Write(Request.ServerVariables("HTTP_X_UP_SUBNO"))
Response.Write(Request.ServerVariables("HTTP_USER_AGENT"))
%>
</p>
</body>
</html>
```

**Figure 5. Sample Implementation of default.asp**

As shown in Figure 4, the "a" tag augmented with the "utn" attribute is described in index.html. By using the linked ASP, as shown in Figure 5 (in this case, the WWW server is Microsoft IIS), we can extract the value of the specified environment variables. When we access this file with a cellular phone using the NTT Docomo service, we will get the message

"DoCoMo/1.0/D503iS/c10/serNMIUA224231"

The string "serNMIUA224231" is the subscriber ID.

During authentication, these values are first stored as personal data for each student, and after that, these values will be checked against the data that is stored previously for each student. However, the user is able to prevent his/her own subscriber ID from being sent. If the system cannot obtain the subscriber ID, the system needs to ask the users to send their subscriber IDs.

### Authentication in WBT

First, it is necessary to register the subscriber ID in the server in order to use the cellular phone for authentication. The registration flow of our method is as follows (Figure 6). The student accesses the web page for registration with the cellular phone.

1. The server asks for the student's (ID, password) pair.
2. The student inputs his/her (ID, password) pair.
3. If the (ID, password) pair is correct, the server collates and stores the subscriber ID of the cellular phone in the authentication database.
4. If the ID is new, the system stores it in the database.

5. The server sends the cellular phone URL on the web page for authentication.

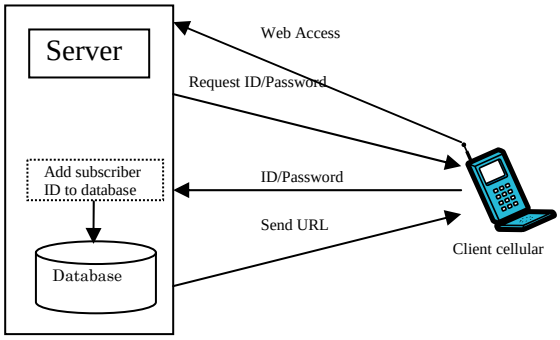



**Figure 6. Registration Flow for authentication**

The authentication flow of our method is as follows (Figure 7).

1. The student accesses the web page of a WBT server.
2. The server asks for the student's (ID, password) pair.
3. The student accesses the specified URL by using his/her own cellular phone. (Sequences 1–2 and 3–4 may not be in this order.)
4. The server checks the acquired subscriber ID against the stored ID. If the check is successful, the server sends the message "OK" to cellular phone and admits the current access for a specified time. (This action is very similar to that of POP before SMTP.)
5. During this specified time, the student inputs his/her ID-password pair.
6. If the ID-password pair is correct, a target web page is displayed.
7. The student starts learning by using this server.
8. After the authentication is completed, the session management or the cookie may use this authentication.

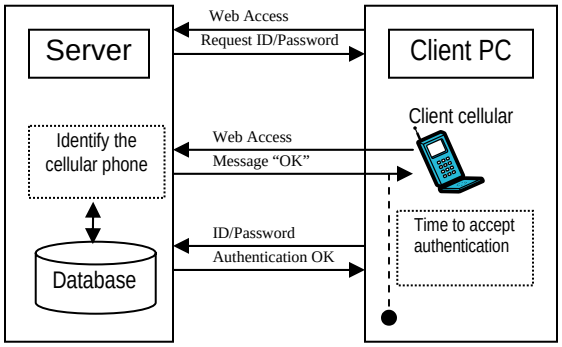



**Figure 7. Authentication Flow in WBT**

## Evaluations

We have implemented the authentication tool based on the above mentioned flow in order to validate the reliability of our method.

Several students used our tools, and they took about 15–20 s to complete the authentication process. This is a little longer than the time taken in the method using ID-password pair. However, students believe that the system that uses the ID-password pair demands more personal information; therefore, our method is valuable for the prevention of identity theft from a psychological point of view.

The authentication procedure becomes a little complicated when compared to the ordinary ID-password authentication method; therefore, if frequent authentication requests are needed, our method becomes cumbersome. This problem can be resolved by increasing the effective period of authentication by using cookies. For instance, when the student first uses the cellular phone for authentication, the authentication information is stored in a cookie on the PC. The server does not demand authentication from the cellular phone for the period during which the cookie is effective.

## Conclusion

In this paper, we have proposed a new authentication method by using cellular phones and have shown its realizability by prototype implementation. The authentication accuracy will be improved, and the advantage of WBT, that is, it can be used everywhere, will be preserved. The results of the questionnaire suggest the possibility of preventing spoofing by using the token value of cellular phones. It is possible to use a combination of the information on several individuals to increase the accuracy of authentication.

One important problem that cannot be resolved yet is how to ensure that a student takes an examination alone without any support from other students. If a student and his/her support person coexist and the same student performs the authentication, our method will have no effect. It is difficult to solve this problem. However, the integration of our method and the usage of cameras can improve this situation.

The second problem is the possibility that a user buys a cellular phone for an illegal attestation. It is possible to solve this problem by recording the position when attesting it by using the GPS function of the cellular phone. We are advancing our research on the method of identification by using photographs and the GPS function.

Nevertheless, the current version of this method has proven to be effective based on the results of the questionnaire. The authentication that combines the cellular phone with the ID-password pair is notable.

## References

E, Suzuki. (2004). A design of authentication system for distributed education, *in Proceeding of 5th ITHET International Conference, May-June 2004,66-71*.

Hakuhodo. (2004). Cellular-phone use situation investigation from teen-ager to 30-something in *http://www.hakuhodo.co.jp/news/pdf/20040319.pdf* (in Japanese, retrieved November 12, 2005)

Just, Mike. (2004). Designing and evaluating challenge-question systems. *IEEE Security & Privacy, September–October 2004, 2,* (5), 32–39.

Lavery, J, & Boldyreff, C. (2001). Securing Web-accessible Information Systems within higher education institutions. *Proceeding of WETICE*, Cambridge, MA, USA.

Lin, N. H., Korba, L., Yee, G., Shih, T. K., Lin, H. W., Nigel, H. L. (2004). Security and privacy technologies for distance education applications. *AINA 18th International Conference 580-585 Vol. 1*

Matyas, V, Jr., & Rish, Z. (2003). Towards reliable user authentication through biometrics, *IEEE Security & Privacy, May–June 2003, 1,* (3), 45–49.

Mauve, M., Schelle, N., &Geyer, W. (2001). Enhancing synchronous distance education with pervasive devices, *Proceedings of Informatik,* Wien.

McCune, J. M., Perring, A.Reiter, &M. K. (2005). Seeing-is-believing: Using camera phones for human-verifiable authentication. *Security & Privacy IEEE Symposium, May 2005, 110–124.*

Ministry of Internal Affairs and Communications. (2005). *Japan: Information and Communications in Japan*, 2005, *http://www.johotsusintokei.soumu.go.jp/whitepaper/eng/WP2005/2005-index.html* (retrieved February 5, 2006)

Mordechai, N., Ido, Y., Ran, E., & Ron, M. (2003). Towards behaviometric security systems: Learning to identify a typist. *Proceeding of 7th European Conference on Principles and Practice of Knowledge Discovery in Databases* , Cavtat-Dubrovnik, Croatie 2838, 363–374.

Peacock, A, Ke, Xian, &Wilkerson, M. (2004). Typing patterns: A key to user identification, *IEEE Security & Privacy, September–October 2004, 2(5),40–47.*

Roussos, G, Marsh A. J. &Maglavera, S. (2005). Enabling pervasive computing with smart phones, *IEEE Pervasive Computing, April–June 2005, 4, (2), 20–27.*

Simson, Garfinkel, L. (2003). Email-based identification and authentication: An alternative to PKI, *IEEE Security & Privacy Magazine, November–December 2003, 1, (6), 20–26.*

Wattinger, C, Kern, C, Guggisberg, M, & Burkhart, H. (2004). Mobile technologies in the lecture room: Techniques and case study, *in Proceeding of 6th ICNEE,* Neuchatel, Switzerland.

Wu, M., Garfinkel, S., &Miller, R. (2003). Secure Web authentication with mobile phones. *Proceedings of Student Oxygen Workshop*, Cambridge, MA, USA.

## About the Authors

**Hideyuki Takamizawa**

**Hideyuki Takamizawa** is a graduate student and Ph.D. Candidate at the Shinshu University in Japan and an IT engineer with the Graduate School of Law at Hitotsubashi University in Japan. His areas of research interest are authentication and distance learning.

Hideyuki Takamizawa
Graduate School of Science &Technology, Shinshu University
4-17-1 Wakasato, Nagano, 380-8553
JAPAN

E-mail: jetta@law.hit-u.ac.jp

**Kenji Kaijiri**

**Kenji Kaijiri** was received the B.E., M.E., and Dr. Eng. Degrees from Osaka University, Japan, in 1972, 1974, and 1977 respectively. He Joined Shinshu University in 1977, and is currently Professor of Faculty of Engineering. His areas of research interest are software engineering and distance learning. He is a member of the IPSJ Japan, IEEE, and ACM.

Kenji Kaijiri
Graduate School of Science & Technology, Shinshu University
4-17-1 Wakasato, Nagano, 380-8553
JAPAN

E-mail: kaijiri@cs.shinshu-u.ac.jp

**Editor's Note**: Communication models are sometimes useful in instructional design and in diagnosing learning problems that are communication based. This paper explores the role of common "fields of experience" for clear communication and effective learning. Different experiential backgrounds between teacher and student, and among students, pose design and delivery challenges, especially when working with multi-cultural and global communities of learners. The role of feedback and interaction are increasingly important to clarify communication and meaning.

# Communication: The Gateway to Online Instructional Environments

**Karen Smith-Gratto**

**USA**

## Abstract

Universities are increasing the number of courses that are offered via the World Wide Web. On-line courses offer opportunities for both universities and students. Consideration for how to make the on-line learning environment meet the needs of the students is essential. Student isolation, the need for clarity of learning materials, precision descriptions of learning activities, and the importance of interaction to quality on-line learning have been identified as problems with on-line learning environments. This article shows how a communication model modified by the author is a unifying factor to tie elements such as instructional design principles, learning theory, and visual design principles to create more effective web-based learning environments.

**Keywords**: online learning, web-based courses, e-learning, communication theory, online course design, field of experience, feedback, instructional design, online teaching, online delivery, communication

## Introduction

Each generation strives to pass on the knowledge, skills, and dispositions that, within that society are felt to best prepare the next generation for survival and hopefully a more enriched future. Each generation has moved to improve not just what is known, but how to pass new knowledge and the accepted traditional knowledge to our youth. Over time changes in tools and methods for educating the next generation occur, but the need for clear communication between the instructor and the student remains. Ensuring clear communication is essential when creating online learning environments. Current research in on-line environments supports concern about communication issues that include: how the materials are designed for clearly communicating content, instructor feedback to students, and student isolation (Lichty, 1997; Schweizer, Whipp, & Hayslett, 2002; Valentine, 2002; Mupinga, Nora, & Yaw, 2006). While new educational paradigms do and will continue to emerge, we must keep true to the central core of what educating the next generation has always involved – communication. While communication is the focus of this discussion, no discussion of learning environments is complete without consideration of other elements that contribute to creating learning environments, such as learning theory, instructional design, visual design, and user interface design.

In order to examine the design and delivery of online learning environments, the Schramm communication model (Schramm, 1954) was modified by the author. Elements within the modified model can be used to provide insights into problems with online course design and delivery and provide guidance for improvements. Through the use of the modified model, connections to theory and practical applications will be discussed.

One element of the Schramm model (Schramm, 1954) that is essential to the understanding of the educational communication process is the "field of experience" of both the original sender (in our case the instructor) and the receiver (student).

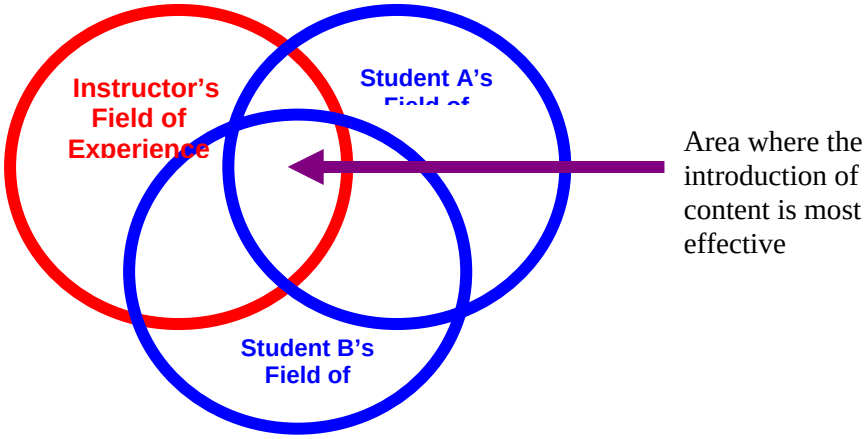



**Figure 1. Fields of Experience**

Figure 1 shows the fields of experience of an instructor and two students. Two students are used to represent a class so that communication between students can be accounted for within the educational process. All on-line course participants have experiences that are not shared and this can cause problems with communication. The area indicated by the overlap is the area in which the introduction of new content and skills must be addressed if the communication process is to succeed. The area where the instructor's and the students' fields of experience overlap is the ideal area in which to begin instruction.

Attending to the existing knowledge of the learner is supported by cognitive theory because students learn better when prior knowledge is accessed (Bruner, et. al., 1954; Wilson & Anderson, 1986; Hannafin & Hooper, 1993; West, et. al., 1991; Shapiro, 2004; Clarke, et.al., 2005). Instructional design also reinforces the need to consider what students know. According to many instructional design models the characteristics of students must be analyzed (Kemp, Morrison, Ross, 1991; Smith, & Ragan, 1999). This analysis can aid in determining what prior knowledge the learners can be expected to possess and help in the design of materials for the on-line course that are most likely to tap into prior experience and knowledge.

As can be seen the threefold approach of communication, learning theory and instructional design support the contention that what the learner knows should be used to design and mediate on-line learning environments. Since most programs have standards, design sometimes starts with objectives without consideration for the learners' prior knowledge. The lack of consideration for what students bring to the learning environment can be detrimental because the design of the messages will result in materials that confuse rather than illuminate the intended message.

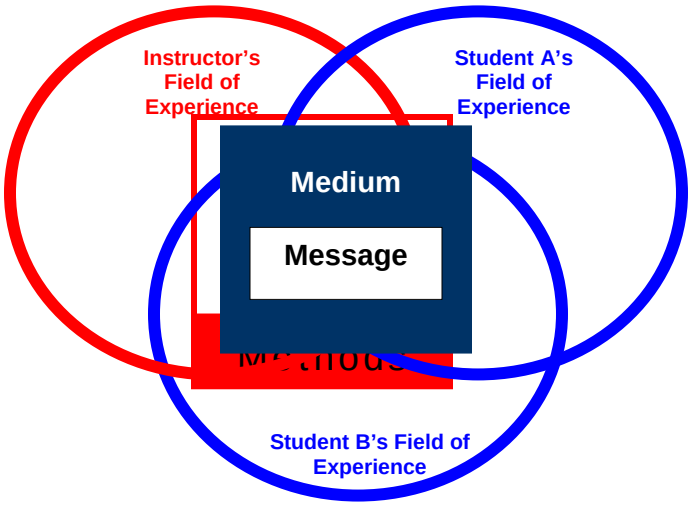



**Figure 2. Message, Medium, and Method**

We further develop our discussion of the model in Figure 2. This graphic is used to illustrate the placement and relationship of the medium, message and methods used within the instructional environment. In discussing these aspects we will begin with the placement of these elements within an overlapping section of the designer's/instructor's field of experience and the students' fields of experience. If the placement of the message is only within the instructor's field of experience, student confusion is the result. For example, when students are new to a content area and an instructor uses specialized terms or jargon without explanation students often become lost because they have no experience on which to pin the new terms and concepts. For the best instruction to occur the introduction should begin in the overlap area and move from the area of mutual experience to within the instructor's field of experience. This concept is important when designing materials for web-based courses as part of the course design should work toward expanding the overlap between the instructor's and students' fields of experience over time.

Some practical steps can be taken to incorporate what students know into the design of the on-line course. First, when we design on-line courses it would be ideal if we could survey students who plan to take the course before we begin course design. This is not usually possible but we can make some assumptions about individuals who would be taking the course under design. Generally, there are common cultural experiences, language, and so forth. Of course, there will be exceptions, but the general design of the course can go forward based upon the general experiences students are expected to possess. These experiences can be used to inform the basic design. However, most of us will have students that do not fit the general model and we can design additional experiences in the online environment to help those students when needed during course delivery.

Here is an example of how materials (for an online course) were designed based upon past on-campus experience with students who took a multimedia development course. In prior on-campus courses, the majority of students had used a cassette recorder but had not connected one to a computer. As a result of prior classes, the author provided online students with photographs of the back of computers and circled appropriate places to connect the cassette recorder. In addition, photographs of plug endings were provided and possible differences between computers were discussed. The primary goal was to create a digital file from an analog source (the cassette player)

not connect a recorder to a computer. However, based upon the expected experience of the students, connections between what they knew (experience with cassette players and headphone use) and what they were expected to learn and be able to do (create a digital audio file from an analog audio source) needed to be provided. In this case, the author started with the cassette player and computer since there was a high probability that all students had experience with both. The underpinning for connecting the equipment and completing the assignment started with the familiar and led the students through digitizing the analog sound from the tape (which was one of the objectives of the unit).

There will be times that we misjudge what the students' experiences are and will need to adjust the course materials. When students indicate confusion through communications to the instructor or through poor performance, it is important to discover where the materials have missed the overlap with the designer/instructor's field of experience and the students' fields of experience. The knowledge about this gap can be used to help students and prepare future materials to include within the course.

The message or content information is carried by some medium, such as text, graphics, audio, animation, or video. Figure 2 shows the placement of the message within a delivery medium. The "Medium" within the model also needs careful consideration because poorly designed materials can hinder student learning (Rieber, 1994). In order to make sure that the media used conveys the message we wish students to come away with we need to consider visual and user interface design. These elements can impact the clarity of communication.

Visual design principles and the laws of perception found in Gestalt theory can be used to help guide the creation and use of on-line text, graphics, audio, animations, and video. The use of Gestalt theory can help create screens that make the presentation easier for students to decipher so that the presentation does not hinder the ability of the student to interpret the instructional information (Smith-Gratto & Fisher, 1998-1999). The laws of perception provide the following guidance for better instructional screen design: clearly differentiated background and foreground elements; the use of simple fonts and graphics (more complex graphics are used when appropriate); placing elements that illuminate each other close together; the use of proximity to make elements such as text identifiers for graphics more easily understood; creating visuals that are balanced and have a sense of symmetry; and the elimination of ambiguous lines or visual elements that can distract the learner. Knupfer (1994) explains differences between print media and the computer screen and that the structure of the visual on the computer screen impacts student learning.

According to Knupfer (1994) the elements on the computer screen must work together as a whole (similar to Gestalt theory applied to the computer screen). Text should be limited on the screen and usually consist of both upper and lower case letters. Font size must take function and audience into consideration. Use of appropriate graphics also needs to consider function within the learning environment. As with Gestalt theory, use of simple line drawings is preferable to complex graphics. When complex graphics are needed then there should be a gradual building of the graphic to lessen cognitive load during the learning process. Student understanding of graphics is impacted by culture, age and level of visual literacy of the viewer. Color can be used to help cue the learner about the emphasis on certain concepts and words or phrases (Krupfer, 1994). While Krupfer (1994) suggests that animation only be used to enhance learner understanding, Reiber (1994) suggests that using graphics or animations for motivational purposes is also appropriate. While these give some idea of what to consider, these are by no means all of the elements that can contribute to the clarity of the on-line materials.

Screen design is also impacted by elements of the user interface design. Danielson, Lockee and Burton (2000) state that instructional design is not enough when creating on-line courses and that

the designer needs to consider how user-friendly the navigational and student interaction elements are. They suggest creating a detailed design that takes the screen appearance, buttons, and menus and so forth into consideration. When planning the user interface, they suggest making sure that the interface is "unambiguous." In this instance, the screen design and user interface can be seen as part of the communication process, in that poor design can hinder or act as noise within that process. The on-line learning environment can be improved by seeing how we can make the communications easiest for students to access through the thoughtful use of visual design and user friendly interface and by making sure that the message is clearly articulated through the use of appropriate media and learning theory based activities.

The last element in Figure 2 that needs to be addressed is Method. In the online environment, the methods of instruction and learning activities are placed within the context of the media and message. The attention to the medium and the construction of the message are perhaps the most problematic within the on-line environment because not only are students interacting with information but the ultimate goal is for students to develop knowledge and skills. While the clear communication of the information is essential, online educational environments can be improved by including the use of learning theory and instructional design principles. The scope of this article does not allow an exhaustive examination but some brief discussion can provide insight into the use of learning theory and instructional design.

Learning theory and instructional design principles can be used to inform how the materials and assignments are structured, how materials are presented and activities designed (Leflore, 2000; Smith-Gratto, 2000). Leflore (2000) gives the following guidelines when the designer is implementing cognitive theory: provide an organized structure; use concept development activities; use activities that trigger students' prior knowledge; and use motivational and instructional graphics. When implementing constructivist theory, Leflore's suggested guidelines include: use activities in which learners construct meaning from the material given; use activities that require communication; and provide problem-solving activities. Combining learning theories when designing activities can address different types of objectives (Smith-Gratto, 2000). Oliver and Herrington (2000) provide guidelines for designing web-based situated learning environments. In each of these instances specific details are given that can help the course designer and/or instructor provide appropriate activities based upon the goals and objectives addressed within the course. While all of these provide concrete activities and suggestions for materials design, it must be noted that if the content information and the directions for activities are presented in ways that do not connect to the students' fields of experience with the content knowledge, the implementation of learning theory will have little effect because students will not understand the material or the directions.

So far we have explored the field of experience, message, medium, and method but have not looked at the interactive nature of both the learning and communication processes. In web-based environments students and instructors are physically separated and this is perhaps part of the reason, distance students have historically expressed feelings of isolation (Rendon, 2001; Bocchi, Eastman, & Swift, 2004). So far our communication model does not address who is sending the message and who receives the message. In figure 3, the red lines show the flow of initial communications from the instructor to the students and the blue lines show the flow of initial communications from the students to the instructor and each other.

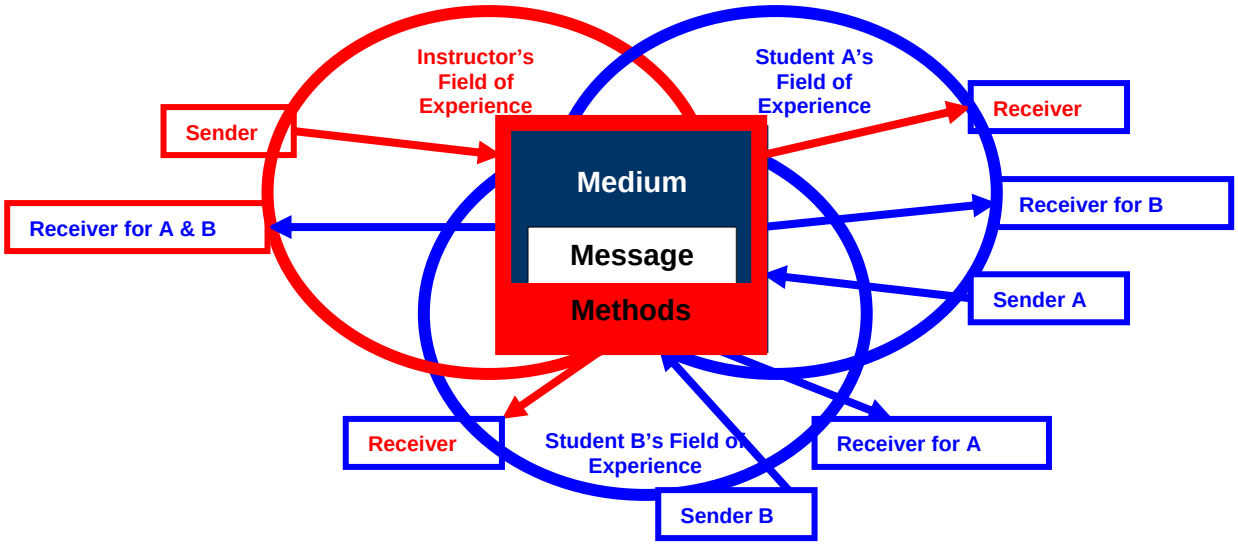



**Figure 3. Senders and Receivers of Initial Messages**

Notice the process so far appears linear with no feedback from the instructor to the students or visa versa. This means that misunderstandings can occur. Initial communication from the instructor includes but is not limited to the on-line course materials. Suppose that the student begins interacting with the course materials and completes activities but does not receive any information about the work back from the instructor. Let us further assume that the student has no contact with other students. Some students may actually complete the course but others will not. Just as Rendon (2001) states the students will feel isolated. The author is particularly aware of this because before the days of computers, she took a "correspondence course" and was sent packets of information and was required to return assignments via the mail. The author sent in the first few assignments and would receive a new packet each time. Not once was any information about completed assignments received. Motivation for the course waned and the course was never completed. We can explain this in terms of Vygotsky (1978) who theorized that learning was enhanced through social interaction. Basically on a personal level, feelings of isolation were experienced because no interaction occurred between the learner and the instructor. The social interaction, which according to Vygotsky (1978) provides support for learning was missing. Just as the author felt this "humanity gap" so too do many on-line students when there is no feedback to their questions or assignments.

In the above example, initial communications in the form of course materials were received. Feedback from the student in the form of assignments was provided. There communication broke down as the student did not receive feedback from an instructor. The student lacked an external measure by which to gage learning because there was no social interaction to provide confirmation or correction to what was being studied and hopefully learned. As novice learners, many students will become discouraged by the "humanity gap." Mutual communication is important, not just to keep students from being isolated but in order to help students refine their understanding of the content. The next part of our communication model shows the interaction element within the process.

In Figure 4, feedback to the initial messages is added (the dashed lines indicate the "feedback loop" between individuals within the communication process). Through feedback we can find out what students do not understand, the misjudgments we may have made with regard to the

students' fields of experience, and the areas of the on-line course that are working. What is important to keep in mind is that the exchange that occurs through feedback can help student learning. When students participate in an on-campus course, there are discussions with peers and the instructor. The informational exchanges help the student refine thinking. Social interaction contributes to what individuals learn (Vygotsky, 1978; Wertsch, 1998). When students have materials but no or little communication from the instructor or other students, no true social interaction occurs. Unlike the old correspondence course in which most communication occurred through postal services, the on-line course environment offers a variety of ways to communicate with all members within the course. E-mail and discussion boards can help alleviate both the problem of isolation and the challenge to help students refine their understanding. Steps can be taken to help bridge the "humanity gap."

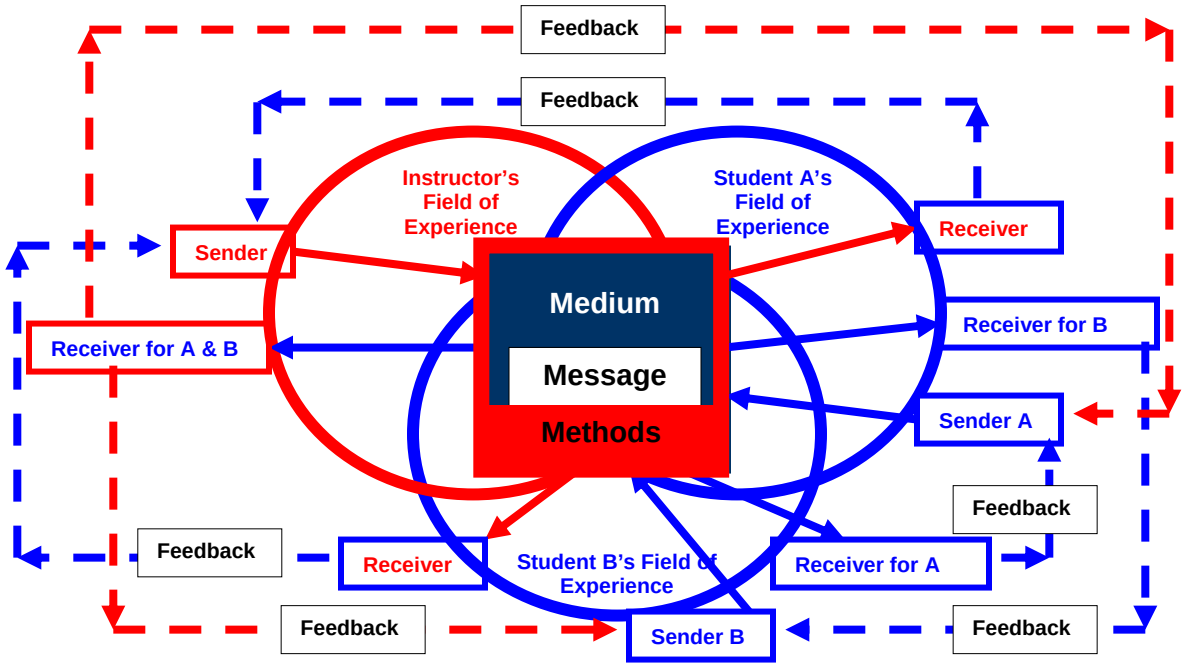



**Figure 4. Modified Communication Model**

The first way to bridge the humanity gap is to state in your course policies how often you plan to check and respond to e-mail, then do so during the course. If you know you will be unable to check your e-mail over a certain period of time be sure to inform students. By telling students this information, you establish a line of clear communication. In this manner students know that if they have sent an e-mail and you haven't answered it by a certain time (say within 24 hours) that you may not have received the e-mail and that they need to resend. In order for this to work you must make sure that you keep to the schedule that you established in your course policies.

Another way to bridge the humanity gap is to make sure that students receive feedback in a timely manner. The feedback needs to include more than a grade. First the additional information provides an element of social mediation as mentioned earlier and lets the students know you are aware of the strengths and weaknesses of the work they are doing. Comments about what is good and what is weak about assignments helps the students feel individually recognized while at the same time providing mediation that leads to a common social construction of the content under

study. In order to add a human element to the feedback responses the author will sometimes include emoticons which are "visual cues formed from ordinary typographical symbols that when read sideways represent feelings or emotions" (Rezabek & Cochennour, 1994, p. 371) [example of emoticon is :-) ] to indicate that the tone is not angry. This is mentioned because when we verbally correct students' work in an on-campus class they can hear our voice tone and see our facial expression, but on-line these clues are not apparent. The author was contacted by a student who indicated that she thought that the feedback provided showed anger toward her. While the author thought that the comments were clear and not angry or negative sounding, the student interpreted the feedback provided in a "harsh" tone of voice. After that the author began to use emoticons to soften the tone of criticisms about student work. Another technique that has proven popular with students is the use of animated gifs in e-mail when sending students feedback about outstanding or interesting work or as an encouragement. A few times students have sent back an e-mail stating that the animations had arrived when they were discouraged and the resulting feeling upon receiving the animation cheered them and helped motivate them to continue. The need for the instructor to communicate with students one on one to provide feedback is not the only communication that is important within a course.

The dialog that occurs between the instructor and student(s) is only one type of communication that acts as a mediating factor in the learning process. Social construction and helping the students feel a sense of community can be addressed through the thoughtful use of discussion boards (sometimes called threaded discussions). Provisions should be made in the course for both content and non-content related discussions.

The communications between and among students also serves to help students refine their understanding of the content through communication. Many theorists and researchers support the position that the understanding individuals construct is refined through interaction with others as a community of practice or through discussion (Vygotsky, 1978; Moore & Marra, 2005; Karagiorgi & Symeou, 2005). Most online instructors set up discussion boards for student participation, however, there are ways to improve and insure student participation. The use of open-ended questions on discussion boards creates a parallel for the whole class discussion that occurs on campus. While on-campus, some students may remain quiet; in on-line classes, we can structure the discussion so that all students must participate. This is in my opinion, an improvement over in-class campus discussions because all students participate, not just the vocal few. The author requires participation in on-line classes and grades for participation and randomly selects discussions for "quality" grading (which simply means that students must use statements that show more thought than "I agree with Mary."). There are other ways to view formally assigned discussions in the online environment.

Moore and Marra (2005) found that the way discussion protocols are set-up impact student participation and the type of learning that occurs. As a result of their research Moore and Marra (2005) suggest that the objectives for discussions be taken into consideration and different protocols be established for different types of objectives. Formal discussions are only part of what can be done to build a sense of community among students and help students mediate their understanding of what they are learning.

In the on-line environment it is possible to create not just a place to clarify content understanding through social interaction but to actually create a sense of community. Open free discussion forums can also be used to help students feel that they are part of a community, rather than isolated individuals. In the author's classes, this is called the "Student Lounge" and students may discuss any topic. Students are told that the Student Lounge is a place where they can have the conversations that would take place before and after class or at other times if they were physically meeting on campus. Each class develops its own student lounge character. Not only do students share and clarify their understanding of the course content, they get to know each other as

individuals. The web-based course is a vast improvement over the old text based correspondence course because there are so many ways to address and deal with student isolation. Group communication is not the only element of communication that must be considered in the online environment.

As we all know, even when everyone else understands the content taught, one student in a class can have difficulty with that content. When one student is involved in the communication gap, one–on-one communication can be used. However, general announcements, e-mails, or additional course materials can and should be added when it becomes apparent that there are many students who did not understand or learn from the original materials. In addition, instructors can include the immediacy of the chat room to have a set time in which students can confer with the instructor as a class. Some instructors are also using "instant messaging" and toggle AIM or other instant messaging accounts on when they are available for student questions. When a question arises, be it within the student lounge, through an individual email message, phone call, or instant messaging the author creates a general announcement so that all students experiencing confusion can benefit from the explanation. Sometimes materials within a course may have been used for several semesters before a group expresses confusion and that confusion may be unique to that group. Regardless of whether the problem shows up in a newly designed course or one that has been taught for several semesters, confusion indicates a break in the communication process and must be addressed. The method of addressing the break (chat, email, announcements) is less important than making sure student understanding is mediated until clarity has been achieved.

Communication between individuals can be fraught with peril. Each of us has developed a unique view shaped by who we are and our life experiences. Even when we are from the same culture, differences in experiences can result in misunderstandings that can hinder student growth. The online environment requires that we take a closer look at the communication process and consider how our design will impact how well students will understand what is under study. Once the course is designed and students are interacting with the materials, gaps in fields of experience may emerge. Understanding that gap can help us improve the communication of content to students both at that time and in future renditions of the course. Our understanding of feedback within the communication process can contribute to the development of shared meanings among our students and ourselves and help us understand the importance of providing students with more than just grades for work done. Taking communication into consideration when we design and when we deliver online courses can improve the experiences of our students and ourselves.

## References

Bocchi, J., Eastman,, J. .K., & Swift, C. O. (2004). Retaining the online learner: Profile of students in an online MBA program and implications for teaching them. *Journal of Education for Business,79*(4), 245-253.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. (1956). *A Study of Thinking.* 3rd ed. New York: John Wiley & Sons, Inc.

Clarke, T., Ayres, P., Sweller, J. (2005). The impact of sequencing and prior knowledge on learning mathematics through spreadsheet applications. *Educational Technology Research and Development, 53*(3), 15-24.

Danielson, Jared, Lockee, Barbara, & Burton, John. (2000). ID and HCI: A marriage of necessity. In Beverly Abbey (Ed.) *Instructional and Cognitive Impacts of Web-Based Education.* (pp. 118-128) Hershey, PA: Idea Group Publishing.

Hannafin, Michael J., & Hooper, Simon R. (1993). Learning Principles. In Malcolm Flemming & W. Howard Levie (Eds.), *Instructional Message Design: Principles from the Behavioral and Cognitive Sciences.* (pp. 191-231). Englewood Cliffis, NJ: Educational Technology Publications.

Karagiorgi, Y., & Symeou, L. (2005). Translating constructivism into instructional design: Potential and limitations. *Educational Technology & Society, 8*(1), 17-27.

Kemp, Jerrold E., Morrison, Gary R., & Ross, Steven M. (1998). *Designing Effective Instruction.* (2nd ed.). Upper Saddle River, NJ: Merrill.

Knupfer, Nancy Nelson (1994). Computers and visual learning. In David M. Moore and Francis M. Dwyer (Eds.) *Visual Literacy: A spectrum of visual learning.* (pp. 209-231). Englewood Cliffs, NJ: Educational Technology Publications.

Leflore, Dorothy. (2000). Theory supporting design guidelines for web-based instruction. In Beverly Abbey (Ed.) *Instructional and Cognitive Impacts of Web-based Education.* (pp. 102-117). Hershey, PA: Idea Group Publishing

Lichty, Patrick. (1997). *Information, Institutions, Society and the New Media.* (Paper presented at the Annual Joint Meetings of the Popular Culture Association/American Culture Association, San Antonio, TX, March 26-29, 1997). (ERIC Document Reproduction Service No. ED 409 591)

Moore, J.L. & Marra, R. M. (2005). A comparative analysis of online discussion participation protocols. *Journal of Research on Technology in Education, 38*(2), 191-212.

Mupinga, D.M., Nora, R.T., Yaw, D.C. (2006). The learning styles, expectations, and needs of online students. *College Teaching, 54*(1), 185-189.

Rendon, Marie Egbert. (2001). *Pitfalls and Success of Distance Learning.* (Paper presented at the National Institute for Staff and Organizational Development (NISOD) Conference (Austin, TX, May 27-30, 2001). (ERIC Document Reproduction Service No. ED 464 699

Rezabek, Landra L., & Cochenour, John J. Emoticons: Visual Cues for Computer-Mediated Communication. In *Imagery and Visual Literacy: Selected Readings from the Annual Conference of the International Visual Literacy Association (26th)* Tempe, AR. October 12-16, 1994, 371 – 383. (ERIC Document Reproduction Service No. ED 380 096

Rieber, Lloyd P. (1994). *Computers, Graphics, and Learning.* Madison, WI: Brown & Benchmark.

Schramm, Wilbur. (1954). How communication works. In W. Schramm (Ed.), *The process and effects of mass communication.* Urbana, IL: University of Illinois Press.

Schweizer, Heidi, Whipp, Joan, & Hayslett, Carrianne. (2002). Quality control in online courses: Using a social constructivist framework. *Computers in the Schools, 19* (3/4), 143-158.

Shapiro, A.M. (2004). How including prior knowledge as a subject variable may change outcomes of learning research. *American Educational Research Journal, 41*(1), 159-189.

Smith, Patricia L. & Ragan, Tillman J. (1999). *Instructional Design.* Upper Saddle River, NJ: Merrill.

Smith-Gratto, Karen. (2000). Strengthening learning on the web: Programmed instruction and constructivism. In Beverly Abbey (Ed.) *instructional and Cognitive Impacts of Web-Based Education.* (pp. 227-240). Hershey, PA: Idea Group Publishing.

Smith-Gratto, Karen, & Fisher, Mercedes M. (1998-1999). Gestalt theory: A foundation for instructional screen design. *Journal of Educational Technology Systems, 27*(4), 361-371.

Valentine, Doug. (2002). Distance learning: Promises, problems, and possibilities. *Online Journal of Distasnce Learning Administration V(III)*, Retrieved January 26, 2003 from: http://www.westga.edu/~distance/ojdla/fall53/valentine53.html.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* (Michael Cole, Vera John-Steiner, Sylvia Scribner, and Ellen Souberman, Eds.). Cambridge, MA: Harvard University Press.

Wertsch, J.V. (1998). *Mind as action.* Oxford: Oxford University Press.

West, Charles K., Farmer, James A., & Wolff, P. M. (1991). *Instructional design: Implications from cognitive science.* Englewood Cliffs, NJ: Prentice Hall.

Wilson, Paul T., & Anderson, Richard C. (1985). What they don't know will hurt them: The role of prior knowledge in comprehension. In Judith Orasanu (Ed.), *Reading comprehension: From research to practice.* Hillsdale, NJ: Erlbaum.

## About the Author

**Karen Smith-Gratto** has been designing computer-based instructional materials and teaching using the computer since the late 1980s. She is the Coordinator for the Instructional Technology Masters Degree Program and an Associate Professor at North Carolina Agricultural and Technical State University in Greensboro, North Carolina. She has been designing and teaching online courses since the late 1990s. Her areas of research and writing are: integration of technology into curricula and the design of computer -based educational and training materials based upon learning theory.

She may be reached at: gratto@ncat.edu

Karen Smith-Gratto, Ph.D.
Associate Professor
Department of Curriculum and Instruction
201 Hodgin Hall
1601 East Market Street
North Carolina Agricultural and Technical State University
Greensboro, North Carolina 27411