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IRRODL Policy Changes

Terry Anderson
Editor, IRRODL

The ongoing trend to openness, transparency, and accessibility affects each of us and our institutions, including this journal. This issue announces an important change to IRRODL's licensing requirements and a clarification of IRRODL policies.

We have changed our Creative Commons licensing to provide increased use and exposure of published articles. IRRODL's editorial board has decided to move from the Creative Commons Attribution, Noncommercial, No Derivative Works  licence to the more accessible and simpler Creative Commons  Attribution licence.

When we first adopted Creative Commons licensing we felt that others should NOT be able to extend the works of our authors directly (even with attribution) by creating derivative products. For example, without the 'no derivatives' restriction, a third publisher could merge two articles, creating a third, or produce an aggregated compilation of IRRODL articles. We decided that this re-use of our materials really does not hurt us in any substantial way, and it could increase readership, while maintaining attribution. Thus, we felt we would like to try licensing without the 'no derivatives' restriction.

The second change was the removal of the Creative Commons licence restriction on commercial re-use. We have given permission to aggregators (e.g., EBSCO) to add IRRODL to the list of journal databases that they sell to libraries and thus were in some ways violating our own licence. In addition, we are aware that in many developing countries, sometimes small, commercial micro-publishers are the only way to get print materials to students and scholars. After considered debate, the editorial board concluded that removing both the no derivatives and the commercial prohibitions, while retaining the attribution requirement, serves to increase accessibility and openness and is consistent with IRRODL's mission. We will thus request that authors wishing to publish in IRRODL license their work to us under the Creative Commons Attribution licence.

We were also motivated to change our licensing so that we would be eligible for the Scholarly Publishing and Academic Resources Coalition Europe seal. SPARC is a leading organization of European research libraries. This certification is awarded only to open access journals that license

via the most open of Creative Commons licences (CC-BY) and to those journals (like IRRODL) that share their article metadata. Thus we look forward to being eligible for the SPARC seal, to maximizing the exposure and distribution of IRRODL work, and to continuing to push ourselves and others to expand access to quality academic publications.

Publishing Previously Distributed Content

The editorial board also discussed the contentious issues that may arise when an author re-uses materials presented at a conference or distributed via a blog, wiki, or other net-based distribution service. We made a useful distinction between publication (distribution after review, editing, and quality control asserted through publication procedures) and distribution (sharing with no quality controls). In pre-Internet days, the only effective way to distribute was through publication, but those days are long past. We thus adopted the following new guidelines:

1. Every article must maintain a high quality of scholarship, not plagiarize the work of others, and make a contribution to the field of open and distance education scholarship.
2. Articles published or under review by other peer review commercial or scholarly publishers are not eligible for publication in IRRODL.
3. Articles distributed as conference proceedings or self-published in blogs or institutional repositories should normally be revised substantially before review and possible publication by IRRODL. (The editor may ask to review in detail the publication/distribution history of any work to make this determination.)
4. Articles that appeared in conference proceedings or were self-published shall acknowledge this distribution history in a footnote.
5. Authors submitting articles that were previously distributed should detail the rationale for review and publication by IRRODL in a note to the editor.

We welcome reader and author responses to either of these two board decisions.

General Issue 11(1)

This issue gathers seven research articles, two articles from the field, one book review, and three Cider sessions on an eclectic set of themes from four continents. The works focus on many learning sectors and many disciplines but have in common their contribution to the development of our practice and research in open and distance education.

The first research article, Deimann and Bastiaens's "The Role of Volition in Distance Education: An Exploration of its Capacities," focuses on a topic that is critically important but often elusive to both teachers and students, that of volition. In the second article, "Learning in an Online Distance Education Course: Experiences of Three International Students," Zhang and Kenny provide a case study of the experiences of students enrolled in online courses offered by a foreign institution.The third article, "An Investigation of Distance Education in North American Research Literature using Co-Word Analysis," by Ritzhaupt, Stewart, Smith, and Barron provides a novel

way to examine the distance education research literature quantitatively, using co-word analysis of the productions of two major distance education journals. The next article by Barnard-Brak, Paton, and Lan, "Profiles in Self-Regulated Learning in the Online Learning Environment," pushes our understandings of the profiles students exhibit in distance education contexts and helps educators support the development of self-regulation by their students.

The next article focuses on teacher professional development that is flexible and unconstrained by time and distance. Marrero, Fitzsimons Riccio, Woodruff, and Schuster present the results of distributed professional development courses in "Live, Online Short-Courses: A Case Study of Innovative Teacher Professional Development." The next article, "The Comparative Instructional Effectiveness of Print-Based and Video-Based Instructional Materials for Teaching Practical Skills at a Distance," takes us to Africa. Donkor's article is one of the few IRRODL has published on the effective delivery at a distance of vocational education. Finally, we conclude the research section with a fascinating examination of the effectiveness of mobile learning technologies. Valk, Rashid, and Elder examine six mLearning projects in "Using Mobile Phones to Improve Educational Outcomes: An Analysis of Evidence from Asia."

This issue also features two articles in our Field Notes section, one from the South Pacific and the other from Europe. In "Reaching REMOTE Learners: Successes and Challenges for Students in an Online Graduate Degree Program in the Pacific Islands," Rao and Giuli overview the unique challenges of delivering graduate programming to students distributed across some of the most sparsely populated regions of the earth. The second article by Cunningham, Fägersten, and Holmsten, "Can you Hear Me, Hanoi? Compensatory Mechanisms Employed in Synchronous Net-Based English Language Learning," discusses the challenges of incorporating students from other countries into synchronous online foreign language courses.

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The Role of Volition in Distance Education: An Exploration of its Capacities[1]

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Abstract

During the past two decades, volition, defined as the ability to stay task-focused and ward off distractions, has become of special relevance for educational research and practice. It describes how decreased motivation or negative emotions can be dealt with by applying action control strategies. However, despite its potential, an important area of education has neglected volitional considerations: distance education (DE). This seems paradoxical because by its very nature distance education requires a great deal of persistence and effort that is volitional. Consequently, the present paper introduces a conceptual framework built on volitional theories; it aims to augment traditional perspectives and to analyse major challenges to DE, such as dropout rates.

The paper reports results from a longitudinal study (September 2007-July 2009) that was conducted to determine the factorial structure of the Volitional Persona Test (VPT), an online instrument to assess volitional competence, and to obtain detailed information on students' volitional competence at a large DE university and at numerous traditional universities in German-speaking countries. It was demonstrated that the construct of volition can be subdivided into distinct factors, volitional self-efficacy, consequence control, emotion control, and meta-cognition, which enables the development of support systems that are tailored to learners' individual needs. Implications for future research are discussed.

Keywords: Distance education, learner support

Motivation in Distance Education

Distance education has emerged as a significant trend in our ever-changing, knowledge-based society. It is a flexible way of studying as it allows learners to pursue goals from different areas (e.g., family, job) simultaneously.

[1] An earlier version of this paper was presented at the 2009 AERA Annual Meeting, "Disciplined Inquiry: Education Research in the Circle of Knowledge", San Diego, CA.

Despite considerable changes over the past decades, DE is still viewed as a set of defining elements. Among them are the separation of teacher and learner during most of the instructional process and the use of educational media to bridge this separation (Keegan, 1996).

These two elements contribute to a form of learning that is radically different from traditional learning because the learner is fully in charge of her/his learning process. In this autonomous, self-regulated learning environment, individuals are assumed to be capable of planning, organizing, controlling, and evaluating their work (Peters, 2002). In this regard, motivation is a key issue as it enables the learner to master various challenges and to attain his/her goals. As a result, researchers have paid some attention to the role of motivation in DE.

Literature Review

There have been several lines of research on motivation in DE, which will be reported in this section. One line pertains to motivation as a personal characteristic for DE learning that is conceptualized as a relatively stable trait and is reported to play a crucial role (Gao & Lehman, 2003; Holder, 2007; Hurd, 2006; Sankaran & Bui, 2001; Wang, Peng, Huang, Hou, & Wang, 2008). Moreover, Martens, Bastiaens, and Kirschner (2007) found that in addition to DE learners, DE developers attach a high value to motivation. Whereas these studies have covered motivation on a general level, Wang, Peng, Huang, Hou, and Wang (2008) revealed motivational variables, self-efficacy and internal attributions, to be positively and predictably related to learning results.

Another line of research attempts to build a holistic approach, for instance to utilize motivation theory for DE learning. Liao (2006) proposes such an example by drawing on flow theory (Csikszentmihalyi, 1975) in order to provide a useful framework for studying the individual differences of DE learners. Song (2000) presents a collection of research issues related to motivation in DE and distinguishes between three stages, (1) motivation to initiate, (2) motivation to persist, and (3) motivation to continue, which may allow DE instructors to address problems that occur at each stage. In a similar vein, Garrison (1997) suggests a comprehensive model to capture the major dimensions of self-directed learning: (1) self-management (task control), (2) self-monitoring (cognitive responsibility), and (3) motivation (entering and task). The latter element is defined as the process of deciding to participate, such as entering a DE program, and the effort needed to stay on task and persist. Furthermore, emphasis is placed on the fact that much can happen during the learning process, so motivation and persistence are subject to fluctuations.

Finally, there is a line of study that draws on motivation concepts and models for the purpose of equipping learners with strategies that can be adopted while learning in a DE environment. Tuckman (2007) employed a so-called motivational scaffold to minimize procrastination among distance learners. It includes study skills support groups, to-do-checklists, and chat sessions. Results showed that procrastinators performed better in the motivationally scaffolded condition while non-procrastinators performed equally in the experimental and in the control condition.
L. Visser, Plomp, Amirault, and Kuiper (2002) conducted a study to test the effectiveness of motivational strategies that should serve to help DE students to become or to stay motivated. A

motivational messages support system (MMSS) was designed and developed based on Keller's (1983) ARCS model of motivational design and on previous work by J. Visser and Keller (1990). Findings indicated that the messages were effective (e.g., improved retention rates) and appreciated by students. Recently, Wickramanayake, Schlosser, and Deimann (2008) have used a similar approach in a comparative study to test the effectiveness of email vs. SMS. ChanLin (2009) has also drawn on the ARCS model to create a motivating interaction environment in a web-based course.

Despite these different lines of research on motivation, there are some gaps and shortcomings that need to be addressed.

Shortcomings in the Study of Motivation

As shown above, theoretical conceptualizations and empirical studies have described motivation as a very powerful force that determines whether learning goals will be attained. However, motivation does not fully explain human action. In particular, when obstacles and distractions arise during the learning process, motivational support may not be strong enough to tackle problems. In these cases, an additional variable is required, specifically targeted at overcoming motivational fluctuations: volition, which is defined as "… the tendency to maintain focus and effort toward goals despite potential distractions" (Corno, 1994, p.229). Whereas motivation initiates and directs action, volition maintains a course of action when obstacles arise. The distinct nature of volition has been illustrated by a muscle or an emergency backup generator, which comes into play when the primary source of energy, motivation, loses strength.

Volition is important for learning at a distance. A DE learner is challenged by multiple and conflicting responsibilities (e.g., family, job), which may endanger his/her motivation to learn. In order to manage decreased motivation, volitional strategies, such as controlling negative emotions triggered by a heavy workload or by family stress, can be applied.

Unfortunately, until now DE research has focused exclusively on motivational aspects of learning; whereas, the actual phase that involves the use of volitional strategies has been neglected. Thus, what DE learners do when obstacles, such as role conflicts, arise has not been investigated. How do they control their emotions after an experience of failure? How do they invest persistence after a hard-working day and after taking care of the family? These are some exemplary questions that can be scrutinized through the lense of volitional theories.

Not only can researchers benefit from an understanding of this relatively unknown body of work, so can practitioners. Based on a profound theoretical framework, strategies that are targeted at overcoming the typical problems of DE learners can be derived. The next section introduces such a theoretical framework and discusses its importance for DE.

An Integrative Framework of Motivation, Volition, and Distance Education

As Lee, Driscoll, and Nelson (2007) concluded, based on a content analysis of major journals in DE, there is a strong need for more theory-based studies, including attempts that describe how an unique theory can support DE. Moreover, Anderson (2004) criticizes that DE research has not yet made clear the affective components of the learner and has left out critical components, such as volition.

The relative complexity of volitional control processes can be reduced by referring to the metaphor of "will as a steersman" (Keller & Deimann, in press), which is based on major theoretical models, such as action control theory (Kuhl, 1985), attention to action (Norman & Shallice, 1986), and on more recent conceptions, such as the meta-model of volition (Sniehotta, Scholz, & Schwarzer, 2005) as well as the compensatory model of motivation and volition (Kehr, 2004).

The *will as a steersman* metaphor describes the balance of learners' motivational, cognitive, and emotional processes with the overall goal to navigate safely through rough courses of action. The instruments that are helpful for these tasks have been described as action control strategies (Kuhl, 1985) and contain the following:

1. Selective attention: also called the "protective function of volition" (Kuhl, 1984, p.126), which shields the current intention by inhibiting the processing of information about competing action tendencies;
2. Encoding control: facilitates the protective function of volition by selectively encoding those features of incoming stimulus that are related to the current intention and ignoring irrelevant features;
3. Emotion control: managing emotional states to allow those that support the current intention and suppress those, such as sadness, in regard to a competing intention that might undermine it;
4. Motivation control: maintaining and reestablishing saliency of the current intention, especially when the strength of the original tendency is not strong ("I must do this even though I don't really want to.");
5. Environment control: Creating an environment that is free of uncontrollable distractions and making social commitments, such as telling people what you plan to do, which help to protect the current intention;
6. Parsimonious information processing: Knowing when to stop, making judgments about how much information is enough, and making decisions that maintain active behaviors to support the current intentions.

The effectiveness of utilizing action control strategies has been confirmed in many studies in a variety of behavioral change settings (Kuhl, 1987) as well as in educational settings (Corno, 2001; Zimmerman, 2001). Although action control strategies seem to be highly relevant for DE,

little has been done in this area so far. The following section outlines the potential and benefits of volition and action control strategies in critical DE situations.

Benefits of Volition and Action Control Strategies

Delay of Gratification

This phenomenon refers to individuals' intentions to postpone immediate available rewards in order to obtain larger rewards temporally distant (Bembenutty & Karabenick, 1998). Obtaining a degree in DE requires balancing several, oftentimes conflicting responsibilities (e.g., taking care of family members, meeting friends) over an extended period of time. In particular, admonishing oneself to study on the weekend or during evening hours can be challenging when family members or friends make social demands that provide immediate reward (e.g., emotional well-being). To focus on the learning assignment can thus be associated with less positive feelings and requires acts of willpower. In these cases, the volitional strategy of emotion control can be beneficial as it helps the person to reassure himself/herself when experiencing feelings of boredom (Brophy, 2004). There is empirical evidence indicating that the use of volitional strategies is related to decreased delay of gratification, increased effort, and better time and study management (Bembenutty, Karabenick, McKeachie, & Lin, 1998).

Dropout Rates

Along with the growth of DE, there has been the problem of high dropout rates, sometimes as high as 40% (Carter, 1996). Consequently, research has focused heavily on factors that may affect attrition, such as mentoring (Bernard & Amundsen, 1989; Garrison, 1987; Tinto, 1975), and it has revealed persistence as an important factor (Levy, 2007). As mentioned, DE studies have neglected volition as a key determinant of persistence and goal-oriented learning. Pintrich (1999) has conceptualized the control of effort and persistence as a volitional strategy located at the construct "control of behaviour." For instance, it can be utilized by way of self-talk: "I just need to stay with it a little more." This can be easily adapted to DE so that learners can enhance their willingness to complete their learning tasks. There are further strategies to control motivation and to avoid premature skipping of the task, such as interest enhancement (e.g., trying to make the task more appealing). DE institutions should equip novice students with such strategies, for instance in workshops, to sensitize them to and prepare them for potential problems that might arise during the semester. As has become clear from research on effort and persistence, the best predictor of learners acting volitionally is conditional knowledge (Boekaerts, 2006; Kuhl & Kraska, 1989), which means that students' knowledge about potential obstacles to goal-pursuit and the way to deal with them effectively predict the degree of effort to invest in the task. Thus, it is important to make students aware of strategies that can help them to increase or decrease effort when needed. This refers to learners' volitional competence, which will be a central topic later in this paper.

Role Conflicts

Learning at a distance is perceived as a convenient form of expanding one's knowledge and of enhancing promotion prospects as most of the time the learner does not need to be on campus. Instead he/she can combine working at home and taking care of the children or other family members with job obligations. However, this can lead to role-conflicts and related stress, especially for female students (Home, 1998). It is crucial to be able to set adequate priorities so that role responsibilities do not interfere with learning goals. More specifically, volitional strategies, such as control of time use or control of others in the task setting, can be utilized in order to reduce possible role-conflicts. As specified by Corno and Kanfer (1993), those strategies are targeted at monitoring and regulating important aspects of the learning process. If, for instance, a DE learner is having trouble with his/her children and/or other family members while trying to learn, he/she can ask them to be quiet. Another possibility would be to arrange special hours in which every family member is told that "mum" or "dad" wants to be alone in order to progress with the learning materials.

Need to Assess Volitional Competence in DE

The aforementioned scenarios have stressed the fact that it is legitimate to assume that DE learners may be unaware of volitional strategies since they have been temporarily away from formal, academic settings (Semmar, 2006). Moreover, they may not have had the opportunity to investigate or assess their competences to deal with conflicting roles or to face distractions, which may result in decreased motivation. Research has provided evidence that when learners have to work within an unfamiliar context (e.g., a web-based setting), many of them are concerned about their ability to manage technical, organizational, and social challenges (Whipp & Chiarelli, 2004). Moreover, an inadequate appraisal of one's volitional skills can be related to an overestimation of one's abilities (Kruger & Dunning, 1999). Wolters (2003) reports that learners who used volitional strategies less frequently seemed to procrastinate more often than students who used them more frequently. It is therefore important to make students aware of their capabilities to effectively apply volitional strategies in a specific context (Boekaerts, 2006). By doing so, learners can enhance their ability to regulate and monitor their study behaviors across various tasks, and this may lead to more realistic self-appraisals concerning one's weaknesses and strengths and to less procrastination (Thiede, Anderson, & Therriault, 2003).

This was the goal of a developmental project at the FernUniversität in Hagen, which included an online questionnaire to assess learners' volitional competence. It investigated to what extent DE learners utilize volitional strategies.

Investigating Volitional Competence in DE

In order to gain insight into the volitional actions of DE learners, an online questionnaire, labeled Volitional Persona Test (VPT), was developed (Deimann, Weber, & Bastiaens, 2009). It is based on two validated instruments, the Volitional Components Inventory (VCI, Kuhl, & Fuhrmann,

1998) and the Academic Volitional Strategy Inventory (AVSI, McCann & Turner, 2004). Both provide insight into different aspects of volitional control (e.g., stress-reducing actions). However, they are not particularly tailored to distance education. Therefore, several semi-structured interviews with distance learners at the FernUniversität in Hagen were conducted to identify relevant situations and strategies that could then be prepared as items. This led to 32 items, which describe volition-eliciting situations and cover a broad range of volitional strategies (for an overview, see Pintrich, 1999).

After the participant answers the final question, the VPT immediately provides an individual competence profile illustrated by a traffic light. This means that if the level of a certain volitional competence falls below a critical value, the respective traffic light turns red to indicate a gap. In the opposite case, if the level exceeds a critical value, the light shows orange to refer to a potentially excessive use of volitional control. As previous research has shown, this may cause serious problems, such as depression (Kuhl & Helle, 1986); therefore, the importance of finding a balanced state of learning is accentuated. If the value is within an optimal range, the light turns green. However, the VPT not only gives a detailed analysis, it also suggests strategies based on the individual's profile. The pool of strategies has been compiled based on an extensive literature review (Corno, 2001; Gollwitzer, 1999; Kuhl, 1985; Locke & Latham, 2002). Thus, the learner is given the opportunity to bridge volitional gaps and to optimize the learning process.

Subjects and Procedure

There were 15,559 participants recruited by direct communication (email to the students of the FernUniversität in Hagen) or by indirect communication (various articles in newspapers, magazines, online portals, blogs etc.). In order to control the response behavior of the participants, several control measures were applied. One of them was the high-hurdle technique (Göritz & Stieger, 2008), which attempts to filter out less motivated individuals through high response burden. In this regard, the VPT entails a lengthy introduction and a great deal of background information as well as two control items (negation, doubling).

By doing so, a large number of German-speaking campus-based universities, universities of applied science, and high schools (in addition to the FernUniversität) could be reached: From the FernUniversität in Hagen, there were 2512 males (34%), 4863 females (66%), Ø age 34 (SD 9.0); from the campus-based universities, there were 2726 males (49%), 2799 females (51%), Ø age 28 (SD 9.2); from the universities of applied science, there were 1108 males (58%), 795 females (42%), Ø age 28 (SD 8.7); from the high schools, there were 333 males (44%), 416 females (56%), Ø age 20.7 (including teachers) (SD 11.7).

Results and Discussion

This section reports results from a longitudinal study (September 2007-July 2009) that was conducted to determine the factorial structure of the VPT and to obtain detailed information on students' volitional competence at a large DE university and at numerous traditional universities

in German-speaking countries. The research builds on an explanatory approach, which is part of a long-term project at the FernUniversität in Hagen.

Factor Analysis

A confirmatory factor analysis with 13,364 subjects based on the outlined theoretical foundation (Kehr, 2004; Kuhl & Fuhrmann, 1998; Sniehotta, Scholz, & Schwarzer, 2005) was calculated. In contrast to the three-factorial structure of the Academic Volitional Strategy Inventory (McCann & Turner, 2004) – self-efficacy enhancement, negative-based incentives, and stress-reducing actions – a four-factorial solution with an explained 41% of the total variance was revealed: factor 1, *volitional self-efficacy* (18%); factor 2, *consequence control* (11%); factor 3, *emotion control* (7%), factor 4, *meta-cognition* (4%). A high percentage of variance could be explained by the fact that the study was conducted online and could not control typical conditions in experiments (Rhodes, Bowie, & Hergenrather, 2003).

The first factor contains eight items, classified as volitional self-efficacy. In contrast to Bandura's well-known concept of self-efficacy (1997), which is focused on motivational (i.e., pre-actional aspects), volitional self-efficacy represents a postintentional construct assumed to be crucial for engagement in planning and for change in behavior (Schwarzer, 2008). The second factor contains six items, loading on the construct of consequence control, which can be described by the question, "What will happen if I fail with my action?" and can be used to counter decreased motivation. Consequence control is related to the concept of "failure control" (Kuhl & Fuhrmann, 1998, p. 23), which focuses on the correction of failure; further, the emotion caused by the failure (disappointment, anger) is employed toward the mobilization of effort. The third factor contains six items, loading on the construct of emotion control, which enhances positive emotions (e.g., thinking of joyful things) and controls negative emotions (e.g., by applying breath techniques). The last factor contains nine items, focusing on meta-cognition, such as careful planning or time management.

Taken together, the factorial structure could confirm the theoretical postulations. Volitional action can be subdivided into distinct factors that are responsible for regulating major aspects of the self, such as achieving a positive emotional state. Table 1 shows the factors with their factor loading, the number of items, and Cronbach's alpha values.

Table 1

Results of the Confirmatory Factor Analysis

Volitional competency	Factor loading	N	α
Volitional self-efficacy e.g., reflecting one's strength to master the task	5,9	8	.79
Consequence control e.g., reflecting on consequences when the task will not be successfully finished	3,4	6	.80
Emotion control e.g., thinking of joyful things	2,1	6	.64
Meta-cognition e.g., deliberate planning of the task	1,4	9	.71

Differences in Volitional Competency among Educational Institutions

Mean volitional competency scores for learners at the FernUniversität in Hagen (FU), campus-based universities (CBU), universities of applied science (UAS), and high schools (HS) are displayed in Table 2.

An ANOVA with four factors (volitional self-efficacy, consequence control, emotion control, and meta-cognition) as dependent variables and the type of institution as the independent variable was calculated to detect differences in the degree of volitional competency. The results revealed significant differences between the educational institutions. However, the effect sizes are very small due to the large population size.

Table 2

Results of the ANOVA

Questionnaire scale		FU N=7380	CBU N=5114	UAS N= 561	HS N=309	p	d
Volitional self-efficacy	M (SD)	3.39 (.66)	3.09 (.70)	3.22 (.70)	3.36 (.72)	<.05***	.04
Consequence control	M (SD)	3.52 (.76)	3.58 (.75)	3.60 (.73)	3.61 (.80)	<.05***	.00
Emotion control	M (SD)	2.80 (.73)	3.08 (.70)	3.10 (.71)	3.13 (.72)	<.05***	.04
Meta-cognition	M (SD)	2.99 (.61)	2.87 (.61)	2.88 (.62)	2.90 (.66)	<.05***	.01

An interesting pattern is worth mentioning: DE students show higher volitional self-efficacy and lower emotion control compared to campus-based learners. This is in line with recent research

demonstrating that negative emotions and motivational challenges may be evoked when learners work face-to-face in groups (Järvenoja & Järvelä, 2009). In contrast, DE students typically learn independently and thus may not experience as often those situations of motivational and emotional challenge. However, as indicated by a high VSE, they seem to be able to mobilize more effort towards goal attainment when needed. DE is often part of a long-term and life-long goal, and apparently DE learners are willing to invest many personal resources.

General Discussion

The present study gives insight into the functional complexity of volition within an educational field of growing importance. Based on an extensive literature review, an online questionnaire to capture volitional competency was developed and tested empirically. The dissemination took place in a naturalistic setting in which participants could decide when and where to fill out the questionnaire. A confirmatory factor analysis revealed consensus with the theoretical assumptions. The reliability of each scale indicated moderate to high levels of internal consistency. Although the ANOVA calculation yielded significant but not very strong mean differences, some tentative conclusions can be drawn.

An interesting pattern that emerged was that learners at the FernUniversität scored highest both in volitional self-efficacy and in meta-cognition and lowest in emotion control. Previous research has shown that meta-cognitive aspects, such as the ability to develop a personal learning plan, are important aspects of learner autonomy in DE (Chen & Willits, 1999). The high amount of volitional self-efficacy implies that it is crucial to have the belief that in the case of learning problems (i.e., failure to stick to the plan), volitional strategies can be utilized. On the other hand, the relatively low degree of emotion control points out a crucial issue. Several studies have shown that insufficient affective and emotional support is related to decreased motivation and eventually to dropout (Gibson, 1996). It is therefore important to equip DE learners with strategies that help them to overcome fears (e.g., feeling separated from the instructor). A first step in this direction is to check various aspects of the learning environment (e.g., study materials) regarding their emotional quality. Astleitner's (2000) F(ear), E(envy), A(anger), S(ympathy), P(leasure) approach is useful for this purpose. It entails detailed prescriptions on how to enhance positive emotions and how to minimize the influence of negative emotions.

The present study has some limitations. Since the distribution of the VPT was not in an experimental setting, it remains unclear how the participants actually used the questionnaire. Yet, the relatively high sample (approximately 25,000 as of August 2007) indicates that there may have been some valuable aspects generated by utilizing the test.

Conclusions

The present research sheds light on a critical issue that has been left uninvestigated in prior DE research: volition, or the ability to be continuously motivated throughout learning activities. It has been argued that there has been some research on motivational issues, such as the concept of flow (Liao, 2006). However, motivation does not fully account for the entire learning process. Instead

it focuses on pre-actional processes and does not deal with problems that may occur after the action has been initiated.

The unique approach of DE requires a special form of learning, which has been referred to as autonomous, self-regulated learning (Peters, 2002). Learners are assumed to take responsibility for their learning activities (e.g., careful planning). In addition, learners are faced with multiple and conflicting roles, such as taking care of family members or job obligations. All these issues challenge learners' motivation, meaning that a high motivation at the beginning can be jeopardized and lead to impairments of performance. In this regard, volitional theories and models provide a profound base of explanations about how to foster goal-oriented learning by addressing decreased motivation.

Major concepts of volition, such as the theory of action control (Kuhl, 1984), have been introduced recently to educational research (Corno, 2001) and have outlined potential benefits. However, such an approach has been missing in the context of DE. Thus, the present paper presented a conceptional framework, targeted at explaining specific issues, such as the delay of gratification.

A further concern of the presented approach was to stress the importance of assessing one's volitional competence. Hence, an online questionnaire, the Volitional Persona Test (VPT) (Deimann, Weber, & Bastiaens, 2009), was introduced. First empirical data were presented and discussed with regard to distinctions between a DE university and traditional institutions. It was demonstrated that the global construct of volition can be subdivided into distinct factors, representing unique aspects of human self-regulation. This allows developing support systems that are tailored to learners' individual needs.

The overall significance of the study rested on the broad dissemination of the VPT so that the vast majority of German-speaking universities could be reached. Based on a combined approach of direct and indirect communication, over 25,000 datasets were gathered.

Yet much more research needs to be conducted to further reveal the potential of volitional concepts for DE. For instance it would be interesting to analyze volitional behaviour within problematic learning episodes, such as procrastination. Also, exemplary role conflicts could be identified and analysed in terms of volitional principles.

It is hoped that this paper will arouse interest in other researchers.

References

Anderson, T. (2004). A second look at learning sciences, classroom, and technology: Issues of implementation: Making it work in the real world. In T. M. Duffy & J. R. Kirkley (Eds.), *Learner-centered theory and practice in distance education* (pp. 235-249). Mahwah, NJ: Erlbaum.

Astleitner, H. (2000). Designing emotionally sound instruction: The FEASP-approach. *Instructional Science, 28*, 169-198.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bembenutty, H., & Karabenick, S. A. (1998). Academic delay of gratification. *Learning and Individual Differences, 10*(4), 329-346.

Bembenutty, H., Karabenick, S. A., McKeachie, W., & Lin, Y.-G. (1998). *Academic delay of gratification as a volitional strategy.* Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Bernard, R. M., & Amundsen, C. L. (1989). Antecedents to dropout in distance education: Does one model fit all? *Journal of Distance Education, 4*(2), 25-46.

Boekaerts, M. (2006). Self-regulation and effort investment. In K. A. Renninger, I. E. Sigel, W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol 4. Child psychology in practice* (pp. 345-377). New York: Wiley.

Brophy, J. (2004). *Motivating students to learn*. London: Routledge.

Carter, V. (1996). Do media influence learning? Revisiting the debate in the context of distance education. *Open Learning, 11*(1), 31-40.

Chen, Y.-J., & Willits, F. K. (1999). Dimensions of educational transactions in a videoconferencing learning environment. *American Journal of Distance Education, 13*(1), 45-59.

Corno, L. (1994). Student volition and education: Outcomes, influences and practices. In D. H. Schunk & B. J. Zimmermann (Eds.), *Self-regulation of learning and performance. Issues and educational applications* (pp. 229-254). Hilsdale, NJ: Erlbaum.

Corno, L. (2001). Volitional aspects of self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement. Theoretical perspectives* (pp. 191-226). Mahwah, NJ: Erlbaum.

Corno, L., & Kanfer, R. (1993). The role of volition in learning and performance. *Review of Research in Education, 19*, 301-341.

Cropley, A. J., & Kahl, T. N. (1983). Distance education and distance learning: Some psychological considerations. *Distance Education, 4*(1), 27-39.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco: Jossey-Bass.

Deimann, M., Weber, B., & Bastiaens, T. (2009). Entwicklung und Verbreitung eines Tests zur Analyse der Willensstärke in Schule und Hochschule [Development of a test of volitional competence in schools and universities]. *Unterrichtswissenschaft, 37*(4), 362-379.

Gao, T., & Lehman, J. D. (2003). The effects of different levels of interaction on the achievement and motivational perceptions of college students in a Web-based learning environment *Journal of Interactive Learning Research, 14*(4), 367-386.

Garrison, D. R. (1987). Resarching dropout in distance education. *Distance Education, 8*(1), 95-101.

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly, 48*(1), 18-33.

Gibson, C. C. (1996). Toward an understanding of academic self-concept in distance education. *American Journal of Distance Education, 10*(1), 23-36.

Göritz, A. S., & Stieger, S. (2008). The high-hurdle technique put to the test: Failure to find evidence that increasing loading times enhances data quality in Web-based studies. *Behavior Research Methods, 40*(1), 322-327.

Holder, B. (2007). An investigation of hope, academics, environment, and motivation as predictors of persistence in higher education online programs. *Internet and Higher Education, 10*(4), 245-260.

Home, A. M. (1998). Predicting role conflict, overload, and contagion in adult women university students with families and jobs. *Adult Education Quarterly, 48*(2), 85-97.

Hurd, S. (2006). Towards a better understanding of the dynamic role of distance language learner: Learner perceptions of personality, motivation, roles, and approaches. *Distance Education, 27*(3), 303-329.

Järvenoja, H., & Järvelä, S. (2009). Emotion control in collaborative learning situations: Do students regulate emotions evoked by social challenges? *British Journal of Educational Psychology, 79*, 463-481.

Keegan, D. J. (1996). *Foundations of distance education*. London: Routledge.

Kehr, H. M. (2004). Implicit/explicit motive discrepancies and volitional depletion among managers. *Personality and Social Psychology Bulletin, 30*, 315-327.

Keller, J. M., & Deimann, M. (in press). Motivation, volition, and performance. In R. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology*. Upper Saddle River: Prentice Hall.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*(6), 1121-1134.

Kuhl, J. (1984). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action control. In B. A. Maher & W. B. Maher (Eds.), *Progress in experimental personality research* (pp. 101-171). Orlando: Academic Press.

Kuhl, J. (1985). Volitional mediators of cognitive-behavior-consistency: Self-regulatory processes and action versus state orientation. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 101-128). Berlin: Springer.

Kuhl, J., & Fuhrmann, A. (1998). Decomposing self-regulation and self-control: The volitional components inventory. In J. Heckhausen & C. S. Dweck (Eds.), *Motivation and self-regulation across the life span* (pp. 15-49). Cambridge: Cambridge University Press.

Kuhl, J., & Kraska, K. (1989). Self-regulation and metamotivation: Computational mechanism, development and assessment. In R. Kanfer, P. L. Ackermann & R. Cudeck (Eds.), *Abilities, motivation and methodology. The Minnesota Symposium on Learning and Individual Differences* (pp. 343-374). Hillsdale, NJ: Erlbaum.

Lee, Y., Driscoll, M. P., & Nelson, D. W. (2007). Trends in research: A content analysis of major journals. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 31-41). Mahwah, NJ: Erlbaum.

Levy, Y. (2007). Comparing dropouts and persistence in e-learning courses. *Computers & Education, 48*(2), 185-204.

Liao, L.-F. (2006). A flow theory perspective on learner motivation and behavior in distance education. *Distance Education, 27*(1), 45-62.

Martens, R., Bastiaens, T., & Kirschner, P. A. (2007). New learning design in distance education: The impact on student perception and motivation. *Distance Education, 28*(1), 81-93.

McCann, E., & Turner, J. E. (2004). Increasing student learning through volitional control. *Teachers College Record, 106*(9), 1695-1714.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth.

Norman, D. A., & Shallice, T. (1986). Attention to action. Willed and automatic control of behavior. In R. J. Davidson, G. E. Schwartz & D. Shapiro (Eds.), *Consciousness and self-regulation* (pp. 1-18). New York: Plenum Press.

Peters, O. (2002). *Distance education in transition: New trends and challenges*. Oldenburg: Bibliotheks-und Informationssystem der Universität Oldenburg.

Pintrich, P. R. (1999). Taking control of research on volitional control: Challenges for future theory and research. *Learning & Individual Differences, 11*(3), 335-351.

Rhodes, S. D., Bowie, D. A., & Hergenrather, K. C. (2003). Collecting behavioural data using the World Wide Web: Considerations for researchers. *Journal of Epidemiology and Community Health, 57*(1), 68-73.

Sankaran, S. R., & Bui, T. (2001). Impact of learning strategies and motivation on performance: A study in web-based instruction. *Journal of Instructional Psychology, 28*(3), 191-198.

Schwarzer, R. (2008). Some burning issues in research on health and behavior change. *Applied Psychology: An International Review, 57*(1), 84-93.

Semmar, Y. (2006). Distance learners and academic achievement: The roles of self-efficacy, self-regulation and motivation. *Journal of Adult and Continunig Education, 12*(2), 244-256.

Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health, 20*(2), 143-160.

Song, S. H. (2000). Research issues of motivation in web-based instruction. *Quarterly Review of Distance Education, 1*(3), 225-229.

Thiede, K. W., Anderson, M. C., & Therriault, D. (2003). Accuracy of metacognitive monitoring affects learning of texts. *Journal of Educational Psychology, 95*(1), 66-73.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125.

Tuckman, B. W. (2007). The effect of motivational scaffolding on procrastinators' distance learning outcomes. *Computers and Education, 49*(2), 414-422.

Wang, Y., Peng, H., Huang, R., Hou, Y., & Wang, J. (2008). Characteristics of distance learners: Research on relationships of learning motivation, learning strategy, self-efficacy, attribution and learning results. *Open Learning: The Journal of Open and Distance Learning, 23*(1), 17-28.

Whipp, J. L., & Chiarelli, S. (2004). Self-regulation in a web-based course: A case study. *Educational Technology Research and Development, 52*(4), 5-22.

Wickramanayake, D., Schlosser, C., & Deimann, M. (2008). A comparison of group and individualized motivational messages sent by SMS and e-mail to improve student achievement. In J. Zumbach, N. Schwartz, T. Seufert & L. Kester (Eds.), *Beyond knowledge: The legacy of competence. Meaningful computer-based learning enviornments* (pp. 113-115). Berlin: Springer.

Wolters, C. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology, 95*(1), 179-187.

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Learning in an Online Distance Education Course: Experiences of Three International Students

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Abstract

This case study explores the learning experiences of three international students who were enrolled in an online master's program offered by a large university in Canada. The aim of the study was to understand the international students' experiences with, and perspectives on, the online learning environment. Findings indicate that previous education and especially language proficiency strongly impacted the learning of these students in this environment. Non-native English speakers required considerably more time to process readings and postings and to make postings themselves. Their lack of familiarity with the details of North American culture and colloquial language made it difficult to follow much of the course discussions. They also tended to avoid socializing in the course, which left them at the periphery of course activities. Based on these findings, the authors make the following recommendations for designers and instructors of online courses: 1) Raise the English language proficiency requirement for graduate admissions into online programs because the text-based communication in a CMC space requires interpreting messages without non-verbal cues; 2) Ensure that online distance education course designers are aware of the needs and expectations of international students; and 3) Combine the design principles from both traditional and constructivism theories.

Keywords: Distance education; online learning; CMC; international students

Background to the Study

As new technologies become less expensive and various forms of multimedia are increasingly accessible, online learning environments are becoming widely used for teaching and learning purposes. In particular, online education, as experienced through computer-mediated communication (CMC), is being heralded as meeting the needs of course participants' lifestyles by allowing them to juggle personal commitments, to manage time conflicts, and to access course materials from a variety of locations.

The benefits of asynchronous communication via CMC have the potential to enhance cooperative learning by providing users with extended time (Aviv, 2001). Participants in an online learning environment can engage in course discussions by providing reflections after thinking about what has been said (Bird, 2004). As asynchronous communication may also allow course participants more time for reading, writing, and posting in discussion forums, there is the potential to increase their participation. Moreover, this virtual environment may promote critical thinking that leads to higher achievement and more satisfaction in collaborative learning (Alavi, 1994).

Stahl (2005) posited that learning takes place in effective collaborative interactions and that individuals internalize the effects of collaboration. However, it has been argued that effective collaboration will not take place in an online learning environment unless the instructor takes proactive measures to provide an appropriate context for collaborative learning (Harasim, 1989). The increasing globalization of education makes it necessary for educators to be aware of the factors beyond their institutions that constrain, steer, or facilitate their practice (Bottery, 2006) and to avoid ethnocentric instructional designs (Gayeski, Sanchirico, & Anderson, 2002).

Literature Review

Computer-Mediated Communication (CMC) and Online Learning

December (2009) defines CMC as "the process by which people create, exchange, and perceive information using networked telecommunications systems (or non-networked computers) that facilitate encoding, transmitting, and decoding messages." CMC provides both the technological infrastructure for, and permits the human cognitive processes involved with, communication and learning. CMC can take place in an evolving range of both synchronous and asynchronous digital spaces. Some advantages of asynchronous communication (e.g., email or threaded discussion forums) include the flexibility to log on from various geographic locations and the opportunity for reflection before responding to a classmate's or the instructor's posting (Everhart, 2000). However, some asynchronous communication methods can also adversely affect course participants if they feel that they are being left behind or if they experience information overload. For instance, students who do not receive a prompt response to their postings or those who find more postings than they can manage to find time to read may feel lonely or stressed.

CMC spaces can also provide a social system for learning. Palloff & Pratt (1999) have shown that learning is improved when there is a sense of community established through the use of CMC. When new members join communities of practice, they have access to existing members and learn from them as they work (Lave & Wenger, 1991). In a virtual learning community, meaning can be negotiated among learners through a process of discussion and collaborative work on specific group projects. Moreover, the interaction among individuals through CMC may assist learners in developing a meaningful and strong sense of identity (Postmes, Spears, & Lea, 2000). For example, Biesenbach-Lucas (2003) observes that while non-native and less verbal students tend to keep silent in face-to-face class, they "felt more comfortable participating more fully in electronic discussions" (p. 36).

In addition, in recent years, online education has experienced the strong influence of constructivist learning theory and a paradigm shift from teacher-controlled to learner-centred instruction (Peters, 2002). In such a constructivist learning environment, learner autonomy and initiative is accepted and encouraged. Learners acquire knowledge by fitting new information together with what they already know. Hence learning is affected by the social and cultural contexts of the situation (Vygotsky, 1978) and the beliefs and attitudes of the learner. Learners are encouraged to invent their own solutions, try out ideas and hypotheses, and assemble new knowledge from their prior experiences (Hedberg & Harper, 1997).

Culture and CMC Environments

In contrast to face-to-face instruction, online learning environments allow geographically dispersed students to enrol in courses; thus, online learners are more likely to be exposed to a greater variety of learning experiences, including those that reflect different cultural conditions and expectations. Ziegahn (2001) suggests that it is important for designers of adult learning programs to take cultural differences into account.

Learners' cultural conditions are influenced by the dynamics of social forces as they operate multidimensionally and multidirectionally across both the micro environment of the immediate locale and the macro environment of the learner's societal situation. The flow and circulation of social, economic, technological, and political forces is complex in any society (Fiske, 1992). Wild and Henderson (1997) argue that culture has a very strong influence on the management, design, and use of information, communication, and learning systems. Palloff and Pratt (1999) suggest that a CMC environment is the great equalizer, which renders participants' cultural, ethnic, or social condition irrelevant, but Reushle and McDonald (2000) disagree, arguing that with the globalization of learning the design process for online teaching and learning must consider and accommodate the challenges of changing learner profiles caused by increasing enrolments of students from diverse conditions.

In this regard, it is becoming common practice in higher education for online distance education programs to enrol international and transnational students. These programs are often offered in a country other than where the awarding institution is located and involve students who have had different teaching and learning experiences and expectations. McLoughlin (2000) argues that as the current instructional design models are the products of particular cultures, they usually do not fully contextualize the learning experience. Since web-based instruction is based on the particular epistemologies, learning theories, and goal orientations of the designers themselves, it cannot be expected to be culturally neutral. Wild and Henderson (1997) state that the learning theories that play a dominant role in distributed learning systems currently provided on the Internet are likely to avoid "the cognitive, epistemological and philosophical aspects of interrelated cultural educational contexts" (p. 187).

Constructivist Theory and Cultural Differences

Online distance education courses that are designed based on principles derived from social constructivist theories of learning usually incorporate teaching strategies that require learners to collaborate, communicate, explore, and reflect (Lebow, 1993). Learning is viewed in these perspectives as an active, constructive process through which the learner creates new knowledge based on available cognitive resources by extracting information from the environment and integrating it with the information stored in memory (Nathan & Robinson, 2001); thus, it follows that constructivist and collaborative approaches are the most appropriate modes for managing online discussion groups (Oren, Mioduser, & Nachmias, 2002).

Regardless, when applying constructivist principles in online distance education course design, it is important to consider whether these design principles fit the perspectives and expectations of students with different cultural conditions. For example, in Asian countries such as China, though the education system has been greatly influenced by Western pedagogical theories in the past few decades, and increasingly attention is being paid to the development of learners' problem solving and communication skills in different educational settings, mainstream educational programs are still test-driven (Lee, 2004). Learners' expectations of a course, whether face-to-face or online, tend to be focused on the mastery of content for the course and on obtaining high scores on the tests.

Active participation in course activities is a very important part of online learning (Scheuermann, Larsson, & Toto, 2001). Researchers have studied how to motivate online learners to actively participate, for example, by providing incentives and by making participation a part of evaluation. However, Beaudoin's (2002) study shows that "invisible" online students, those who do not seem to be participating as often as others, may log on to the course site often and "feel they are still learning and benefiting from this low-profile approach to their online studies" (p. 147). An online learning environment has many benefits for learners, such as flexibility, the quantity and quality of participation, open and accessible communication, and archived postings from participants for reference (Morse, 2003). However, as students enrol in online courses from different locations, time zone differences may keep some students from participating, especially when synchronous communication methods are used (Cifuentes & Shih, 2001). Research also shows that learners may feel uncertain in their communication and isolated in this environment because of a lack of non-verbal cues and social presence (Muilenburg & Berge, 2005), and this may impact significantly students who were raised in a culture where social context and/or social presence (Ku & Lohr, 2003; Tu, 2001) are emphasized. International students, especially those who are from Asia and the Middle East, may face more challenges or frustrations in this regard than their domestic peers because of such factors as language barriers (Goodfellow, Lea, Gonzalez, & Mason, 2001; Lee & Greene, 2007), feelings of isolation or alienation (Shattuck, 2005; Walker-Fernandez, 1999, as cited in Uzuner, 2009), unfamiliarity with the disciplinary culture of the institution offering the course (Zhao & McDougall, 2008), and a lack of knowledge of specific cultural references (Thompson & Ku, 2005). Influenced by their home culture, international students may not participate in the online learning environment as actively as domestic students (Al-Harthi, 2005; Hannon, J., & D'Neto, 2007).

This study explores the learning experiences of three international students enrolled in an online master's program offered by a large university in Canada with the aim of understanding their perspectives of the online learning environment. Based on our findings, we make some tentative recommendations for designers and instructors of online courses about how to take cultural expectations into account and how to accommodate the needs and perspectives of such international students.

Methods

Purpose

The purpose of this study was to explore the learning experiences of three international online master's students by using an exploratory case study design to understand their perspectives of the online learning environment. The goal of an exploratory case study is "not to conclude a study but to develop ideas for further study" (Yin, 2003, p. 120). A case study "provides descriptions of a case, a group, a situation, or an event" (Krathwohl, 1998, p. 26) and examines the details of a setting, subject, or particular event (Merriam, 1988; Stake, 1995; Yin, 2003). We examined relationships between a research participant's cultural conditions and his/her learning practices as complex social phenomena (Yin, 2003) in order to provide a "comprehensive view and broader insight into the multifaceted phenomenon" (Waggoner, 1991, p. 137). In this case study, we combined both qualitative and quantitative research methods (Waggoner, 1991).

Research Questions

This study addressed the following two research questions:

1) How do international students perceive their learning in an online course?
2) What were the biggest challenges the international students had to face in the online learning environment?

Participants

The participants in the full study included 12 graduate students enrolled in a graduate Educational Technology program offered fully online at a large western Canadian university. The course was 13 weeks long, and WebCT was used as the course delivery system. To recruit participants, a contact letter was sent through the instructors to all 55 students in the course. Thirteen students volunteered to participate in the study, but one decided to withdraw after a few weeks. Participants' ages ranged between 20 and 50, and there were nine females and three males. The participants represented a variety of backgrounds in terms of first language, country of origin, previous educational experiences, life experience in North America, English language proficiency, types of employment, access to learning technologies, and reasons for enrolling in the program. Most of the participants were located in western Canada while four lived outside of Canada: two in Japan, one in China, and one in the United States. Additional information about

the participants/course/course instructor(s)/program of study is omitted to protect their privacy. Among the twelve participants, eight were born in countries other than North America, but they had lived in Canada or the USA for more than eight years. As such, they had been substantially exposed to the educational system and culture in North America. This case study focuses on the experiences of three international students. Ping, Masahiro and Mitra are non-native speakers of English, who had not lived in North America for more than six months. They were taking the course from China, Japan, and Canada respectively.

Data Collection

Data were collected through the use of an online survey, online observation, email interviews, and telephone interviews. The online survey was used to collect demographic data, such as age, access to the Internet, educational background, English proficiency, gender, and life experience in North America. The first author made observations in the online discussion forums by monitoring how often the participants were posting messages, how promptly they responded to the course assignments, how long their postings were, how formal their language was, and how their peers responded to their postings. Email interview questions were generated on the basis of the survey results and observations then sent to participants individually. We asked participants about their cultural conditions of learning and any modifications they made for the course. Further, semi-structured interviews were conducted by telephone to obtain an in-depth understanding of the participants' perspectives of online learning and their experiences in an online learning environment.

Data Analysis

The research data were analyzed to understand the participants' learning experiences in an online learning environment and how their cultural conditions affected their participation in the learning process. The analysis was carried out by the first author, who used multiple methods to code the data. After reading all the observation notes and transcripts from the discussion forums, he first used open coding (Creswell, 2003) to mark participants' postings with regard to a) kinds of questions they raised, b) how often and when they participated online, c) if and how they articulated arguments and the responses these arguments received, d) how they responded to peer messages, and e) their perspectives and interpretations of different aspects of the course. Next, he used a holistic coding approach (Spatariu, Hartley, & Bendixen, 2004) to analyze the interview transcripts, looking at the most frequently used keywords and key terms (e.g., challenge, frustration, language, background knowledge). Finally, he identified themes related to the research questions and looked for relationships to the key concepts of learning experiences and cultural conditions as they emerged from the data and as they were associated with the literature reviewed.

Through the data analysis, he interwove the empirical data with the conceptual and theoretical ideas discussed in the literature review as a way to examine the contexts of these data within the broader scope of selected research. He also read through the postings looking for what themes emerged while the collection of other data was still in process. For example, the recording and

reading of discussion postings aided in the construction and modification of telephone interview questions for different interviewees.

The analysis of quantitative data for the purpose of generating statistical information was carried out at the end of the course semester, while qualitative data collection commenced at the beginning of the course and was ongoing for the duration of the study. This research data was then reanalysed to focus on the three international students described in this article, using the themes of previous educational experiences, English language proficiency, life experiences, and socializing in the online learning environment, which are most closely related to the online learning experiences of these participants.

Findings

Previous Educational Experiences

Participants in this research study had a wide variety of previous educational experiences. We focused on whether their previous education was received outside of North America or had occurred within North America because the course they had enrolled in was offered through a North American university. We assumed that their learning would also be affected by whether they had learning experiences in an online environment or if they had previously experienced courses that were organized around a constructivist curriculum. The three international students focused on in this study had all received their degrees in their home country. Ping received her bachelor's and master's degrees in Science from China, Masahiro received his Bachelor of Science from Japan, and Mitra received her Bachelor of Science from Iran. They all had online experiences prior to this course.

Ping believed the relationship between professors and graduate students was closer in her previous degree in China than in the current online program and the topics of graduate students' conversations were usually related to research rather than social interaction:

> I got more advising from professors than in this online program. The learning environments are also different. Even when it was out of classroom or lab, the conversations with professors or other graduate students were mostly related to research. We often talked about newly released technologies or software in the dining hall. In this online environment, when you are not online, you are on your own. (Ping, telephone interview)

Masahiro observed that the Japanese and Canadian education systems were quite different in terms of allowing students to have discussions in class. The Japanese curriculum is test-driven, and students are supposed to memorize what they learned from the textbook to pass tests. So, when he started taking the online master's program offered in Canada, it took him some time to become familiar with these different ways of teaching and learning:

> [In Japan], because we have the objectives, we want students to pass the qualification test, or license test. …So [teaching is] more like pushing knowledge into their brains. Is there talking, or is there discussing during the class? It's not acceptable in Japan. No chatting during the class. You know what I mean, silence. Only the instructor's voice or students' voice if they are asked to answer. (Masahiro, telephone interview)

Mitra said that she had taken an online professional development course previously, but because there were a number of moderators in that course, she found it more supportive than this graduate course. In her undergraduate program, all the courses were taught face-to-face, and she felt insecure in this online environment because of the lack of nonverbal cues:

> In this online setting, you say something, either you get some responses and you don't know what are the emotions behind it, or you do not get any response, and what does that mean? … so I sometimes decided to have less contributions, because I was scared, if I say something and these people think that "She's an idiot." (Mitra, face-to-face interview)

Previous educational experiences also affected the participants' understanding and perspectives of their learning environment. For example, Ping and Masahiro stated that one of the main reasons they did not seem to be as active as many other classmates was that they were reluctant to argue with their peers, let alone the instructors, because of their prior educational experiences and societal sets of cultural conditions. Research (e.g., Bates & Poole, 2003) shows that in many Asian countries, the educational systems reflect a hierarchical authoritative structure of pedagogy. Ping and Masahiro had received their previous education in China and Japan respectively, where a transmission approach to teaching and learning is still widely used and valued by teachers (Pratt, Kelly, & Wong, 1999).

English Language Proficiency

Admission into this graduate program required that students first demonstrate both verbal and written proficiency in the use of English. However, non-native English speakers, especially those whose written and verbal skills met a minimal level of proficiency, were apt to think the language barrier prevented them from posting as many messages as they would have liked. During their telephone interviews, Ping and Masahiro expressed difficulties they experienced when learning through a CMC system.

Masahiro thought his English was sufficient for daily conversations, but reading and writing in English required a great deal of time:

> I am actually taking this course in a second language, and my [English] language, speaking, oral communication is not so bad,

> but reading and writing, especially writing, are actually pretty slow. And also I have to write with hand as well as type the words on computers. And spelling mistakes, sometimes I have to check the spelling and stuff, so it takes a lot of time. (Masahiro, telephone interview)

He used email with a spell check function and was diligent about proofreading his communication texts before posting. He relayed to us that he was worried that his peers might refuse to work with him in group activities if they judged his English proficiency as poor. Masahiro stated,

> Actually I usually use email that has spell checker. I don't write down my postings real-time. I always use those spell check editor, and then copy and paste, so it takes more time. Sometimes I ask my wife [a native English speaker from Canada] to check the grammatical stuff, but when I don't have time, I directly write. I always worry about my English writing. My writing is not so good so other people might don't [not] want to work with me, especially for group assignments. (Masahiro, telephone interview)

Like Masahiro, Ping also experienced language difficulties as a non-native speaker. She stated that it was difficult for her to understand her peers' postings, especially if informal language was used, and the language barrier kept her from responding to others' postings:

> … language difficulties restricted my ability to learn. The difficulties I faced to were my slow reading and writing speed and had difficulties in understanding the slang and idioms in other's posts as well as the meaning behind their posts. These difficulties made me busied [busy] in reading materials and my peers' posts so that I seldom responded to other's posts even if I had read them and had some ideas in my mind. (Ping, email interview)

However, she thought it was easier to communicate in the online learning environment because, compared with face-to-face courses, the online environment made her feel less stressed or embarrassed when communicating with classmates in English:

> I feel the online environment is better for ESL students, especially to those [who] are not at home in English. [In an online course] I can spend more time on reading, and I think it easier to read than to listen. And after reading threads of discussions I can figure out what it's about. …in an online class, you don't have to worry too much about your English so you are

> less nervous. … I feel more relaxed, I can spend more time on it but I don't have to worry about being embarrassed. (Ping, telephone interview)

Mitra was quite comfortable with both spoken and written English, but she still found it hard to understand many postings from her classmates that involved some Western specific cultural background knowledge she was lacking. She said,

> I was not able to make sense of what I was reading because it was very context specific. Everything was deeply rooted in western culture which is very, very much different from mine. People were writing essays about things that I did not know what they meant. (Mitra, email interview)

She also felt hesitant to post as many messages as she would have liked to because she was afraid that the others would not understand what she meant.

Life Experiences

Besides previous educational experiences, life experiences (including living and work experiences) also played a role in influencing the way the participants communicated with their peers and the instructors. For example, when Ping first enrolled in the online program, she tried to contact those with Chinese names or whose photograph on the self-introduction "looked Chinese" because she thought it would be easier to communicate with them in terms of language and culture values. But she found it hard to tell someone's first language simply by their name or appearance as many people in the course, even though their ethnic heritage was Chinese, were born and grew up in an English-speaking country and did not speak Chinese. So she started to communicate with colleagues who posted messages that reflected her opinions or with those who responded to her postings, no matter what their ethnic background was.

Masahiro was a high school teacher in Japan, who had to leave for school early in the morning and stay after school to run a computer programming club for students or to attend staff meetings. So the only time he could study for his online course was late at night, when his family members were asleep. In the online course, synchronous discussions were held every Thursday, and two sessions were held to accommodate the different schedules or time zones of class members, one in the morning and the other in the afternoon. For Masahiro, neither of the sessions worked because of the 17-hour time difference and his work schedule. During the interview, Masahiro said that he did not want to skip the graded synchronous discussions, but he was not able to attend, so he had to accept a lower mark.

Socializing in the Online Learning Environment

The online course had a space called "Socializing/Mingling," which was set up by the instructors for course members to communicate on topics not directly related to the course content. Many messages were posted in this space by the course members, mostly to share jokes or information about upcoming conferences or to make arrangements for face-to-face group meetings for those who resided nearby. However, the three participants for this case study did not make much use of the space. Masahiro posted three short messages in this space, mostly to ask questions about class assignments, but Mitra and Ping did not post any messages in this space. When asked about their perspectives on the socializing space, the three participants said they went there occasionally to see what was posted, but they did not really make any contributions as this space was not directly related to the learning of the course content. Masahiro said he posted messages there because he felt it was "less embarrassing" as he did not know under which other specific thread he should have posted his questions.

Discussion

English language proficiency was one of the most important cultural conditions related to the participants' learning practices in this online learning environment and was by far the most restricting condition for the participants. Language proficiency affected their participation and communication in course discussions. Non-native speakers of English were not very confident about their English proficiency and spent considerably more time than their English-speaking peers reading and composing messages in the course CMC spaces. They preferred to read others' postings first rather than initiate a message about the assigned readings, and some chose to have others proofread their drafts before they were posted on the bulletin board. For example, Masahiro believed that he was a slow reader, and to save time he preferred to read short postings in the discussion forum first and to read longer ones when he found time later. Ping talked about her difficulties understanding the passages from peers, especially the colloquial expressions.

Masahiro also equated his own sense of identity and productivity with his ability to use the English language proficiently enough to communicate with his peers in the course. This indicates that he understood that his use of the English language partially represented who he was to peers in the context of the CMC spaces, which had the potential to regulate (limit or extend) his ability to be productive in the course. Both Masahiro and Ping stated that in their previous educational experiences if they agreed with a peer's opinion, they were not motivated to respond. Both were also reluctant to argue with peers in a public forum if they did not agree with somebody's opinion. This supports the assertion of Biesenbach-Lucas (2003) that "non-native speakers, particularly students from Asian countries, consider it far less appropriate to challenge and criticize ideas, and in addition, they may not know how to express disagreement appropriately in English" (p. 37).

Mitra had confidence in her command of English but stated that she had difficulties communicating with peers on the discussion board about certain topics. This echoes the findings

of other researchers (e.g., Thompson & Ku, 2005) that a lack of knowledge of certain cultural references may frustrate international students.

In this online learning environment, all communication between the instructors and course members and among course members themselves took place via CMC. With asynchronous discussions, participants usually waited for a response to their postings. For some non-native English speakers, these communication delays produced nervousness, adding to their sense of apprehension about their own ability to contribute in a meaningful way to the course. Some assumed that if their posting did not get a response, it might mean they did not express themselves clearly or that their message was interpreted as offensive. There was a sense of anxiety associated with using a CMC space for non-English language speakers. Personal interests might be an explanation for some participants' passive participation in course CMC spaces, but for non-native English speakers, the degree of their activity was based on their language proficiency and their ability (Lee & Greene, 2007) to control their communication practices in the online learning environment.

Research participants with different cultural conditions perceived collaborative learning differently. The participants who had limited North American educational experiences tended to think that other course members were more knowledgeable. This belief inhibited their confidence to express their thoughts in English freely, and it made them unwilling to engage in CMC spaces and to negotiate course issues with other group members. These participants believed that the communications in the online learning environment should be closely related to the learning of the course contents, so even though some course members thought a space for socializing was somewhat important, they did not perceive it as critical for their learning. In addition, life experiences extend or limit learners' participation and engagement in the online learning community. For example, when Ping found that those who "looked Chinese" were not actually Chinese speakers she changed her way of approaching her colleagues. She may have done so because she felt that her original approach did not help her to find the social context she was seeking (Ku & Lohr, 2003). And finally, as discussed by Cifuentes and Shih (2001), time zone differences can limit some learners' access or participation. Masahiro's work schedule and time zone kept him from attending the synchronous discussions even though he did not want to lose points for his absence.

Based on the number of postings from each student in this online learning environment, it is clear that international students were more often than not "invisible" online, or "lurkers," who did not seem to be participating as often as others. Beaudoin (2002) believed that these students "feel they are still learning and benefiting from this low-profile approach to their online studies" (p. 147). We suspect that their previous cultural conditions "nurtured" them to be listeners rather than active speakers in class.

Conclusions

Various cultural attributes related to the online learning environment have been identified in this study. However, English language proficiency was one of the most important cultural attributes that limited or extended course members' participation within the CMC spaces. Admission into graduate studies at this particular university requires all non-native English speakers to score 550 or above on the TOEFL (Test of English as a Foreign Language), and scores of this magnitude (or the equivalent 6.5-7.0 rating on the IELTS, the International English Language Testing System) are predictive of academic success at this level (Feast, 2002; Messner & Liu, 1995). However, these minimum scores might not be sufficient for admission of students to online distance education programs. In this study, some of the research participants who scored close to the minimum TOEFL score still found it difficult to complete and maintain a minimum level of participation. For example, Masahiro's TOEFL score was 580 and, in addition, his (native English-speaking) Canadian wife helped him with the understanding of readings and the proofreading of his writing. Nonetheless, he still had difficulties completing the course assignments and engaging comfortably with online discussions. Raising the English language proficiency requirement for graduate admissions into online programs, therefore, might be in order because the text-based communication in a CMC space requires interpreting messages without non-verbal cues.

This research indicated that the CMC spaces of this online learning environment were contested educational landscapes. Virtual spaces are connected to real life cultural conditions of the students enrolled in the course. Some research participants were reluctant to engage in course discussions because they were not sure what they could contribute. They were not from North America and lacked certain background knowledge. They understood that their textual communications partially represented who they were. The design and delivery of the online course were focused on what was familiar for local students, and students with strong English language proficiencies and Western cultural backgrounds tended to dominate the discussion forums. In light of the fact that an online course can enroll members from different parts of the world with different educational and life experiences, course designers and instructors have a responsibility to develop course content and mediate CMC spaces to accommodate the cultural conditions of these diverse populations. In order to meet the needs of learners who are used to certain educational practices, it may be necessary for online distance education course designers to be aware of the needs and expectations of international students and to combine the design principles from both traditional and constructivism theories, at least during a period of transition of education paradigms.

References

Alavi, M. (1994). Computer-mediated collaborative learning: An empirical evaluation. *MIS Quarterly, 18*(2), 159-174.

Al-Harthi, A. S. (2005). Distance higher education experiences of Arab Gulf students in the United States: A cultural perspective. *The International Review of Research in Open and Distance Learning, 6*(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/263

Aviv, R. (2001). Educational performance of ALN via content analysis. *Journal of Asynchronous Learning Networks, 4*(2), 53-72. Retrieved from http://www.aln.org/publications/jaln/v4n2/pdf/v4n2_aviv.pdf

Bates, A.W., & Poole, G. (2003). *Effective teaching with technology in higher education: Foundations for success*. San Francisco, CA: Jossey-Bass.

Beaudoin, M. (2002). Learning or lurking? Tracking the "invisible" online student. *Internet and Higher Education, 5*, 147-155.

Biesenbach-Lucas, S. (2003). Asynchronous discussion groups in teacher training classes: Perceptions of native and non-native students. *JALN, 7*(3), 24-46.

Bird, C. (2004). Sinking in a C-M sea: A graduate student's experience of learning through asynchronous computer-mediated communication. *Reflective Practice, 52*(2), 253-263.

Bottery, M. (2006). Education and globalization: Redefining the role of the educational professional. *Educational Review, 58*(1), 95-113.

Cifuentes, L., & Shih, Y.C. D. (2001). Teaching and learning online: A collaboration between U.S. and Taiwanese students. *Journal of Research on Computing in Education, 33*, 456-474.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches.* Thousand Oaks, CA: Sage.

December, J. (2009). *What is computer-mediated communication*. Retrieved from http://www.december.com/john/study/cmc/what.html

Everhart, R. (2000). Enterprise systems and distance learning: Creating services for connected learners. *Syllabus, 13*(9), 48-51.

Feast, V. (2002). The impact of IELTS scores on performance at university. *International Education Journal, 3*(4), 70-85.

Fiske, A.P. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review, 99*(4), 689-723.

Gayeski, D., Sanchirico, C., & Anderson, J. (2002). Designing training for global environments: Knowing what questions to ask. *Performance Improvement Quarterly, 15*(2), 15-31.

Goodfellow, R., Lea, M., Gonzalez, F., & Mason, R. (2001). Opportunity and e-quality: Intercultural and linguistic issues in global online learning. *Distance Education, 22*(1), 65-84.

Hannon, J., & D'Neto, B. (2007). Cultural diversity online: Student engagement with learning technologies. *International Journal of Educational Management, 21*(5), 418-432.

Harasim, L. (1989). On-line education: A new domain. In R. Mason & A. Kaye (Eds.), *Mindware: Communication, computers and distance education* (pp. 50-62). Oxford, UK: Pergamon.

Hedberg, J., & Harper, B. (1997). *Creating motivating interactive learning environments*. Keynote Address, EDMEDIA, Calgary, Canada.

Krathwohl, D. (1998). *Methods of educational and social science research: An integrated approach* (2nd ed.). New York: Addison-Wesley Educational Publications, Inc.

Ku, H. Y., & Lohr, L. L. (2003). A case study of Chinese students' attitudes toward their first online learning experience. *Educational Technology Research and Development, 51*(3), 95-102.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Lebow, D. (1993). Constructivist value for instructional systems design: Five principles toward a new mindset. *Educational Technology Research and Development, 41*(3), 4-16.

Lee, D. (2004). Web-based instruction in China: Cultural and pedagogical implications and challenges. *Educational Technology Research and Development, 52*(1), 101-105.

Lee, Y., & Greene, J. (2007).The predictive validity of an ESL placement test: A mixed methods approach. *Journal of Mixed Methods Research, 1*(4), 366-389.

McLoughlin, C., & Oliver, R. (2000). Designing learning environments for cultural inclusivity: A case study of indigenous online learning at tertiary level. *Australian Journal of Educational Technology, 16*(1), 58-72.

Merriam, S. (1988). *Case study research in education: A qualitative approach*. San Francisco, CA: Jossey-Bass Inc., Publishers.

Messner, P.E., & Liu, N. (1995). The Test of English as a Foreign Language: An examination of "cut-off scores" in US universities. *The International Journal of Educational Management, 9*(2), 39-42.

Morse, K. (2003). Does one size fit all? Exploring asynchronous learning in a multicultural environment. *JALN, 7*(1), 37-55.

Muilenburg, L.Y., & Berge, Z.L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education, 26*(1), 29-48.

Nathan, M., & Robinson, C. (2001). Considerations of learning and learning research: Revisiting the "media effects" debate. *Journal of Interactive Learning Research, 12*(1), 69-88.

Oren, A., Mioduser, D., & Nachmias, R. (2002). The development of social climate in virtual learning discussion groups. *International Review of Research in Open and Distance Learning, 3*(1). Retrieved from http://www.irrodl.org/content/v3.1/mioduser.pdf

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

Peters, O. (2002) *Distance education in transition*. Oldenburg, Germany: Bibliotheks-und Informationssystem der Universität Oldenburg.

Postmes, T., Spears, R., & Lea, M. (2000). The formation of group norms in computer-mediated communication. *Human Communication Research, 26*(3), 341-371.

Pratt, D.D., Kelly, M., & Wong, W.S.S. (1999). Chinese conceptions of "effective teaching' in Hong Kong: Towards culturally sensitive evaluation of teaching. *International Journal of Lifelong Education, 18*(4), 241-258.

Reushle, S., & McDonald, J. (2000). Web-based student learning: Accommodating cultural diversity. *Indian Journal of Open Learning, 9*(3), 351-359.

Scheuermann, F., Larsson, K., & Toto, R. (2001). Designing collaborative teaching and learning in virtual environments for large scale international participation. *Proceedings of ED-Media 2001 World Conference on Educational Multimedia, Hypermedia & Telecommunications*, Finland, 1655-1660.

Shattuck, K. (2005). *Cultures meeting cultures in online distance education: Perceptions of international adult learners of the impact of culture when taking online distance*

education courses designed and delivered by an American university (Unpublished doctoral dissertation). The Pennsylvania State University.

Spatariu, A., Hartley, K., & Bendixen, L. (2004). Defining and measuring quality in online discussions. *The Journal of Interactive Online Learning, 2*(4).

Stahl, G. (2005). Group cognition in computer-assisted collaborative learning. *Journal of Computer Assisted Learning, 21*(2), 79-90.

Stake, R.E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage Publications, Inc.

Thompson, L., & Ku, H. (2005). Chinese graduate students' experiences and attitudes toward online learning. *Educational Media International, 42*(1), 33-47.

Tu, C. (2001). How Chinese perceive social presence: An examination of interaction in online learning environment. *Educational Media International, 38*(1), 45-60.

Uzuner, S. (2009). Questions of culture in distance learning: A research review. *The International Review of Research in Open and Distance Learning, 10*(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/690

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.

Waggoner, M. (1991). A case study approach to evaluation of computer conferencing. In A.R. Kaye (Ed.), *Collaborative learning through computer conferencing* (pp. 137-146). Berlin: Springer-Verlag.

Walker-Fernandez, S. E. (1999). *Toward understanding the study experience of culturally sensitive graduate students in American distance education programs* (Unpublished doctoral dissertation). Florida International University.

Wild, M., & Henderson, L. (1997). Contextualizing learning in the World Wide Web: Accounting for the impact of culture. *Education and Information Technologies, 2*(3), 179-192.

Yin, R. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Zhao, N., & McDougall, D. (2008). Cultural influences on Chinese students' asynchronous online learning in a Canadian university. *Journal of Distance Education, 22*(2), 59-80.

Ziegahn, L. (2001). Considering culture in the selection of teaching approaches for adults. *ERIC Digest, 231*. Retrieved from http://www.cete.org/acve/docs/dig231.pdf

Appendix A

Online Survey

Please answer the following questions and then hit the "Submit" button:

1. Name: _____

2. Gender

___ Female

___ Male

3. Age range:

___ 20 - 29

___ 30 - 39

___ 40 - 49

___ 50 +

4. Online learning experience

___ This is my first online course

___ This is my second online course

___ I have taken three or more online courses before this one

5. English language proficiency

___ English is my native language

___ English is not my first language but I've been using English since secondary school

___ English is not my first language, but it was my major in college/university

___ I started to use English for academic purposes since I came to Canada (or another English-speaking country)

___ Other. Please explain:

6. Education background

___ This MET program is my first Master's program

___ This is my second Master's program

___ I'm enrolled in this course just for credits for another program

___ Other. Please explain:

7. Life experience in North America

___ I was born and grew up in Canada / USA

___ I came to Canada / USA ten or more years ago

___ I've lived in Canada / USA for three or less than three years

___ Other. Please explain:

8. Internet access from home

___ Dia-up

___ ADSL/Cable

___ No access from home

Appendix B

Email Interview Questions

1. Describe your learning in an online environment. Please include the following: physical setting, amount of and use of time, influence of family life, work, or other aspects of your social situations. In particular describe how these social conditions enhance or restrict your ability to learn.

2. Describe ways that you modify your social situations to enhance your preferred ways of learning in an online environment. Please take into consideration the same social conditions mentioned above.

Appendix C

Sample Telephone/Face-to-face Interview Questions

1. Preferred learning Practices
   a) What was the biggest challenge for you in this online course? Why?
   b) What strategies did you use to deal with the challenge?
   c) How would you describe your learning style (preferred learning practice)?
   d) How did you select which postings to read first? Why?

2. Relationship of Cultural Background to Preferred Learning Practices
   a) Describe differences do you notice between the education system you had and that you had in the online course you were enrolled.
   b) Describe how your MET online experiences were similar and or different from your past educational experiences.
   c) What do you think of the socializing/mingling space on the course website? Do you think such a space is helpful for your learning?
   d) Can you tell me why you chose to study in the online program?
3. What suggestions would you like to give for an online course (design and delivery)?

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An Investigation of Distance Education in North American Research Literature Using Co-word Analysis

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Abstract

The field of distance education is composed of a multiplicity of topics leading to a vast array of research literature. However, the research does not provide a chronological picture of the topics it addresses, making it difficult to develop an overview of the evolution and trends in the literature. To address this issue, a co-word analysis was performed on the abstracts of research articles found in two prominent North American research journals (N = 517), the *American Journal of Distance Education* and the *Journal of Distance Education*, between 1987 and 2005. The analysis yielded underlying trends and themes for three different periods (pre-Web, emerging Web, and maturing Web). Additionally, similarity index analyses were conducted across time periods. The pre-Web era was characterized by the need for quality and development. The emerging Web era was characterized by the development of theory. The maturing Web era was characterized by interaction and the use of tools for communication. The results demonstrate that the North American distance education research literature is characterized by having few consistent and focused lines of inquiry. Conclusions are provided.

Keywords: Distance education; co-word analysis; similarity index analysis; themes; trends

Distance Education Research

In fewer than 20 years, the field of distance education has grown from correspondence courses to podcasts and virtual classrooms. The definition of distance education is a complicated phenomenon, drawing from many factors and perspectives. Keegan's (1996) definition of distance education is frequently cited in the research literature and involves the description of five qualities that distinguish distance education from other forms of instruction: a) the quasi-permanent separation of teacher and learner, b) the influence of an educational organization, c) the use of technical media, d) the provision of two-way communication, and e) the quasi-

permanent absence of learning groups. Related research literature is being produced at a very rapid rate, yet the empirical characterization of the field and its evolution is lacking. The purpose of this article is to provide a synopsis of previous meta-analytics studies conducted in the field of distance education and then to employ objective methods called *co-word analysis* and *similarity index analysis* to investigate trends and themes in the field from 1987 through 2005.

Distance Education Synthesis

Because the term distance education is overarching and encompasses a vast array of topics and literature, researchers in the field face a difficult challenge in attempting to generalize findings and inform practice (Salas, Kosarzycki, Burke, Fiore, & Stone, 2002). There have been several attempts to generalize findings in distance education literature using well-established techniques, which include quantitative meta-analysis, content analysis, and literature synthesis. These studies have attempted to capture various aspects of distance education. Table 1 summarizes the researchers, their methods, the sources of their literature, the number of articles, and the period under investigation. Each of these articles has its strengths and contributions.

Table 1

Previous Distance Education Synthesis Articles

Researchers	**Method**	**Source**	**N**	**Period**
Koble and Bunker, 1997	Mixed method using a content analysis technique, Porter's forum analysis, (1992), and synthesis, focusing on authors, readership, and classification using the International Centre for Distance Learning as classification system	*American Journal of Distance Education*	129 articles	1987-1995
Berge and Mrozowski, 2001	Content analysis technique using Sherry, Fulford and Zhang's (1998) classification system, focused on learner characteristics and needs, media influence on the instructional process, access issues and stakeholder roles, and research methodology (descriptive, co relational, experimental, case study)	*American Journal of Distance Education* *Distance Education* *Journal of Distance Education* *Open Learning* Dissertation Abstracts	1,419 articles and dissertations	1990-1999

Rourke and Szabo, 2002	Content analysis technique on article topic, research method, type, and biographical information about first authors.	*Journal of Distance Education*	235 articles	1986-2000
Lee, Driscoll, and Nelson 2004.	Content analysis of journal articles using Sherry (1995), Phipps, and Merisotis (1999) and Khan's (1997) classification for topics, methods, and citations	*American Journal of Distance Education* *Journal of Distance Education* *Distance Education Open Learning*	383 articles	1997 - 2002
Bernard et. al., 2004.	Quantitative meta analysis and synthesis of research comparing distance education to traditional classroom achievement, attitude, and retention	Included numerous journals and proceedings using comprehensive inclusion and exclusion criteria	232 articles and proceedings	1985-2002
Zhao, Lei, Yan, and Tan, 2005	Quantitative meta analysis and synthesis of research related to factors affecting "effective" distance education	Included numerous journals using comprehensive inclusion and exclusion criteria	51 articles	1987-1995
Zawacki-Richter, Bäcker, and Vogt 2009	Content analysis method on research areas, methods, and authorship patterns	*American Journal of Distance Education* *Journal of Distance Education* *Distance Education Open Learning* *International Review of Research in Open and Distance Learning*	695 articles	2000-2008

Koble and Bunker (1997) utilized a content analysis technique in concert with Porter's forum analysis (1992) to analyze the *American Journal of Distance Education* from 1987 to 1995 (129 articles). They chose the International Centre for Distance Learning's classification system (ICDL, 2006) to analyze the articles in this time period. Using this classification scheme, the articles were classified as the following: theory, policy and development (33%), media and delivery systems (31%), institution, staff, and management (16%), student psychology, motivation, and characteristics (15%), faculty participation and instructional process (11%), course design and curriculum development (10%), and student administration and support (3%) (Koble & Bunker, 1997). An analysis of the authorship showed that 70% of the contributors were from the United States, 20% from Canada, and the remaining were undisclosed (Koble & Bunker, 1997). Their results also concluded that many articles "continue to appear providing more evidence of the 'effectiveness' of distance education in different contexts" and that there is a

"move away from an early emphasis on correspondence study to one which includes telecommunications technologies and discussions of interaction …" (Koble & Bunker, 1997, p. 17). The researchers also demonstrated growth in the area of faculty issues, which they attributed to the changing roles in distance education environments (Koble & Bunker, 1997).

Berge and Mrozowski (2001) reviewed 1,419 articles from four major distance education journals and dissertation abstracts with a distance education classification. Their research used Sherry's (1998) classification system to categorize each of the articles on content and research method classification. Using a synthesis methodology, their research findings showed that the majority (76%) of the published articles in distance education used a descriptive research methodology, followed by case study (9%), correlational (8%), and experimental (7%) (Berge & Mrozowski, 2001). The researchers also concluded that most of the published literature addressed design issues, followed by learner characteristics, and strategies to increase learner interactivity and active learning. They also noted gaps in the research relating to an underemphasis on total academic program outcomes, limited explanations of high dropout rates, a focus on individual technologies rather than multiple technologies, and a lack of literature addressing the effectiveness of digital libraries (Berge & Mrozowski, 2001).

Rourke and Szabo (2002) used a traditional content analysis technique to classify articles from 1986 to 2000 from the *Journal of Distance Education* on topic, research method, type, and biographical information about first authors. Their findings showed that approximately 70% of the articles published in this period were empirical (data collection and inference), descriptive, publication reviews, and perspective papers. Unlike Koble and Bunker, Rourke and Szabo found that the representation of gender was nearly equal between male (45%) and female (43%), with the rest unidentified. The *Journal of Distance Education* is resident to Canada; 52% of the first authors were from Canada, and the remaining authorship was from primarily English-speaking countries. Seventy-two percent of the authors were affiliated with institutions of higher education, and the remaining authors were associated with the Canadian Association of Distance Education (Rourke & Szabo, 2002).

A comprehensive meta-analysis of 232 articles and proceedings between 1985 and 2002 compared distance education with traditional classroom environments on independent achievement, attitude, and retention (Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, Wallet, Fiset, & Huang, 2004). They concluded that much distance education research was of low quality, "particularly in terms of internal validity" (Bernard et al., 2004, p. 416). "Overall results indicated effect sizes of essentially zero on all three measures and wide variability. This suggests that many applications of distance education outperform their classroom counterparts and that many perform more poorly" (Bernard et al., 2004, p. 379).

Lee, Driscoll, and Nelson (2004) examined 383 journal articles published in the *American Journal of Distance Education*, *Distance Education*, *Journal of Distance Education*, and *Open Learning* from 1997 to 2002. Results from the analysis of the research methods revealed that "78 (20%) of the 383 articles published in the four journals described theoretical inquiry, 47 (12%) were experimental research, 138 (36%) were case studies, 23 (6%) were evaluation research, 26

(7%) were developmental research, 48 (13%) were survey research, and 23 (6%) were implemented with combined inquiries" (Lee, Driscoll, & Nelson, 2004, p. 231). They concluded that distance education has progressed as a field because of an emergence of new media technologies and suggest that "the research methodology and the research paradigm for distance education are important because they lead empirical investigations of a theory to draw on other theory that may be more suitable for a better explanation of distance education approaches" (Lee, Driscoll, & Nelson, 2004, p. 239)

A study by Zhao, Lei, Yan, and Tan (2005) sought to discover factors that affect "effective" distance education by applying meta-analysis to 51 articles meeting their selection criteria. The empirical findings varied greatly and were not found to be significantly different from traditional instructional methods. However, their conclusions were that not all implementations of distance education were "created equal," which may be attributed to the small effect sizes. Their findings also provide evidence that not all content is suitable for distance education, human interaction is critical, and some learners may not be able to benefit from the delivery method (Zhao et al., 2005).

A more recent study conducted by Zawacki-Richter, Bäcker, and Vogt (2009) examined five major journals, including the *American Journal of Distance Education*, *Journal of Distance Education*, *Distance Education*, *Open Learning*, and the *International Review of Research in Open and Distance Learning*. In total, 695 unique journal articles were examined. Their findings showed that the most frequently studied research areas included interaction and communication in online learning communities (17.6%), instructional design (17.4%), and learner characteristics (16.3%). In terms of research methods, they coded quantitative, qualitative, triangulation, and other and found that in 2007 and 2008 "other" (mixed methods) was the most frequently used methodology, followed by quantitative.

Purpose of the Study

Previous research studies have attempted to generalize findings and inform practice, but distance education research falls behind because of rapid innovations in technology and instructional practice (Lee, Driscoll, & Nelson, 2004). Consequently, many unanswered questions remain. How have the major tenets changed over time? Most previous investigations have focused on a few aspects of the field (e.g., research methodology) or domains (e.g., peer collaboration), using a priori sets of themes and subjective interpretation. In classifying research articles to a specific category or theme, a tremendous amount of information may have been lost. The purpose of this research was to employ an objective investigation, using co-word analysis. Specific research questions include the following:

1. What themes can be identified over the years in the abstracts published in major North American distance education research journals?
2. What are the relationships among the themes identified in abstracts published in major North American distance education research journals?

3. How have the themes identified in the abstracts published in major North American distance education research journals changed over time?

Co-Word Analysis

This research study attempts to examine distance education research by implementing a co-word analysis methodology to identify themes, trends, and structural characteristics in North American distance education literature. Co-word analysis is an automated content analysis technique that is effective in mapping the strength of relationships among textual data. It employs a graphical modeling technique that is similar to association analysis (Edwards, 1995; Kaufman & Rousseeuw, 1990). Co-word analysis identifies co-occurrence strengths of terms and creates a set of lexical graphs that effectively illustrate the strongest associations between various terms (Coulter, Monarch, & Konda, 1998; Whittaker, 1989). "In contrast to most other types of statistical graphics, the graphs do not display data, but rather an interpretation of the data, in the form of a model" (Edwards, 1995, p. 146).

As noted by Ding, Chowdhury, and Foo (2001), co-word analysis reduces data into detailed visual representations with the essential information contained in the data. It is based on the notion that words are the important carriers of scientific concepts, ideas, and knowledge (van Raan & Tijssen, 1993). Unlike previous meta-analytic methods, co-word analysis allows the primary themes to emerge from the research literature. Thus, the research literature allows the words of a discipline to describe the themes relevant to a domain.

In previous studies, this method has been applied to software engineering, polymer chemistry research and technology literature, information retrieval research literature, scientometrics, neural networks, and information systems education literature (Callon, Courtial, & Laville, 1991; van Raan & Tijssen, 1993; Courtial, 1994; Coulter et al., 1998; Ding, Chowdhury, & Foo, 2001; Ritzhaupt, 2003). The results of previous studies vary, but co-word analysis has proven to be a useful method for identifying research themes and trends. Carnegie Mellon University's Software Engineering Institute developed the software, Co-Word Analysis Information Retrieval, or CAIR, which was employed in this study.

Time Periods and Corpus

To obtain a comprehensive corpus of textual information, two of the leading journals in the North American field of distance education were selected for inclusion in this study: the *American Journal of Distance Education* (AJDE) and *Journal of Distance Education* (JDE). The *American Journal of Distance Education* is "the internationally recognized journal of research and scholarship in the field of American distance education" (p.1, 2008). Available since 1987, AJDE is currently published by Rogers and Taylor. The *Journal of Distance Education* is "an international publication of the Canadian Network for Innovation in Education" (p. 1, 2008). JDE has been published since 1986. Both journals were selected because they had similar publication inception dates (1987 and 1986), are published in North America, and are leading publication venues in the field of distance education. North American journals were selected

because the co-word method relies heavily on the consistency of the language.

Though somewhat arbitrary, a retrospective look at the last 20 years of distance education, from the inception of the World Wide Web (Web) until the present, reveals three, relatively distinct time periods (pre-Web, emerging Web, and maturing Web). The period from 1987 until 1993 marks the era in which the Web was not yet significant to distance education research; the first graphical user interface (Mosaic) was not developed until 1993 (NCSA, 2008). The emergence of the Web and its initial impact on distance education occurred from approximately 1994 to 1999 (Reiser, Dear, & Edge, 2001). It was during this time period that tools such as WebCT and FrontPage became available (Chan, 2005). The maturation of distance education and the Web since 2000 marks another significant period (until 2005, the endpoint of this study's look at the era).

Term Extraction

Prior to using co-word analysis, the data (text retrieved from the abstracts of the articles) required preparation. Some articles were written in French (JDE is resident to Canada) and had to be translated before being included in the analysis. The abstracts from the journal articles were used in the analysis, each serving as a separate unit of analysis. Extraneous terms, such as *this paper*, were removed from the analysis, and others were modified to accommodate synonyms, variations in language, and acronyms. For example, it is common in distance education literature to refer to *computer-mediated communication* as CMC.

The corpus was organized by placing the abstracts for each period in separate text files. Table 2 summarizes the number of documents by journal and time period, the average number of words per unit, and the number of terms extracted for each time period by abstract. A total of 517 articles are included in the analysis.

Table 2

Articles by Journal and Time Period, Average Words per Unit, and Number of Terms Extracted by Unit and Period

	AJDE	**JDE**	***Abstracts**	**#Abstracts**
1987-1993	108	115	84.97	231
1994-1999	74	85	136.39	242
2000-2005	75	60	115.56	205

*Average number of words per unit.
#Terms extracted with occurrence level of 5 for abstracts

Co-Word Analysis Algorithm

The co-word analysis algorithm uses *Strength* (S_{ij}) to measure the association between the terms *i* and *j*, with the following equation (Coulter et al., 1998, p. 1209):

$$S_{ij} = \frac{c_{ij}^2}{c_i \bullet c_j}, 0 \le S \le 1$$

Let c_i be the number of times the term *i* occurs in a corpus and c_j be the number of times the term *j* occurs in another corpus then let c_{ij} be the number of co-occurrences of the terms *i* and *j*. The result is S_{ij} between the range of zero to one, inclusive, which can be used to measure the strength of the association of two terms co-occurring across a number of units.

The co-word algorithm incorporates two passes on the corpus to produce pair-wise connection strengths between related terms. The pass-1 terms are the primary associations. The outcome is a set of lexical maps with interacting terms based on the strengths of relationships. The first pass uses a breadth-first approach: the ensuing terms are considered internal terms, and the links are considered internal links (Ritzhaupt, 2003). The pass-1 terms are depicted by bolded rectangles, and the pass-1 links are depicted by bolded links (see Figure 1).

The second pass is concerned with the relationships between lexical maps generated in pass-1. To be a candidate for inclusion in pass-2, both terms must be in some pass-1 lexical map (Coulter, 1998). Thus, all the terms used in pass-1 are reused in pass-2. A pass-2 link connects a pass-1 term occurring in one lexical map to another pass-1 term in another lexical map (Ritzhaupt, 2003). Thus, the second pass generates the pervasive relationships. Pass-2 items are represented with non-bolded lines and rectangles (see Figure 1).

The co-word algorithm allows the researcher to select two parameters: the number of pass-1 terms that can exist in a single lexical map and the minimum co-occurrence. “If the co-occurrence minimum is set too high, few links may be formed; if it is set too low, an excessive number of links may be formed” (Coulter et al., 1998, p. 1211). Therefore, it was determined through trial and error, the terms must co-occur in at least five separate abstracts to yield the most comprehensive results for these data.

Results and Discussion

Co-word analysis provides several different results, including the following: (a) lexical maps, which highlight the co-occurrences among terms; (b) cohesion and coupling graphs, which display the internal strength and interactivity of maps; and (c) super networks, which visualize pair-wise relationships between lexical maps.

Lexical Maps (Themes)

The analysis of the 1987 to 1993, 1994 to 1999, and 2000 to 2005 abstracts generated 9, 11, and 6 lexical maps, respectively. The lexical map names assigned to the abstracts by each time period are shown in Table 3. The maps in Table 3 also illustrate the number of terms (N) and links (L) within each lexical map. This analysis of the lexical maps addresses the first research question, "What themes can be identified over the years in the abstracts published in major North American distance education research journals?"

Substantially fewer maps were generated in the subsequent two time periods. The marked decrease can be explained in that the average number of words per abstract and the number of articles during 1987-1993 was substantially higher than the following time periods. The growth in distance education research over the past 20 years has spawned more specific publication venues, such as the *Journal of Asynchronous Learning Networks* and the *Journal of Online Learning and Teaching*. In addition, the AJDE and JDE have raised their quality requirements since the first time period.

Table 3

Lexical Maps Generated for Abstracts by Time Period

1987-1993 Abstracts	**N**	**L**	**1994-1999 Abstracts**	**N**	**L**	**2000-2005 Abstracts**	**N**	**L**
87-93-Abs1-Distance Education-Course-Student	20	40	94-99-Abs1-Study-Distance Education-Learning	20	45	00-05-Abs1- Study-Distance-Student	20	39
87-93-Abs2-Need-Development-Quality	20	25	94-99-Abs2-Interview-Method-Process	20	26	00-05-Abs2-Activity- Research-Practice	20	23
87-93-Abs3-Program-Method-University	20	38	94-99-Abs3-Need-Education-Role	19	27	00-05-Abs3-Interaction-Communication-Tool	20	27
87-93-Abs4-Relationship-Model-Process	20	26	94-99-Abs4-Development-Theory-Information	20	38	00-05-Abs4-Teacher-Experience-Results	20	33
87-93-Abs5-Concept-Term	10	13	94-99-Abs5-Goal-Value	12	15	00-05-Abs5-Community-Development-Evaluation	20	27

1987-1993 Abstracts	N	L	1994-1999 Abstracts	N	L	2000-2005 Abstracts	N	L
87-93-Abs6-Difference-Level-Instruction	18	51	94-99-Abs6-Content-Time-Computer	20	24	00-05-Abs6-Way-Type-Information	20	22
87-93-Abs7-Teaching-Education-Factor	20	24	94-99-Abs7-Research-Change-Purpose	20	25			
87-93-Abs8-Role-Field	12	15	94-99-Abs8-Resource-Teaching-School	20	33			
87-93-Abs9-Evaluation-Problem-Design	20	30	94-99-Abs9-Program-Knowledge-Skill	20	27			
			94-99-Abs10-Way-Instruction-Interaction	20	29			
			94-99-Abs11-Environment-Author-Model	20	33			

*N= Number of terms, L=Number of links

Each lexical map was named using a systematic naming algorithm involving the lexical map's central terms. The maps' names consist of the time period (e.g., "87-93") followed by the corpus and map number (e.g., "Abs2" being the second map generated from the abstract corpus), followed by the three primary terms from the lexical map. The primary terms were identified by the pass-1 term with the maximum number of pass-1 connections appearing first, followed by the second, and the third. In the event of a tie, the number of pass-2 links connecting the terms was used to select the term. If a lexical map only had two pass-1 terms, these were the only terms used in the naming convention. Thus, the lexical map names should be viewed as independent themes that emerged from the research literature. In the following sections, the ability of co-word analyses to show fading, evolving, and emerging themes in the lexical maps is illustrated.

Teleconference: A fading communication technology.

One powerful aspect of co-word analysis is its inherent ability to highlight themes and terms that have faded from one time period to the next. "Distance education that emerged in the United States in the 1980's was based on the technologies of teleconferencing…" (Moore & Kearsley, 2005, p. 38). The term *teleconference* occurred in the 1987 to 1993 time period but failed to emerge as a term as part of a theme in the subsequent time periods. This is a relatively clear indication that the use of *teleconferencing* is fading from research literature in distance education. As shown in Figure 1, *teleconference* is a pass-1 term 87-93-Abs4-Relationship-Model-Process

lexical map. Keegan's (1986) definition of distance education includes these qualities: the use of technical media and the provision of two-way communication. The map illustrates *communication* as a pass-1 term and *teleconferencing* as a medium. Though teleconferencing may be fading from research literature, this does not indicate whether it is fading as a modality in practice.

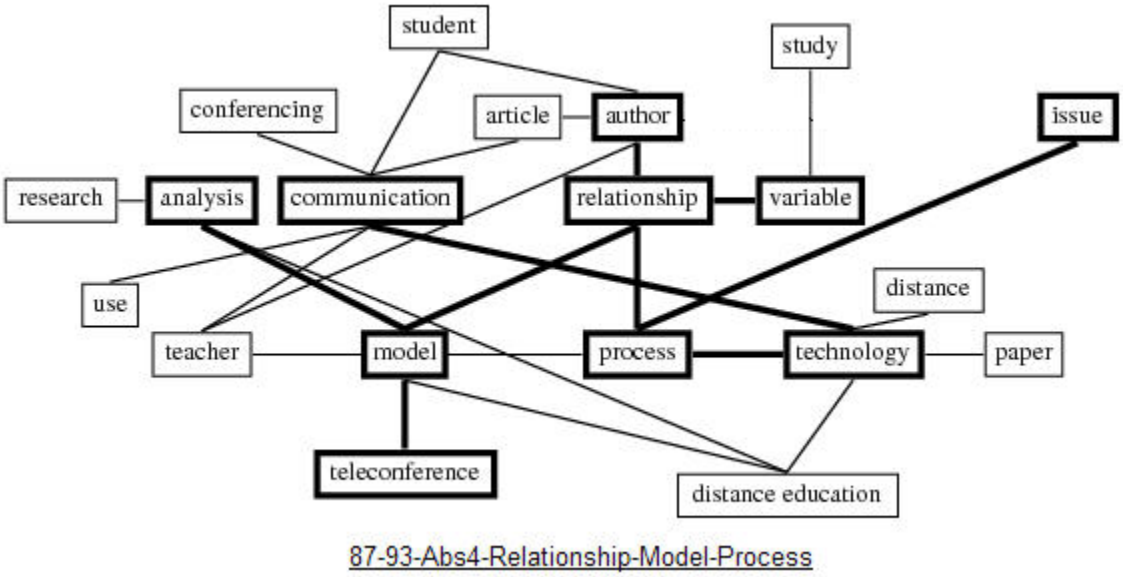

Figure 1. 87-93-Abs4-Relationship-Model-Process lexical map.

Interaction: An emerging and evolving theme in distance education.

Co-word analysis also helps illustrate themes that emerge and swiftly evolve over time. *Interaction* first emerged as a theme (94-99-Abs10-Way-Instruction-Interaction) in the second time period. During this time period, there is a strong connection between *interaction* and *instruction* and a slightly weaker connection between *interaction* and *communication,* as shown in Figure 2.

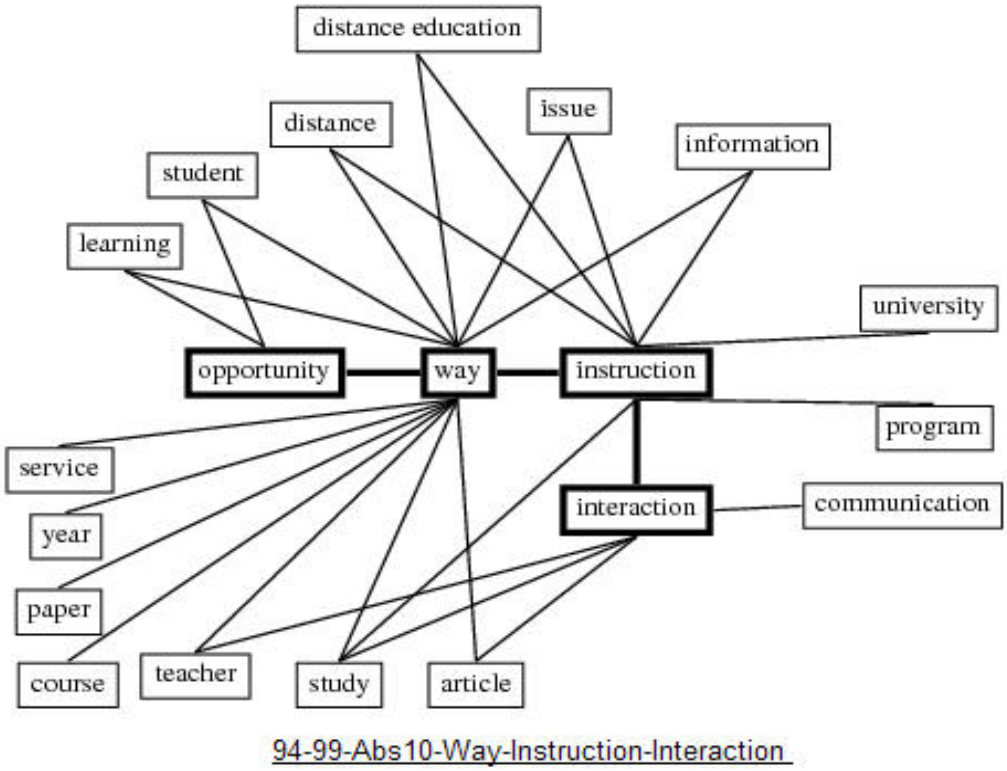

Figure 2. 94-99-Abs11-Way-Instruction-Interaction lexical map.

In the subsequent time period, the lexical map 00-05-Abs3-Interaction-Communication-Tool shows that the connection between *interaction* and *communication* strengthens (see Figure 3), where both *communication* and *interaction* are pass-1 terms. The 2000 to 2005 time period shows that *interaction* also interacts with other relevant terms: *strategy*, *learning environment*, and *tool*. In this time period, *interaction* appears to have escalated as a key term in distance education research literature and has clearly evolved between time periods.

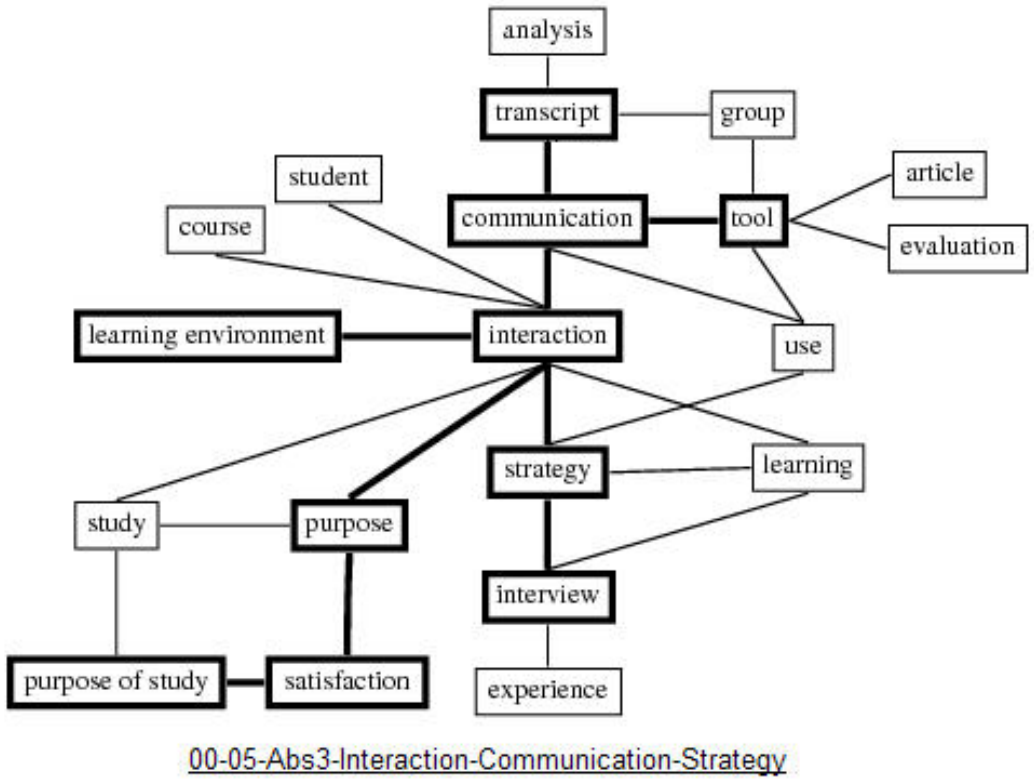

Figure 3. 00-05-Abs3-Interaction-Communication-Tool lexical map.

Emergence of computers.

During the second time period, the term *computer* emerges as shown in Figure 4 (94-99-Abs6-Content-Time-Computer). *Computer* had not appeared in the previous time period. *Computer* connects to *tool*, *access*, and *content* as pass-1 terms, illustrating perhaps the use of computers as the tool for providing access and delivering content emerging in the research literature. During this time period, *computer access* was a major concern for rural, low income, and disabled populations. However, neither *computer* nor *access* appears as a pass-1 term in 2000 to 2005. The availability of advanced telecommunications capability in the United States has increased dramatically, making access of decreased concern (FCC, 2004).

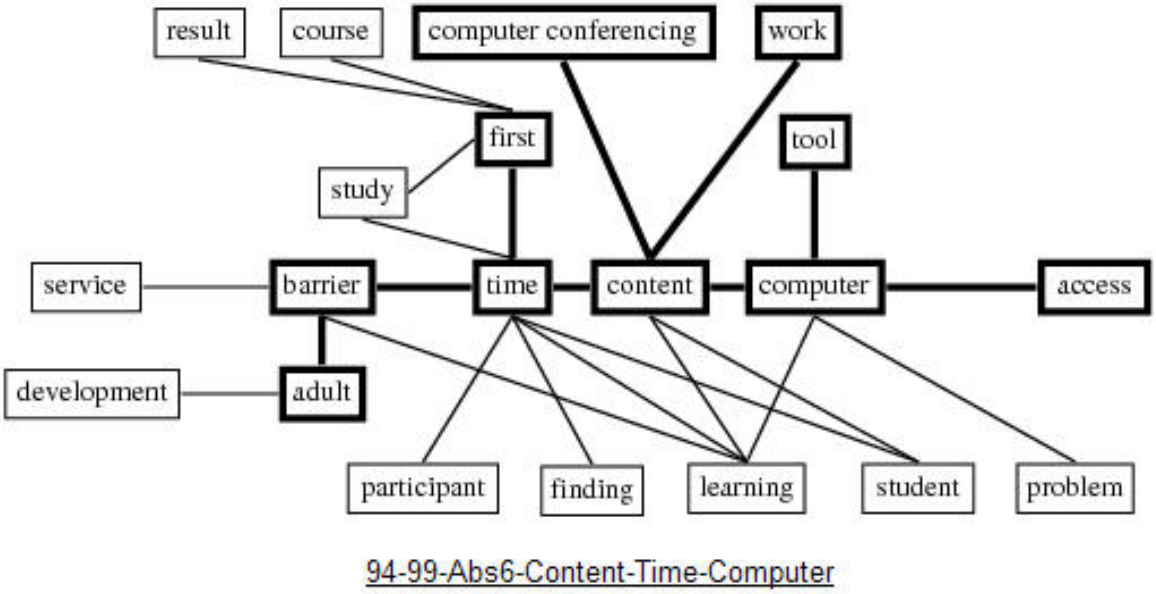

Figure 4. 94-99-Abs6-Content-Time-Computer.

Cohesion and Coupling Graphs

Two variables, cohesion and coupling, are used to measure the internal strength and interactivity of maps in a time period. Cohesion is defined as the mean of pass-1 strengths of a network, and coupling is defined as the square root of the sum of the squares of the pass-2 strengths of a network (Ritzhaupt, 2003). Cohesion is used to measure the internal strength of a lexical map, while coupling represents a lexical map's position in strength of interaction with other lexical maps. Those lexical maps with high cohesion have strongly related terms; whereas, those with high coupling have stronger relationships with other lexical maps. A Cartesian graph is constructed with cohesion along the vertical axis, coupling along the horizontal axis, and the origin formed at their median values. An interesting result from the cohesion and coupling graphs (CCG) across the three time periods is that relatively few of the lexical maps exhibit both higher than average cohesion and coupling (those appearing in the first quadrant of the Cartesian plane). This attests to distance education covering a broad spectrum of research literature with a relatively broad focus of topics and terminology. Across the three time periods, the 1987 to 1993 time period has only one map in the upper right quadrant; both subsequent time periods have two.

Table 3 displays the lexical map names of the diagrams in the following section. The CCG for the 1987 to 1993 time periods is shown in Figure 5, with the median coupling and cohesion shown at each axis and each node, with *X* representing lexical map 87-93-Abs*X-theme*. The diagram illustrates that lexical map one (87-93-Abs1-Distance Education-Course-Student) has the highest degree of cohesion and coupling, which would indicate the pervasiveness of *distance education, course and student* as a theme. In addition, the theme *distance education, course and student* exhibits a strong internal relationship and has the highest interactivity with other themes in the

time period. The theme 87-93-Abs2-Need-Development-Quality exhibits the third-highest degree of cohesion and a slightly below-average coupling. The theme 87-93-Abs8-Role-Field exhibits an average degree of cohesion and the second-lowest degree of coupling, indicating this theme does not appear to interact with other themes during this time period.

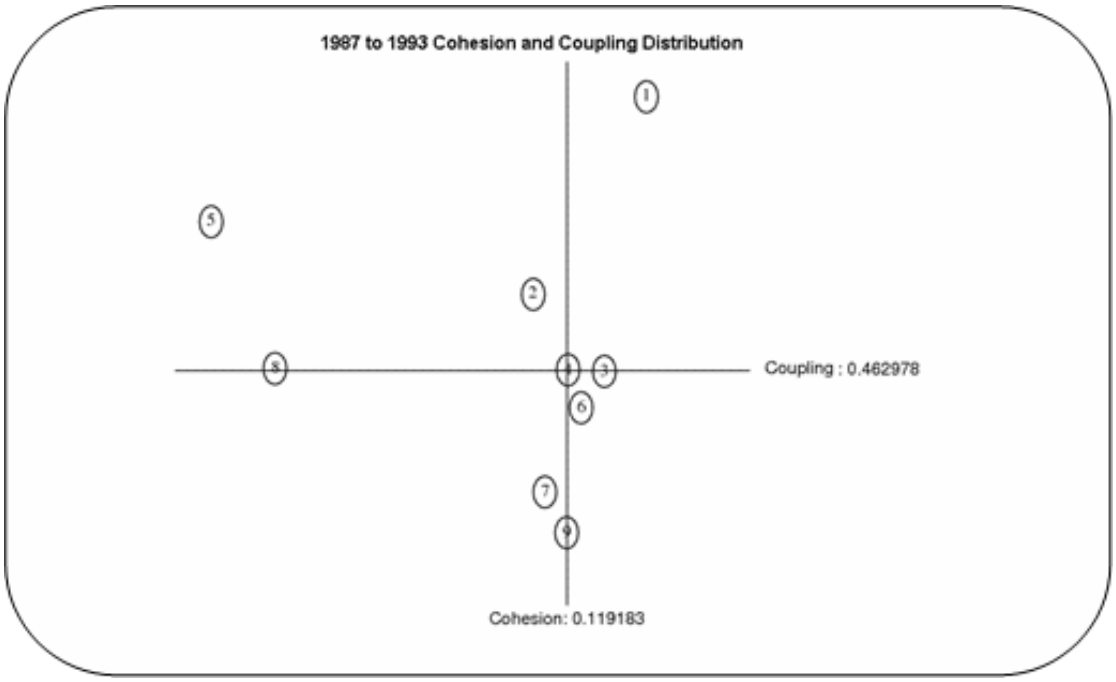

Figure 5. Cohesion and coupling graph (1987 to 1993).

The CCG for the 1994 to 1999 time period is shown in Figure 6. The lexical maps 94-99-Abs1-Study-Distance Education-Learning and 94-99-Abs4-Development-Theory-Information exhibit the highest coupling with other themes. This indicates a time period with greater emphasis on the development of sound *theory* and systematic *study* in *distance education*. The lexical map 94-99-Abs2-Interview-Method-Process has a below-average degree of coupling and the third-highest degree of cohesion, indicating that *interviews* may have been a predominant *method* utilized during this time period.

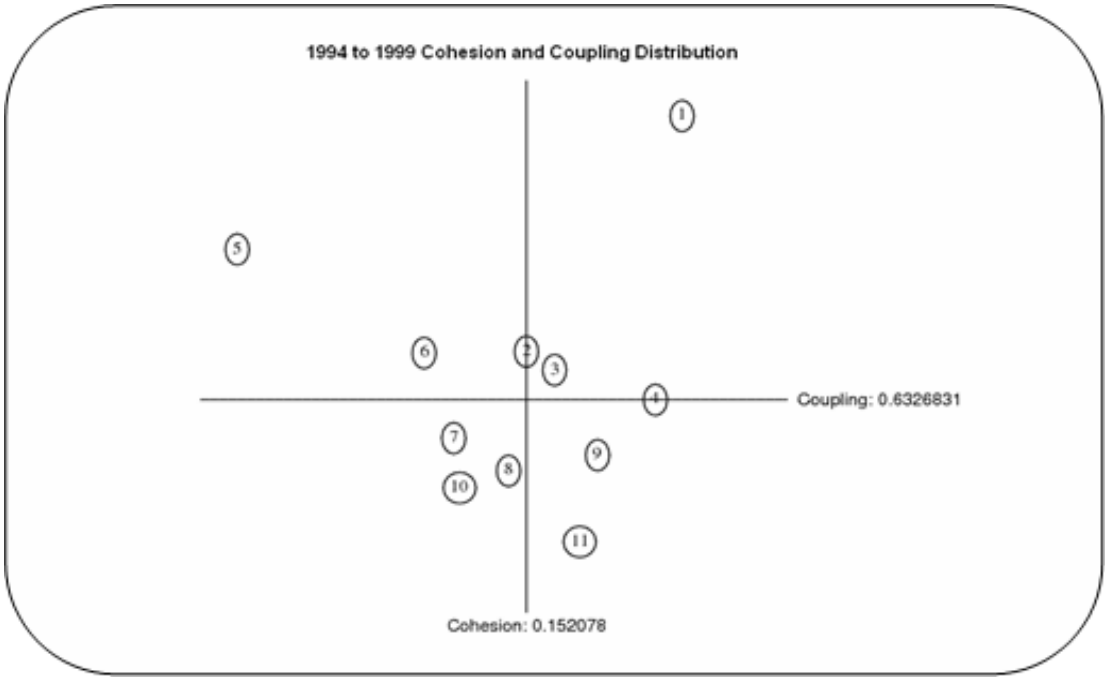

Figure 6. Cohesion and coupling graph (1994 to 1999).

The CCG for the 2000 to 2005 time period is shown in Figure 7. The lexical maps 00-05-Abs1-Study-Distance-Student-Learning and 00-05-Abs4-Teacher-Experience-Results exhibit a high degree of coupling with other themes and also strong internal strength (cohesion). The lexical map 00-05-Abs3-Interaction-Communication-Tool exhibits the second-highest degree of interactivity within this time period. The lexical map 00-05-Abs2-Activity-Research-Practice has a modest degree of cohesion and the poorest degree of interaction with other themes.

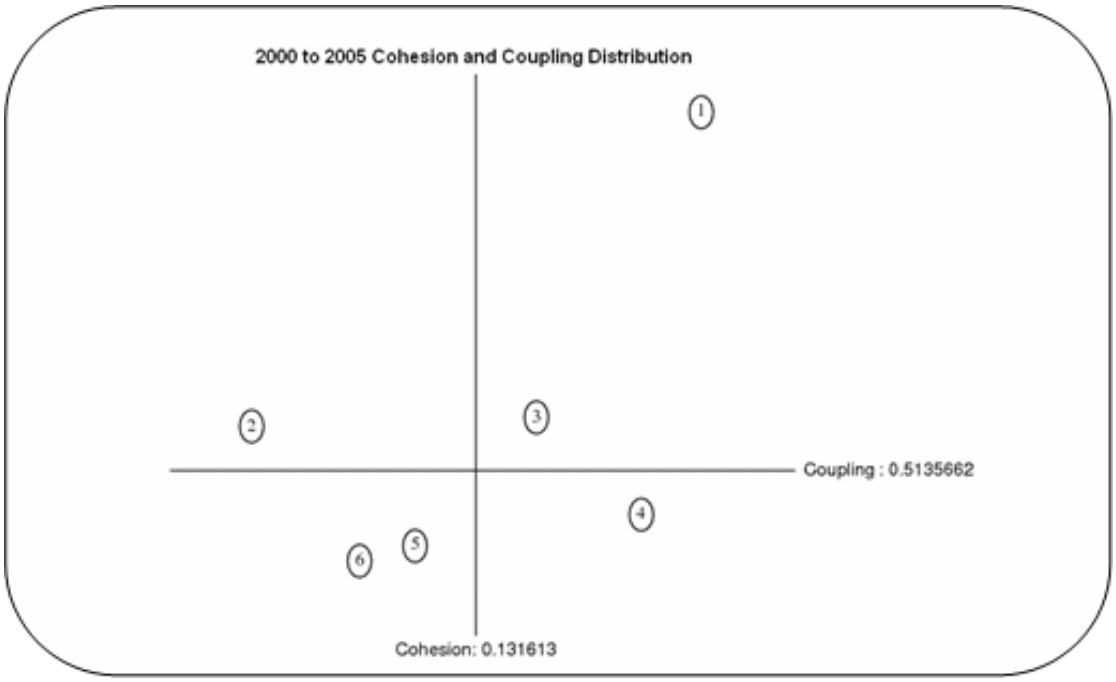

Figure 7. Cohesion and coupling graph (2000 to 2005).

Super Networks

There are essentially three types of lexical maps: principal, secondary, and isolated (Coulter, 1998). Principal maps are connected to one or more (secondary) maps. Secondary maps are linked to principal maps through a high number of pass-2 terms, and isolated networks are those with a very low number of pass-2 terms interacting with other maps (Coulter et al., 1998). The analysis of the CCGs and the super networks addresses the second research question, "What are the relationships among the themes identified in abstracts published in major North American distance education research journals?"

Coupling is taken to the next level with super networks. Super networks are a more focused coupling visualization that describes a pair-wise relationship between lexical maps within a time period. Super networks are defined with principal and secondary maps as follows: If Map-A has internal terms that are pass-2 terms in *x* links of Maps-B, and each of these *x* links has a pass-2 strength value that surpasses the minimum pass-1 strength value of Map-B, then Map-A is a secondary network of Map-B (Coulter et. al., 1998). The super networks for the abstract corpus by time period are shown in Figure 8.

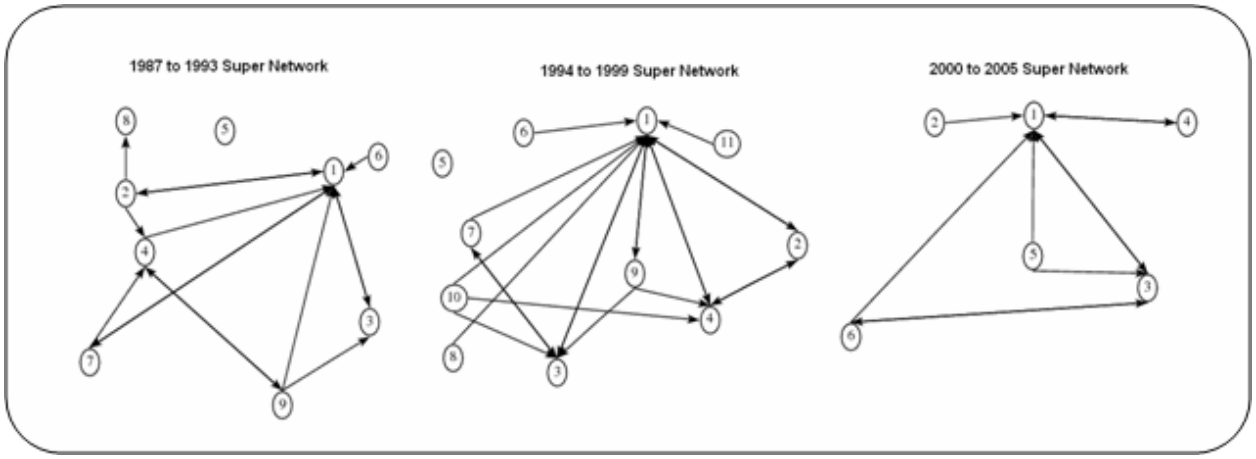

Figure 8. Super networks for abstracts by time period.

The 1987 to 1993 time period shows 87-93-Abs1-Distance Education-Course-Student as a central theme for this time period because it serves as the primary map for six of the nine lexical maps resulting in the time period. Also of importance are the themes 87-93-Abs4-Relationship-Model-Process and 87-93-Abs3-Program-Method-University. The 1994 to 1999 time period indicates 94-99-Abs1-Study-Distance Education-Learning as the central theme followed by 94-99-Abs4-Development-Theory-Information and 94-99-Abs3-Need-Education-Role. The 2000 to 2005 time period demonstrates the 00-05-Abs-Study-Distance-Student lexical map followed by the 00-05-Abs3-Interaction-Communication-Tool lexical map as the central themes in the time period.

The 87-93-Abs5-Concept-Term is an isolated map in the 1987 to 1993 time period, and 94-99-Abs5-Goal-Value is an isolated map in the 1994 to 1999 time period, while the 2000 to 2005 time period did not generate any isolated maps. The isolated lexical maps indicate these themes (lexical maps) do not interact with other themes within the time period and may be interpreted as a fading theme. Few themes appear to be completely isolated from the other themes in each time period.

Analysis across Time Periods

The transformations of lexical maps and their intersections with other lexical maps across time periods have the potential to provide insights into the emergence of distance education research themes. To quantify this type of analysis, a similarity index (SI) approach can be adopted (Callon, Courtial, & Laville, 1991). SI measures the int ersection of descriptors in two lexical maps but does not directly include corresponding links. Since all terms in lexical maps are at least indirectly linked, this measure captures some portion of similarity. Consider two lexical maps N_i and N_j, and let w_i be the number of terms in N_i and let w_j be the number of terms in N_j. Finally, let w_{ij} be the number of descriptors N_i and N_j then (Coulter et al., 1998, p. 1218),

$$SI(w_i, w_j, w_{ij}) = 2 \times (\frac{w_{ij}}{w_i + w_j}), 0 < SI \leq 1$$

.

Similarity index analysis provides an answer to the third research question, "How have the themes identified in the abstracts published in major North American distance education research journals changed over time?" For example, the emergence of *interaction* in distance education research literature is an important one. The term *interaction* does not appear in the first time period then appears in the 94-99-Abs10-Way-Instruction-Interaction and 00-05-Abs3-Interaction-Communication-Tool as a pass-1 node. In particular, SI can be used to trace the emergence history of the term *interaction*. Figure 9 illustrates the relationship of 94-99-Abs10-Way-Instruction-Interaction with the lexical maps in the previous time period (only those *SI* > .4 are shown). Hence, 94-99-Abs10-Way-Instruction-Interaction incorporates several terms from the 1987 to 1993 time period. The strongest relationship is with the 87-93-Abs6-Difference-Level-Instruction theme, indicating the term *instruction* has a direct link with the emergence history of the term *interaction* in distance education research literature.

N_1	N_2	w_1	w_2	w_{12}	*SI*
94-99-Abs10-Way-Instruction-Interaction	87-93-Abs4-Relationship-Model-Process	20	20	9	0.45
	87-93-Abs5-Concept-Term	20	10	7	0.47
	87-93-Abs6-Difference-Level-Instruction	20	18	11	0.58
	87-93-Abs7-Teaching-Education-Factor	20	20	8	0.40
	87-93-Abs8-Role-Field	20	12	7	0.44
	87-93-Abs9-Evaluation-Problem-Design	20	20	9	0.45

Figure 9. Similarity index for 94-99-Abs10-Way-Instruction-Interaction.

The 94-99-Abs6-Content-Time-Computer lexical map exhibits the emergence of the term *computer* in distance education research, which did not emerge in the previous time period. The emergence of the term *computer* in distance education is undoubtedly a function of the Internet and the pervasiveness of lower-cost, personal computers. However, its emergence may be interconnected with other facets of distance education research. Figure 10 illustrates the relationship of 94-99-Abs6-Content-Time-Computer with the lexical maps in the previous time period (Only those *SI* > .25 are shown). The 94-99-Abs6-Content-Time-Computer theme does not intersect with as many or as strongly as the previous example. However, the theme does mildly intersect with four themes from the previous time period.

N_1	N_2	w_1	w_2	w_{12}	SI
94-99-Abs6-Content-Time-Computer	87_93-Abs1-Distance Education-Course-Student	20	20	6	0.30
	87-93-Abs3-Program-Method-University	20	20	5	0.25
	87-93-Abs6-Difference-Level-Instruction	20	18	6	0.32
	87-93-Abs9-Evaluation-Problem-Design	20	20	5	0.25

Figure 10. Similarity index for 94-99-Abs6-Content-Time-Computer.

Conclusions

What can be concluded from the analysis of research publications on distance education? First, each time period can be characterized by a few central themes illustrated in the super networks and CCGs. The central theme of the first time period or pre-Web era, 87-93-Abs1-Distance Education-Course-Student and 87-93-Abs2-Need-Development-Quality, indicates the need for developing quality distance education courses and institutional policy, as supported by Moore and Kearsley, who state, "A far bigger problem [than Internet access] is the quality of media produced for distribution via the technology" (2005, p.8).

The 1994 to 1999 time period (emerging Web era) places emphasis on the study of distance education (94-99-Abs1-Study-Distance Education-Learning) and the development of sound theory (94-99-Abs4-Development-Theory-Information) to guide research efforts. As pointed out by Moore and Kearsley (2005),

> Research is ineffective when it is not set in a theoretical framework. Researchers are not able to build on the work of others, they are less likely to identify the really significant questions, and their results are of limited generalizability. (p. 256)

This was also echoed in Lee, Driscoll, and Nelson's (2004) work. What is unique about this finding is that the emerging Web period is characterized by a heavier emphasis in theory development.

The central theme in the third time period, maturing Web era, appears to emphasize the study of distance education (00-05-Abs1- Study-Distance-Student), and there is a greater emphasis on strategies for communication and interaction (00-05-Abs3-Interaction-Communication-Tool). This triangulates the recent findings of Zawacki-Richter, Bäcker, and Vogt (2009) in that interaction and communication among learning communities were the most frequently studied areas.

Second, some emerging, fading, and evolving themes across time periods of distance education research have been identified. Teleconferencing as a theme seems to have faded from the research literature, beginning in the second time period. Meanwhile, the theme *interaction* and the tool *computer* have emerged. Subsequently, the theme of interaction swiftly evolved into a central role, as can be seen by examining the super network and CCGs from the 1994-1999 and 2000-2005 time periods. In the second time period, 94-99-Abs10-Way-Instruction-Interaction was a secondary term for many of the other themes, while in the third time period 00-05-Abs3-Interaction-Communication-Tool is a principal theme to three other themes during this period. The SI revealed *instruction* may be a direct link to the emergence of *interaction* in distance education research literature.

Third, it can be concluded that distance education research is broad in scope and can be characterized as having few consistent and focused lines of inquiry in the research literature. This can be deduced by examining the relatively small number of themes (lexical maps) that exhibit both a high degree of cohesion and coupling across the three time periods. This research confirms that there are many facets and contours of distance education. Co-word analysis overcomes many of the limitations of a priori research methodology, which potentially loses a tremendous amount of information. However, as of yet, co-word analysis is still an imperfect science because natural language, in this case English, contains many idiosyncrasies. The use of specific jargon in the field of distance education can make it difficult to ascertain the precise meaning of a lexical map or relationship.

At minimum, this research has demonstrated the capability of the co-word analysis method and its extensions on a large corpus of distance education literature. Other disciplines, such as software engineering (Coulter et al., 1998), employ strict taxonomies for their publication databases. This research should encourage and aide researchers and practitioners in the field of distance education to investigate alternate methods to precisely define the contours of this multifaceted discipline.

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References

American Journal of Distance Education. (2008). Retrieved from http://www.ajde.com/index.htm

Berge, Z., & Mrozowski, S. (2001). Review of research in distance education, 1990 to 1999. *The American Journal of Distance Education, 15*(3), 5-19.

Bernard, R.M., Abrami, P.C., & Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Wallet, P.A., Fiset, M., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379-439.

Callon, M., Courtial, J.P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemistry. *Scientometrics, 22*(1), 153–205.

Callon, M., Law, J., & Rip, A. (1986). *Mapping of the dynamics of science and technology*. London: Macmillan.

Chan, L. (2005). WebCT revolutionized e-learning. *UBC Reports, 51*(7). Retrieved from http://www.publicaffairs.ubc.ca/ubcreports/2005/05jul07/webct.html

Chen, T. (2003). Recommendations for creating and maintaining effective networked learning communities: A review of the literature. *International Journal of Instructional Media, 30*(1), 35-44.

Coulter, N., Monarch, I., & Konda, S. (1998). Software engineering as seen through its research literature: A study in co-word analysis. *Journal of the American Society for Information Science, 49*(13), 1206-1223.

Courtial, J. P. (1994). A coword analysis of scientometrics. *Scientometrics, 31*(3), 251-260.

Ding, Y., Chowdhury C. G., & Foo, S. (2001). Bibliometric cartography of information retrieval research by using co-word analysis. *Information Processing and Management, 37*(6), 817-842.

Edwards, D. (1995). *Recent advances in descriptive multivariate analysis*. Royal Statistical Society Lecture Note Series, Chapter 7, Graphical Modeling, 135-156. Clarendon Press.

Federal Communications Commission (FCC) (2004). *Availability of advanced telecommunications capability in the United States*. FCC 04-208, GN Docket No. 04-54 Fourth Report to Congress.

Garrison, D., & Shale, D. (1987). Mapping boundaries of distance education: Problems in defining the field. *American Journal of Distance Education*, *15*(1), 7-23.

International Centre for Distance Learning. Retrieved from the Institute of Educational Technology and Library of the Open University: http://www-icdl.open.ac.uk/.

Journal of Distance Education. (2008). Retrieved from http://www.jofde.ca/index.php/jde/index

Kaufman L., & Rousseeuw, P.J. (1990). *Finding groups in data*. John Wiley & Sons, Inc., Wiley Series in Probability and Mathematical Statistics. http://www3.interscience.wiley.com/cgi-bin/bookhome/119054821

Keegan, D. (1996). *Foundations of distance education* (3rd ed.). London: Routledge.

Khan, B. H. (1997). Web-based instruction: What is it and why is it? In B.H. Khan (Ed.), *Web-based instruction* (pp. 5–18). Englewood Cliffs, NJ: Educational Technology Publications.

Koble, M. A., & Bunker, E. L. (1997). Trends in research and practice: An examination of the American Journal of Distance Education 1987 to 1995. *American Journal of Distance Education, 11*(2), pp. 19-38.

Lee, Y., Driscoll, M. P., & Nelson, D. W. (2004). The past, present, and future of research in distance education: Results of a content analysis. *American Journal of Distance Education, 18*(4), 225-241.

Moore, M.G. (1973). Towards a theory of independent learning and teaching. *Journal of Higher Education, 44*, 661-679.

Moore, M., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing.

Moore, M., & Kearsley, G. (2005). *Distance education: A systems view*. (2nd ed.). Belmont, CA: Wadsworth Publishing.

NCSA (2008). *About NCSA Mosaic*. Retrieved from http://www.ncsa.uiuc.edu/Projects/mosaic.html

Phipps, R., & Merisotis, J. (1999). *What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education.* Washington, DC: The Institute for Higher Education Policy. Retrieved from http://www.ihep.org/Publications/publications-detail.cfm?id=88

Porter, J. (1997). *Audience and rhetoric*. Engelwood Cliffs, NJ. Prentice Hall.

Reisman, S., Dear, R. G., & Edge, D. (2001). Evolution of web-based distance learning strategies. *International Journal of Educational Management, 15*(5), 245-251.

Ritzhaupt, A. D. (2003, April). An exploration of themes and trends in information-related education: Using computer-aided content analysis. *Proceedings of the Annual College of Computing, Engineering, and Construction Symposium and Career Showcase*, Jacksonville, FL.

Rourke, L., & Szabo, M. (2002). A content analysis of the Journal of Distance Education 1986-2001. *Journal of Distance Education, 17*(1), 63-74.

Salas, E., Kosarzycki, M. P., Burke, C. S., Fiore, S. M., & Stone, D. L. (2002). Emerging themes in distance learning research and practice: Some food for thought. *International Journal of Management Reviews, 4*(2), 135-153.

Sherry, L. (1995). Issues in distance learning. *International Journal of Educational Telecommunications, 1*(4), 337–365.

Sherry, A., Fulford, C, & Zhang, S. (1998). Assessing distance learners' satisfaction with instruction: A quantitative and a qualitative measure. *American Journal of Distance Education, 12*(3), 4-28.

van Raan, A.F.J., & Tijssen, R.J.W. (1993). The neural net of neural network research. *Scientometrics, 26*(1), 169–192.

Verduin, J.R., & Clark, T. A. (1991). *Distance education: The foundations of effective practice*. San Francisco: Josey-Bass.

Whittaker, J. (1989). *Creativity and conformity in science: Titles, keywords, and co-word analysis*. London: SAGE.

Zhao, Y., Lei, J., Yan, B., & Tan, S. (2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record, 107*(8), 1836-1884.

Zawacki-Richter, O., Bäcker, E. M., & Vogt, S. (2009). Review of distance education research (2000 to 2008): Analysis of research areas, methods, publication, and authorship patterns. *International Review of Research in Open and Distance Learning, 10*(6). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/741/1433

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Profiles in Self-Regulated Learning in the Online Learning Environment

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Abstract

Individuals who are self-regulated in their learning appear to achieve more positive academic outcomes than individuals who do not exhibit self-regulated learning behaviors. We suggest that distinct profiles of self-regulated learning behaviors exist across learners. In turn, these profiles appear to be associated with significantly different academic outcomes. The purpose of the current study was to examine whether profiles for self-regulated learning skills and strategies exist among learners. To achieve this purpose, we conducted two studies using two different samples. We administered the Online Self-Regulated Learning Questionnaire (OLSQ), a 24-item scale with a 5-point Likert-type response format, to students enrolled in online degree programs at a large, public university located in the Southwestern United States. The OSLQ consists of six subscale constructs, including environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. Latent class analyses were performed with participant subscale scores from the OSLQ.

Our results indicate the presence of five, distinct profiles of self-regulated learning replicated across both study samples: super self-regulators, competent self-regulators, forethought-endorsing self-regulators, performance/reflection self-regulators, and non- or minimal self-regulators. Results also indicate that individuals differ significantly in their academic achievement according to their profile membership; for example, minimal and disorganized profiles of self-regulated learning are both associated with similar, poorer academic outcomes (e.g., lower GPAs). These profiles in self-regulated learning may be viewed as contributing to the development of theory by elucidating how exactly individuals are and are not self-regulated in their learning. The authors suggest future research directions.

Keywords: Self-regulated learning; online learning

Self-Regulated Learning

Self-regulated learning refers to those active and volitional behaviors on the part of individuals to achieve in their learning. These behaviors include but are not limited to goal setting, time management, task strategies, environment structuring, and help-seeking. As skills and strategies that individuals perform, these self-regulated learning behaviors are a function of an individual's desire to achieve in their learning. These skills and strategies of self-regulation have been proffered as being utilized in social relationships as well as in learning (Boekaerts & Cascallar, 2006). Thus, self-regulated learning is both a function of the *skill* and the *will* on the part of individuals (Woolfolk, Winne, & Perry, 2000). In view of this conceptualization, "self-regulated learning is seen as a mechanism to help explain achievement differences among students and as a means to improve achievement" (Schunk, 2005, p. 85). Self-regulated learning skills and strategies appear to have a dual purpose in both differentiating among individuals with respect to academic achievement while also enhancing academic achievement outcomes.

Self-regulated learning is based upon the assumption that individuals can act as causal agents in their own lives. Self-regulated learning would appear to center on the *self* as an agent who acts upon his or her environment: "agency is the capability of individual human beings to make choices and to act on these choices in ways that make a difference in their lives" (Martin, 2004, p. 135). However, agency is not only the capability of the individual to act upon the environment but also a requirement for the individual to achieve academically. This agentic perspective provides that individuals who become self-regulated in their learning can act both autonomously and causally to influence their outcomes and experiences. From this broad agentic perspective, the self-regulation of learning can be viewed from a variety of theoretical frameworks that support a self-deterministic perspective. For the purposes of the current study, self-regulated learning will be viewed from a social cognitive theoretical framework.

From a social cognitive perspective, the development of self-regulated learning skills and strategies is a function of the bidirectional interaction of personal, behavioral, and environmental factors, which takes the form of triadic reciprocal causation (Bandura, 1986, 1997; Schunk, 2001; Zimmerman, 1994). Given the bidirectional interaction of factors, the process of developing self-regulated learning skills and strategies appears to be cyclical (Schunk, 2001). The cyclical process in which self-regulated learning skills and strategies develop appears to be a function of personal, behavioral, and environmental factors adjusting, modifying, and changing as they interact with one another in each cycle or iteration. In a student's learning process, these factors interact with each other in each cycle, which changes the student's self-regulated learning skills and strategies (Bandura, 1986, 1997).We suggest that *iterative* may be a better way of describing the process in which self-regulated learning skills and strategies develop.

The term *cyclical* implies that individuals must be involved in a prescribed cycle of personal, behavioral, and environmental events before self-regulated learning skills and strategies may develop. We suggest that individuals can also adjust, modify, or change their self-regulated learning skills and strategies by the interaction of two of these factors, such as personal and behavioral factors or personal and environmental factors alone. For instance, an individual can

engage in the classic study technique of cramming the night before a test. The individual wakes up very tired for his/her examination. Without environmental feedback (e.g., a test score), the individual may then decide that the behavior of cramming is non-advantageous. Some individuals, however, may require their environment to reinforce that this behavior of cramming is non-advantageous. As the development of self-regulated learning skills and strategies can be considered to be a dynamic process, where some skills and strategies develop before others (Pintrich, 2000), the term *iterative* may depict this process better.

In theorizing about the development of self-regulated learning skills and strategies, Zimmerman (1998) proposed a three-phase model. The first phase, *forethought*, refers to the skilled and strategic processes that precede and set the stage for performance in learning. These processes would include but are not limited to goal-setting, attribution, self-efficacy of eminent tasks, and the intrinsic motivation to perform the learning task. This forethought phase may be thought of as consisting of those self-regulated learning skills and strategies that are at the intersection of the cognitive and motivational factors that typically occur prior to or as the student enters the learning process. Self-regulated learning skills and strategies such as environment structuring and goal setting may be associated with the forethought phase.

The second phase, the *performance control* or volitional phase, consists of the skilled and strategic processes that occur during the learning process. These skilled and strategic processes include but are not limited to attention, affect, and monitoring of action. Self-regulated learning skills and strategies, such as time management, task strategies, and help seeking, are associated with the performance control phase. In the third and final phase, the *self-reflection* phase, individuals react and respond to their self-regulated efforts in the learning process by evaluating the outcomes of their performance. During the final self-reflection phase, the individual will self-evaluate based upon social comparisons and adjust the implementation of skills and strategies in the forethought and performance control phases for the next learning task. Self-regulated learning skills and strategies such as self-evaluation may be associated with the self-reflection phase.

The purpose of the current study was to examine whether profiles or types of self-regulated learning skills and strategies exist. No research has yet to examine the presence of profiles in self-regulated learning skills and strategies except to acknowledge that there are differences according to the self-regulated learning skills and strategies characterized by students (Greene & Azevedo, 2007). While acknowledging that student characteristics do play a part in self-regulated learning skills and strategies, Greene and Azevedo (2007) have noted the lack of clarity as to how we can account for these differences. We suggest that the demarcations of theory presenting the development of self-regulated learning as a cyclical or iterative process may have limited the mindscape of researchers, preventing them from considering profiles or types of self-regulation among learners as they develop these self-regulated learning skills and strategies. To achieve the purpose of the current study, we conducted two studies using two different samples in the online learning environment. Examining self-regulated learning skills and strategies in the online learning environment is especially important given that this environment has been noted as requiring individuals to be more autonomous in their learning, the prerequisite of which is being able to self-regulate (Ally, 2004). We employed latent class analysis techniques to discern

whether any such profiles for self-regulated learning skills and strategies existed. We conducted our analyses across two study samples to cross-validate our findings with regard to any profiles for self-regulated learning discerned. In the second study, we examined additionally the association of an individual exhibiting a certain self-regulated learning profile (as discerned by latent class membership) with academic achievement as measured by grade point average (GPA). The method and results of each study according to each sample are reported consecutively.

Study One

Participants

Study 1 consisted of students enrolled in online degree programs at a large, public university located in the Southwestern United States. Of the students taking online courses, 279 self-selected to complete the survey online by responding to a recruitment e-mail message. Approximately 42% of the participants identified themselves as male (n = 117) while 58% identified themselves as female (n = 162). With regard to ethnicity, approximately 76% of the participants identified themselves as white (n = 212) while approximately 14% identified themselves as Hispanic (n = 39), 6% as Asian American (n = 17), and 4% as African American (n = 11). The student gender distribution (117 males vs. 162 females) in this study may be considered representative of those enrolling in distance education courses across the nation (Kamarae, 2001). The student ethnic/racial distribution in this study was representative of the student population of the university studied. With values for age ranging from 20 to 65 years old, the mean age of participants was 34 with a standard deviation of 9.10. A total of 19 different academic degree programs and a total of 134 different U.S. postal zip codes were represented. The average number of courses taken at a distance was 9.52 with a standard deviation of 8.64.

Measures

The Online Self-Regulated Learning Questionnaire (OSLQ; Barnard, Lan, & Paton, 2008; Barnard, Lan, To, Paton, & Lai, 2009) is a 24-item scale with a 5-point Likert-type response format having values ranging from strongly agree (5) to strongly disagree (1). As self-regulated learning skills and strategies appear to be "highly context dependent" (Schunk, 2001, p. 125), the development of an instrument contextualized to the online and distributed learning environments is requisite. Thus, the current study examines self-regulated learning skills and strategies in view of the online learning environment. Though research has indicated that self-reported measures of self-regulation have been unreliable as over-estimates of self-regulated learning (Winne & Jamieson-Noel, 2002), the OSLQ has revealed satisfactory psychometric properties being validated across two samples of learners in the online and blended learning environments respectively (Barnard, Lan, To, Paton, & Lai, 2009), despite this bias being reported. As such, data obtained from the OSLQ has also revealed acceptable psychometric properties and statistical significance when examined in relation to epistemological beliefs and academic achievement (Barnard, Lan, Crooks, & Paton, 2008) and across time (Barnard-Brak, Lan, & Paton, in press). Additionally, self-regulated learning skills and strategies appear to be associated with perceptions

of online course communications and collaboration (Barnard, Paton, & Rose, 2007), and this relationship has been examined with data obtained from the OSLQ, which revealed again acceptable and consistent psychometric properties and statistical significance (Barnard, Paton, & Lan, 2008).

The OSLQ consists of six subscale constructs, including environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. The scores obtained from the measure demonstrated adequate internal consistency of scores with $\alpha = .90$. Nunnally (1978) has suggested that score reliability of .70 or better is acceptable when used in basic social science research, such as in this study. When examining the internal consistency of scores by subscale, values for Cronbach alpha ranged from .85 to .92, revealing sufficient score reliability on the subscale level. Table 1 contains internal consistencies for scores obtained from each of the subscales (See the appendix for a complete copy of the instrument, including subscale construct designation.)

Table 1

Study One Internal Consistencies for each Subscale

Subscale	α
Environment structuring	.92
Goal setting	.88
Time management	.91
Help seeking	.92
Task strategies	.85
Self-evaluation	.89

Procedure

The OSLQ was administered online to a sampling frame of 516 students, indicating an approximately 54% response rate. After data were collected, some items were recoded and reversed per instrument instructions. No modifications were made to the instrument. All participants were assured that their responses would remain anonymous and confidential. Data were imported from the Web into MS Excel format and then imported into SPSS (v. 16.0). Data analyses were performed in M*Plus* (v. 5.20; Muthén & Muthén, 2008) and SPSS (v. 16.0). Values for missing data were handled using multiple imputation techniques (e.g., Bayesian estimation). These multiple imputation techniques were employed upon the analysis recommendations of Widaman (2006) when facing a complex model with many parameters to be estimated, such as in the current study.

Analyses

Latent class analyses were performed with participant subscale scores from the OSLQ. Latent class analyses may be considered a structural equation modeling approach to estimating

unobserved heterogeneity via categorical latent variables (Muthén, 2002). In contrast to factor analyses and multiple regression techniques, latent class analyses may be considered a person-centered over a variable-centered approach (Muthén & Muthén, 2000). Thus, person-centered approaches may be considered as answering different research questions by identifying how persons may be classified according to a set of variables (e.g., cluster analyses, discriminant function analyses, and latent class analyses). In contrast, variable-centered approaches may be considered as identifying how variables may be related according to a sample or sub-sample of persons (e.g. factor analyses & multiple regression techniques). As the purpose of the current study was to identify how persons may possibly belong to certain profiles of self-regulated learning, a person-centered approach may be considered more applicable to our purpose. The greater suitability of the latent class analyses does not imply that other methods and techniques are inferior but rather reflects different research questions.

Four statistics reflecting fit were assessed: Bayesian Information Criterion (BIC); Akaike Information Criterion (AIC); entropy; and the Lo-Mendel-Rubin Likelihood Ratio Test (LMR-LRT). BIC is a measure of goodness of fit that penalizes for model complexity (D'Unger, Land, McCall, & Nagin, 1998; Nagin, 2005). Smaller values of BIC are indicative of better fit. BIC has been viewed as a conservative measure of fit compared to the AIC. Values of AIC may be interpreted in a similar manner to that of BIC, where smaller values indicate better fit. In making model comparisons, differences in BIC (and AIC) of 10 or more were considered to be very strong evidence of model fit corresponding to the odds of 150:1 (Raftery, 1995, p. 115). Entropy values indicate the degree to which classes may be considered distinguishable from one another with standardized values ranging from 0 to 1 (Muthén, 2000). An entropy value closer to 1 indicates the presence of clear, distinct classes and greater power to predict class membership (Muthén & Muthén, 2001). The LMR-LRT is a test of statistical significance, where the null hypothesis is the number of classes, *c,* estimated minus one (e.g., H_0: *c* - 1 model fits) (Lo, Mendel, & Rubin, 2001). For instance, in testing a three-class solution (e.g. $c = 3$), we would reject or fail to reject a two-class solution (e.g., $c - 1 = 3 - 1 = 2$) using the LMR-LRT statistic. Additionally, the number of free parameters was also reported for each *c*-class model estimated.

Results

In performing our latent class analysis, our results indicate support for a five-class solution as compared to the other *c*-class solutions estimated. Of the models tested, the five-class solution model contained the lowest estimated values of BIC (= 1,256.773) and AIC (= 1,156.339) and the highest entropy value (= .85), indicating the best model for the data. In evaluating the LMR-LRT statistic, results indicate that the one- through four-class solutions may be rejected, $p < .01$, while we failed to reject a five-class solution, $p = .30$. Table 2 contains the number of free parameters along with values for BIC, AIC, entropy, and the LMR-LRT statistic for each latent class solution tested. Values for the best-fitting five-class solution are also in bold in Table 2.

Table 2

Study One Summary Statistics for Model Fit of Latent Class Solutions

Classes	# of free parameters	BIC	AIC	Entropy	LMR-LRT (H_0: c – 1 model fits)
1	12	1,346.459	1,316.329	*NA*	*NA*
2	19	1,294.699	1,246.992	0.76	Reject 1-class solution, $p < .01$
3	26	1,283.172	1,217.890	0.80	Reject 2-class solution, $p < .01$
4	33	1,275.567	1,172.708	0.82	Reject 3-class solution, $p < .01$
5	**40**	**1,256.773**	**1,156.339**	**0.85**	**Reject 4-class solution, $p < .01$**
6	47	1,264.836	1,163.826	0.83	Do not reject 5-class solution, $p = .30$
7		No Convergence			

In examining our five-class solution, approximately 22% (n = 61) of the sample was estimated to belong to the first class of the five classes or profiles of self-regulation revealed. For the purposes of the current study, we refer to this first class or profile as *class 1* and all other classes respectively. Approximately 16% (n = 46) was estimated to belong to the second class (e.g., *class 2*); 12% (n = 33) was estimated to belong to the third class (e.g., *class 3*); 9% (n = 25) was estimated to belong to the fourth class (e.g., *class 4*); and the remaining 41% (n = 114) was estimated to belong to the fifth and final class (e.g., *class 5*). As a result of our latent class analyses, all classes were significantly different from one another in terms of standardized mean subscale scores. Figure 1 displays the standardized means for each subscale according to class.

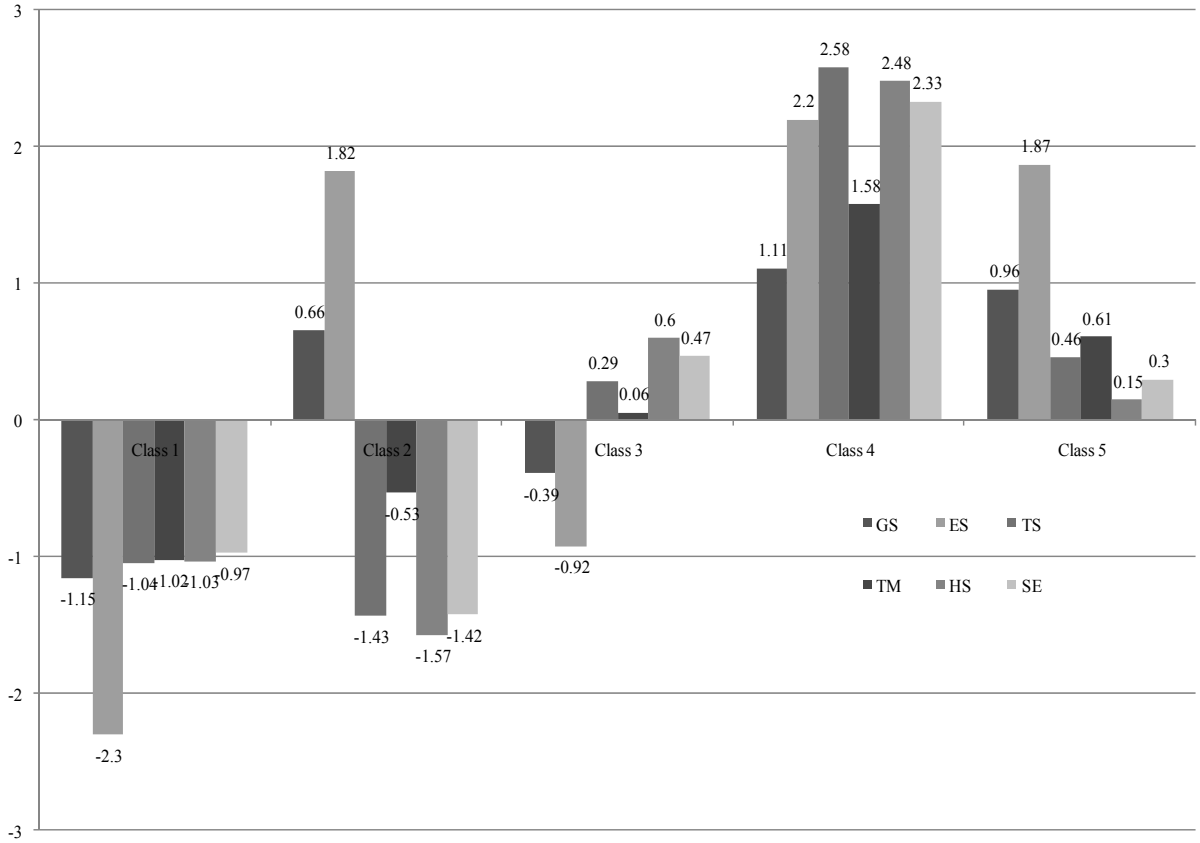

Figure 1. Study 1 standardized subscale means by class.

Study Two

Participants

Study 2 consisted of students enrolled in online degree programs at a large, public university located in the Southwestern United States. Of the students taking online courses, 197 self-selected to complete the survey online by responding to a recruitment e-mail message. Approximately 43% of the participants identified themselves as male (n = 84) while approximately 57% (n = 113) identified themselves as female. With regard to ethnicity, approximately 78% of the participants identified themselves as white (n = 154) while approximately 12% identified themselves as Hispanic (n = 23), 7% as Asian American (n = 12), and 3% as African American (n = 8). The student gender distribution (84 males vs. 113 females) in this study may be considered representative of those enrolling in distance education courses across the nation (Kamarae, 2001). The student ethnic/racial distribution in this study was representative of the student population of the university studied. With values for age ranging from 22 to 65 years old, the mean age of participants was 38 with a standard deviation of 9.93. A total of 22 different academic degree programs and a total of 136 different U.S. postal zip codes were represented, which is similar to that of the study 1 sample. The average number of courses taken at a distance was statistically similar to that of participants in study 1 with a mean of 10.21 and a standard deviation of 8.70. In

contrast to study 1, data for GPA was also collected, which revealed a mean of 3.53 and a standard deviation of .41.

Measures

The same measure employed in study 1 was utilized in study 2. For study 2, the scores obtained from the measure demonstrated an adequate internal consistency of scores with $\alpha = .92$. When examining the internal consistency of scores by subscale, values for Cronbach alpha ranged from .88 to .95, revealing sufficient score reliability on the subscale level. Table 3 contains the internal consistencies for scores obtained for each subscale.

Table 3

Study 2 Internal Consistencies for each Subscale

Subscale	α
Environment structuring	.92
Goal setting	.95
Time management	.89
Help seeking	.88
Task strategies	.92
Self-evaluation	.94

Procedure

Study 2 consisted of the same procedure as study 1. The OSLQ was administered to a sampling frame of 434 students, indicating an approximately 45.4% response rate.

Analyses

Study 2 consisted of the same procedures as study 1 with regard to latent class analysis techniques. Additionally, however, we analyzed how latent class or profile of self-regulated learning membership was associated with GPA by performing a one-way univariate analysis of variance (ANOVA) with GPA as our dependent variable. This GPA data is the actual cumulative grade point average of students retrieved from the university with the consent of the participant. After conducting our omnibus ANOVA, we then conducted post hoc tests. Cohen's *d* was calculated as the measure of effect size. Cohen's *d* values of .20, .50, and .80 or larger indicate small, medium, and large effect sizes respectively (Cohen, 1988).

Results

In performing our latent class analysis, our results indicate support for a five-class solution as compared to the other *c*-class solutions estimated. Of the models tested, the five-class solution

model contained the lowest estimated values of BIC (= 2,580.964) and AIC (= 2,455.064) and the highest entropy value (= .89), indicating the best model for the data. In evaluating the LMR-LRT statistic, results indicate that the one- through four-class solutions may be rejected, $p < .001$, while we failed to reject a five-class solution, $p = 0.17$. Table 4 contains the number of free parameters along with values for BIC, AIC, entropy, and the LMR-LRT statistic for each latent class solution tested. Values for the best-fitting five-class solution are also in bold on Table 4.

Table 4

Study 2 Summary Statistics for Model Fit of Latent Class Solutions

Classes	# of free parameters	BIC	AIC	Entropy	LMR-LRT (H_0: c – 1 model fits)
1	12	2,910.656	2,872.886	*NA*	*NA*
2	19	2,659.007	2,599.204	0.74	Reject 1-class solution, $p < .01$
3	26	2,615.781	2,533.946	0.79	Reject 2-class solution, $p < .01$
4	33	2,591.909	2,480.042	0.82	Reject 3-class solution, $p < .01$
5	**40**	**2,580.964**	**2,455.064**	**0.89**	**Reject 4-class solution, $p < .01$**
6	47	2,593.235	2,581.052	0.86	Do not reject 5-class solution, $p = .17$
7		No Convergence			

In examining our five-class solution, approximately 19% ($n = 38$) of the sample was estimated to belong to the first class of the five classes or profiles of self-regulation revealed. For the purposes of the current study, we refer to this first class or profile as *class 1* and all other classes respectively. Approximately 15% ($n = 31$) was estimated to belong to the second class (e.g., *class 2*), 6% ($n = 12$) was estimated to belong to the third class (e.g., *class 3*), 20% ($n = 39$) was estimated to belong to the fourth class (e.g., *class 4*), and the remaining 39% ($n = 77$) was estimated to belong to the fifth and final class (e.g., *class 5*). As a result of our latent class analyses, all classes were significantly different from one another in terms of standardized mean subscale scores. Figure 2 displays the standardized means for each subscale according to class.

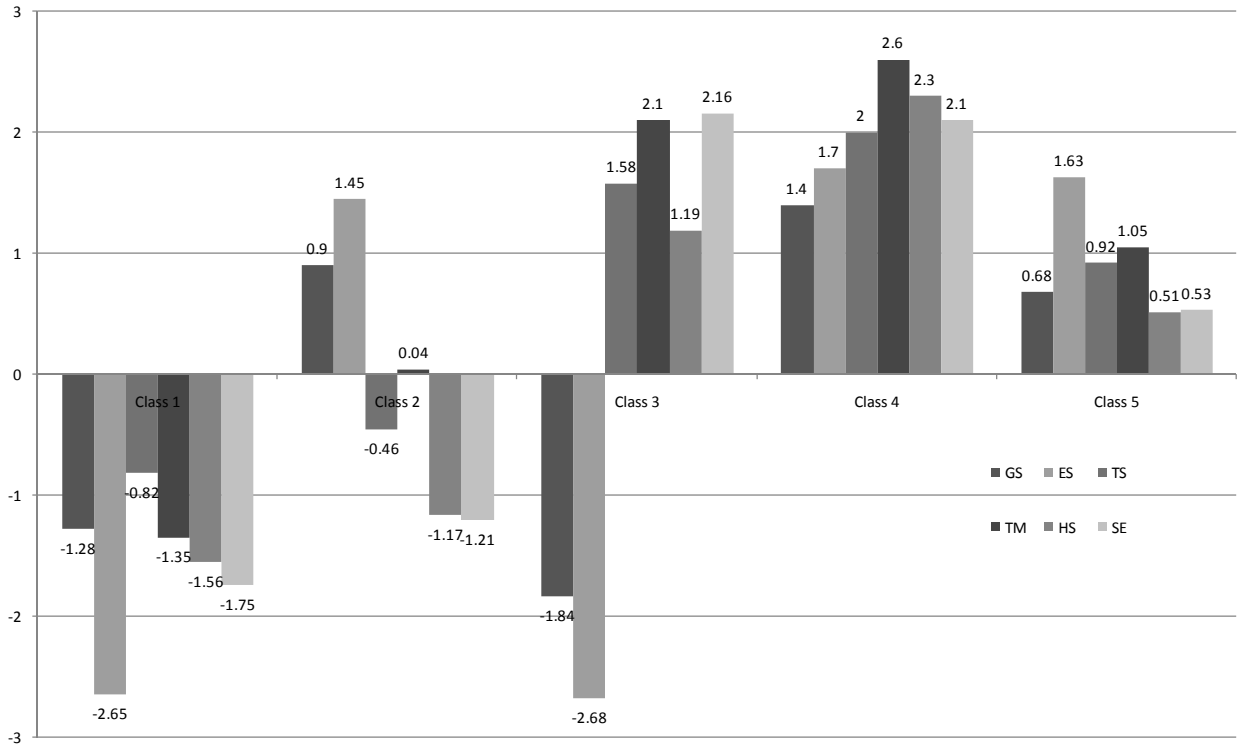

Figure 2. Study 2 standardized subscale means by class.

As we collected GPA data in Study 2, we next examined whether there were any significant differences in academic achievement according to class or profile membership. Results indicated that participants differed significantly in their GPA according to their class or profile of self-regulated learning membership, $F(4, 196) = 15.69$, $p < .01$, $f = .65$. As a measure of effect size, Cohen's f values of .10, .25, and .40 or larger indicate small, medium, and large effect sizes respectively (Cohen, 1988). Thus, a Cohen's f value of .65 indicates a large effect suggesting overall substantial differences in GPA according to class or profile of self-regulated learning membership. Table 5 contains the means and standard deviations for GPA according to each class.

Table 5

Descriptive Statistics according to Class

Class	*M* & *SD*
Class 1	$M = 3.37$, $SD = .63$
Class 2	$M = 3.58$, $SD = .34$
Class 3	$M = 3.55$, $SD = .38$
Class 4	$M = 3.91$, $SD = .20$
Class 5	$M = 3.91$, $SD = .18$

After conducting our omnibus ANOVA, we proceeded to conduct post hoc tests. As the assumption of the homogeneity of variances was not met, Levene's F (4,196) = 19.16, $p < .05$, we conducted post hoc tests using the Games-Howell procedure (Field, 2005; Kirk, 1995). These post hoc test results indicate that differences among individuals belonging to classes 1, 2, and 3 were statistically non-significant as with differences between individuals belonging to classes 4 and 5. Individuals belonging to classes 4 and 5 revealed significantly higher academic achievement than individuals belonging to classes 1, 2, and 3 with values of Cohen's d ranging from -1.16 to 1.21 for these statistically significant differences. Table 6 contains a summary of these post hoc test results including values of Cohen's d for all significant contrasts.

Table 6

Summary for Significant Post Hoc Tests

Contrast	Significance	Cohen's *d*
Class 1 vs. class 4	$p < .001$	$d = -1.15$
Class 1 vs. class 5	$p < .001$	$d = -1.16$
Class 2 vs. class 4	$p < .001$	$d = -1.18$
Class 2 vs. class 5	$p < .001$	$d = -1.21$
Class 3 vs. class 4	$p = .03$	$d = -1.19$
Class 3 vs. class 5	$p = .04$	$d = -1.21$

Discussion

In the current study, we examined whether profiles of self-regulated learning skills exist, which revealed the presence of five classes or profiles of self-regulated learning strategies or skills invoked by individuals across two samples. In both study 1 and study 2, individuals belonging to the first class or profile of self-regulated learning skills endorsed the skills and associated with self-regulated learning the least. In study 1, approximately 22% of the sample belonged to this least self-regulated learning class while approximately 19% of the sample in study 2 belonged to this class. We term this class as depicting the profile of individuals who are non-self-regulators or minimal self-regulators in their learning. At the other end of the spectrum, individuals belonging to the fourth class appeared to be composed of super self-regulators as endorsing the skills and strategies of self-regulated learning highly across all subscales. In both study 1 and study 2 respectively, 20% and 9% belonged to the class that depicts the profile of individuals who are highly self-regulated in their learning.

Individuals belonging to class 5 appeared to be moderately to highly endorsing skills and strategies of self-regulated learning but not to the same extent as those individuals who may be considered super self-regulators. We consider individuals belonging to this class as exhibiting the profile of competent self-regulators. We hypothesize that these competent self-regulators 'do what it takes' in terms of invoking self-regulated learning strategies and skills to achieve well in their learning but they don't do much more. In study 1, approximately 39% of the sample belonged to the class that profiles competent self-regulators while approximately 41% of the

sample in study 2 belonged to this class. Competent self-regulators appear to be the largest class of self-regulators with the highest percent in each sample belonging to class 5 depicting this profile.

The remaining two classes (e.g., classes 2 and 3) were more difficult profiles of self-regulated learning to interpret. Individuals belonging to class 2 appeared to more highly endorse goal setting and environment structuring as self-regulated learning strategies and skills while endorsing task strategies, time management, help seeking, and self-evaluation to much lesser extents. As goal setting and environment structuring typically occur in the forethought phase of the development of self-regulated learning skills and strategies (Zimmerman, 1998; Zimmerman & Schunk, 2001), we suggest that these learners may be best described as belonging to a profile of forethought-endorsing self-regulators. We consider individuals belonging to this profile of self-regulated learning skills and strategies to be concerned with self-regulation in the a priori or proactive sense, but they are not necessarily concerned with following through with the use of task strategies, time management, help seeking, or self-evaluation in their learning. Approximately 16% and 15% appeared to belong to this class depicting this profile of forethought-endorsing self-regulated learning in study 1 and study 2 respectively.

Individuals belonging to class 3 appeared to more highly endorse task strategies, time management, help seeking, and self-evaluation as self-regulated learning skills and strategies compared to goal setting and environment structuring. As task strategies, time management, help seeking, and self-evaluation are behaviors more typically associated with the performance control and self-reflection phases in the development of self-regulated learning strategies and skills, we suggest that these learners may be best described as belonging to a profile of performance control or self-reflection-endorsing self-regulators. As self-regulated learning skills and strategies pertaining to both the performance control and self-reflection phases were highly endorsed in this class, we will term individuals belonging to class 3 as performance/reflection-endorsing self-regulators. We consider individuals belonging to this profile of performance/reflection-endorsing self-regulators as being more concerned with self-regulation in the post hoc or reactive sense; they are not necessarily concerned with behaving proactively by goal setting or structuring their environment appropriately to achieve in their learning. Approximately 12% and 6% appeared to belong to this class, depicting this profile of self-regulated learning in study 1 and study 2 respectively.

We term individuals belonging to both class 2 and 3, which profiles forethought- and performance/reflection-endorsing self-regulators respectively, as being disorganized in the manner that they invoke skills and strategies associated with self-regulated learning. These learners would appear to need assistance in connecting different, less endorsed strategies and skills of self-regulated learning as being equally instrumental to them in achieving in their learning. Forethought- and performance/reflection-endorsing self-regulators, as disorganized self-regulators, may simply view that their current self-regulated learning strategies and skills are either the only or perhaps the best mechanisms to achieve in their learning. These individuals would appear to be more amenable to intervention on their behalf because these learners already

endorse some self-regulated learning skills and strategies as compared to non- or minimal self-regulators as depicted by class 1.

In the second study, we additionally examined the association of self-regulated learning profile membership as exhibited by latent class analyses with GPA. Our results indicated statistically significant differences in academic achievement (e.g., GPA) according to the class or profile of self-regulated learning that an individual belonged to. Super and competent self-regulators (e.g., classes 4 and 5 respectively) had the highest GPAs and were not significantly different from each other in GPA. Our results indicate that while being or becoming a super self-regulator would appear to be preferable, competent self-regulators do just as well in terms of academic achievement by most likely navigating and figuring out their learning environment enough to achieve well. Non-self-regulators (or minimal self-regulators) along with forethought- and performance/reflection-endorsing self-regulators had the lowest GPAs and were not significantly different from each other in GPA. These results would indicate that minimal and disorganized profiles of self-regulated learning are both associated with similar, poorer academic outcomes (e.g., lower GPAs). Our results appear to indicate that disorganization in self-regulated learning strategies and skills is as non-advantageous to a learner as non-existent or minimal self-regulation.

We suggest that these profiles in self-regulated learning may be viewed as contributing to the development of theory by elucidating how exactly individuals are and are not self-regulated in their learning in view of the development of self-regulated learning. The results of the current study suggest that individuals may not only be different in the quantitative level or amount in which they are self-regulated in their learning but also as to the form that this difference takes. For instance, in examining total self-regulated learning scale scores, our results indicated no significant differences between individuals belonging to classes 2 (e.g., forethought-endorsing self-regulators) and 3 (e.g., performance/reflection-endorsing self-regulators). Thus, in examining aggregate self-regulated learning scores, we would not be able to distinguish individuals belonging to classes 2 and 3 nor be able to term these individuals as disorganized in their self-regulation as we would not observe the form of these differences by specific skill or strategy. It is only through examining the subscale scores for the individual skills and strategies of self-regulated learning (e.g., goal setting, task strategies, etc.) that we would be able to discern the form of these differences in self-regulated learning for these disorganized self-regulators.

While the results of the current study provide insight into how learners are and are not self-regulated in view of theory, there are certain limitations that accompany the interpretation of our findings. For the samples in both study 1 and study 2, the mean values for GPA may be considered high as compared to the population of college students at large. Students with higher GPAs may enroll in online courses at higher rates as a result of having higher degrees of self-efficacy, the belief that they can achieve in courses delivered at a distance or in other non-traditional formats. Due to this possible bias in our samples, we suggest that future research be performed that represents a better range or diversity of learners in terms of academic achievement. Additionally, the results of the current study may be exclusive in their application to

online learners as learners in other learning environments may reveal different profiles of self-regulated learning according to discipline or domain.

Future research should consider replicating the results of the current study with respect to learners in other domains and learning environments. The context of learning has been noted as influencing the way students approach their learning (Severiens, Ten Dam, & Wolters, 2001). As such, Schunk (2001) has noted that self-regulated learning behaviors are "highly context dependent" (p. 125), thus future research will be required to replicate the results of the current study across several domains in order to cross-validate our findings for these five, distinct self-regulated learning profiles. Additionally, future research should also examine other cognitive factors, such as epistemological beliefs (e.g. Barnard, Lan, Crooks, & Paton, 2008; Pintrich & Zusho, 2002), which may be associated with the profile of self-regulated learning to which an individual belongs. We suggest that individuals with more sophisticated or constructivist-oriented epistemological beliefs would more likely be profiled as super or competent self-regulators. For instance, in another study of online learners, Barnard, Lan, Crooks, and Paton (2008) found a statistically significant and highly positive relationship between epistemological beliefs and self-regulated learning skills.

References

Ally, M. (2004). Foundations of educational theory for online learning. In T. Anderson (Ed.), *The theory and practice of online learning* (pp. 15-44). Edmonton, CA: Athabasca University Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Barnard, L., Lan, W. Y., Crooks, S. M., & Paton, V. O. (2008). The relationship of epistemological beliefs with self-regulatory skills in the online course environment. *Journal of Online and Learning Teaching*, *4*(3), 261-266.

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S. L. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education, 12,* 1-6.

Barnard, L., Paton, V.O., & Lan, W. Y. (2008). Online self-regulatory learning behaviors as a mediator in the relationship between online course perceptions with achievement. *International Review of Research in Open and Distance Learning*, *9*(2), 1-11.

Barnard-Brak, L., Paton, V.O., & Lan, W. Y. (in press). Self-regulation across time of first-generation online learners. *Journal of Association of Learning and Technology*.

Boekaerts, M., & Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review, 18*, 199-210.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum & Associates.

D'Unger, A., Land, K., McCall, P., & Nagin, D. (1998). How many latent classes of delinquent/criminal careers? Results from mixed Poisson regression analyses of the London, Philadelphia, and Racine cohort studies. *American Journal of Sociology, 103*, 1593-1630.

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of Full Information Maximum Likelihood estimation for missing data in structural equation models. *Structural Equation Modeling, 8*(3), 430-457.

Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). Thousand Oaks, CA: Sage.

Greene, J. A., & Azevedo, R. (2007). A theoretical review of Winne and Hadwin's model of self-regulated learning: New perspectives and directions. *Review of Educational Research, 77*(3), 334-372.

Kirk, R. E. (1995). *Experimental design: Procedures for the behavioral sciences* (3rd ed.). Brooks/Cole Publishing Co.

Kramarae, C. (2001). *The third shift: Women learning online.* Washington, D.C.: American Association of University Women Educational Foundation Press.

Lo, Y., Mendell, N., & Rubin, D. B. (2001). Testing the number of components in a normal mixture, *Biometrika, 88*, 767-778.

Martin, J. (2004). Self-regulated learning, social cognitive theory, and agency. *Educational Psychologist, 39*(3), 135-145.

Muthén, B. O. (2002). Beyond SEM: General latent variable modeling. *Behaviormetrika, 29*(1), 81-117.

Muthén, B. O. (2000). Methodological issues in random coefficient growth modeling using a latent variable framework: Applications to the development of heavy drinking. In J. Rose, L. Chassin, C. Presson & J. Sherman (Eds.), *Multivariate applications in substance use research* (pp. 113-140). Hillsdale, NJ: Erlbaum.

Muthén, L. K., & Muthén, B. O. (2008). *MPlus user's guide.* Los Angeles, CA: Muthén & Muthén.

Muthén, L. K., & Muthén, B. O. (2001). *MPlus user's guide* (2nd ed.). Los Angeles, CA: Muthén & Muthén.

Muthén, B. O., & Muthén, L. K. (2000). Integrating person-centered and variable-centered analyses: Growth mixture modeling with latent trajectory classes. *Alcohol Clinical & Experimental Research, 24*, 882-891.

Nagin, D. S. (2005). G*roup-based modeling of development.* Cambridge, MA: Harvard University Press.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451-502). San Diego, CA: Academic.

Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 249-284). San Diego, CA: Academic.

Raftery, A. E. (1995). Bayesian model selection in social research. *Sociologial Methodology, 25,* 111-163.

Schunk, D. H. (2005). Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist, 40*(2), 85-94.

Schunk, D. H. (2001). Social cognitive theory and self-regulated learning. In B.J. Zimmerman & D.H. Schunk, (Eds). *Self-regulated learning and academic achievement* (2nd edition). Mahwah, NJ: Lawrence Erlbaum.

Schunk, D.H., & Zimmerman, B.J. (1998). *Self-regulated learning: From teaching to self-reflective practice*. New York: Guilford Press.

Severiens, S., Ten Dam, G., & Wolters, B. V. H. (2001). Stability of processing and regulation strategies: Two longitudinal studies on student learning. *Higher Education*, *42*(4), 437-453.

Widaman, K. F. (2006). Missing data: What to do with or without them. *Monographs of the Society for Research in Child Development, 71*(3), 42-64.

Winne, P. H., & Jamieson-Noel, D. (2002). Exploring students' calibration of self-reports about study tactics and achievement. *Contemporary Educational Psychology, 27*, 551-572.

Woolfolk, A. E., Winne, P. H., & Perry, N. E. (2000). *Educational psychology.* Scaborough, Ontario, Canada: Allyn and Bacon.

Zimmerman, B. J. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist, 33*, 73-86.

Zimmerman, B. J. (1994). Dimensions of academic self-regulation: A conceptual framework for education. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance* (pp. 3–21). Hillsdale, NJ: Lawrence Erlbaum.

Zimmerman, B.J. & Schunk, D. H. (2001). *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Appendix

Item	Subscale
1. I set standards for my assignments in online courses.	Goal Setting
2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	
3. I keep a high standard for my learning in my online courses.	
4. I set goals to help me manage studying time for my online courses.	
5. I don't compromise the quality of my work because it is online.	
6. I choose the location where I study to avoid too much distraction.	Environment Structuring
7. I find a comfortable place to study.	
8. I know where I can study most efficiently for online courses.	
9. I choose a time with few distractions for studying for my online courses.	
10. I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.	Task Strategies
11. I read aloud instructional materials posted online to fight against distractions.	
12. I prepare my questions before joining in the chat room and discussion.	
13. I work extra problems in my online courses in addition to the assigned ones to master the course content.	
14. I allocate extra studying time for my online courses because I know it is time-demanding.	Time Management
15. I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule.	
16. Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.	
17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	Help Seeking
18. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.	
19. If needed, I try to meet my classmates face-to-face.	
20. I am persistent in getting help from the instructor through e-mail.	
21. I summarize my learning in online courses to examine my understanding of what I have learned.	Self-Evaluation
22. I ask myself a lot of questions about the course material when studying for an online course.	
23. I communicate with my classmates to find out how I am doing in my online classes.	
24. I communicate with my classmates to find out what I am learning that is different from what they are learning.	


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Live, Online Short-Courses: A Case Study of Innovative Teacher Professional Development

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Abstract

Teachers are searching for new venues through which they may meet stringent professional development requirements. Under competitive funding from NASA's (National Aeronautics and Space Administration) Office of Education and the NASA Explorer Schools Project, U.S. Satellite Laboratory, Inc. created a series of live, online, interactive short-courses. In this case study, a mixed methods analysis of a variety of data sources reveals that diverse educators from a variety of classroom contexts view the short-courses as a useful professional development tool, both as a vehicle for a teacher's own professional growth and for classroom applications. Teachers were particularly interested in the ability to participate in a collaborative community of practice with other educators, instructors, and scientists from across the country, and they found the flexible design of the professional development to be useful. This short-course design offers promise for future professional development opportunities.

Keywords: Online learning; teacher professional development; in-service science teachers; synchronous online learning

Background to the Study

Traditional professional development for educators has been criticized for being irrelevant, ineffective, and fractured, and for not giving teachers what they actually need to teach students (Corcoran, 1995; Wilson & Berne, 1999). The current educational culture of accountability has revamped the definition of teacher quality. In this culture of quality, teachers are largely responsible for their own professional development – often in order to maintain their state certification and their delineation as "highly qualified." For example, in New York State, professional certification is no longer granted for a lifetime; teachers must complete requisite hours of professional development within five-year cycles (New York State Education Department [NYSED], 2007). Faced with stringent content standards and high-stakes testing,

teachers are turning to new and different sources for quality professional development. Many of them are looking to online sources (Garet, et al., 2001). In particular, teachers of science seek up-to-date resources for professional development. Science is a dynamic and exciting field in which new information is constantly forthcoming; science educators need access to up-to-date research and curricular materials ready to be implemented in classrooms.

To that end, U.S. Satellite Laboratory, Inc. (U.S. Satellite), a small business focused on the design, development, and delivery of curriculum and professional development programs, sought to create online professional development opportunities that 1) were relevant to teachers' day-to-day practice, 2) provided an opportunity for professional sharing and collaboration, 3) contributed to teachers' professional growth, and, 4) were in a format accessible to a wide range of educators.

The *short-courses*, and therefore this study, were underpinned by a theoretical framework of social constructivism. In this framework, knowledge built by the learners is intertwined with their own world experiences and those shared with others. Social constructivism contends that knowledge is constructed as a group through interaction and knowledge-building. In social constructivism, "there are social aspects of the construction process; although individuals have to construct their own meaning...the process of constructing meaning always is embedded in a particular social setting of which the individual is a part" (Duit & Treagust, 1998, p. 8). The teachers in this case study developed their scientific understanding and pedagogical content knowledge (PCK) (Shulman, 1986) through interactions with colleagues, NASA scientists, and teacher educators. Richardson (1997) notes in her discussion of social constructivism in teacher education, "It is within this interaction that cultural meanings are shared within the group, and then internalized by the individual" (p. 8). The design of the short-courses promoted constant discourse and collaborative knowledge-building among both participants and instructors. Participants brought their own sociocultural context to the dialogue and contributed to the understanding of others. Teachers were encouraged to share their own ideas and experiences; the instructors viewed these as important starting points for knowledge growth, as suggested by the professional development literature (van Driel, Beijaard, & Verloop, 2001). The mutual growth and understanding is inherent when exploring the participants' perceptions of the short-courses. The case study methodology is also consistent with the constructionist epistemology and constructivist theoretical perspective in that it "will put all understandings, scientific and non-scientific alike, on the very same footing" (Crotty, 1998, p. 16). The goal of this study was to examine the educators' views on the efficacy of this professional development model.

Methodology

Setting: The Live, Short-Courses for NASA Explorer Schools Program

To address the professional development goals presented above, U.S. Satellite created a professional development program called "Live, Short-Courses for NASA Explorer Schools" under a competitive grant from NASA's (National Aeronautics and Space Administration) Office of Education and the NASA Explorer Schools (NES) initiative. NASA Explorer Schools are schools selected from across the United States to promote the use of NASA assets and

educational content in classrooms. The U.S. Satellite professional development for NES educators consisted of seven short-courses, live (synchronous) online courses each comprising 4-6 one-hour sessions, with independent assignments as follow-up activities between sessions. Educators participated by simultaneously logging into an online classroom and using a telephone to dial into a conference call. This innovative format offered teachers the ability to take courses from home or school and to still interact *live* with expert instructors, guest research scientists, and other educators. The intent of the short-courses was to give educators an opportunity to actively learn content and applications for the classroom. Both the content and applications were to be incorporated within the teacher's curriculum in line with the professional development goal for the NES initiative, "to address local challenges in science, technology and mathematics education" (NASA, 2007).

Underpinned by the theories of social constructivism, the short-courses aimed to facilitate teachers' active learning, assimilation of activities into the classroom, and collaboration among groups, all of which have been shown to be factors that have the most significant impact on the professional growth of science and math teachers (Garet, et al., 2001; National Research Council, 1996). Guest scientific researchers from NASA, NOAA (the National Oceanographic and Atmospheric Administration), and other exemplary science institutions interacted with short-course participants and presented current research as it related to short-course content. A wide range of scientific topics was represented in the short-courses, including oceanography, meteorology, and heliophysics. A major goal was to improve teachers' pedagogical content knowledge (PCK) in science. PCK includes strong knowledge of the subject matter, or the content, but, more importantly, it includes knowledge of how this subject matter should best be taught to students. PCK includes, "the most powerful analogies, illustrations, examples, explanations, and demonstrations . . . that make it [the subject matter] comprehensible to others" and "an understanding of what makes the learning of specific topics easy or difficult" (Shulman, 1986, p. 9).

Each short-course began with introductions, and the participants soon realized that the unique online environment included educators from Florida to Nebraska, New York to Alaska. The fast-paced, interactive atmosphere of the short-course meant that each participant received an opportunity to ask and answer questions aloud and to share their unique, personal experiences. Additionally, instructors used embedded technological resources, such as online quizzes/polls, as a formative assessment and as a way for participants to share ideas quickly.

The participants were self-selected members of the NES community, including educators from active and alumni NES schools as well as from schools that had unsuccessfully applied to be an NES location. NES schools were given many professional development opportunities in different formats, online, onsite, and through travel. Other distance learning opportunities available to these educators included one-session webinars and events through NASA's DLN (digital learning network), a videoconferencing tool. Participants indicated that they had participated in many diverse professional development events within the NES network, and the lead members of the NES teams, all of whom were state certified, at each school were mandated to participate in professional development and were expected to encourage other teachers from their site to attend.

For teachers who began short-courses with U.S. Satellite, the attrition rate was less than 1%. Data for other NES activities is unavailable to the authors.

The short-course design was grounded in the research in online training; although, research in synchronous online design is sparse. Previous studies demonstrated online training to be as effective as in-person training and much more efficient and inexpensive (Schmeekle, 2003). Training sessions normally taught in person could be taught in one-half to two-thirds of the time using the online learning environment (Barker & Brooks, 2005; Schmeekle, 2003). These studies, although they did not take place within teacher education, contributed to the compact design of the short-courses.

The live aspect of the short-course sessions was also deliberately designed to reflect research findings. In a classic study, Threlkeld and Brozoska (1994) found that support and interaction between students and instructors as well as between students are keys to success in distance learning environments. Carr-Chellman (2000) took this argument a step further to live contact, stating,

> The advantages of synchronous interchanges include a more direct sense of collegial interaction, immediate resolution to questions posed, and possibly a strong contribution to the team building required to sustain future student interactions. The synchronous mode is particularly appropriate for the inclusion of motivating guest lectures in specific content areas. (p. 236)

Northrup (2000) highlighted the importance of the interaction between participants, explaining that it may mitigate feelings of isolation and frustration common in distance learning participants.

Data Collection

Case Study Methodology

We used a variety of data sources, including questionnaires, reflective essays, personal communications, and field notes to study the "bounded system" (Merriam, 1998) of participants in the NES short-courses. The case study is a methodology that provided us with the ability to examine the professional development as a whole, giving an in-depth look at the experience from multiple perspectives (Creswell, 2007; Merriam, 1998). Case studies rely primarily on qualitative methods, although quantitative data may be used to support emergent themes (Creswell, 2007).

Questionnaires

As a primary data source to study these short-courses as a professional development tool, the researchers administered an online mixed questionnaire to examine teacher views about the shared experience of the online short-courses. The mixed methods approach included open-

ended questions embedded in a series of Likert and yes/no questions. The purpose of this design was to allow the researchers to gain a deeper understanding of teachers' feelings and impressions about the strengths and limitations of this approach to professional development while also collecting quantitative data to assess their general beliefs about the program's efficacy. The questionnaire was answered anonymously and questions were based on general program evaluation questions as put forth by NASA's office of Managements and Budgets. Both qualitative and quantitative sources of information gained were important; mixed methods design draws from the strengths of both qualitative and quantitative approaches (Creswell, 2003, Johnson & Onwuegbuzie, 2004). Using mixed methods allowed the authors to support the qualitative data of the case study with additional information that could be quantified.

In 2007, educators who had participated in short-courses from November 2005 to March 2007 were invited to complete the online questionnaire concerning their experience. Respondents logged into the online survey system and answered fifteen questions, a mix of Likert-scale, yes/no, and open-ended items. Items were designed to discover information about the teachers' classroom context as well as how the short-courses contributed to their professional growth, whether the short-courses were relevant to local curricula, and whether they were able to use what they learned in their classrooms. Two of this study's authors were instructors in the short-courses under study and therefore took on the role of participant observers (Jorgensen, 1989).

Reflective Essays

A small percentage (approximately 10%) of teachers participating in the live short-courses elected to take the course for graduate credit. Earned credits could be used by teachers toward earning/maintaining state certifications as well as for ascending district pay scales. Those teachers who earned credit completed additional projects based on classroom implementation of science content and pedagogical strategies learned in the short-course(s). These supplemental assignments included reflective essays, in which the educators critically examined their implementation of what they had learned. These essays served as a data source in this study.

While we cannot be certain, we believe that most teachers did not take advantage of the graduate credit opportunity for two reasons. First, these teachers were given *many* opportunities to earn credit through NES, often for simply attending workshops/events at their school; whereas, to earn credit for these courses, the educators were required to complete additional work beyond the course itself. Also, more of the teachers (approximately 20%) earned continuing education units (CEU's), which did not require essay submissions yet are often accepted for teachers who wish to advance on the pay scale and/or to maintain state certification.

Personal Communications

Throughout the Live, Short-Courses program (2 years), U.S. Satellite team members remained in constant communication with participating educators, both during the courses as well as while teachers implemented what they had learned in the classroom. Team members, including scientists and teacher educators, were available by phone and email to discuss content,

pedagogical strategies, and other issues. The nature of these communications varied but occurred quite often. Instructors often received several emails a week from participants. Field notes were recorded during this time and these notes as well as emails are an additional data source.

The use of diverse data sources provided triangulation for the themes that emerged in this study, which is considered to be a way to approximate validity in qualitative studies (Guba & Lincoln, 1989). Additionally, these sources contributed to the rich, thick description (Merriam, 1998) of the case study within the Findings section.

Data Analysis

Data collected through the online survey tool were exported to a Microsoft Excel spreadsheet. Responses from the Likert and yes/no items were separated and percentages calculated for each response. To analyze the open-ended questions, the researchers followed the procedures of grounded theory analysis (Guba & Lincoln, 1989). We first examined all of the data and made general notes of the results. Then data was broken into chunks for coding based on emerging categories or themes (open coding). Two of the researchers followed this independent procedure then peer-debriefed to agree on emergent themes (Creswell, 2003; Merriam, 1998). We then compared the themes across data sources and created categories (axial coding; Guba & Lincoln, 1989). For example, one questionnaire response stated, "Interacting with teachers from a variety of locations was great!" During open coding, this response was categorized as *interaction* by both coders. In the axial coding process, the coders observed this theme across data sources and eventually determined that this was indeed an emergent theme, *interaction with instructors, scientists and other educators.*

After determining the emergent themes, each theme's frequency was calculated. This quantitative aspect of the study added another layer of validity; the numbers helped to justify the themes found, and "determine the distribution of a phenomenon within [the] chosen population" (Creswell, 2003, p. 216).

We followed the same procedure of open and axial coding, without quantifying results, to analyze the other data sources, including field notes, reflective essays, and personal communications. Then all data sources were considered together to build the case study.

Findings

Quantitative Data

Demographics.

Before delving into the results of the study, it is important to examine the demographics of the population of educators under study. Fifty-nine teachers (out of approximately 248 educators who participated in the Live, Short-Courses program) responded to the questionnaire, a response

rate of almost 24%. At least 13 respondents had participated in all seven possible short-courses. The respondents indicated that their schools represented a variety of demographic areas, including urban (41%), suburban (19%), rural (36%), and other (4%) (Figure 1).

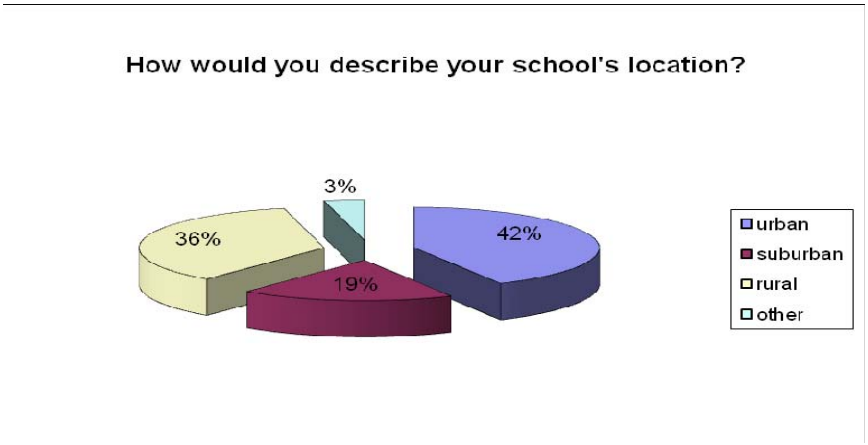

Figure 1. Location of schools.

The respondents teach pre-college grade levels from kindergarten through twelfth grade. Most taught within Grades 4 through 9, consistent with NES educator demographics. Forty percent of the participants reported teaching science subjects including physical science, earth science, general science, astronomy, biology, and environmental science. Other subject areas included health, physical education, gifted education, language arts, social studies, special education, mathematics, and reading. Respondents reported teaching students of a wide range of ability levels from students with emotional disturbance or learning disabilities to Advanced Placement courses. Five percent of respondents were informal educators.

Relevance of Short-Courses

The researchers were very interested in whether the participating educators felt that the short-courses were relevant to their work at their schools. Regardless of their location or the myriad subjects taught, 79.6% of respondents reported that they were *using* what they learned in the short-course (content, activities, and strategies) during the *current* school year, and 96.6% of respondents *anticipate* using what they learned during the *current* school year. When asked who in their school community might benefit from participating in short-courses, 95% chose other teachers, 51% chose parents, 44% chose paraprofessionals, and 34% chose administrators. One hundred percent of respondents would be interested in taking future short-courses.

When presented with the statement, "The content I learned in this course fits with my curriculum," 86% chose "agree" or "strongly agree." The remaining participants chose "neutral." Respondents were also presented with the statement, "The Short-course(s) contributed to my professional growth." In response, 78% chose "strongly agree," 21% chose "agree," and 1% chose "neutral" (Figure 2).

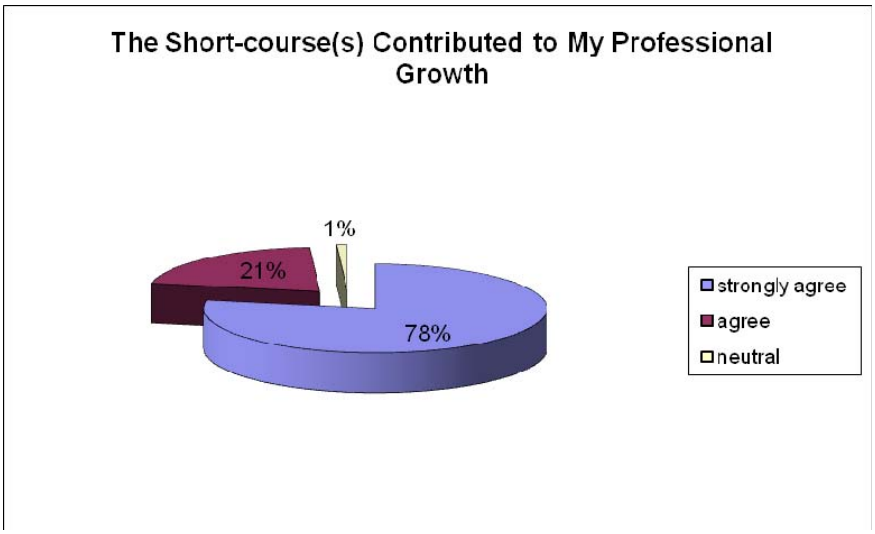

Figure 2. Contribution of the short-courses to professional development.

Format of Short-Courses

Because traditional online courses are held asynchronously, not live, and are self-paced, it was important to ask participants to compare their experience in this format with other online courses. Respondents were presented the statement, "I feel that a live, online course is a good model for professional development." Seventy-three percent chose "strongly agree," 20% chose "agree," and 7% chose "neutral" (Figure 3).

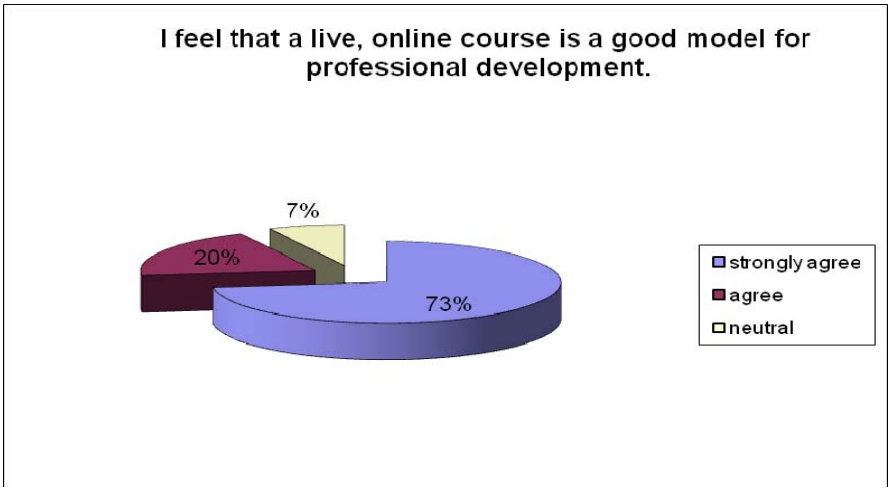

*Figure 3.*Short-courses as a good model for professional development.

Next, participants were presented with the statement, "I prefer live, online courses to online courses that are not live" (Figure 4). Fifty-four percent chose "strongly agree," 24% "agree," 19% "neutral," and 3% "disagree."

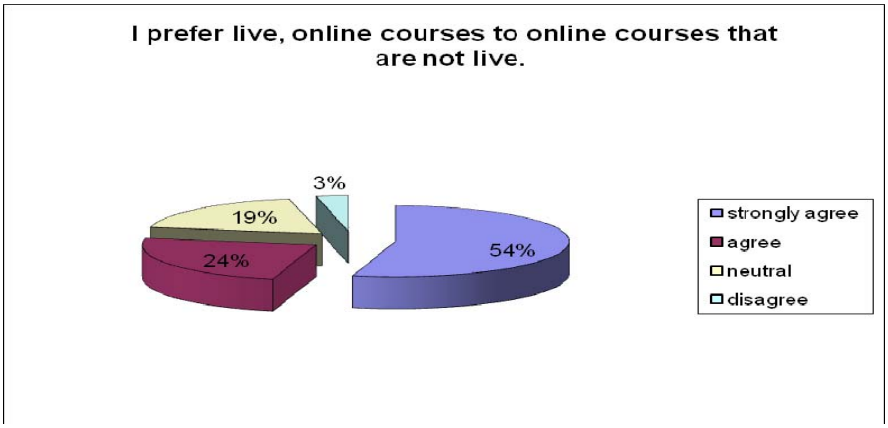

Figure 4. Preference for live online courses.

Qualitative Data

The final section of the questionnaire consisted of open-ended questions, intended to reveal some of the participants' specific attitudes and criticisms concerning the short-courses. Other qualitative data sources included subject-produced documents (i.e., reflective essays), field notes, and personal communications. Three major themes emerged from the qualitative sources: 1) interaction with other educators, 2) immediate feedback from instructors and scientists, and 3) flexibility of the course structure.

Theme 1: Interaction with other educators.

The most common theme (54% of questionnaire respondents) was the ability to interact with, collaborate with, and gain knowledge from other educators. In addition to the questionnaire, this theme was evident in the reflective essays of participants as well as in the field notes. The fact that educators had the opportunity to interact and share across diverse contexts without traveling was a very positive feature of short-courses.

For instructors, it was noteworthy to observe the development of socially constructed knowledge building and of a professional network. At the first live session of participants, four to six logged onto the online classroom and called into the conference call about 10-15 minutes early for the one-hour class. The instructor typically made small talk, asking perfunctory questions about the weather or current events, although these brief interactions were punctuated by periods of science. By the second session, pre-class chatter was no longer facilitated by the instructor. Instead, teachers began sharing ideas, experiences, and strategies. They asked one another how they might incorporate what they had already learned and shared lessons into which new material could be incorporated. By the last class, the classmates were exchanging emails and the instructor needed to break through the animated conversation in order to begin class.

The significance of this developing network of knowledge-sharing was also evident to the participants. Sample questionnaire responses centered on this theme included the following:

- Interacting with teachers from a variety of locations was great!
- [I enjoyed] professional interaction revolving around content.
- Being able to interact with other teachers from around the country
- I liked the live part for me because I could ask questions and communicate with others in the course.
- Collaboration with other teachers

Many individual educators felt that working with other diverse educators, sharing best practices, and discussing content in locations across the country were positive aspects of the short-courses. In her reflective essay, one teacher wrote,

> The lessons were excellent and the live part was so important. I feel confident that I can implement them in my 5th grade class. Students will appreciate learning from ongoing interesting research. I also liked learning from other teachers across the country.

This teacher, like many others, viewed learning from other educators as an important aspect of her short-course experience. Similarly, another educator explained, "There were excellent applications of the subject matter . . .This is also an excellent venue for interacting with teachers nationwide." The diverse group of educators – encompassing Grades K-12, myriad subjects from Advanced Placement Physics to kindergarten to physical education – felt that it was valuable to interact with and learn from one another in the live format.

Additionally, it was evident that through their interactions, the teachers were building knowledge together, reflecting the social constructivist theoretical framework. For example, in the course entitled *Astro-Venture*, which is based upon the NASA-developed curriculum module (accessible at http://astroventure.arc.nasa.gov/), each participant prepared a short presentation on content within the Astro-Venture curriculum guide. Content topics included the Doppler effect, calculating orbital eccentricity, and comparing tectonic activity on different planets. Several teachers remarked that these presentations allowed them to improve their understanding of these topics, both by presenting and by listening to and interacting with the other educators. For some of these teachers, the content was novel and seemed overwhelming, yet the friendly atmosphere of the short-course evidently assisted them in learning the topics.

Theme 2: Immediate feedback from instructors and scientists.

Another common theme, cited by 24% of questionnaire respondents, was the ability to receive immediate feedback to questions. In more common and traditional asynchronous online courses, students may post questions for a professor to be answered days later. During the live, short-course sessions, participants were highly encouraged to ask questions both of the instructors and

of the guest scientists taking part in the class. The difference was that the answers were immediate and often resulted in reciprocal discussions.

During a typical class session, the instructor presented a PowerPoint presentation interspersed with live links, videos, animations, visualizations of scientific data, and much more. Along the way, participants were asked to try their hand at interpreting data, making predictions, and reflecting on new content. Brief poll questions were embedded throughout the lesson to check for understanding. Each short-course included a presentation by at least one guest speaker, such as a Mars volcanologist, oceanographer, astrobiologist, etc. These scientists presented current research in the field, enhancing the cutting-edge content of the courses. After the presentation, the educators often engaged in animated discussions with the guest, asking many questions and relating classroom applications.

The theme *immediate feedback* was very prevalent throughout the data sources as an important aspect of the short-courses. In their essays, teachers wrote, "I liked the live part for me because I could ask questions and communicate with others in the course," and "For me, the interaction with the presenters and the scientists they included in the short course was so important. I was able to ask questions and reflected on brand-new content." Another comment was, "I had a lot of questions and the immediate feedback was invaluable."

Questionnaire responses centered on this theme included, "being able to ask questions and discuss answers," "real-time interaction and feedback," "live questions were answered on the spot," and "immediate feedback and clarification to any question or misconception."

Theme 3: Flexibility of course structure.

In addition to the live interactivity and feedback, an emergent theme of *course flexibility* was often cited as an important positive aspect. For example, one questionnaire respondent wrote, "The fact that it was online gave me more flexibility. I'm a single mom and didn't have to seek child care to participate." Another respondent explained that "[the] short amount of time works better because of scheduling issues."

The short-courses were held after school, in the evenings, or during the summer breaks in order to accommodate the busy schedules of educators. Teachers often shared that they liked being able to participate at night, after dinner and putting children to bed, or during the summer early in the morning. A session was normally offered twice in one day; participants were encouraged to attend the same session (i.e., 4 p.m. or 9 p.m. throughout a course), but having multiple sessions allowed changes if necessary. As noted by one teacher, "I really like the flexibility when they are offered more than one time per day because things come up at the last minute."

Limitations

As we have mentioned, conducting live, synchronous online professional development for educators is a relatively new trend. Though we have employed this method over the

implementation of several short-courses in several years, we look forward to the opportunity to provide several semesters of training in each of the short-courses so that as many teachers as possible can participate, and scenarios of implementation can be vetted.

A few questionnaire respondents (15%) wished to see improvement in addressing technology issues. Examples included, "less distractions from teachers with technical problems," "setting up my computer for the course was challenging," "less technical difficulties that drag the speed of the course," and "eliminate technical difficulties."

The methods for data collection and analysis were limited by the researchers' ability to identify first-hand how participating educators implemented short-course content in their classrooms. In addition to self-reporting through Likert and yes/no questions, future data collection may include an interview process, whereby researchers visit and interview randomly selected teachers from each demographic, such as urban and rural, high-need, and affluent schools. Teachers could also provide evidence of student work to show how short-course content fit into their existing curriculum.

Discussion and Implications

Short-courses for NASA Explorer Schools primarily targeted Grades 4-9 science teachers, and the majority of participants teach science. However, representatives from other disciplines, including math, physical education, special education, social studies, language arts, and others, participated in short-courses. Intended implementation of curricular materials and use of content was effective across disciplines as 96.6% of study participants indicated that they anticipate using the materials during the same school year, which shows that the courses provided 'something for everyone.' Teachers in every discipline are responsible for maintaining a standard of excellence and completing professional development requirements. Short-courses provided educators with expert training and resources, which they may not have had access to through their local district. We are, however, unclear about how such diverse educators perceived that they benefitted from the courses themselves. This aspect of our findings certainly requires further study.

In addition, the short-courses promoted an environment where participants felt comfortable sharing ideas, reflecting on best practices, and interacting with instructors, scientific researchers, and practitioners. As this was the most common emergent theme, it is important to teachers to exchange information about using the resources in their classrooms, across diverse contexts. While they never met their classmates in person, it seems that the participants felt that the short-courses offered the best of both worlds, live discussion with like-minded professionals across the country without having to travel. These findings affirm similar findings from research on asynchronous professional development experiences. Vrasidas and Zembylas (2004) used the lenses of social constructivism and situated cognition to examine online professional development. In the asynchronous programs under study, teachers were working on common tasks and activities and were monitored by moderators, and this design promoted interaction and the development of a sense of community among teachers. In a 2007 study, Hew and Hara examined the interactions of teachers within a listserv and found that teachers are often motivated

by opportunities for knowledge sharing, but that face-to-face interactions often increase familiarity and therefore willingness to share knowledge. We wonder whether the synchronous interactions via telephone in the short-courses bred the same sort of increase in familiarity. Thus, our findings seem to refute the ideas asserted by Schlager and Fusco (2003) that online community development should be situated within local face-to-face teacher professional development communities, such as those that develop within local school districts. Our study shows that giving teachers a forum for sustained interaction might support the development of an online community of practice. Further study in this area is needed. Most of the respondents indicated that they preferred the live short-course format over the traditional asynchronous online course format. While it is possible that this result is due to participants' familiarity with the format, the researchers believe that the live format is particularly promising for professional development in science education as cutting-edge content can often be challenging. The synchronous course design allows participants to ask and receive answers, clarifying questions on the spot, thus eliminating some of the frustrations that may be the result of learning difficult content.

While these findings are promising, the next step would be to examine changes in the teachers' content knowledge as well as their in pedagogical content knowledge (PCK) to see if there are any resulting changes in teaching practice. The results of this study are nevertheless important because in order for professional development to be effective, teachers must 'buy in' to the model and what they are learning.

Conclusion

Increasing numbers of educators are seeking online sources to meet their professional development needs. This mixed methods study examined the views of teachers from NASA Explorer Schools about the viability of the live, online short-course model for professional development. Findings indicate that the teachers felt it was an effective model. Emergent themes indicate that teachers felt it was important to interact with and learn from other educators who are located across the country. Also, the live nature of the courses was critical in terms of working through new science concepts and ideas because teachers were able to receive immediate feedback from instructors and participating scientists. Of course, the online design also offered flexibility that traditional professional development workshops do not. The response to this online community of reflective educators includes positive professional growth and overwhelming enthusiasm for participants to continue to use short-courses as a solution for meeting their professional development needs.

References

Barker, B., & Brooks, D. (2005). An evaluation of short-term distributed online learning events. *International Journal on Elearning, 4*(2), 209-228.

Carr-Chellman, A.(2000). The ideal online course. *British Journal of Educational Technology, 31*(3), 229.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed). Thousand Oaks: Sage.

Corcoran, T.B. (1995). Helping teachers teach well: Transforming professional development. *CPRE Policy Briefs.* Retrieved from http://www.ed.gov/pubs/CPRE/t61/index.html

Crotty, M. (1998). Introduction: The research process. In *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks: Sage.

Duit, R., & Treagust, D. (1998). Learning in science: From behaviorism towards social constructivism and beyond. In B. J. Fraser & K. G. Tobin (Eds.), *International handbook of science education* (pp. 3-25). Great Britian: Kluwer Academic Publishers.

Garet, M.S., Porter, A.C., Desimone, L., Birman, B.F., Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

Guba, E. G., & Lincoln, Y. S. (1989). Judging the quality of fourth generation evaluation. In *Fourth generation evaluation* (pp. 228-251). Thousand Oaks: Sage.

Johnson, R. B., & Onwuegbuzie, A.J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.

Jorgensen, D. L. (1989). *Participant observation: A methodology for human studies* (Vol. 15). Thousand Oaks, CA: Sage.

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. Hoboken, NJ: Jossey-Bass.

NASA Explorer Schools. (2007). Retrieved from http://explorerschools.nasa.gov/portal/site/nes/

National Research Council (NRC). (1996). *National science education standards.* Washington, DC: National Academy Press.

New York State Education Department (NYSED) (2007). *Types of certificates and licenses.* Retrieved from http://www.highered.nysed.gov/tcert/certificate/typesofcerts.htm

Northrup, P.T. (2001). A framework for designing interactivity into web-based instruction. *Educational Technology, 41*(2), 31-39.

O'Loughlin, M. (1992). Rethinking science education: Beyond Piagetian constructivism toward a sociocultural model of teaching and tearning. *Journal of Research in Science Teaching, 29*(8), 791-820.

Richardson, V. (Ed.) (1997). *Constructivist teacher education: Building new understandings.* New York: Routeledge.

Schlager, M. S., & Fusco, J. (2003). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? *The Information Society, 19*, 203-220.

Schmeeckler, J.M. (2003). Online training: An evaluation of the effectiveness and efficiency of training law enforcement personnel over the internet. *Journal of Science Education and Technology, 12*(3).

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Threlkeld, R., & Brzoska, K. (1994). Research in distance education. In B. Willis (Ed.), *Distance education: Strategies and tools*. Englewood Cliffs, NJ: Educations Technology Publications, Inc.

Van Driel, J.H., Beijaard, D., & Verloop, N. (2001). Professional development and reform in science education: The role of teachers' practical knowledge. *Journal of Research in Science Teaching, 38*(2), 137- 158.

Vrasidas, C., & Zembylas, M. (2004). Online professional development: Lessons from the field. *Education & Training, 46*(6/7), 326-334.

Willis, B. (Ed.) (1993). *Distance education: Strategies and tools*. Englewood Cliffs, NJ: Educations Technology Publications, Inc.

Wilson, S.M, & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education, 24*, 173-209.

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The Comparative Instructional Effectiveness of Print-Based and Video-Based Instructional Materials for Teaching Practical Skills at a Distance

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Abstract

Print-based instructional materials have been more popular than any other medium for teaching practical skills during the delivery of technical and vocational education and training via distance learning. However, the approach has its shortcomings and in recent times alternatives have been sought. The comparative instructional effectiveness of one such alternative is the focus of this paper. The study sought to examine the instructional effectiveness of video-based instructional materials vis-à-vis traditional print-based instructional materials for teaching distance learners of a Block-Laying and Concreting practical skills programme. An experimental design was used and participants were randomly assigned to two treatment groups: Users of video-based instructional materials or users of print-based instructional materials. A researcher-designed performance test and an achievement test of 20 multiple-choice items were used to collect data from 34 participants who used print-based instructional materials and 35 participants who used video-based instructional materials to learn practical skills. The instruments were based on the instructional objectives of lessons on mortar and wall finish. Pilot test data for the achievement test yielded Cronbach's alpha of 0.84. Descriptive statistics and t-test at a 0.05 level of significance were used to analyse the data. The results indicated that the two instructional materials were pedagogically equivalent in terms of theoretical knowledge acquired. Practical skills acquired, however, were significantly higher among users of video-based instructional materials. Finally, users of video-based instructional materials displayed significantly superior craftsmanship.

Keywords: Achievement test; block-laying and concreting; instructional effectiveness; open and distance learning; open schooling; performance test; practical skills; print-based instructional materials; technical and vocational education and training (TVET); video-based instructional materials

Teaching Practical Skills to Distance Learners

Distance education as a delivery mechanism has been relatively more successful in the academic field than in the field of technical and vocational education and training (TVET). The practical

nature of TVET disciplines mostly accounts for the situation. For the open and distance learning (ODL) environment, the teaching of practical skills poses considerably more difficulties than the teaching of knowledge and theory (Hampton, 2002). Examining the future of open schooling, Ferreira (2009, p. 202) observed that "the provision of technical and vocational course subjects represents, for many countries, a national challenge" and that "success in delivering the practical components depends on collaboration amongst the different stakeholders." The successful teaching of practical skills could thus hold the key to the successful delivery of TVET via ODL.

The teaching of practical skills requires the use of precise instructions to enable learners to follow the process and thereafter repeat the skill, whether within a conventional educational institution or via distance learning. In a typical conventional classroom-based educational institution, an instructor provides such instructions in workshops and laboratories using the appropriate materials and equipment. For open and distance learners who are separated from the instructor much of the time, the most frequently used method for teaching practical skills, according to Hampton (2002), is the use of print-based illustrations of step-by-step procedures. This approach has its shortcomings and, therefore, in recent times alternatives have been sought. One such alternative used by The President's Special Initiative on Distance Learning in the delivery of Block-Laying and Concreting via distance learning in Ghana is video-based practical lessons, the comparative effectiveness of which is the focus of this paper.

The use of video in the delivery of practical lessons is acknowledged in the literature. For example, Mishra (2001) observed that video is useful to show practical and real life activities and that video can be used to capture hazardous and costly experiments for presentation and for repeated use. Tooth (2000) also observed that video resources are expensive to produce but are very useful where practical demonstrations of skills are required. For Jung (2005), however, cost-savings are expected from reuse of video resources. The decision of ODL practitioners to use video-based instructional materials to teach practical skills in spite of the relatively high cost will to a large extent depend on the assurance of their guaranteed instructional effectiveness. Empirical research into the effectiveness of video-based instructional materials for the teaching of practical skills at a distance may be necessary to provide reason for their use or otherwise.

The President's Special Initiative on Distance Learning Open Schooling in TVET

The Ghana Government has realised the need to find alternate means of responding to the educational needs of her people. It therefore established The President's Special Initiative on Distance Learning (PSI-DL) in April, 2002 to co-ordinate and implement alternate models of education that complement Government's efforts to ensure that Ghana attains the target of "Education for All" by 2015. Accordingly, PSI-DL began to broadcast television lessons on state television, which has nation-wide coverage, on July 23, 2003. The lessons are based on the Ghana Education Service syllabus for the junior and senior high schools. Subjects covered include English, mathematics, physics, chemistry, biology and integrated science.

PSI-DL started its open schooling in TVET at the pre-tertiary level in September, 2007 on a pilot basis using learning centres in the existing six TVET institutions and in five prisons in Ghana. The courses selected for the pilot are Block-Laying and Concreting and Catering. Worldwide, open schooling is a response to the rapidly increasing demand for secondary education, both as an end itself and as a route to tertiary education and training (Daniel, 2008). In the view of Daniel, open schooling has also become "a vehicle for ramping up the proportion of technical and vocational education and training in the school system as a whole…" (p. 43). Similarly, the PSI-DL Open Schooling in TVET is a means to increase the proportion of TVET in the school system in Ghana. Two different approaches to open schooling have been identified by Rumble and Koul (2007), one complementary to the conventional school system and the other alternative to the conventional school system. The PSI-DL Open Schooling in TVET operates as a complementary system offering the same curriculum for the youth and young adults who, for a variety of reasons, miss the formal, classroom-based school system. Similar to their counterparts in the conventional classroom-based school system, the distance learners are prepared to take the same Intermediate Craft Examination organised by the Technical Examinations Unit of the Ghana Education Service.

Rationale

TVET has been identified as crucial to the achievement of the Millennium Development Goal of eradicating extreme poverty and hunger by 2015. It has the potential to make huge gains in poverty reduction and wealth creation. This fact has been well articulated by the National Development Planning Commission (2005) in the Ghana Growth and Poverty Reduction Strategy (2006-2009) document, which acknowledges a strong linkage between TVET and poverty reduction. Additionally, the aspiration of Ghana to become a middle income earning economy depends largely on the ability to equip her citizens with knowledge and skills to produce quality goods and services on a continuous basis for income. The acquisition of skills is also a way of sustaining the socio-political stability of the nation. Based on these realisations, the PSI-DL Open Schooling in TVET was initiated to enable unemployed youth to have the opportunity to acquire skills for sustainable livelihoods and to enhance their chances in the labour market.

Target Group and Objectives

The PSI-DL Open Schooling in TVET is at the post junior high school level and targets the youth and young adults who, for a variety of reasons, have not been part of the formal, classroom-based school system. The program seeks to equip the learners with skills to enable them to do the following:

1. set up their own businesses,
2. work in industries, or
3. move on to the tertiary level for further education.

Instructional Materials

Under the PSI-DL Open Schooling in TVET, learners are provided with self-instructional materials (as a tutor-in-print/substitute for the teacher) to study at home on their own. During face-to-face sessions that take place fortnightly at learning centres established in existing conventional technical and vocational institutions, the learners also get local personal support in the form of tutorials, counselling, access to practical lessons, self-help study group activities, etc. The learning of theory is through print-based instructional materials. Regarding acquisition of practical skills, learners initially use either print-based illustrations of step-by-step procedures or video-based practical lessons. In the case of the latter, the practical aspects of the course are converted into production scripts then shot, edited, and dubbed onto VCDs. The learners access the practical lessons using computers or VCD players in their homes or at the learning centres. Practical skills acquisition is finally consolidated through hands-on activities in the workshops and laboratories during face-to-face sessions at the learning centres under the supervision of an instructor/tutor.

The Problem Statement

For the teaching of practical skills to open and distance learners, Hampton (2002, p. 85) sees video as "a successful medium because it links the audio and the visual together to provide a multisensory experience for the learner." Hampton observes that video makes it possible for the learner to play, replay, pause and rewind to specific sections of the lesson and further contends that "because practice and rehearsal is so important in developing competency, video is particularly well placed" (p. 85). In spite of the foregoing, not much is encountered in literature regarding empirically documented works about the instructional effectiveness of video vis-à-vis other approaches for the teaching of practical skills to open and distance learners. This void in literature needs to be filled in order to increase our understanding of the relative effectiveness of the various approaches used in teaching practical skills via distance learning.

As already indicated above, PSI-DL has produced practical lessons on VCDs and print-based materials for teaching practical skills to its distance learners. However, there has not been any assessment regarding their relative instructional effectiveness. In view of this, the present study was undertaken to provide feedback regarding the comparative instructional effectiveness of the two approaches to teaching practical skills to distance learners, while at the same time attempting to fill the identified gap in literature.

Purpose of the Study

This was an exploratory study that sought to examine the effectiveness of the video-based instructional materials (practical lessons on VCDs) vis-à-vis the traditional print-based instructional materials for the teaching of practical skills to distance learners of a Block-Laying and Concreting programme. Specifically, the study was designed to compare the level of learning (in terms of theoretical knowledge and practical skills acquisition) between learners using video-based

instructional materials and those using print-based instructional materials in relation to the instructional objectives of the lessons on mortar and wall finish.

Research Questions

The following research questions guided the study:

1. How do learners using video-based practical lessons and those using print-based practical lessons compare in practical skills acquisition?
2. How do learners using video-based practical lessons and those using print-based practical lessons compare in theoretical knowledge?
3. How do learners using video-based practical lessons and those using print-based practical lessons compare in their craftsmanship?

Methodology

Research Design

The study used experimental design. As the study sought to compare the level of learning (in terms of knowledge and practical skills acquisition and craftsmanship) between learners using video-based instructional materials and those using print-based instructional materials, the experimental design was deemed appropriate. The main variables involved were level of learning as the dependent variable and instructional materials (video-based and print-based) as the independent variables.

Generally, there are three ways to assign participants to experimental conditions: a between-subjects design (sometimes called an independent-group design), a within-subjects design (also called a repeated-measures design), and a mixed design (Vernoy & Kyle, 2002). Each of the learners selected for the study participated in only one of the two experimental conditions making the study a between-subjects design. According to Vernoy and Kyle, a between-subjects design requires that "each level of each independent variable has different participants; thus, there is a distinct difference *between* each level of the experiment because each person participates in one and only one level" (p. 259).

Population and Sample

The population comprised all 151 learners who registered for Block-Laying and Concreting during the 2007/2008 academic year at the five learning centres (institutions) offering the subject via distance learning. They were all males. This is consistent with male dominance in Block-Laying and Concreting in the formal, classroom-based school system, owing to gender stereotyping.

The study sample consisted of all 73 learners of three study centres purposely drawn from three zonal divisions in Ghana, namely Bolgatanga Technical Institute for the Northern Zone, Ramseyer

Vocational and Technical Institute, Kumasi for the Middle Zone, and Takoradi Technical Institute for the Southern Zone. The learners from each selected study centre were assigned randomly to two treatment groups as indicated in Table 1: learners using video-based instructional materials and those using print-based instructional materials.

Table 1

Distribution of Study Sample according to Experimental Conditions

Study centre (institution)	Number of learners		Total
	Video-based group	Print-based group	
Bolgatanga Technical Institute, Bolgatanga	13	12	25
Ramseyer Vocational and Technical Institute, Kumasi	7	8	15
Takoradi Technical Institute, Takoradi	16	17	33
Total	36	37	73

Instruments

The study used two instruments to collect data to answer the three research questions posed. The two instruments were based on the instructional objectives of lessons on mortar and wall finish. The first instrument was an achievement test that sought to measure the level of theoretical knowledge acquired after learners had been exposed to theoretical lessons from print-based instructional materials (manuals) and the practical lessons from either the video-based or print-based materials. It consisted of 20 objective test items with 10 items on mortar and 10 items on wall finish (see Appendix A). Each item had four options of responses. The second instrument was a performance test that sought to measure the level of practical skills acquired by learners after exposure to the practical lessons from either the video-based or print-based materials. The participants were instructed to perform certain tasks so as to demonstrate certain skills acquired (see Appendix B). The marking schemes for scoring both tests appear in Appendix C.

Content validity of the instruments was established by a panel of four Block-Laying and Concreting tutors out of 12 research assistants recruited for the study. The research assistants were all tutors of Block-Laying and Concreting and long-serving examiners at the Intermediate Craft level of the Technical Examinations Unit of the Ghana Education Service. The questionnaire was pre-tested using a sample of 20 randomly selected full-time students from one of the institutions that constituted the population but was not selected for the study. The sample size of 20 for the pilot study was based on the observation of Borg and Gall (1983) that for a pilot study it is rarely necessary to include more than 20 subjects.

The researcher personally administered the achievement test to the 20 students after they had completed the lessons on the two selected topics that formed the scope of the study, namely mortar and wall finish. Before administering the test, the purpose of the study was explained to the students and they were asked to underline words they did not understand. To ensure anonymity, the participants were asked to write only their index numbers but not their names. Additionally, they were advised to do independent work. At the start of the exercise, the time was recorded. On submission of the test, the time was again recorded on the individual's test paper so as to determine the time taken by each participant to complete the test. In all, the participants spent between 23 and 38 minutes to complete the test. As and when the participants completed the achievement tests and handed them in, the tests were scrutinised to ensure that they had been properly completed.

After the administration of the achievement test, four out of the 20 students were selected randomly to participate in the piloting of the performance test. One student at a time undertook the exercise and all four research assistants involved in the validation of the instruments scored them independently. After assessing the four students, the researcher and the four research assistants met to discuss the scoring in relation to the marking scheme. For all four research assistants, the scores for each competency as specified in the marking scheme were discussed. After the discussions, we agreed on common strategies that could help to reduce subjectivity during the scoring process and thus minimise variability.

The achievement test was scored by awarding one mark for each correct response and zero for incorrect alternatives. After scoring, item-analysis was carried out to determine the difficulty level of the items, the discriminating power of the items, and the effectiveness of the options of responses (distracters). The item analysis indicated that the difficulty level and the discriminating power of each of the 20 test items were acceptable. Additionally, the analysis of the distracters indicated that for all 20 items, the options appeared plausible to the respondents, (i.e., the alternatives functioned as intended). Thus, it was concluded that there were no ambiguous test items or flawed options that needed revision.

Cronbach's alpha reliability test for the achievement test yielded a value of 0.84. Against the background of the observation byJohnson and Larry (2008, p. 149) that "A popular rule of thumb is that the size of coefficient alpha should generally be, at a minimum, greater or equal to .70 for research purposes," this value of reliability indicates good internal consistency and instrument reliability. Beside the item analysis and the reliability test, words that participants did not understand were identified and revised accordingly.

Data Collection Procedures

The scoring of any performance test requires converting qualitative indicators of competencies into numeric (quantitative) values for each indicator. Such an exercise is generally subjective, and there could be variability and lack of reliability across different scorers. In the present study, therefore, each participant was assessed by three research assistants and any two scores with the lowest variability were averaged to produce a composite score for the participant. In furtherance of measures to minimise variability in the scoring, the 12 research assistants first met to discuss the

performance test and the scoring process using the marking scheme (Appendix C) as a uniform standard of measurement. The four research assistants who participated in the pilot study facilitated the discussions.

The data collection took three days, with a day at each of the three participating learning centres. The participants were assigned index numbers for use in both tests. At each centre, the researcher personally administered the achievement test which was followed by the performance test. All the participants took the achievement test together, whilst a maximum of four participants took the performance test at a time. The achievement test was administered and scored in a manner similar to the pilot study. On each occasion of administering the achievement test, two of the research assistants were in attendance as invigilators. The participants were adequately spaced to ensure that they worked independently. As and when the participants completed the achievement test and handed them in, they were scrutinised to ensure that they had been completed properly, especially the index numbers. The administration of the achievement test took less than forty minutes, similar to the pilot test.

For the purpose of scoring the performance test, the eight research assistants who did not participate in the pilot study were assigned randomly into four groups; the four who participated in the pilot study were also assigned randomly to the four groups of scorers as team leaders. At each sudy centre, the researcher re-constituted the groups as described above. During the administration of the performance test, four students were selected randomly from a given treatment group and assigned randomly to the respective four groups of scorers. The necessary materials and working area were provided. All three research assistants in each group of scorers scored the work of the participants assigned to them independently, using the marking scheme in Appendix C, without knowing the treatment group the participants belonged to. It was also arranged in such a way that participants who completed the performance test could not communicate with those awaiting their turn.

A total of 69 out of the 73 selected distance learners took part in the study, representing an overall response rate of 94.5%. This included 35 out of the selected 36 (representing 97.2% response rate) users of video-based instructional materials and 34 out of the selected 37 (representing 91.9% response rate) users of print-based instructional materials.

Method of Data Analysis

The data analysis focused on the comparison of the cognitive and psychomotor impacts of the two instructional materials. Regarding the cognitive impact, the study addressed the question: How do learners using video-based practical lessons and those using print-based practical lessons compare in theoretical knowledge? With regard to the psychomotor impact, the study addressed two questions:

1. How do learners using video-based practical lessons and those using print-based practical lessons compare in practical skills acquisition?
2. How do learners using video-based practical lessons and those using print-based practical lessons compare in their craftsmanship?

The raw data were analysed, using the Statistical Package for the Social Sciences (SPSS). First, descriptive statistics such as frequency counts, percentages, means and standard deviations were used to analyse the data collected. Second, t-test at a 0.05 level of significance was used to determine whether the two treatment groups differed regarding theoretical knowledge and practical skills acquired and the craftsmanship displayed during the performance of the hands-on activity assigned to them.

Results and Discussion

The research findings are presented in three sections according to the three research questions that guided the study.

1. How do learners using video-based practical lessons and those using print-based practical lessons compare in practical skills acquisition?

The level of practical skills acquired by the participants was measured by the performance test in Appendix B. The distribution of the performance test scores (out of a possible 50) showed that the group that used print-based instructional materials to learn practical skills had scores ranging from 23.5 to 40.5, while the group that used video-based instructional materials had scores ranging from 26.0 to 43.0. For the users of the print-based instructional materials, the modal score was 31.0 with a frequency of three. The modal score for users of the video-based instructional materials was 40.0 with a frequency of three. The mean score for the group that had used print-based instructional materials to learn practical skills was 31.84 (SD = 4.85). For the group that had used video-based instructional materials to learn practical skills, the mean score was 35.20 (SD = 5.44).

To compare the instructional effectiveness of the two instructional materials for learning practical skills at a distance, the mean scores of the two treatment groups in the performance test were compared using t-test at the 0.05 level of significance. The results of the t-test analysis are presented in Table 2. The results indicated that the performance test scores of the group that used video-based instructional materials to learn practical skills were significantly higher than those who used print-based instructional materials (p-*value* < 0.05). Thus, the video-based instructional materials were more effective than the print-based instructional materials in equipping the distance learners with practical skills.

Table 2

Results of T-Test Analysis for the Performance Test

Treatment group	No. of respondents	$\bar{x}$	SD	t	p-value
Print-based	34	31.84	4.85	2.668*	0.009
Video-based	35	35.20	5.44		

* Significant at 0.05 level

The practical nature of TVET disciplines makes its delivery via distance learning more challenging than in the academic field. Traditionally, print-based instructional materials have been used for teaching distance learners practical skills. In the present study, video-based instructional materials were found to be pedagogically more effective than the print-based instructional materials in the delivery of Block-Laying and Concreting via distance learning. It is the researcher's view that this relatively unexplored area of ODL has been investigated to a limited extent. Additional research is needed to determine the effectiveness of video-based instructional materials in the teaching of practical skills in other disciplines of TVET. This would offer ODL practitioners better insight into the real effectiveness of video-based instructional materials in the teaching of practical skills.

2. How do learners using video-based practical lessons and those using print-based practical lessons compare in theoretical knowledge?

The theoretical knowledge acquired by the distance learners was measured by the achievement test that appears in Appendix A. The distribution of the achievement test scores (out of a possible 20) showed that users of the print-based instructional materials had scores ranging from 9 to 20. Users of the video-based instructional materials had scores ranging from 10 to 20. The modal score for the users of print-based instructional materials was 13 with a frequency of eight. The other treatment group had a modal score of 15 with a frequency of seven. The mean score for the group that used print-based instructional materials to learn practical skills was 14.82 (*SD* = 2.50). For the group that used video-based instructional materials to learn practical skills, the mean score was 14.86 (*SD* = 2.59).

To compare the instructional effectiveness of the two instructional materials regarding acquisition of theoretical knowledge, the mean scores in the achievement test of the two treatment groups were compared using t-test at the 0.05 level of significance. Table 6 shows the results of the t-test analysis. Though the treatment group that used video-based instructional materials appeared to perform better than those who used print-based instructional materials, the difference was not significant (*p-value* > 0.05). Thus, the two instructional materials are comparable and pedagogically equivalent regarding their effectiveness in equipping distance learners with theoretical knowledge.

Table 3

Results of T-Test Analysis for the Achievement Test

Treatment group	No. of respondents	$\bar{x}$	SD	t	p-value
Print-based	34	14.82	2.50	0.054*	0.956
Video-based	35	14.86	2.59		

*Non significant at 0.05 level

Practical lessons could help reinforce theoretical knowledge acquired by learners, especially in the field of technical and vocational education and training. In the present study, the theoretical knowledge acquired did not differ significantly between users of print-based instructional materials and users of video-based instructional materials. The lack of significant difference may be due to the effectiveness of the study materials provided to learners for the teaching and learning of the theoretical aspects of Block-Laying and Concreting, which makes it possible for similar levels of achievement among the users. Alternatively, the two approaches to the teaching of practical skills could have helped to raise the theoretical knowledge acquired by the learners but to comparable levels among the two treatment groups. Thus, the two instructional materials were pedagogically equivalent in terms of theoretical knowledge acquired.

3. How do learners using video-based practical lessons and those using print-based practical lessons compare in their craftsmanship?

The term *craftsmanship* as used in this study refers to the learner's display of a clean working environment, the correct handling of tools and equipment, the effective use of time, the consciousness of safety, and the judicious use of materials during hands-on practical activity. It formed the last section of the marking scheme for scoring the performance test (see Appendix C). The distribution of the craftsmanship scores (out of a possible 6) indicated that the scores for the group that used print-based materials ranged from 2.0 to 5.0, while the other group obtained scores ranging from 2.5 to 5.0. The modal score for the users of print-based instructional materials was 4.0 with a frequency of eight. The other treatment group had a modal score of 4.5 with a frequency of nine. The mean score for the group that used print-based instructional materials to learn practical skills was 3.26 (SD = 0.88). For the group that used video-based instructional materials to learn practical skills, the mean score was 3.91 (SD = 0.73).

To compare the instructional effectiveness of the two instructional materials regarding craftsmanship, the mean scores of the two treatment groups were compared using t-test at the 0.05 level of significance. The results of the t-test analysis are presented in Table 4. The results indicated that the craftsmanship scores of the group that used video-based instructional materials to learn practical skills were significantly higher than those who used print-based instructional materials (*p*-

value < 0.05). Thus, the video-based instructional materials were more effective than the print-based instructional materials in equipping the distance learners with the desired craftsmanship.

Table 4

Results of T-Test Analysis for Craftsmanship Displayed

Treatment group	No. of respondents	$\bar{x}$	SD	t	p-value
Print-based	34	3.25	0.88	3.409*	0.001
Video-based	35	3.91	0.73		

*Significant at 0.05 level

The study found that the users of video-based instructional materials demonstrated superior levels of craftsmanship compared to the users of print-based instructional materials. Thus, users of video-based instructional materials are more likely to spend relatively less time performing specific tasks during practical lessons. Additionally, there would be less spoilage/wastage of consumables, reduced incidence of damage to equipment, and reduced accidents among users of video-based instructional materials during hands-on practical lessons. The identified benefits associated with the use of video-based instructional materials in teaching practical lessons could help to reduce costs when there is less spoilage/waste of materials, reduced injuries to learners, and reduced damage to equipment. This could help to compensate for the cost of producing the practical lessons on VCDs for use by distance learners.

Conclusion and Implications for Practice

The PSI-DL Open Schooling in TVET runs the Block-Laying and Concreting programme via distance learning at the pre-tertiary level. The practical aspect of the programme is delivered through print-based and video-based instructional materials. The present study sought to compare the instructional effectiveness of the two approaches in teaching practical skills to distance learners.

The findings of the study suggest that the video-based instructional materials are pedagogically superior to the print-based instructional materials as users of the former exhibited superior skills acquisition and craftsmanship. The two instructional materials were however found to be pedagogically equivalent in terms of the teaching and learning of theory. The comparative instructional effectiveness of different approaches used in teaching practical skills appears to be an unexplored area of ODL and has been investigated to a limited extent in this exploratory study. Additional research is suggested to determine the effectiveness of video-based instructional materials for the teaching of practical skills in other disciplines of TVET.

Though the use of video-based instructional materials may have cost implications, their superior instructional effectiveness in the teaching of practical skills is not in doubt. Additionally, the use of

video-based instructional materials for teaching practical lessons is associated with such benefits as reduced cost of organising practical lessons due to less spoilage/waste of materials, reduced injuries to learners, and reduced damage to equipment. These benefits could help to compensate for the cost of producing the practical lessons on VCDs for use by open and distance learners. Thus, as much as possible, when selecting delivery options for the teaching and learning of practical skills, decision-makers and ODL practitioners should rank them above print-based materials for their pedagogical impact.

References

Borg, W. R., & Gall, M. D. (1983). *Educational research: An introduction*. New York: Longman.

Daniel, J. (2008). *Open schooling – Communicating the basics*. In R. Jones-Parry (Ed.), *Commonwealth education partnerships 2008/2009* (pp. 41 - 43). Cambridge, UK: Nexus Strategic Partnership.

Ferreira, F. (2009). The bright but challenging future of open schooling. In D.A.M.X. Abrioux & F. Ferreira (Eds.), *Perspectives on distance education: Open schooling in the 21st Century* (pp. 193-204). Vancouver, Canada: Commonwealth of Learning. Retrieved from http://www.col.org/SiteCollectionDocuments/OpenSchooling_web.pdf

Hampton, C. (2002). Teaching practical skills. In A. K. Mishra & J. Bartram (Eds.), *Perspectives on distance education: Skills development through distance education* (pp. 83-91). Vancouver, Canada: Commonwealth of Learning. Retrieved from http://www.col.org/SiteCollectionDocuments/Skills_Chapter09.pdf

Johnson, R.B., & Larry, B. (2008). *Educational research: Quantitative, qualitative and mixed approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Jung, I. (2005). *Innovative and good practices of open and distance learning in Asia and the Pacific* (A study commissioned by UNESCO, Bangkok). Retrieved from http://www.unescobkk.org/fileadmin/template2/apeid/odl_innov.pdf

National Development Planning Commission. (2005). *Ghana growth and poverty reduction strategy (2006-2009)*. Accra: Author.

Mishra, S. (2001). *Designing online learning.* Vancouver, Canada: Commonwealth of Learning. Retrieved from http://www.col.org/SiteCollectionDocuments/KS2001-02_online.pdf

Rumble, G., & Koul, B.N. (2007). *Open schooling for secondary and higher secondary education: Costs and effectiveness in India and Namibia***.** Vancouver, Canada: Commonwealth of Learning. Retrieved from http://www.col.org/SiteCollectionDocuments/Open_Schooling_Secondary_Higher_Education_071707.pdf

Tooth, T. (2000). *The use of multi media in distance education*. Vancouver, Canada: Commonwealth of Learning. Retrieved from http://www.col.org/SiteCollectionDocuments/KS2000%20multimedia.pdf

Vernoy, M., & Kyle, D. (2002). *Behavioral statistics in action* (3rd ed.). Boston: McGraw-Hill.

Appendix A

Achievement Test

Index Number: ……..

This test consists of multiple-choice items on 'Mortar' and 'Wall Finish'. Each question is followed by **four** options lettered A to D. Find out the correct option for each question and kindly circle the letter bearing that option. Give only **one** answer to each question.

Answer all questions

1. The ease with which mortar can be worked with is termed ……

A. flexibility
B. workability*
C. retentivity
D. durability

2. Which of the following mix proportions may not be appropriate for preparing cement-sand mortar for rendering?

A. 1 : 4
B. 1 : 5
C. 1 : 6
D. 1 : 9*

3. What is the composition of 'compo mortar'?

A. Sand, cement and additive
B. Sand, cement and lime*
C. Sand and cement
D. Sand and lime

4. The function of plasticizers in mortar is to……

A. give the mortar strength*
B. start the chemical reaction in the cement
C. reduce shrinkage in the cement
D. coat and bind the fine aggregate

5. Which of the following materials is first put into the mixing drum during machine mixing of mortar?

A. Sand
B. Cement
C. Water*
D. Additives

6. The function of 'palm chaff' in clay mortar is to…….

A. provide colour
B. increase the strength*
C. provide colour and strength
D. speed up the setting

7. Which of the following statement(s) about mortar is/are correct?

I. Mix proportion can only be determined when the work to be done is known.
II. During batching of materials the headpan is preferred to the gauge box.
III. Lime mortar can be re-activated by re-mixing and re-used.

A. I only
B. I and II only
C. I and III only*
D. II and III only

8. Which of the following statement(s) about water used in mortar preparation is/are true?

I. It must be as good as drinking water.
II. It starts the chemical reaction in the cement.
III. It reduces the heat in the cement.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III*

9. Which of the following is not used during manual preparation of mortar?

A. Mixing drum*
B. Head pan
C. Dumper
D. Wheel barrow

10. What is the reason for using 'compo mortar' in plastering?

A. To provide colour.

B. To increase strength.
C. To provide colour and strength.
D. To reduce cost.*

11. The coat applied to the uneven surface of the internal block work to provide an even surface is called…….

A. brown coat
B. putty coat
C. scratch coat*
D. green coat

12. The ability of mortar under stress to elongate before breaking under stress is termed…

A. flexibility*
B. plasticity
C. consistency
D. durability

13. Which of the following is **not** a function of plastering?

A. To give a smooth surface
B. To form a base for receiving other finishes like paint
C. To help regulate temperature*
D. To give strength to the wall

14. Which of the following statement(s) about plastering is/are correct?

I. It is a three coat work.
II. It is a one coat work.
III. The thickness of the brown coat is smaller than the scratch coat.

A. I only
B. I and II only
C. I and III only*
D. II and III only

15. Another name for the pebble-dash finish is …….

A. wet-dash finish
B. dry-dash finish*
C. spatter-dash finish
D. Tyrolean finish

16. Which of the following tools is **not** used during plastering?

A. Chisel
B. Bolster*
C. Hawk
D. Comb hammer

17. What tool is used in receiving mortar to seal crevices (small holes) that are left after scrubbing off excess mortar during plastering/ rendering?

A. Pointing trowel*
B. Plaster's trowel
C. Hand trowel
D. Hawk

18. The best remedy for shrinkage as a plastering/rendering problem is to……

A. treat the surface well before work proceeds.
B. allow mortar to dry before floating.
C. increase the water content in the mortar.
D. minimise cement content in the mortar.*

19. Which of the following is **not** a problem that arises in plastering/rendering works?

A. Blistering
B. Swell-outs
C. Fall off
D. Wrinkling*

20. Which of the following statements, being reasons for watering the base that is to receive plaster, are true?

I. Prevent shrinkage.
II. Wash off accumulated dirt on walls.
III. Help mortar to adhere properly to wall.

A. I and II only
B. I and III only*
C. II and III only
D. I, II and III

END OF TEST

Appendix B

PERFORMANCE TEST

Index Number: …….. **Time allowed: 1 Hour 30 Minutes**

A 150mm thick wall with a return angle is built at the workshop for students' practical test. The wall is to be given a 12mm thick rendering and plastering on both faces and finished with a wooden float

The candidate is to batch and mix cement/sand mortar in the appropriate ratio for the wet finish. Marks will be awarded for the correct procedure of batching and mixing by hand (manual method), the elimination of unnecessary movement in carrying out the work piece as well as for the quality of work and the craftsmanship displayed.

Assistance

The candidate is provided Assistance for the conveyance of mortar and materials and the removal of waste as and when required.

Materials

Sand
Cement
Water

Tools

Steel trowel
Wooden float
Straight edge
Shovel
Spade
Head pan/Gauge box
Lath

Working Area

The recommended working area for each candidate is 4.5m x 2.7m

Appendix C

MARKING SCHEME

ACHIEVEMENT TEST

Test Item	Correct Option/Answer	Test Item	Correct Option/Answer
1.	-B	11.	-C
2.	-D	12.	-A
3.	-B	13.	-C
4.	-A	14.	-C
5.	-C	15.	-B
6.	-B	16.	-B
7.	-C	17.	-A
8.	-D	18.	-D
9.	-A	19.	-D
10.	-D	20.	-B

PERFORMANCE TEST

Mortar Preparation

Correct batching	-5 marks
Mixing twice dry	-5 marks
Mixing twice wet	-5 marks
Workable mortar	-4 marks

Rendering and Plastering

Provision of a key (Surface preparation)	-5 marks
Thickness	-5 marks
Flush face	-5 marks
External angle	-5 marks
Internal angle	-5 marks

Craftsmanship Displayed

Clean working, effective use of time, safety, judicious use o materials	-6 marks
Total	**-50 marks**


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Using Mobile Phones to Improve Educational Outcomes: An Analysis of Evidence from Asia

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Abstract

Despite improvements in educational indicators, such as enrolment, significant challenges remain with regard to the delivery of quality education in developing countries, particularly in rural and remote regions. In the attempt to find viable solutions to these challenges, much hope has been placed in new information and communication technologies (ICTs), mobile phones being one example. This article reviews the evidence of the role of mobile phone-facilitated mLearning in contributing to improved educational outcomes in the developing countries of Asia by exploring the results of six mLearning pilot projects that took place in the Philippines, Mongolia, Thailand, India, and Bangladesh. In particular, this article examines the extent to which the use of mobile phones helped to improve educational outcomes in two specific ways: 1) in improving access to education, and 2) in promoting *new learning*. Analysis of the projects indicates that while there is important evidence of mobile phones facilitating increased access, much less evidence exists as to how mobiles promote new learning.

Keywords: Mobile phones; mobile learning; distance learning; educational outcomes; information and communication technologies; new learning

Introduction

For quite some time, the international development community has emphasized the paramount role of education in bringing about sustainable socio-economic development in the South. Goal 2 of the United Nations Millennium Development Goals (MDGs) aims to achieve universal primary education for children everywhere, boys and girls alike, by 2015. Significant challenges remain, however. For example, in southern Asia the enrolment ratio has reached 90%, but there still remain more than 18 million children of primary school age who are not enrolled. Similar challenges confront secondary and tertiary education. In developing countries, on average, only 54% of children of the appropriate age attend secondary school currently (UN, 2008, pp. 13-14). Additionally, more than one-third of the world's adult population – most living in the developing world – has no access to printed knowledge, new skills, and technologies that could improve the quality of their lives (Dhanarajan, 2009, p. 46). Inequalities in access to education continue to

pose major barriers in the developing world, and the delivery of cost-effective and quality education remains a persistent problem.

In the attempt to find viable solutions to these problems, much hope has been placed in new information and communication technologies (ICTs). It is believed that ICTs can empower teachers and learners by facilitating communication and interaction, offering new modes of delivery, and generally transforming teaching and learning processes. Of the many different forms of ICTs, mobile phones are thought, for several reasons, to be a particularly suitable tool for advancing education in developing regions. First, mobile phones are the most prevalent ICT in the developing world, and the penetration rate is rising rapidly. In Asia, mobile penetration has doubled within a short span of time; in 2001, average penetration was 19.7 per 100 inhabitants while in 2005 the penetration rate rose to 40.9 (Orbicom, 2007). Also relevant is the fact that mobile phone ownership is increasingly more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008). Second, mobile phones are an especially good 'leapfrogger' since they use the radio spectrum. There is, therefore, less need for new physical infrastructure such as roads and phone wires, and base-stations can be powered via generators in places where there is no electrical grid (Economist, 2008). Finally, in addition to voice communication, mobile phones allow the transfer of data, which can be particularly useful for delivering educational content over long distances.

The concept of mobile learning (mLearning) – understood for the purposes of this article as learning facilitated by mobile devices – is gaining traction in the developing world. The number of projects exploring the potential of mobile phone-facilitated mLearning in the developing world is steadily growing, spurred in part by the use of mobile technology in the educational sector in the developed world which has expanded from short-term trials on a small scale to large-scale integration. However, there remains a lack of analysis that brings together the findings of the rising number of mLearning projects in the developing world.

With the increasing attention now being given to the role of mobiles in the educational sector in developing countries, there is a need at this juncture to take stock of the available evidence of the educational benefits that mobile phones provide in the developing world. Consequently, this article explores the results of six mLearning projects that took place in several developing countries in Asia – the Philippines, Mongolia, Thailand, India, and Bangladesh – both because most developing-country mLearning interventions are being undertaken in Asia and because developments in Asia seem to indicate that the region could become the global leader in educational uses of mobiles (Motlik, 2008). In exploring how mobile phone-facilitated mLearning contributes to improved educational outcomes, this article examines two specific issues: 1) the role of mobiles in improving access to education, and 2) the role of mobiles in promoting *new learning*, those new learning processes and new instructional methods currently stressed in educational theory. Of note, the projects reviewed deal with both formal and non-formal education as defined by Dighe, Hakeem, and Shaeffer (2009, p. 60).

The structure of the article continues as follows. After the introduction, the article engages with the literature that discusses how mobile technology can address the problems of access

confronting the educational sector as well as mobile technology's role in relation to new learning. The article then examines six pilot projects that involved the use of mobile phones for education in developing countries in Asia, analyzing the pilot projects in order to determine whether the supposed benefits that the literature outlines hold true in the developing world. The article concludes with a discussion of the potential of mobile phone-facilitated mLearning as well as with indications for possible future areas of research.

Theories of Mobile Learning

The literature on mLearning points to a variety of benefits that mobile phones could have on the educational sector. For heuristic purposes, the impacts of mobile phones on educational outcomes that are identified in the mLearning literature can be classified into two broad categories. On the one hand, mobiles supposedly impact educational outcomes by improving access to education while maintaining the quality of education delivered. On the other hand, mobiles purportedly impact educational outcomes by facilitating alternative learning processes and instructional methods collectively known as *new learning*.

The Role of Mobiles in Improving Access to Education

In theory, mLearning increases access for those who are mobile or cannot physically attend learning institutions – those who would not otherwise be able to follow courses in a traditional educational setting due to the constraints of work, household activities, or other competing demands on their time. MLearning makes education more accessible in that it enables learners to pursue their studies according to their own schedule. The portability of mobile technology means that mLearning is not bound by fixed class times; mLearning enables learning at all times and in all places, during breaks, before or after shifts, at home, or on the go. Interestingly, however, while mLearning is portable, it is not necessarily associated with physical movement. According to a study conducted by Vavoula, few people actually utilize the time spent in transit to learn (Sharples, Taylor, & Vavoula, 2005, p. 3).

MLearning, as Visser and West (2005) suggest, can also increase access in those situations where cost represents a significant barrier to learning (p. 132). For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly eLearning, mLearning presents great opportunities. For the individual learner, mobile technology is much less cost-prohibitive than other technologies like personal computers and broadband connections that are necessary for eLearning. The ubiquity of mobile phones, moreover, means that educational services can be delivered with learners' existing resources. In as much as mobile technology presents a less cost-prohibitive medium for learning, it represents an important avenue by which to reduce the gap between the haves and the have-nots in contemporary society where access to knowledge and information is increasingly important (VanWeert, 2005).

In regards to cost, the benefit of increased access afforded by mLearning is particularly relevant in the developing country context. Many developing countries are completely bypassing investments in costly, fixed telephone infrastructure for the installation of mobile phone networks

(Motlik, 2008; Sharples, Taylor, & Vavoula, 2007, p. 224; Traxler & Dearden, 2005). Thus, mLearning provides a potential way forward for the expansion of education programs to larger segments of the population rather than via the eLearning model that has been adopted in much of the developed world. MLearning allows a method of educational delivery that could be more cost-effective than eLearning methods, not to mention that the ubiquity of mobile phones means that many people are already familiar with mobile phone applications (Motlik, 2008).

In so much as mLearning exerts an impact on educational outcomes by increasing access, mLearning represents a continuation and improvement of distance learning through increased utility and applicability (Keegan, 2002, p. 7). MLearning, the literature suggests, broadens the availability of quality education materials through decreased cost and increased flexibility while also enhancing the efficiency and effectiveness of education administration and policy.

The Role of Mobiles in Promoting New Learning

Others suggest that the benefits of mobile phones are not merely limited to increased access to educational services. MLearning, they indicate, can also facilitate changes in the character of learning modalities that in turn impact educational outcomes. In this regard, mLearning represents more than a mere extension of traditional forms of education; mLearning facilitates alternative learning processes and instructional methods that the theories of new learning identify as effective for learning.

According to proponents of new learning, mobiles facilitate designs for personalized learning in that they are responsive to difference and diversity in the way learning occurs. They facilitate designs for situated learning by providing learning during the course of the activity – in the field for a botany student, in the classroom for a teacher trainee, or in the workshop for an engineer. In this sense, mLearning also facilitates designs for authentic learning, meaning learning that targets real-world problems and involves projects of relevance and interest to the learner (Kukulska-Hulme & Traxler 2007, pp. 184-86; Traxler, 2007, p. 7).

The supposed value of mobiles also arises from the manner in which they facilitate lifelong learning. Mobiles can support the great amount of learning that occurs during the many activities of everyday life, learning that occurs spontaneously in impromptu settings outside of the classroom and outside of the usual environment of home and office. They enable learning that occurs across time and place as learners apply what they learn in one environment to developments in another (Sharples et al., 2005, pp. 2, 4; 2007, pp. 222-23).

Mobile phones theoretically make learner-centred learning possible by enabling students to customize the transfer of and access to information in order to build on their skills and knowledge and to meet their own educational goals (Sharples et al., 2007, p. 223). MLearning thus exerts a democratizing effect on the learning experience as learners take a greater responsibility for the learning process instead of being passively fed information by an instructor. Whereas in traditional models of education the goal is the transfer of knowledge from teacher to student, mLearning empowers students to actively participate in the learning process to make it a process

of construction and not mere instruction (dela Pena-Bandalaria, 2007). MLearning thus represents learning that is not 'just-in-case,' education for the sake of producing a bank of knowledge, but rather represents learning that is 'just-in-time,' 'just enough,' or 'just-for-me' (Traxler, 2007, p. 5). As a facilitator of new learning, mLearning goes beyond an emphasis on the possession of information to enabling learners to find, identify, manipulate, and evaluate existing information (Brown, 2003, p. 2).

Mobiles can also supposedly facilitate knowledge-centred learning by providing efficient and inventive methods by which students can learn with understanding – meaning that they deepen their understanding of a specific subject matter rather than merely memorizing large amounts of information – and then use this knowledge as a basis for new learning through integration and interconnection. Mobile devices make possible assessment-centred learning as well by enabling the provision of continual feedback throughout the learning process, presenting learners with diagnosis and formative guidance as to what might be improved or what might be learned next. Moreover, in providing prompt feedback, mLearning maintains the appeal of learning and provides a motivating factor that can at times be lacking in traditional modes of education (Geddes, 2004). Mobile phones also facilitate community-centred learning, meaning learning that the learner deems valuable because of its relevance to the surrounding social context; mLearning facilitates learning that can be used to achieve socio-economic goals that respond to problems, such as problems related to health or family care confronting the surrounding community (Sharples et al., 2007, p. 223; Wagner & Kozma, 2005, pp. 83-85).

Given that social interaction is central to effective learning, as indicated by theories of new learning, mobile phones should also impact educational outcomes by facilitating communication. Mobiles permit collaborative learning and continued conversation despite physical location and thus advance the process of coming to know, which occurs through conversations across contexts and among various people. Via mobile technology, learners engage in conversation whereby they resolve differences, understand the experiences of others, and create common interpretations and shared understanding of the world (Nyiri, 2002; Sharples et al., 2007, p. 225-26).

In promoting educational modalities that accord with the theories of new learning, mLearning should offer an appeal aspect that also impacts educational outcomes. MLearning can be particularly appealing for those who have not succeeded in traditional learning environments; it can attract those not enamoured by traditional learning approaches that are generalized and decontextualized in nature. MLearning is also beneficial in that it can provide immediate feedback and thus provide continued motivation for those who are not motivated by traditional educational settings. Moreover, mLearning presents an appeal simply because the use of mobile technology in and of itself presents something new and exciting for a great array of learners (Geddes, 2004, p. 4).

Mobiles, therefore, should impact educational outcomes by altering the character of education and learning because the nature of mobile technology converges with and facilitates new learning. The new learning is personalized, learner-centred, situated, collaborative, ubiquitous, and lifelong. Likewise, mobile technology is increasingly personal, user-centred, mobile, networked,

ubiquitous, and durable (Sharples et al., 2007, p. 224). The literature indicates that the benefits afforded by this convergence should exert a positive impact on educational outcomes.

Methodology

In light of the theories as to how mLearning should solve access problems as well as facilitate new learning, the authors sought to examine the existing evidence so as to confirm, or refute, the purported benefits advanced by the literature. To this end, the authors identified relevant mLearning pilot projects by conducting a search of academic publications and conference proceedings, as well as conducting a general Internet search. The projects were selected according to the following criteria:

1) Projects that demonstrate the use of mobile phones for educational (formal and non-formal) purposes,
2) Projects that were implemented in the low-income/lower-middle income countries of Asia-Pacific,[i]
3) Projects that clearly document results and have evidence, both qualitative and quantitative, such that definitive conclusions can be drawn regarding the impact of mobile phones on educational outcomes via increased access to education and/or via contribution to promoting new learning.

Six projects met the criteria of the search and are discussed in the section that follows (see Table 1 for brief summary). The search revealed that most mLearning projects have been implemented in the developed countries of Europe, North America, and Asia-Pacific; mLearning projects in the developing countries of Asia have been few in number.[ii] Moreover, of the projects undertaken, only a select few were documented in a manner that allows analysis of results. For the six selected cases, project reports and project-related, peer-reviewed publications served as the source for information.

Some key limitations of the study must be taken into consideration when generalizing the findings. Firstly, the study depended on the validity of the data presented by the sources. To minimize this limitation, the authors reviewed the appropriateness of the methodologies for each project in order to ensure, to the best of their knowledge, that they were acceptable. Secondly, the absence of a process of collecting primary data for this study meant that, in some cases, the data resulting from the projects reviewed did not always relate to the research question of this study. Consequently, some of the projects produced only limited information concerning the indicators that this study assessed.

Table 1

Summary of Projects

	Project name	Country	Educational purpose	Technology used
1	Viability of SMS Technologies for Non-formal Distance Education	Philippines	English language and math training	SMS
2	Viability of SMS Technologies for Non-formal Distance Education	Mongolia	English language, emergency care, and endocrinology training	SMS
3	Mobile Telephone Technology as a Distance Learning Tool	Bangladesh	Distance education course via national television	SMS
4	An Experiment in the Use of Mobile Phones for Testing at King Mongkut's Institute of Technology	Thailand	Test-taking	SMS
5	Improving Literacy in Rural India: Cellphone Games in an After-School Program	India	English language training	Cellphone games
6	Learning Communities Enabled by Mobile Technology: A Case Study of School-based, In-service Secondary Teacher Training	Bangladesh	Secondary teacher training	SMS; MMS; tele-conferencing

Case Studies

1. Viability of SMS Technologies for Non-Formal Distance Education in the Philippines

This project led by the Molave Development Foundation Inc. (MDFI) and funded by the International Development Research Centre (IDRC) sought to explore the viability of Short Messaging Service (SMS) technologies for non-formal distance education in the Philippines. The project, dubbed Project MIND, involved a partnership with the Alternative Learning Services (ALS) of the Philippines Department of Education (Batchuluun, Ramos, & Trinona, 2007). Based upon information gathered in pre-project surveys and focus-group discussions, the MDFI created two learning modules in conjunction with the ALS. One module was titled *MIND your English* and included sections on expressing oneself, language and grammar, reading skills, and letter-writing. The other module was titled *MIND your Math* and included sections on fundamentals of mathematics, area and perimeter, and percentage. Each module was designed to incorporate the use of SMS with a workbook. The English module also contained an audio CD containing the workbook exercises in audio form to aid students with proper pronunciation and diction. The

modules were designed such that SMS quizzes and tests had to be passed in order to complete the modules (Ramos, 2008, p. 9).

The impact of the SMS-based modules was assessed by way of the ALS Accreditation & Equivalency (A&E) high school examination, successful completion of which represents the equivalent to a high school diploma. The MIND your English and MIND your Math modules aligned respectively with part II of the ALS A&E exam titled *Communication Skills in English*, and part III titled *Problem Solving and Critical Thinking*. A group of students enrolled in the ALS was selected and, in turn, split into an SMS sub-group and a non-SMS control group. Those in the experimental group followed the Project MIND SMS modules, while those in the control group did not. Both groups took the A&E exam (Ramos & Trinona, 2009, p. 245).

The A&E exam results (see Table 2) reveal that the mean percent correct score of passers in the SMS group was marginally higher than those in the non-SMS group. The difference between the two groups was slightly greater in regards to the mean percent correct for parts II and III. Most remarkable is the difference in the range of the mean percent correct for parts II and III, with the lowest scores for the SMS group being significantly higher than the lowest scores of the non-SMS group. This difference in the range, the authors of the project suggest, may also account for the large difference in the overall passing rate between the two groups (Ramos, 2008, p. 24; Ramos & Trinona, 2009, p. 245).

Table 2

Results of ALS Accreditation and Equivalency Exam for Parts II and III (Adapted from Ramos, 2008, p. 24)

	Difference in scores (+ denotes higher score for SMS group than non-SMS group)	Score range	
		SMS group (N = 142)	Non-SMS group (N = 135)
A&E overall passing rate	+13.78		
A&E mean percent correct (PC) score of passers	+1.06	70-88	70-88
Mean percent correct (PC) in part II - *Communication Skills in English*	+5.00	56-98	30-96
Mean percent correct (PC) in part III - *Problem Solving and Critical Thinking*	+2.32	44-90	36-90

Findings regarding improved access and promotion of new learning.

Several program and hardware problems arose during the testing phase of the project (Ramos, 2008, pp. 25-27). The SMS server card did not function originally with the PC host, a problem that was quickly resolved by transferring the SMS hardware to another PC. There were also some

problems with the handling of student records and access to the SMS server because of the malfunctioning of the data encoding system that ensured that only mobile phones registered in the system could access the SMS quizzes. Some students switched phones and others dropped out without advising their teachers, causing problems because the SMS system required updates to ensure that new numbers were not blocked. At the start of the project, the volume of incoming messages also led to delays in the auto-reply system. Student errors in entering improper keywords also led to problems with the quizzes. Evident, then, is the fact that careful planning is necessary to ensure that mLearning does in fact deliver on its promise of increased access to educational services and to ensure that technological factors do not hinder the effective design and implementation of mobile phone-facilitated mLearning.

The ALS students that followed the SMS modules indicated that the modules enabled them to pursue their schoolwork according to their own schedule. Interestingly, however, given the short length of the modules, all students, except one, finished the modules within one day. Except for two students who spent roughly the same amount of money for transportation, the SMS materials actually cost more than previous modes of learning. Yet, all students indicated that the flexibility afforded by the modules made the additional money worthwhile. Some students even pointed to the added benefit of being able to do their lessons during breaks, meaning that they could still work and gain an income. Overall, students expressed interest in following modules covering other subject areas as well as modules containing more advanced information. The authors of the project conclude that cost is still a relevant factor for mLearning; a balance must be struck between providing increased education without becoming more costly than the student or learning institution is willing to pay (Ramos & Trinona, 2009, p. 254).

Students expressed excitement regarding the use of mobiles for learning (Ramos, 2008, pp. 25-27). One mentioned that the learning process was akin to answering trivia questions where feedback as to whether the answers were right or wrong was immediate and thus also allowed revisiting the error.

All students except two did not make use of the audio CD since they realized that it had the same content as the written module material. Those that did make use of the audio CD, however, appreciated learning the proper pronunciation of the words. Rather than submitting answers at intervals, all the students went through the modules and recorded their answers and sent them in together at the end. Students reported no major problems with the content of the course, stating that the modules were easy to follow. According to the students, the lessons were basic, but they served as a good refresher prior to the ASL A&E exam. The students also mentioned that the SMS modules were helpful because they could revisit material, unlike typical in-class modules that cannot be brought home. Additionally, students underscored that they appreciated the input of teachers who could respond to questions and technical issues.

The results of the ALS A&E exam seem to indicate that SMS-based learning was particularly beneficial for those students whose grades were situated at the lower end of the spectrum. While the average scores of those that used SMS-learning were not much different from those that did, the difference between the lowest scores of the range of these two groups was substantial. The

reason for the improvement in the scores of the lowest achievers is not clear from this individual pilot project, although respondents did indicate in the post-project focus group discussions that SMS-based learning made learning attractive.

2. Viability of SMS Technologies for Non-Formal Distance Education in Mongolia

This project involved a partnership with two organisations based in Ulaanbaatar, Mongolia, the English for Special Purposes Foundation (ESPF) and the Health Sciences University of Mongolia (HSUM) (Batchuluun, Ramos, & Trinona, 2007). The ESPF created an English language module that consisted of a workbook, dictionary, and audiocassette, with SMS messages required for completion of the module. They tested the module with a group of bank tellers and a group of restaurant servers. Similarly, the HSUM developed a module with sections on emergency care for pregnant women and endocrinology, which they tested among a group of obstetricians and gynecologists. Evaluation of the modules was conducted via comparison of pre- and post-tests (Ramos, 2008, pp. 18-19).

The results of the ESPF quiz (see Table 3) reveal a difference in the mean scores of the pre- and post-tests, as do the results of the HSUM quiz (see Table 4). According to the project's authors, this indicates that the SMS-based distance education curriculum facilitated an increase in the knowledge of those students that participated in the study (Ramos, 2008, p. 28).

Table 3

ESPF SMS Quiz Results (Adapted from Ramos, 2008, p. 28)

	Bank tellers	Servers
No. of students who completed module	15/15	10/10
No. of questions	20	11
Mean scores pre-test	12.33	5.70
Mean scores post-test	16.00	9.00
Net difference	+3.67	+3.3

Table 4

HSUM SMS Quiz Results (Adapted from Ramos, 2008, p. 28)

	Endocrinology	Emergency
No. of students who completed module	18/18	19/19
No. of questions	10	14
Mean scores pre-test	5.50	7.28
Mean scores post-test	9.56	7.63
Net difference	+4.06	+0.35

Findings regarding improved access and promotion of new learning.

The ESPF focus group participants indicated that the SMS modules were helpful, although they pointed to problems with message delays (Ramos, 2008, pp. 29-30). They mentioned that the booklets and audio CDs were useful in improving listening skills, pronunciation, and familiarity with new words. The participants also expressed their desire to learn more via SMS; they emphasized that they enjoyed distance learning because it allowed greater freedom of schedule, even though most still did their lessons at the last minute. Participants of the HSUM group also indicated that the flexibility of the modules was a great benefit.

The HSUM focus group participants revealed that they were excited about the use of SMS for learning and that they found SMS-based learning more interesting than learning via paper-based tests. They also appreciated the instant feedback on the tests, mentioning that feedback for paper-based quizzes has a much longer delay (Ramos, 2008, p. 29).

3. Mobile Telephone Technology as a Distance Learning Tool in Bangladesh

This pilot project (Islam, Ashraf, Rahman, & Rahman, 2005) investigated how mobile phones could be used to introduce interactivity and thus overcome the problems plaguing traditional distance education in Bangladesh, including a lack of interaction between presenter and student, a lack of feedback during presentations, no monitoring of student progress throughout the course, and no evaluation of teaching quality. Given that the cost of Internet bandwidth is high and that there is a lack of infrastructure to facilitate chat room technology or video conferencing, mobile phones presented a promising alternative.

The project simulated a typical distance education course broadcast on the Bangladesh national television network, but included the added dimension of interaction between instructor and students via SMS technology. Fifty-two students were divided into two groups: the control group, in a room face-to-face with the instructor, and the experimental group, in a room with a projection screen on which they could watch the instructor. Those in the latter group could raise and respond to questions via SMS. To determine outcomes, the two groups were each given the same pre-test and post-test, with the face-to-face group answering the questions by pencil and the other group answering via SMS.

Findings regarding improved access and promotion of new learning.

A t-test of the post-test scores reveals that mobile-based learning was at least as effective as face-to-face learning. This result, according to the project's authors, indicates that mobile-based learning provides a feasible alternative, one that might be particularly attractive given educational access issues in Bangladesh.

The project documentation reviewed contains no qualitative findings related to new learning except to mention that video recording revealed excitement amongst the group that used mobile phones. Related studies (Alam & Islam, 2008; Islam, 2008; Islam, Rahman, Razzaq, Sayed, & Zaman, 2006) have tracked students' interaction during similar pilot projects, revealing that participation rates were high among those students who took part in mobile phone-facilitated distance education pilot courses.[iii] Feedback from student participants in these related studies also reveals that they very much enjoyed the interactivity and that they found the immediate feedback a great motivator.

4. An Experiment in the Use of Mobile Phones for Testing at King Mongkut's Institute of Technology, Thailand

This project (Whattananarong, 2004) explored the effects of mobile phone use for testing at King Mongkut's Institute of Technology North Bangkok. Accordingly, 56 students who were registered in the Department of Technological Education were tested with similar tests from a test bank by the traditional paper and pen method as well as by simulated audio-mobile and visual-mobile methods. The visual-mobile simulated method involved the projection of questions on a screen, to which students responded by sending their answers via SMS. The audio-mobile simulated model involved a tape recorder that played the questions out loud, to which students then responded by SMS. All students therefore had three sets of scores. A control group and experimental group were selected from the participants, and scores from the traditional method were compared to those of the mobile-based methods.

Findings regarding improved access and promotion of new learning.

Results (see Table 5) indicate that there was no significant difference between the test scores from the three methods, with the visual-phone simulation having a slightly closer correlation to the traditional testing method than the audio-phone simulation. The project therefore reveals no negative effects in the use of mobile phones for testing, meaning that mobile phones could be used as a technology for educational reform in Thailand and for increasing access to educational services. An exploration of student's perceptions of the benefits and limitations of mobile phones for testing did, however, reveal that students were concerned about the potential challenge posed by the small screen size of mobile phones.

Table 5

Test Scores by Testing Method (Adapted from Whattananarong, 2004)

	Traditional method *N* = 28	Audio-phone method *N* = 28	Visual-phone method *N* = 28
Mean score (/40)	31.7500	31.5357	31.7857

Project-related documentation reviewed does not provide discussion that allows analysis of how mobile phones promote alternative learning processes and instructional methods that the new learning theories identify as effective for learning.

5. Improving Literacy in Rural India: Cellphone Games in an After-School Program

This project (Kam, Kumar, Shirley, Mathur, & Canny, 2009) explored the role of mobile phones in expanding the reach of English language learning to out-of-school settings, thus complementing formal schooling. The pilot project took the form of an after-school program consisting of children from rural, low-income families. A qualifying test ensured that students had the basic numeracy to utilize the mobile keypad as well as basic ESL literacy so that the program could target more advanced English than the alphabet. A Hindi language test was also conducted since success in acquiring a second language is correlated to literacy in one's native language.

With the assistance of an Indian ESL teacher, a curriculum was devised that aligned with local ESL learning needs and represented the equivalent to the material that a qualified teacher could cover in eighteen hours with rural children in a classroom setting. The cellphone games devised thus targeted listening comprehension, word recognition, sentence construction, and spelling and

were broken into various levels. The program consisted of 2-hour sessions that spanned 38 days from late December 2007 to early April 2008.

Assessment was based on pre- and post-tests, which specifically targeted spelling. Findings reveal an overall average increase in the score results between the pre- and post-tests; the mean pre-test score was 5.2 out of 18 while the mean post-test score was 8.4 out of 18, with the average post-test gains being 3.4. Interestingly, disaggregation of the students into high-gains and low-gains learners (those with post-test gains higher than the mean of 3.4 classified as high-gains learners) reveals that high-gains learners not only scored high on the post-test, but also outscored the low-gains learners on the pre-test, Hindi test, and qualifying test (see Table 6). Post-test gains show a high correlation with grade levels and a medium correlation with age, meaning that high-gains learners were generally older and in more advanced grades at school than low-gains learners.

Table 6

High-Gains vs. Low-Gains Learners in Terms of Test Scores (Adapted from Kam et al., 2009)

		Qualifying test (out of 50)	Qualifying test, spelling section (out of 6 words)	Hindi literacy test (out of 18)	Pre-test (out of 18)	Post-test (out of 18)
Low-gains learners (n = 15)	Mean	42.9	1.2	6.3	3.5	4.8
	Min.	37	0	0	0	2
	Max.	46.5	4	14	10	12
High-gains learners (n = 9)	Mean	47.1	3.4	12.0	7.4	14.4
	Min.	43.5	2	10.5	2	6
	Max.	49	6	14	13	18

Findings regarding improved access and promotion of new learning.

The authors of the project imply that the rationale for their pilot project was to explore the potential that mobile phones present for out-of-school learning. Particularly, they indicate that mobile phones provide the platform for a modality of learning that can complement formal education, one that can prove more convenient for low-income children who often have to stay at home to help their families. The project's authors also indicate that mLearning can provide enhanced learning for children in public schools in India plagued by teachers who lack adequate qualifications or who put little effort into teaching because of sentiments that pay is insufficient. However, the pilot project was structured as an after-school program, which still required students to come to a central location. Given that participation rates among some students were low, including high-gains learners, the pilot project does not fully demonstrate the potential of mLearning for improved access to educational services. Moreover, in the documentation

reviewed, the authors of the project do not reflect on possibilities for further expansion of the mobile edutainment program beyond a situated after-school program.

For all participants, a high correlation existed between post-test gains and qualifying test scores, while post-test gains had a lower correlation with Hindi literacy levels and pre-test scores. This implies that the greatest predictor of success in spelling the words presented in the cellphone games was the existing level of spelling proficiency and the grade enrolled in at school rather than the number of sessions attended. The findings thus indicate that rural children who have a stronger academic foundation are better able to take advantage of the benefits afforded by mobile phone-based learning. This observation, the authors of the project indicate, is consistent with the findings of He, Linden, and MacLeod (2008) whose study with rural and urban low-income children in India showed that weaker students gained more from teacher-directed pedagogical intervention, while stronger students were able to benefit more from a self-paced, machine-based approach to English learning.

The findings of this project seemingly contradict the claims of the mLearning literature, mentioned previously, that mLearning can benefit those learners who have not performed well in traditional educational settings. Yet, the authors of the project stress that the findings do not completely discount mLearning for low-income children. Rather, they suggest, these findings have important implications for educational design of mLearning programs. More attention and research must go into how mLearning software can provide the support needed by children with less academic preparation. In regards to the particular software employed in this pilot project, the authors of the project indicate that the software could be redesigned to track learner performance to ensure that the program is personalized to individual learners' level of knowledge and need for feedback.

6. Learning Communities Enabled by Mobile Technology: A Case Study of School-Based, In-Service Secondary Teacher Training in Rural Bangladesh

This pilot project (Pouezevara & Khan, 2007a, 2007b) sought to determine whether mobile phone-supported distance education could serve as an effective modality for in-service secondary teacher training in Bangladesh. The impetus for the project arose from recognition that the existing 14-day face-to-face training program, which requires rural teachers to travel to one of the government's teacher training colleges for the duration of the training session, presents challenges for teachers who cannot easily leave their many commitments at school, at home, and in the community.

The project revised the training curriculum from a 2-week face-to-face workshop to a pilot 6-week distance education program consisting of 12 units. According to the program design, each unit would consist of three main activities. First, each trainee would independently read and then reflect on the background materials provided, initiating communication with the trainer regarding the content as necessary. The trainee would then facilitate peer-learning sessions in which the

trainee would gather colleagues from within the school to discuss training concepts and to observe the classroom practices of colleagues. Each unit would end with a conference call, which involved the trainer and trainees from all the various schools as well as other colleagues in those schools, in order to discuss questions and outcomes arising from the peer group sessions.

An integral component to the program design was the use of mobile phones, which were made available to the trainees. The mobile phones, as called for in the project design, would allow the trainer to diffuse reminders, motivational messages, and assessment questions to the trainees via SMS as well as allow trainees to communicate with the trainer in order to pose questions, request materials, or respond to assessment questions. The mobile phones would also enable the conference calls at the end of each unit. Finally, the mobile phones would allow trainees to communicate amongst each other and with the smartphone capabilities to share multimedia examples of best practices.

To measure the outcomes of the project, the pre- and post-tests scores of the mobile phone-supported distance education study group were compared to the scores on the same tests of a control group that followed the face-to-face training program. These tests, standard to all the in-service teacher training workshops, consisted of two components, one that covered pedagogic knowledge and another that covered subject knowledge. Further qualitative information regarding the impact of the training program was gleaned from call logs and daily journals, in which participants were required to document their daily activities and thoughts, as well as from follow-up interviews and questionnaires.

Post-tests scores indicate that there were gains for both the study and control groups (see Table 7). Part two scores reveal little difference between post-test gains of the two groups. For part one, the control group made greater post-test gains in math, with the reverse true for Bangla. Despite the large difference in gains for the math teachers of the two groups, the project's authors indicate that comparison of the part one post-test scores exhibits no significant difference between the control and study groups.

Table 7

Post-Test Gains by Group (Adapted from Pouezevara & Khan, 2007a, p. 31)

Part one - pedagogy		
	Math teachers	Bangla teachers
	Post-test gains	
Control	10.45	4.15
Study	3.33	8.50
Part two – subject knowledge		
	Math teachers	Bangla teachers
	Post-test gains	
Control	1.98	1.50
Study	1.78	1.56

Findings regarding improved access and promotion of new learning.

The program design unfolded in a slightly different manner than anticipated. Participants did not use the MMS capabilities, most likely due to the fact that the clips that trainees created were too long to be transmitted over the network. Some participants also expressed difficulty with sending SMS messages because SMS could only be sent using English characters, and they were not comfortable with the English alphabet. Thus, the project incorrectly assumed that the trainees would easily adapt to these more advanced mobile functions when the trainees actually required instruction and support. In regards to the language issue, the authors of the project suggest that the use of mobile phones for teacher training might be more successful with English teachers because they have a familiarity with English characters (Pouezevara & Khan, 2007b, p. 5-6).

The feedback from participants provided the greatest indication of the benefits of mobile phone-assisted distance education. Evaluations revealed high satisfaction with the content and effectiveness of the training program. Trainees particularly valued the distance education approach as it was flexible and independent, thus allowing them to stay with their schools and families during the training period. For the schools and the Ministry of Education, this learning modality also had the added benefit of being less costly (Pouezevara & Khan, 2007b, pp. 5-6).

Contrary to original expectations, the conference-calling feature was not used because the phone model selected for the project, despite the claims of the mobile phone provider, could only connect three locations at a time and because the sound quality was not adequate for discussions. This development, suggest the authors of the project, demonstrates the necessity of adequate infrastructure and hardware for the success of mLearning. The scheduled conference call time was instead used for one-on-one communication between the trainer and trainees. Most time spent using the mobile phones included one-on-one communication with trainees in other schools to discuss the content of the program, demonstrating that the curriculum design promoted learning by enhancing interaction and collaboration between teacher trainees and by encouraging debate and deliberation regarding course ideas and their application (Pouezevara & Khan, 2007b, pp. 4-5).

Participants identified as beneficial the program design that required shared responsibility between trainer and trainee in the training program, making the program more learner-centred and participatory. In this regard, the use of mobile phones transformed the learning process from a process of instruction to collaborative construction; trainees were required to actively participate in the learning process. Participants also appreciated the situated nature of the learning modality. Distance education enabled them to immediately apply their training in the classroom, and the mobile phones provided the added benefit of enabling participants to immediately solve problems and answer questions that arose during the process by communicating with the trainer and with other trainees. If given the choice, 16 of 18 trainees said they would choose the distance version of the training program, indicative of the fact that many participants changed their attitudes towards technology-assisted training over the duration of the program (Pouezevara & Khan, 2007a, pp. 28-36; 2007b, pp. 4-5).

The authors of the project indicate that the project was not conclusive in determining whether the program was more effective with the use of mobile phones than had it been carried out as a traditional distance-learning course without the technology. Trainees, they indicate, learned much simply from the printed materials as well as discussion with and feedback from colleagues in their school. Also, the project's authors add, the project originally overestimated the value of the technology since it was the simplest function of the phones that was used – the ability to communicate one-on-one with the trainer and other trainees. Nonetheless, the authors of the project state that mobile phones did offer added value for students. The mobiles enabled immediate experimentation with and application of lessons learned in the classroom. The mobile phones facilitated on-demand communication between trainer and trainees; they also enabled discussion and shared problem solving between trainees thus both overcoming the isolation typical of most distance learning and improving content understanding and application. What is needed to truly determine the value added by the use of mobile phones, suggest the authors of the project, is a study that could compare a study group using the same curriculum design with a control group using only print-based materials (Pouezevara & Khan, 2007b, pp. 6-7).

Conclusion

Analysis of these projects indicates that while there is important evidence in the developing world that mobile phones impact educational outcomes by facilitating increased access, much less evidence exists as to how mobiles impact educational outcomes by promoting new learning. Regarding increased access, feedback from participants in the Philippines and Mongolia projects indicates the convenience of greater flexibility of schedule that mLearning affords. Likewise, participants in the Bangladesh teacher training program underscored the benefits of being able to stay with their families and in their schools for the two-week training period. The mobile phone-based teacher training program also enabled the Bangladesh Ministry of Education to extend access to quality training in a more affordable manner. Of greatest significance, however, is the fact that, as specifically shown by the Philippines, Bangladesh SMS, and Thailand projects, mobiles can reduce barriers to education while attaining educational outcomes that are, at minimum, comparable to those of traditional educational methods.

The projects also reveal, however, that there remain important issues that must be taken into consideration for future mobile phone interventions to indeed facilitate improved access to education. As participants in the Thailand project mentioned, technological issues such as screen size can remain a barrier to effective mLearning. Technical difficulties experienced in the rollout of the Philippines and Mongolia projects also reveal that the quality of the software and hardware is instrumental to the success of mLearning modalities. Furthermore, language barriers and unfamiliarity with advanced smartphone functions among participants in the Bangladesh teacher training project show that inadequate training can impede the benefits of mLearning interventions. Of particular relevance to the viability of mLearning in the developing country context, the Bangladesh teacher training project demonstrates that the state of mobile infrastructure directly affects the success of mLearning interventions; certain technological functions integral to the project design could not be used in the end because of inadequate

infrastructure. Additionally, as the authors of the Philippines project suggest, cost remains a relevant factor. MLearning is not always less expensive for the individual learner, as the mLearning literature might suggest, perhaps due to the fact that most of the mLearning literature addresses the developed world.

The findings of the projects are mixed in regards to the extent to which mLearning promotes new learning. Feedback from participants indicates that mLearning enables learner-centred education, particularly in comparison to traditional distance education models. MLearning provides increased interaction, as demonstrated, for example, by the first Bangladesh project discussed. Several projects also reveal the motivational factor of the immediate feedback that mLearning makes possible. Additionally, participants, particularly those in the Philippines and Mongolia projects, indicated that they enjoyed the appeal factor stemming from the use of a novel technology.

Yet only the Bangladesh teacher training pilot project demonstrates the benefits of mLearning that stem from the facilitation of contextualized, situated, constructive, and collaborative learning. Teacher trainees were able to immediately apply lessons learned within their classrooms, and, in turn, to discuss results of the newly applied techniques with trainers and other trainees. The collaborative program design based around the use of mobiles also encouraged constructive learning via interaction and participation on the part of the trainees. The other projects reviewed do not provide evidence of these supposedly important aspects of mLearning. This is interesting, given that, as previously mentioned, the mLearning literature particularly highlights the value of mLearning in offering this potential. The important findings of the Bangladesh teacher training project, therefore, necessitate further exploration in the context of the developing world regarding the potential impact that mobile phone-facilitated mLearning can have on educational outcomes via the promotion of new learning.

The projects reviewed also produce some contradictory evidence in regards to the benefits of mLearning for those who have not succeeded in traditional educational settings. The Philippines project seems to indicate that mLearning, and the new learning that it facilitates, affords great opportunities for such learners. The India project, to the contrary, seems to indicate that those with a weaker academic foundation are less able to take advantage of the benefits provided by mobile phones and would rather benefit from a more teacher-centric educational approach. Such discrepancy necessitates future investigation.

Although the projects reviewed point to a positive role with respect to mobiles as a tool to either access educational materials or deliver more learner-centred curriculum, future research should investigate the opportunity cost of investing in mLearning compared to the costs and benefits of other investments in the educational sector. It is possible that investments in educational infrastructure and materials, as well as more traditional teacher training, might yield more significant beneficial educational outcomes. However, due to the absence of such comparative studies, it is impossible to tell. Moreover, very little research in the developing world has looked at comparing the costs and benefits of the different technologies used to deliver educational services – traditional technologies like television and radio, or newer ones such as computers and

mobiles – in order to ensure that governments have the appropriate information to make wise investments. The current debate about the relevance of the One Laptop Per Child initiative (OLPC, n.d.) for developing countries, for example, has put the need for rigorous studies of the comparative value of various technological investments in the educational sector at the forefront of information systems research agendas.

References

Alam, S., & Islam, Y. M. (2008, July). *Virtual interactive classroom (VIC) using mobile technology at the Bangladesh Open University (BOU)*. Paper presented at the 5th Pan-Commonwealth Forum on Open Learning. Retrieved from http://wikieducator.org/images/4/45/PID_563.pdf

Batchuluun, B., Ramos, A. J., & Trinona, J. P. (2007). Evaluations of distance-based delivery methods: Report C, mobile technology in nonformal distance education. In J. Baggaley & T. Belawati (Eds.), *Distance education technology in Asia* (pp. 131-149). Lahore: Virtual University of Pakistan.

Brown, T. (2003, June). *The role of m-learning in the future of e-learning in Africa?* Paper presented at the 21st ICDE World Conference, Hong Kong.

dela Pena-Bandalaria, M. (2007). Impact of ICTs on open and distance learning in a developing country setting: The Philippine experience. *International Review of Research in Open and Distance Learning*, *8*(1). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/334/793

Dhanarajan, T. (2009). Education for all in the digital age. In S. Akhtar & P. Arinto (Eds.), *Digital review of Asia Pacific 2009-2010* (pp. 45-49). New Delhi: SAGE Publications.

Dighe, A., Hakeem, H., & Shaeffer, S. (2009). ICTs in non-formal education in Asia Pacific. In S. Akhtar & P. Arinto (Eds.), *Digital review of Asia Pacific 2009-2010* (pp. 59-66). New Delhi: SAGE Publications.

Donner, J. (2008). Research approaches to mobile phone use in the developing world: A review of literature. *The Information Society, 24*, 140-159.

Economist, The. (2008, May 29). Halfway there: How to promote the spread of mobile phones among the world's poorest. Retrieved from http://www.economist.com/

Frohberg, D, Göth, C., & Schwabe, G. (2009). Mobile learning projects – a critical analysis of the state of the art. *Journal of Computer Assisted Learning*, *25*, 307–331.

Geddes, S. J. (2004). Mobile learning in the 21st century: Benefits for learners. *Knowledge Tree*. Retrieved from http://knowledgetree.flexiblelearning.net.au/edition06/download/Geddes.pdf

He, F., Linden, L. L., & MacLeod, M. (2008). *How to teach English in India: Testing the relative productivity of instruction methods within the Pratham English language education program* (Working Paper). Retrieved from http://www.columbia.edu/~ll2240/PicTalk%20Working%20Paper%202008-07-02.pdf

Islam, Y. (2008). *Virtual interactive classroom overview*. Retrieved from http://www.scribd.com/doc/7518042/Virtual-Interactive-Classroom-Overview

Islam,Y. M., Ashraf, M., Rahman, Z., & Rahman, M. (2005). Mobile telephone technology as a distance learning tool. *Proceedings of the Seventh International Conference on Enterprise Information Systems*, Miami, USA, May 25-28, 226-232.

Islam, Y. M., Rahman, Z., Razzaq, S. S., Sayed, M. A., & Zaman, S. (2006). Effect of feedback during lecture style delivery both in a face-to-face classroom & during a distance education television session in a developing country like Bangladesh without the use of Internet. *Proceedings of the Sixth IEEE International Conference on Advanced Learning Technologies*, 469-471. Available from IEEE Xplore Digital Library: http://ieeexplore.ieee.org/Xplore/guesthome.jsp

Kam, M., Kumar, A., Shirley, J., Mathur, A., & Canny, J. (2009). Improving literacy in rural India: Cellphone games in an after-school program. *Proceedings of IEEE/ACM Conference on Information and Communication Technology and Development (ICTD '09)*, Doha, Qatar, April 17-19. Retrieved from http://www.cs.cmu.edu/~mattkam/publications/ICTD2009.pdf

Keegan, D. (2002). *The future of learning: From elearning to mlearning*. Hagen, Germany: FernUniversitat. Retrieved from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/b6/8e.pdf

Kukulska-Hulme, A., & Traxler, J. (2007). Designing for mobile and wireless learning. In H. Beetham & R. Sharpe (Eds.), *Rethinking pedagogy for a digital age: Designing and delivering e-learning* (pp. 180-192). London: Routledge.

Motlik, S. (2008). Mobile learning in developing nations. *International Review of Research in Open and Distance Learning*, *9*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/564/1071

Nyiri, K. (2002, August). *Towards a philosophy of m-learning*. Paper presented at the IEEE International Workshop on Wireless and Mobile Technologies in Education, Vaxjo, Sweden. Retrieved from http://21st.century.phil-inst.hu/eng/m-learning/nyiri_m-learn_philos.htm

OLPC (n.d.). Retrieved from http://laptop.org/en/

Orbicom (2007). *Emerging development opportunities: The making of information societies and ICT markets*. Ottawa: IDRC.

Pouezevara, S. L., & Khan, R. (2007a). Learning communities enabled by mobile technology: A case study of school-based, in-service secondary teacher training in rural Bangladesh. In *Innovative information and communication technology in education and its potential for reducing poverty in the Asia and Pacific region* (Appendix 11). Asian Development Bank. Retrieved from http://www.adb.org/Documents/Reports/Consultant/39035-REG/appendix11.pdf

Pouezevara, S. L., & Khan, R. (2007b). Summary of findings, learning communities enabled by mobile technology: A case study of school-based, in-service secondary teacher training in rural Bangladesh. In *Innovative information and communication technology in education and its potential for reducing poverty in the Asia and Pacific region* (Appendix 16). Asian Development Bank. Retrieved from http://www.adb.org/Documents/Reports/Consultant/39035-REG/appendix16.pdf

Ramos, A. J. (2008). *Final report for sub-project #2, Project MIND: The viability of mobile SMS technologies for non-formal distance learning in Asia*. Philippines: Molave Development Foundation, Inc.

Ramos, A. J., & Trinona, J. P. (2009). Mobile technology in nonformal distance education. In J. Baggaley & T. Belawati (Eds.), *Distance education technology in Asia* (pp. 231-56). Lahore: University of Pakistan.

Sharples, M., Taylor, J., & Vavoula, G. (2005, October). *Towards a theory of mobile learning*. Paper presented at 4th World Conference on mLearning, Cape Town, South Africa. Retrieved from http://www.mlearn.org.za/CD/papers/Sharples-%20Theory%20of%20Mobile.pdf

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage handbook of e-learning research* (pp. 221-247). London: Sage Publications.

Samarajiva, R., & Zainudeen, A. (Eds.). (2008). *ICT infrastructure in emerging Asia*. Ottawa: IDRC.

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ . . . *The International Review of Research in Open and Distance Learning*, *8*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/346

Traxler, J., & Dearden, P. (2005). *The potential for using SMS to support learning and organisation in Sub-Saharan Africa*. Retrieved from http://www.wlv.ac.uk/PDF/cidt-article20.pdf

United Nations. (2008). *The Millennium Development Goals Report*. New York: UNDESA. Retrieved from http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2008/MDG_Report_2008_En.pdf#page=14

van Weert, T. (2005). Lifelong learning in knowledge society: Implications for education. In T. J. van Weert (Ed.), *Education and the knowledge society: Information technology supporting human development* (pp. 15-25). Boston: Kluwer Academic Publishing.

Visser, L., & West, P. (2005). The promise of m-learning for distance education in South Africa and other developing nations. In Y. L. Visser, L. Visser, M. Simonson, & R. Amirault (Eds.), *Trends and issues in distance education: International perspectives* (pp. 117-129). Greenwich, CT.: Information Age Publishing.

Wagner, D., & Kozma, R. (2005). *New technologies for literacy and adult education: A global perspective*. Paris: UNESCO Publishing.

Whattananarong, K. (2004, September). *An experiment in the use of mobile phones for testing at King Mongkut's Institute of Technology, North Bangkok.* Paper presented at the International Conference on Making Education Reform Happen: Learning from the Asian Experience & Comparative Perspectives, Bangkok, Thailand. Retrieved from http://www.seameo.org/vl/krismant/mobile04.pdf

World Bank (n.d.). *Country groups*. Retrieved from http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

[i] The authors chose to focus on Asia as currently most developing-country interventions in education using mobile phones are being undertaken in Asia, exploiting the relative ubiquity of the technology in the region. Early indications suggest that Asia can be the global leader in the development of educational uses of mobiles (Motlik, 2008). This study sought to explore the potential of mobile phones in contexts of poverty and relatively under-developed educational sectors, and, therefore, projects were limited to low and lower-middle income countries, following the World Bank classification (World Bank, n.d).

[ii] For a comprehensive review see Frohberg, Göth, and Schwabe (2009).

[iii] Further discussion of these related projects is not included in this article as the documentation reviewed includes no findings, such as pre- and post-test comparison, that might point to the impact of mobile phone-facilitated mLearning on actual educational outcomes.

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Reaching REMOTE Learners: Successes and Challenges for Students in an Online Graduate Degree Program in the Pacific Islands

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Keywords: Distance Learning; Pacific Islands; indigenous education

Background

Access to higher education in the U.S-affiliated Pacific Islands is limited. The island nations and territories in this Pacific region are geographically dispersed and separated by thousands of miles of ocean. Although local and regional colleges offer undergraduate degrees (associate's and bachelor's levels), islanders who seek graduate-level education have to move away from home or avail themselves of distance education opportunities in order to earn degrees at the master's and doctoral levels.

To address a need for building the capacity of educational leaders in the Pacific to conduct and utilize program evaluation appropriately and effectively, Pacific Resources for Education and Learning (PREL) and the University of Hawaii at Manoa (UHM) partnered to deliver a two-year, online master's degree program. With funds provided by a grant from the National Science Foundation (NSF), PREL and UH developed the Regional Education Master's Online Training in Evaluation (REMOTE) program to provide this educational opportunity to students located on several islands in the geographically vast and diverse Pacific region.

In this paper, we present the results from an evaluation of the two-year program. The program evaluation was conducted to understand the issues that an online student in the Pacific region faces. These Pacific island students are from indigenous communities and live in rural settings. Many speak English as a foreign language. As adult learners who are mid-career working professionals, they undertake an online program with many concurrent commitments to family, work, and community.

Description of the REMOTE Program

Selection of the REMOTE Cohort

Nineteen students were selected for the REMOTE program through a process that involved island chiefs of education and the University of Hawaii. Students were nominated by State Educational Agency chiefs and Institute of Higher Education presidents from islands across the U.S.-affiliated Pacific, including American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), the Federated States of Micronesia (Chuuk, Kosrae, Pohnpei), Guam, Hawaii, the Republic of the Marshall Islands (RMI), and the Republic of Palau. The nominees applied to the University of Hawaii Graduate Division and had to meet admission requirements.

After all selection criteria were met, the original cohort consisted of three students from America Samoa, two students from the islands of RMI, Kosrae, Chuuk, and CNMI, and one student from the islands of Pohnpei, Palau, Guam, and Hawaii. These 15 students were joined by four more whose tuition was paid by the American Samoa Department of Education. This original cohort of 19 students represented a group scattered across thousands of miles of ocean and located on nine different islands.

Development and Delivery of the REMOTE Curriculum

The curriculum was administered by the Department of Educational Foundations of the UHM's College of Education. The department created a special track, within its existing Master's in Education program, specifically for the Pacific cohort. The REMOTE cohort had to complete 10 courses (see Table 1) during the two-year program and submit a master's thesis in order to graduate.

Table 1

REMOTE Program Courses

Academic year/semester		Course
Year 1 2007-2008	Summer	Introduction to Evaluation Educational Statistics
	Fall	Introduction to Educational Research Social and Cultural Contexts of Education
	Spring	Survey Research Design and Analysis Foundations of Evaluation Theory
Year 2 2008-2009	Summer	Independent Study (work on master's thesis with advisor)
	Fall	Seminar in Educational Psychology: Educational Evaluation Seminar in Educational Foundations
	Spring	International Development Education Directed Reading (completion and submission of master's thesis)

All courses were taught online, using WebCT and Sakai course management systems. The only exception was a face-to-face meeting for part of the first summer semester, funded by the grant. Students convened in Honolulu in person for two weeks at the start of the program as an orientation and kickoff. They met some of the REMOTE instructors and received training on the online technologies they would be using during the two years of study. Instructors of the two summer courses also delivered part of their courses during this two-week orientation. Students completed those two courses online after returning to their islands. The remaining eight courses were conducted entirely online, with no additional face-to-face meetings.

Courses were offered largely in an asynchronous format, with course management software and email as the primary means of communication. When students first returned to their islands, program staff implemented ways to bring the cohort together using synchronous technologies. The staff began using teleconferencing and web-conferencing as a way to bring students together to discuss questions and issues. Course instructors also began to use web-conferencing (using Elluminate Live! software) to convene students in their courses periodically. These synchronous meetings were optional and informal, not a required element of the program.

During the two years of the program, students' primary interactions were with course instructors and the REMOTE program director. The instructors were all professors or adjunct professors at the UHM Educational Foundations department, and the program director was an educational technology specialist at PREL. The program director managed the project and played a significant role in organizing operations and interfacing with students regarding operational matters. Students were also assigned individual advisors to help them with their master's thesis papers.

Review of the Literature

To guide the design of this program evaluation and our development of questions for the surveys and interviews, we narrowed our examination of the extensive body of literature on online learning to studies conducted with students who have similar cultural and geographical profiles to the participants of the REMOTE program. The following section provides an overview of findings from prior studies conducted with indigenous learners, some of whom lived in similar rural and underresourced settings as did the Pacific Islanders in the REMOTE cohort. This section also provides background on evaluation methods for online learning that informed our formative and summative evaluation of the REMOTE program.

Cultural Considerations for Online Learning

Researchers note that online learners from indigenous communities face unique challenges (Berkshire & Smith, 2000; McLoughlin, 1999; Zepke & Leach, 2002). These researchers suggest that to give students a chance to succeed in online programs and courses, instructional design should consider the cultural modes and preferences of the students being served. Berkshire and Smith discussed the unique cultural circumstances of the native Alaskan student, basing their study on the Rural Alaska Native Adult (RANA) program at the Alaska Pacific University. They

noted that family duties and obligations are central to the lives of many native Alaskans and highlighted the importance of accommodating these cultural components in the courses offered.

Based on her work with adult indigenous learners in Australia, McLoughlin (1999) discussed the need to incorporate the skills and values of the community in order to create authentic learning contexts. She recommended designing instruction that takes into account cultural traditions, issues, and problems. She highlighted the necessity of asking learners about their preferences before designing a course, rather than assuming that the characteristics of one group will fit others. Zepke and Leach (2002) described the importance of community and collaboration in their studies of online learners from Maori communities in New Zealand.

Researchers also note that Pacific Islanders involved in distance learning experiences value face-to-face meetings and synchronous opportunities for communication and interactions (Ho & Burniske, 2005; Rao, 2007). Ho and Burniske studied the use of videoconferencing in courses developed for students in American Samoa. Rao studied the use of web-conferencing in courses developed for students in Micronesia. In both cases, students found that these synchronous technologies helped mitigate feelings of isolation and helped create a sense of community and a relationship with instructors, which they missed in asynchronous forms of distance learning.

Evaluation Designs for Online Programs

Toth, Foulger, and Amrein-Beardsley (2008) emphasized the importance of embedding continuous evaluation measures into hybrid degree programs in order to improve instruction and student learning within the program. They noted the importance of implementing lessons learned from formative evaluation to increase satisfaction, learning, and success for participants.

Research designs that utilize quantitative and qualitative data can be a useful way to assess online courses (Lebec & Luft, 2007). These mixed methods studies can provide descriptive and statistical data as well as additional contextual information on teaching and learning processes that aid the interpretation of results.

For example, Lebec and Luft (2007) noted that quantitative studies of DL suggest that there is no essential difference between courses taught via distance and those taught face-to-face. They stated that these results often assess superficial learning outcomes, but do not evaluate the meaningful learning and deeper levels of understanding of content. By merging quantitative and qualitative data in their study of an online biology course, they were able to analyze more finely what factors worked for students in this distance learning format. The mixed method format allowed researchers to examine student attitudes that hindered the learning experience and resulted in a lack of engagement, such as a lack of intrinsic motivation and frustrations with some facets of the course.

Purpose of the Study

The purpose of this study was to identify promising practices and common challenges faced by students enrolled in a multiyear, online degree program. We also sought to determine (a) the unique challenges experienced by students from rural areas and traditional cultures and (b) what factors helped them to stay on track and graduate on time. The students in this program were all mid-career working professionals who lived in rural settings and who were from traditional cultures and indigenous communities.

Evaluations of online programs often focus on student experiences in a single course; this study examined the processes that took place during the two-year program in order to understand the issues faced by Pacific Islanders as they undertake a rigorous online course of study. From this study of students' perspectives on their experience as online learners in a graduate degree program, we developed recommendations for designers of online programs for students in similar settings and situations.

Our approach to the evaluation activities and design was governed by our purpose of understanding and improving the delivery of online learning through the experiences participants had completing the course. The majority of evaluation activities conducted for this study were formative rather than summative (Scriven, 1967; 1991). The primary purpose of this program evaluation effort was to include ongoing and continuous improvement of program components during program implementation. A secondary purpose was to obtain information that would allow us to reach summative conclusions of the students' perceptions of the program overall. Surveys administered throughout the duration of the program helped us understand the significance of student experiences for continuous course improvement. The information obtained from these surveys, often called quantitative data, added a critical perspective to our evidence. The information obtained from the interviews, often called qualitative data, was important for informing our understanding of the program in ways not available from quantitative information (Green, 1997; Maxwell, 2004; Lincoln, 2002; Patton, 2002).

Research Questions

To examine the factors of an online graduate degree program that affect the students' experiences in the program, the following research questions were developed:

1) What factors of a two-year, online master's degree program helped students succeed?
2) What factors of a two-year, online master's degree program posed challenges for students?

Methods

We collected data using end-of-course surveys and end-of-program interviews with students, instructors, and program administrators. The end-of-course surveys contained fixed-response questions with five-point Likert scales and open-ended questions.

Participants

Data were collected from students, instructors, advisors, and program administrators. Of the original cohort of 19 students, 8 completed the required coursework and graduated in the two-year time span of the course; 7 students dropped out; and 4 students were close to completion with no more than two courses and the master's thesis not completed. These four students stated their intention to complete the program by finishing their coursework in two additional semesters. Five course instructors, six advisors, and three program administrators participated in the majority of the two-year program. All were based in Honolulu, Hawaii and were affiliated with either PREL or UHM.

Data Collection

Students completed the end-of-course surveys (Appendix A) using an online survey tool. Responses were anonymous. At the end of the two-year program, an evaluator contacted all 19 students who were originally enrolled in the program. Students were asked whether they could be contacted by phone and were given the choice of answering questions via email. Six students who were enrolled for the full two years participated in interviews by phone and two students who had dropped out of the program responded to the questions by email. The interview protocol can be found in Appendix B.

Three of the five instructors who taught REMOTE courses responded to the instructor interview questionnaire (Appendix C). All five program administrators who were queried responded to the administrator interview questionnaire (Appendix D) via email.

Results

Results are presented in the following subsections: (a) end-of-course survey, closed-ended responses; (b) student comments, which include responses from the open-ended survey items and interviews; c) instructor comments; and d) administrator comments.

End-of-Course Survey, Closed-Ended Questions

At the completion of each REMOTE course, students completed a 22-item end-of-course questionnaire like those typically used to evaluate course satisfaction (Appendix A). Seventeen items were closed-ended and used five response categories (strongly disagree, disagree, neutral, agree, strongly agree). These fixed-choice items were divided in two sections with roughly the

same number of items. The first section assessed the pedagogical practices of the instructors (such as clarity of expectations, provision of feedback, and use of culturally relevant perspectives – items 2, 3, and 7, respectively). The second section of the questionnaire assessed the instructional climate generally (whether different learning styles were accommodated, whether the distance learning format was successful, and whether students felt isolated – items 9, 12, and 16, respectively).

The percentage of responses given for the agree responses (agree and strongly agree aggregated) were interpreted to indicate a satisfactory outcome. The average percentage of responses across all questionnaires that were either *agree* or *strongly agree* was 82. That is, on average, 82% of respondents felt favorably about the instructional practices of the REMOTE instructors as well as the general instructional climate. Because the overall feelings of participants about the courses were quite positive, and because there was little variation on these responses, the fixed-choice results for the end-of-course questionnaires were not analyzed further.

Student Comments

In this section, we report key themes that emerged from the end-of-course survey, open-ended questions, and the interview data gathered at the end of the program. Students reported challenges to their progress, factors that helped them succeed in the program, ways to improve the course, and the relevance of the course to their work.

Challenges.

Finding time to do coursework was the most common challenge stated. As professionals who had jobs and obligations to family and community, most students reported difficulty keeping up with deadlines and completing coursework. Issues with technology were the second most prevalent challenge. Students cited various problems, for instance slow Internet connections and a lack of knowledge about basic computing skills. The University changed course management software in the middle of the program, and this change created challenges for many students who had gotten used to the interface of the older course management system. Students also said that assignments in some courses were overwhelming at times, with too much reading to do or textbooks that were too complicated to understand.

Success factors.

The factors that helped students succeed included personal interactions during the course, organization and clarity of the course, and appreciation for course content. In the end-of-course surveys, students noted that they valued opportunities to interact with one another as part of their course activities. The discussion forum in the online course was useful and engaging. Students also stated that they appreciated it when courses were well laid out (in the course management software), instructors stated expectations clearly, and the course was well organized. Students

emphasized that they appreciated course content that had relevance to their local scenarios. They found the resources used in courses, such as textbooks and articles, useful and thought provoking.

When students were interviewed at the end of the two year program and reflected on the program as a whole, they felt that the factors that helped them succeed were support from the program staff (instructors, program director, and advisors), the face-to-face group meeting at the start of the program, and the fact that course content was locally relevant. Many students said they liked having web-conference meetings during the courses, during which they could interact with instructors and other students synchronously. Students appreciated the communication they had with advisors, instructors, and program staff and cited the extra time put in by all staff to reach out and keep the students engaged as key factors in their ability to complete the program. The instructors' flexibility and personal touches were often cited as factors that made students persevere when it became difficult to juggle coursework and other life responsibilities.

Course improvements.

Asked what changes they would make to the program, student suggestions included a mandatory weekly meeting by phone or web-conferencing, having local coordinators on their home islands for the program, and more opportunities for face-to-face meetings.

Course relevance.

In addressing interview questions about the efficacy of the two-year program, students stated that they were able to use what they learned in their jobs. They learned the importance of using assessment in their various positions, and they used their new skills in their work settings. Reflecting on what they thought about the distance learning format, they said that although learning online was challenging, it was a great opportunity to earn a degree without having to leave behind families and jobs.

Instructor Comments

Instructors commented that factors in student success included face-to-face sessions, web-conferencing, and discussion boards within courses. They noted that a student's individual drive played a large part in his or her success.

They felt that the greatest challenges for students included English language proficiency, finding time to do coursework, and problems with technical infrastructure. Because of these, instructors said that students often had trouble meeting course deadlines. To address these challenges, instructors said that in future courses they would find more accessible texts for speakers of English as a foreign language, reduce the number of assignments, and be more realistic about how much content they could teach in one semester.

In reflecting on their own challenges as online instructors for this group, they noted that it took longer to establish rapport with students in the online format than it would in a face-to-face format. They also noted that it was far more time consuming to teach online; at times, they felt as though they were conducting multiple individual tutorials. One instructor noted that she was astonished at how much time students were putting into coursework each week.

Instructors commented that in order to have coherence and consistency in a program like this, only a few faculty members should teach all courses. One instructor noted that a two-year program like this may be too long for students who have many other responsibilities and that a series of single-year certificate programs may be a better option.

Administrator Comments

The administrators noted that the factors in the success of the program included the face-to-face session during the first summer, the oversight by the program director, and the fact that the program was successfully implemented on a limited budget. They noted that the hard work and flexibility of the instructors were key to the success of the program. They were also impressed by the goodwill and attitude of the students.

The challenges noted by administrators included the competition for time that students faced in balancing work and life commitments with program demands. They also noted that the computer and Internet infrastructure created hurdles for students to learn online and that writing an academically rigorous final thesis was challenging for those who used English as a foreign language. One administrator noted that the program may have been too short and suggested adding another semester to give students extra time and flexibility to complete all requirements. Another administrator noted that it was challenging for students to work on inquiry-based projects for their final thesis in this distance format.

Administrators stated that the challenges for the program as a whole included the relatively small budget for this program, the issues created by the cultural barriers and maintaining the integrity of a master's degree program, the failure to provide sustained mentoring for students, and the lack of applicants who were better qualified for graduate work.

The administrators agreed that more synchronous meetings should be built into the program via face-to-face sessions or a more systematic use of web-conferencing software. Administrators also emphasized the need to build in more structures to support students, such as program advisors who could travel to their sites and advisors who were paid staff (in the case of REMOTE, advisors volunteered their time to the project).

Discussion

Eight students (42%) of the original 19 REMOTE cohort graduated on time. Four students (21%) came close to completion. Although this graduation rate (42%) is not low for online programs, it is worth considering what supports and strategies online degree programs need in order to keep

students motivated and on track for course completion and graduation. In rural and isolated settings, such as the Pacific island nations served by the REMOTE program, it is also important to keep in mind the cultural and environmental factors that affect a student's participation in an online degree program.

We discuss the major findings and propose some considerations for future program and course designers working with similar populations or in similar settings. End-of-course surveys illustrate that student satisfaction with all courses was high; analysis of their open-ended responses and interview data allows us to draw conclusions about specific challenges they faced and elements that helped them succeed. Although the sample of students studied here was somewhat limited, some of these findings may be useful for other cohorts of online students who are similar to the students in the REMOTE cohort, for instance adult learners, working professionals, and students who live in rural areas and in traditional cultural settings.

The Work-Life Balance: Realities for the Online Student

Balancing work, family, and community commitments with coursework was a significant challenge to the students in the REMOTE program. This was reiterated by all the students interviewed. Four of the seven students who dropped out of the program noted that they simply were unable to juggle all their life commitments along with online coursework. As might be expected, several students encountered significant transitions in life during the two years: marriages, divorces, births, illnesses, deaths in the family, and job changes. These life events resulted in students taking incomplete grades in some semesters. Although some students were able to catch up and complete courses later, some dropped out after falling behind over several semesters of coursework.

REMOTE was structured as a two-year program with no redundancy built into courses. Because it was a pilot program with a limited budget, it was not possible to offer courses multiple times. This tight scheduling caused problems. If students missed a semester of coursework or took incompletes in courses, they had to make it up on their own, with the instructors providing one-on-one assistance. Several students took incompletes and finished courses one or two semesters after the courses were done, but this required instructors to volunteer time to prepare an independent course of study and to grade student work.

Because the amount of engagement and flexibility required for instructors is large, it may be unreasonable to expect this level of commitment. This is an important consideration for program developers. When students, owing to other commitments and life situations that arise, are unable to finish coursework during a semester, ways for them to retake courses should be found. Otherwise, a student who falls behind for several semesters may have no other choice than to drop out of the program because it requires an overwhelming individual effort to finish coursework.

Even the students who successfully completed the program in two years stated that balancing life demands with coursework was challenging throughout. Students often said that face-to-face

learning would have been preferable because it would have helped them stay on task and accountable.

One irony for adult learners who enroll in distance learning programs is that they choose an online program because they have limited time to enroll in an on-campus program. However, the reality remains that students need to find or make time for online coursework.

It might help to make students aware that they will need to find strategies to make time to finish coursework. One way to do this might be to address this issue explicitly during their orientation to the program. It can be useful for adult learners, who are juggling full-time day jobs and family commitments after work, to consider their schedules and figure out how to prioritize time for coursework compared with other obligations.

Interaction and Community

All stakeholders in the program – students, instructors, and administrators – noted the importance of the interactive elements within the program. The initial two-week, face-to-face meeting in Honolulu was highly valued by students. It gave them the opportunity to meet and bond with others in the cohort and with the instructors. Throughout the program, the desire to have more opportunities like this was repeatedly expressed in student comments, both informally and formally.

The students also valued the online discussions with one another during each course. The power of interacting and sharing information about the relevance of course content to their own island contexts was interesting and engaging to students. Although students encountered some technical frustrations with the online discussion board at times (owing to changes in the course management system), the resounding message from students was that interactions with others in the cohort were useful for them. Getting feedback from peers and gaining understanding of the course content as it applied to their fellow students' island contexts were deemed by students to be motivating, engaging, and informative.

Instructors used Elluminate Live web-conferencing software to offer synchronous online meetings during their courses. These sessions were informal and optional, not built into the program's framework as an essential component of each course. These web-conferencing sessions allowed students to gather as a group and discuss course content and other course-related issues with one another and with the instructor. Although only a few students attended the Elluminate sessions each time, students did state that they were useful. Students cited conflicts with work times and Internet issues as reasons they were not able to attend. Had the Elluminate sessions been built into courses as a requirement, students may have had the motivation and incentive to make these sessions a priority when making choices amongst their many commitments to jobs, personal lives, and coursework.

The REMOTE project's budget did not allow more than one face-to-face meeting to be planned. One way to foster interactions within such limitations would be to build synchronous online

meetings more formally throughout the program. For example, as mentioned above, instructors could require attendance at synchronous sessions as part of their courses. These synchronous sessions could be used to deliver course content and foster discussion between students and instructors, thereby creating an interactive environment. Sessions required in the context of their classes may have provided added incentive for people to make the time to attend. If such sessions were mandatory and built into courses throughout the program, students would have had consistent opportunities to come together and stay connected with one another and with instructors synchronously in addition to the asynchronous interactions within the online discussion boards.

Student Support Structures

Consistent support of online learners is another aspect that can make the difference between success and failure for students. As REMOTE students noted, instructor flexibility and understanding were key to their ability to finish courses. In their efforts to support students, instructors often went beyond expectations even conducting one-on-one sessions to help students complete coursework after deadlines had passed.

Although this close, individualized attention should not be an expectation placed on instructors, a key lesson for course designers and instructors is to build in instructional activities and assignments that are flexible. The REMOTE instructors noted that after teaching a first course, they changed the amount of content covered and selected more accessible texts for the students. Instructors also incorporated synchronous Elluminate sessions to conduct discussions with students.

Of the five instructors who taught a REMOTE program course, three taught two or more courses. Having instructors who taught more than one course was of great benefit to the program and to the students' progress. In a graduate-level program, much of the content is built on prior courses. Having a few instructors teach a bulk of the courses helped to maintain consistency of content, of format, and of the process by which courses were taught. The instructors who taught two or more courses got to know the students. These relationships helped them support each student. Because relationships can take longer to establish in an online program, this was a good way for students and instructors to build trust and to understand one another's teaching and learning styles. Instructors also learned about the students' cultural contexts and realities over time and were able to design course content that was connected and relevant to the students' local settings.

Unlike a traditional degree program, in which students attend courses on campus and have the benefit of informally sharing program information with one another, online students do not automatically see the bigger picture of the scope of their programs. REMOTE students also noted the support provided by their advisors and by the program director. The program director provided information to the students on the bigger picture of their two-year program, keeping them abreast of upcoming deadlines and courses and tracking individual student progress.

The advisors, a group of volunteers, helped students write their final theses, serving as one-to-one mentors. Students found these regular communications from the program director and from their advisors useful and motivating. Some noted that this sort of one-on-one communication, coming at some key moment when they were ready to drop out of the program, gave them the push and determination to continue.

Conclusion

Online learners have a variety of personal circumstances and learning preferences. Although it is not possible to foresee all the issues that a particular cohort or program will encounter, it is possible to consider the major challenges that adult learners taking online courses are likely to face and to build in support structures at the start of a program. In a traditional face-to-face degree program, students have the benefit of a structure that comes with being on a campus, interacting at regular intervals with peers, and having informal interactions with faculty and staff. For online learners, specific structures can be designed and implemented to address their needs for information, communication, and interaction. We conclude this paper with a set of recommendations for multiyear degree programs in settings such as the Pacific Islands:

1. Provide opportunities for synchronous meetings either in person or virtually using technology. Synchronous technologies that bring students together for virtual meetings can greatly enhance interactions and motivate students by allowing them to feel as though they are part of a learning community.
2. Create support structures for students with key personnel who are connected to students and who remain with them over the course of the program. Faculty and staff who are aware of the challenges of the online learner can be instrumental in designing course and program elements that support the student who is juggling coursework among many obligations.
3. Be aware and respectful of the realities of the students' lives. Adult learners from traditional and indigenous communities have multiple obligations that require them to prioritize their coursework in different ways.

Online learning is indeed a unique opportunity for many people in rural and geographically dispersed settings to further their education. With forethought about the factors that will keep students engaged and the realities of their lives that may impede sustained focus on academic matters, program developers and instructors can create learning environments that help students complete their course of study and earn their degrees.

Acknowledgements

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References

Berkshire, S., & Smith, G. (2000). Bridging the great divide: Connecting Alaska native learners and leaders via "high touch-high tech" DL. In L. Berry (Ed.), *Monograph series of the National Association of African American Studies*. Houston TX: National Association of African American Studies.

Green, J. C., & Caracelli, V. J. (Eds.). (1997). *Advances in mixed-methods evaluation: The challenges and benefits of integrating diverse paradigms. New Direction for Program Evaluation* (Vol. 74). San Francisco: Jossey-Bass.

Ho, C., & Burniske, R. (2005). The evolution of a hybrid classroom: Introducing online learning to educators in American Samoa. *TechTrends*, *49*(1), 24-29.

Lebec, M., & Luft, J. (2007). A mixed methods analysis of learning in online teacher professional development: A case report. *Contemporary Issues in Technology and Teacher Education*, *7*(1), 554-574.

Lincoln, Y. S. (2002, November). *On the nature of qualitative evidence*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Sacramento, CA.

Maxwell, J. A. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher*, *33*(2), 3-11.

McLoughlin, C. (1999). Culturally responsive technology use: Developing an on-line community of learners. *British Journal of Educational Technology*, *30*(3), 231-243.

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Rao, K. (2007). Distance learning in Micronesia: Participants' experiences in a virtual classroom using synchronous technologies. *Innovate*, *4*(1), Retrieved from http://www.innovateonline.info/pdf/vol4_issue1/Distance_Learning_in_Micronesia-__Participants%27_Experiences_in_a_Virtual_Classroom_Using_Synchronous_Technologies.pdf

Scriven, M. (1967). The methodology of evaluation. In R. W. Tyler, R.M. Gagne & M. Scriven (Eds.), *Perspectives of curriculum evaluation* (pp. 39-83). Chicago, IL: Rand McNally.

Scriven, M. (1991). *The evaluation thesaurus* (4th ed.). Newbury Park, CA: Sage.

Toth, M., Foulger, T., & Amrein-Beardsley, A. (2008, June 1). Post-implementation insights about a hybrid degree program. *TechTrends: Linking Research and Practice to Improve Learning, 52*(3), 76-80.

Zepke, N., & Leach, L. (2002). Appropriate pedagogy and technology in a cross-cultural distance education context. *Teaching in Higher Education, 7*(3), 309–321.

Appendix A

End-of-Course Survey

Section I and Section II are closed-ended questions answered on a five point scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

Section I: Instructor Practices

1. The instructor effectively facilitated this course.
2. The instructor clearly communicated class expectations and course objectives.
3. The instructor provided feedback in a timely manner (i.e., replied to emails, answered questions).
4. The course assignments were relevant to my setting (i.e., could be applied in the local cultural or social context).
5. The instructor encouraged us to interact with other students when completing assignments or studying for exams.
6. The instructor encouraged us to apply theories learned during the course to real-world situations.
7. The instructor provided opportunities for us to incorporate locally and culturally relevant perspectives in discussions and assignments.
8. The instructor was accessible (i.e., I could communicate and reach the instructor when needed).

Section II: Course Content and Instructional Strategies

9. This course incorporated a combination of learning styles (textual, auditory, visual and tactile).
10. The combination of learning styles met my needs as a student.
11. This course combined opportunities to work individually and in a group.
12. I was able to learn the content of this course in this distance-learning format.
13. I learned as much or more in this distance learning course as compared to classes I have taken in a traditional classroom setting.
14. I had the technology skills required to be successful in this distance learning class.
15. I had adequate opportunities to interact with students and teachers.
16. I felt isolated because of the lack of face-to-face contact.
17. The meetings over Elluminate and teleconferences helped me connect with other learners.

Section III: Open-Ended Questions

18. If you did not attend any Elluminate sessions, what factors kept you from attending? (You can address any issues - lack of interest, not able to join owing to timing, technical difficulties, etc.)

19. In the fall and spring semesters, we have divided the semester so you take only one course each 8 weeks. Do you like this format? Would you prefer to take both courses at the same time and spread them over the whole semester?
20. What were some successful experiences you had in this course? Please describe any factors that worked well for you (including content acquisition, instruction, communication, interaction) .
21. What would you change to make this course better?
22. Additional comments:

Appendix B

Student Interview Protocol

End-of-Program Questions for Students

1. What were the three greatest challenges for you in this two-year program?
2. What were some factors that helped you most in the program?
3. How will you use what you learned in the program in your career? Do you expect to continue using what you learned in the long run?
4. What changes would you make to this program?
5. How was the coursework? [Too hard? Not enough time? Too much reading? Too much writing? Availability of resources?]
6. How was the support you received in the program?
7. What are some of your impressions of doing a degree via distance learning?
8. Would you recommend this course to someone else? What would you tell them before they start?
9. Anything else?

Overall rating of program (1-10 scale)

1. Program support
2. Course content
3. Quality of interaction with classmates

Appendix C

Instructor Questionnaire

1. What did you consider to be the three most significant challenges for students?

2. What challenges did you face interacting with students in this online environment?

3. What elements of your course (for example, content, design, or instruction) would you change
1. if you taught a REMOTE course again?

4. What elements of your course did you think were especially successful?

5. In your experience, how did teaching a REMOTE course (or an online course of the sort you taught for REMOTE) compare with teaching a face-to-face course?

6. Do you think that the knowledge and skills that students learned during the REMOTE program will aid them in their professional practice? Please elaborate on what characteristics of your instruction you think will facilitate their work and what facets may not have the intended effect.

7. Other comments

Appendix D

Administrator Questionnaire

1. What did you think were the three most successful facets of REMOTE?
2. What did you think were the three greatest challenges for students?
3. What did you think were the three greatest challenges for the administration of the program (from your perspective and role)?
4. If you designed an online master's degree program for the Pacific, what are some lessons learned from REMOTE that you would retain or eliminate from the program?
5. Other comments?

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"Can you hear me, Hanoi?" Compensatory Mechanisms Employed in Synchronous Net-Based English Language Learning

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Keywords: Intelligibility; online learning; e-learning; distance education; CMC; nonnative speech

English for Academic Purposes (EAP) at Dalarna University, Sweden

Ahern (2008) writes that the ability to remove the constraints of time and place is a major hallmark of computer-mediated communication (CMC) but that it also supports real-time synchronous forms of interaction. He suggests that "synchronous technologies create a strong network bond because each of the participants must be present at the same time in order to communicate" (Ahern, 2008, p. 99). Kenning (2010, p. 6), expanding on the work of Ciekanski and Chanier (2008, p. 173) would have us view the synchrony and asynchrony as a matter of degree where "face-to-face offers greater simultaneity than audio networks, audio than textchat and text chat than a shared word processor." At Dalarna University, Sweden, we offer modes of communication at many points of Kenning's continuum with a web-based learning platform, including asynchronous document exchange and collaborative writing tools, e-mail, recorded lectures in various formats, live streamed lectures with the possibility of text questions to the lecturer in real time, textchat, and our audiovisual seminars in Marratech™ or Adobe Connect™. Our online students live in many countries around the world and come to our online learning spaces from profoundly different physical realities, so the synchronous seminar is a shared experience that is quite separate from the physical environment in which the students find themselves.

Many of our net-based English for Academic Purposes (EAP) students experience that their limited English language proficiency, compounded by technical difficulties and the constraints of the online spaces available, will sometimes cause problems in synchronous seminars. On the other hand, the rich environment of Marratech™, the desktop videoconferencing system used, offers multiple modes of communication (see Figure 1). The aim of this study is to examine the use of the multiple modes available in the seminar tool Marratech to support communication by students and teachers in a synchronous online learning environment. We describe the communication problems experienced in this kind of education and the compensatory strategies

employed by students and teachers. We will consider situations where communication is disturbed because of

- technical problems, such as the system expelling a student, or the purchased Internet time in a public Internet café having expired, or poor connectivity;
- students not understanding the teacher because of poor sound conditions, poor perception skills in English, the teacher speaking an unfamiliar variety of English, or a combination of these;
- students not understanding fellow students usually because of limited proficiency on one or both parts, possibly in combination with the technical issues mentioned above;
- the teacher not understanding the student often because of the student's unintelligible pronunciation, in combination with less than optimal sound conditions.

Context of Study

This paper presents material from two online courses in English for Academic Purposes (EAP) at Dalarna University where students with different linguistic backgrounds meet in our seminars. At Dalarna University, we do not require online language students to attend campus at any stage. However, we do require students to attend timetabled, synchronous seminars. Most students are nonnative speakers of English, with a wide variety of first languages. The conditions under which they study vary tremendously. Many work full-time alongside their studies. Their previous knowledge and proficiency in English are also varied.

Dalarna University uses both synchronous and asynchronous channels in most online education. As Bian (2009) points out, synchronous and asynchronous media complement each other in online education. They certainly address the needs of different learner styles. Learners who have more confidence are better served by the "on-the-fly" communication required in synchronous settings, while more cautious learners may prefer asynchronous channels, which offer time for thought and editing. A balance between synchronous and asynchronous tools is helpful here. For example, being able to listen multiple times to lectures that are constantly available online is a huge advantage for a student who may not understand what was said first time around, while the real-time contact involved in a synchronous seminar enriches the communication and experienced social presence (King & Ellis, 2009) between students and between students and teacher.

Methods

The online seminars in which this study is carried out took place using the desktop videoconferencing system, Marratech[1], which was developed in Sweden. Figure 1 shows an annotated screen dump of a Marratech session in action. For more information, see Cogbuan and Kurup (2006), who offer a review of various video conferencing environments used in tertiary education. Marratech allows users to communicate using voice, moving picture via web cams,

[1] This company was recently bought by Google, and Marratech has now been discontinued, which forced us to abandon Marratech in favor of Adobe Connect.

text chat, and whiteboard (see Figure 1). Online seminars for two EAP courses, Basic English Pronunciation and Text Studies, were recorded for the purposes of this investigation. There were 8-10 students in the seminars in the Text Studies course, with Arabic, Turkish, Swedish, Chinese, Spanish, and Persian as their first languages, and 12-18 students in the Basic English Pronunciation course, with Portuguese, Igbo, Spanish, Macedonian, Persian, Rumanian, Swedish, English, Vietnamese, and Urdu as their first languages. These courses were chosen because one dealt mostly with written material and the other mostly with the sound channel and because the students on the EAP courses typically do not have high levels of proficiency.

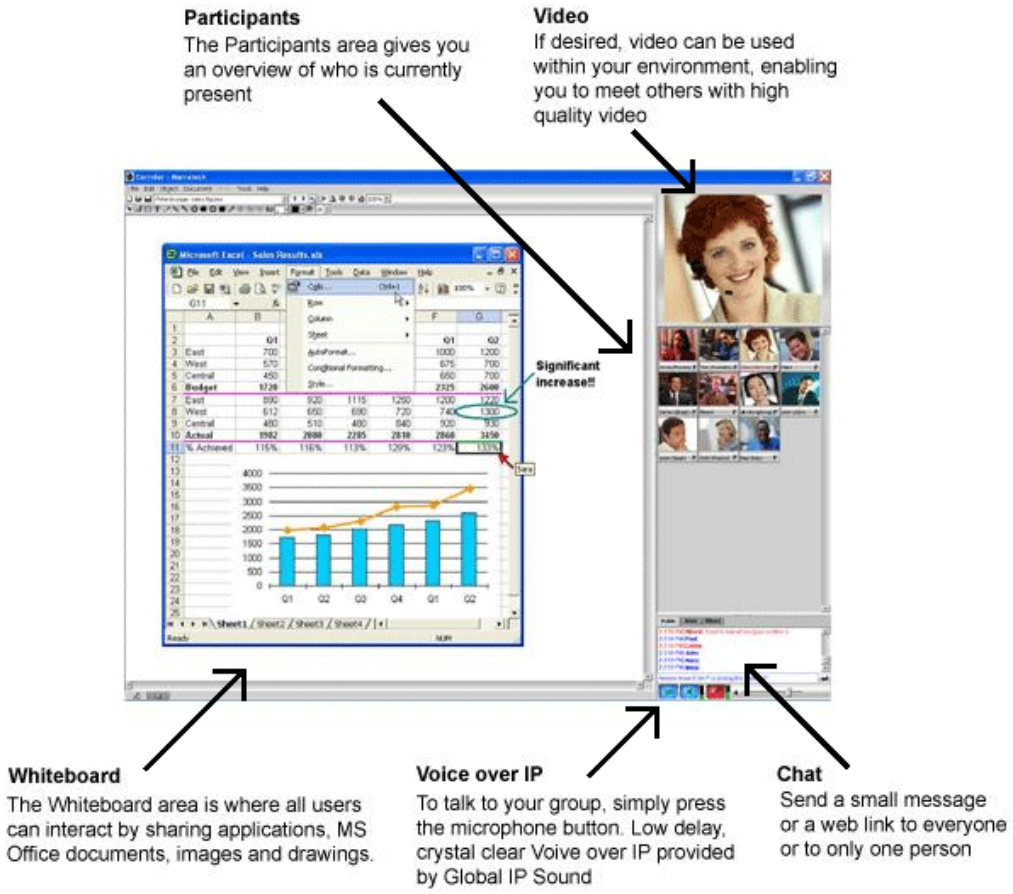

Figure 1. The Marratech seminar environment: http://www.marratech.com/

Findings

Multimodality and Metacommunication

Students may need instruction in the use of some of the functions of the seminar software, such as how to activate the pointer function, the text box, etc. This means that some time is spent every seminar on meta-modal discourse (see Beers Fägersten et al., in press), with the teacher or sometimes other students, helping other participants with the technology, such as in the following Transcript 1, a transcription of the voice communication in Marratech during a seminar, where

almost two minutes of the seminar are used in a fruitless attempt to help one student located in Sweden to use the text box or the pointer in order to do an exercise.

Transcript 1: Meta-modal communication

10:07 Teacher: Yeah, and Student 1, you haven't marked your word, but ah, can you show us it?
10:17 Teacher: And pronounce it for us
10:22 Teacher: Are you with us student 1?
10:27 Student 1: Yes I am trying to ah
10:32 Teacher: OK the pencil is right up by the letter T to the right of it. Can you see where I'm pointing?
10:44 Teacher: Otherwise you can just use the pointer and show us.
10:53 Student 1: But I cannot write
11:00 Teacher: Have you clicked on the pencil? Up here? At the top of the screen (showing with her pointer on the whiteboard). And then you just hold the mouse button down. If you click on the pencil and then just hold the mouse button down then you can write.
11:19 Teacher: Otherwise you can just click on the left mouse button and point at the word.
11:30 Teacher: Are you not getting it? Is it not working for you?
11:35 Student 1: It's not working, no.
11:41 Teacher: Can you just point with the ordinary pointer like this (showing with her pointer on the whiteboard)
11:45 Teacher: Can you just hold down the left mouse button?
11:50 Student 1: The pencil or the button?
11:55 Teacher: Have you got the pencil marked? In that case hold down the left mouse button. Then you should be able to write.
12:00 Student 1: It's not working.

Even though the problem is not resolved in this case, the use of the whiteboard tool, combined with voice instruction, is usually enough to put students on the right track.

Text Chat

In cases where there are a large number of participants in the seminar, especially if many of them are using web cams, participants may actually lose contact with Marratech from time to time or be disconnected from the room. This seems to depend on the kind of Internet connection that the individual is using. For the teacher, who will often be sitting at the University with a very fast connection, there are seldom problems, but our students work under a wide variety of conditions, and many parts of the world are still without sufficient connectivity for applications like Marratech (see e.g., Mendler, Simon, et al., 2002; Pick & Azari, 2008). The example shown in Figure 2 is a Swedish student having difficulty.

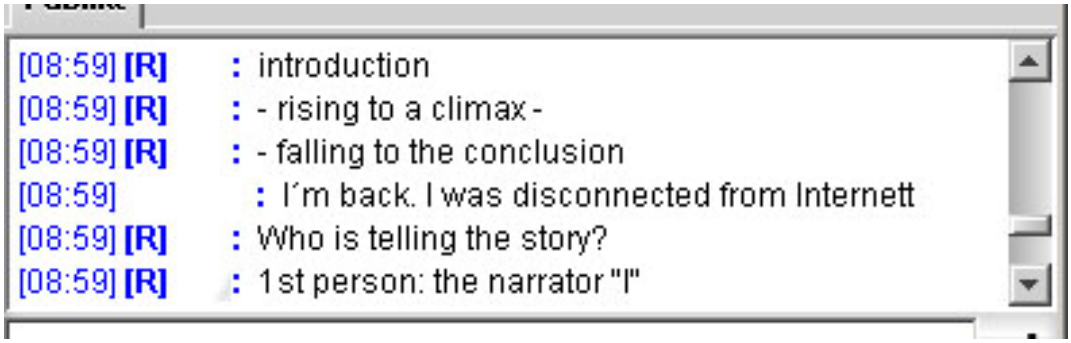

Figure 2. Connectivity problems. A student reports his return to the seminar, entering in the middle of a side discussion using the text chat function between some students (names removed from image).

Other students, both in Sweden and abroad, attend seminars from Internet cafes or public Internet computers in railway stations and airports. There may be a lot of background noise, poor connectivity, or limited access time, as shown in Figures 3-5 below. Such disruptions obviously make it difficult for students to give the seminar their full attention.

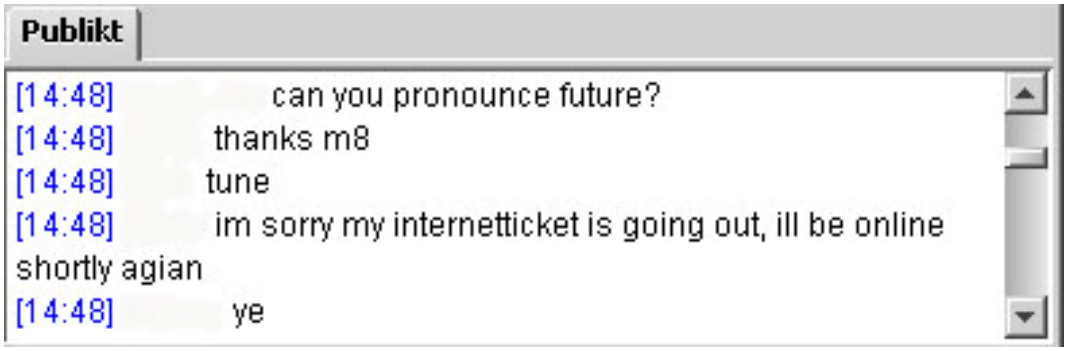

Figure 3. Excerpt from the text chat box in a Marratech seminar. Internet time runs out (names removed from image).

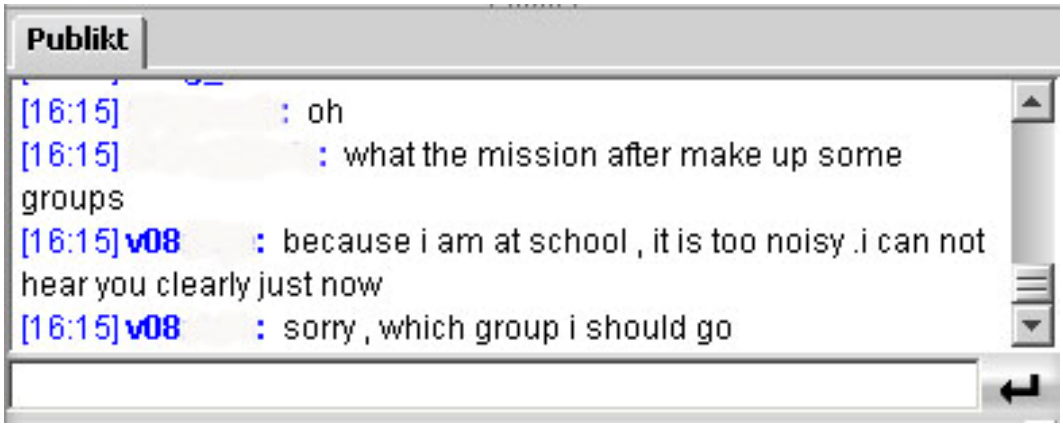

Figure 4. Noisy surroundings (names removed from image).

Figure 5. Connectivity problems can interfere with sound (names removed from image).

Generally, this kind of metacommunication about technical problems will be carried out in the text chat facility. In conditions with poor connectivity or inadequate equipment, the sound may break up or be inaudible, leaving the text chat as the only possible channel. It is fairly frequently the case that one or two of the students will be communicating in the chat and on the whiteboard but will not be able to use the voice channel. At the same time, the text channel is the least disruptive to the seminar itself, which may well be progressing normally for the teacher and other students.

Some students express a preference for written communication even if they have no problem using the voice channel. The written text channel gives them a little more time to respond. Yamada (2009) found that text chat in EFL teaching gave students more grammatical confidence than voice chat. This could be another aspect of the same phenomenon.

Another use of the text chat function in Marratech is that students will communicate with each other, while the teacher is talking. The chatting that goes on in the full group chat is often pertinent to what the teacher is saying. A student may ask for clarification of a term or may alert the teacher to the fact that she has not understood or heard something clearly. Sometimes another student will fill in, helping the student to understand what the teacher said. Students use the text chat for answering open questions from the teacher, particularly when they are not speaking and do not wish to ask for the floor. Figure 8 is an example of this. Notice that the last line in Figure 6 is a request from one student to another. It is directed to a native speaker of American English, who is often asked by the teacher to pronounce words as an alternative for her Northern Irish pronunciation.

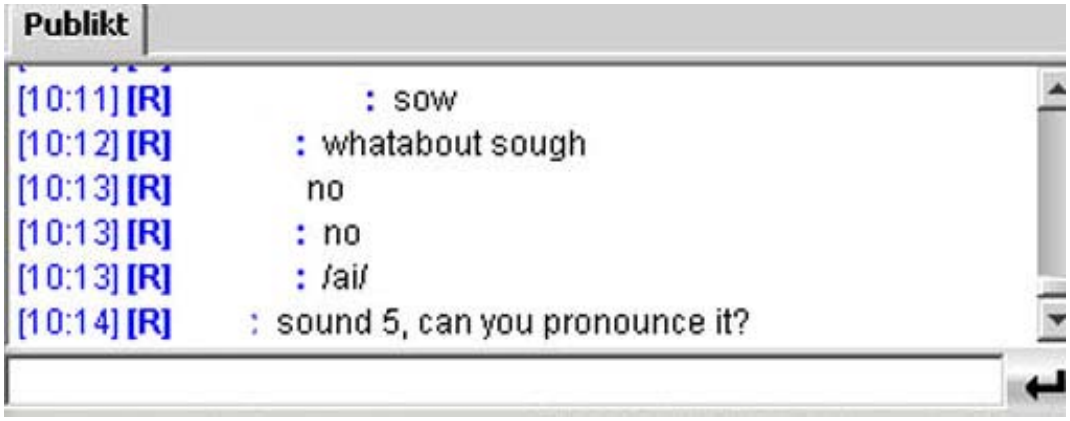

Figure 6. Answers (names removed from image).

The text chat is also used when a student or teacher adds information to what is being said on the voice channel (e.g., a relevant link). Sometimes students can be directed to sound or other material, which is available through a web page, and asked to listen to these while still in the seminar as in Figure 7.

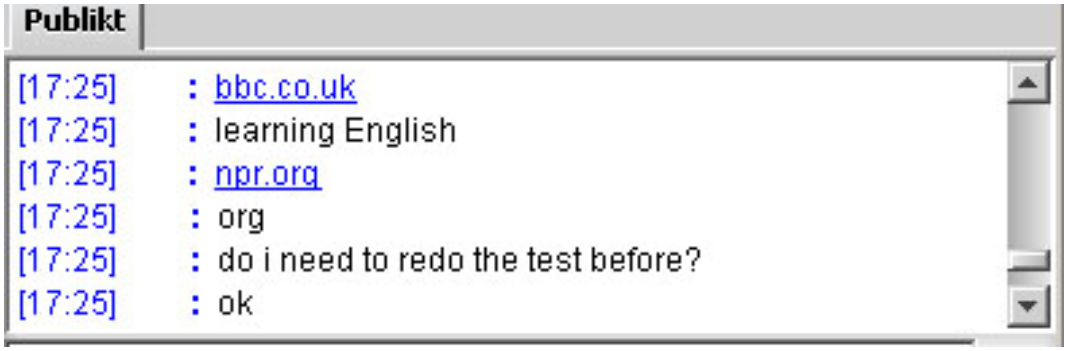

Figure 7. URLs (names removed from image).

Thus, the text chat is often used to support the oral communication in a way that is unique to this multimodal environment. There are examples of this in Figure 8, line 5 and Figure 9, lines 1 and 3. The students will also use the text chat to let other participants know when they need to step away from the computer for a while. This is of course common practice in other, nonacademic kinds of computer-mediated communication.

Text chat is also used when students are not ready to abandon a topic, even when the teacher has moved on. There is an example of this in Transcript 2. Note the use of capitals in *BUT IT IS WRONG*, a graphical representation of a raised voice.

Transcript 2: Heated debate

> Teacher: Yes, Student 6 wrote a nice comment there - student 6, would you like to comment on that?
> Student 6: Yes, I mean, it just glorifies and celebrates war. [… unclear…] I do not know the background of this project ah. I think that people want to strike for the common good and the American dream.
> Student 7: I think you talking about a nation, not a continent, because I mean, America is a continent.
> Teacher: You think he is talking about a continent?
> Student 7: I think he is writing about a continent, because he talks about a nation. Or he think that America is not a nation?
> Student 8: Maybe he think it a nation. I dunno.
> Student 7: Yes, but a nation have a name. What is the name of United States of America?
> Teacher: For many Americans, maybe most Americans it is America, and they do not think about it. Maybe then they are actually talking about the whole continent? They say America when they mean their country
> Student 8: Yeah I know but it is wrong.
> Teacher: (changes subject)
> Student 8: (in chat box) BUT IT IS WRONG. America is a continent
> Student 9: (in chat box) it is both. A country that is also known as USA and the continent divided in three parts

As well as the public chat, Marratech also has a function whereby two participants can have private chats with each other. Students use this as a way of "whispering in class." Sometimes this private communication will be purely social, but very often students discuss what is being said in class. We know this because a student may refer to a discussion in a private chat when asking the teacher a question. One student might be asking for clarification, or perhaps the students are discussing a case exemplifying what the teacher is talking about.

The Video Channel

The video image in Marratech is not refreshed frequently enough to be perceived as synchronized with the speech. This means that listeners cannot support their listening with lip reading, as would be the case in face-to-face communication. By the same token, gesture and body language cannot easily be used to support communication in Marratech seminars, although facial expression may be useful. Yamada (2009) comments on the role of video feedback, such as nodding or shaking the head, to let speakers know whether or not they are making themselves understood.

To minimize background noise, students are requested to keep their microphones off when they are not speaking. This has the unfortunate side-effect of casting the teachers in an atmosphere of total silence. If, in addition, many participants have no webcam on, the teacher may feel that she is on her own entirely and she may need to elicit an explicit confirmation from students, as in the

plaintive "Can you hear me, Hanoi" of the title, or as in Transcript 3. From the teachers' perspective, webcams give feedback, letting them know if they have the attention of the students and if they are making themselves clear (Slovak 2007). If the students are using webcams, it is easy for the teachers to see that they are still paying attention and are active in the class. Without webcams, many teachers frequently address students by name, asking for responses. In situations where seminar attendance is compulsory and seminar participation contributes to the student's grade, it is important that student activity can be monitored.

Transcript 3: Teachers need feedback too.

> Teacher: Student 2 can you hear me? Student 2?
> Student 2: Yes, I can hear you
> Teacher: Oh, great!
> Student 2: You sound surprised
> Teacher: Well, for a while there I could not hear you
> Student 2: Yeah, right
> Teacher: Yeah, so uh, what can you say about the difference between fiction and nonfiction?

Many students are strangely reluctant to use webcams. This might be attributed to the perceived anonymity of computer-mediated communication, with its associated disinhibition effects (Suler 2004). Thurlow, Lengel, et al. (2004) point out that being or feeling relatively anonymous in CMC entails both a perception of freedom from constraints and of freedom from responsibility, such that people can feel less self-conscious about their appearance and more inclined to disclose things about themselves. The opportunities made available by CMC for misrepresentation or obfuscation of the self (see Joinson, 2003, pp. 78-79) may be more relevant to social networking than to educational applications of CMC, but this distinction may not always be apparent for students or indeed those educators who embrace the use of avatars and pseudonyms in environments such as Second Life, as described, for example, in recent work by Cliburn and Gross (2009) and Foster (2008). It has been found that students who experience social anxiety see the Internet as a useful channel for social engagement (Shepherd & Edelmann 2005). Rice and Markey (2009) and High and Caplan (2008) found that anonymous text chat conversations with strangers were perceived as less stressful than similar face-to-face conversations. Senem (2009) found that students found it difficult to see their classmates as real at the beginning of the course and that they actively looked for pictures of their classmates to have an idea what they looked like, suggesting that visual information about fellow students and teachers may be important for constructing a perception of social presence.

The video channel can also be used for clarification purposes. In Figure 8, the teacher wants to indicate that the first sounds of the words *the* and *three* are different. Since it is not possible to write International Phonetic Alphabet (IPA) symbols in the Marratech whiteboard or text chat box, holding up this sheet to the camera is a useful alternative and yet another example of how the multimodal Marratech environment can achieve efficient communication in the face of technological challenges.

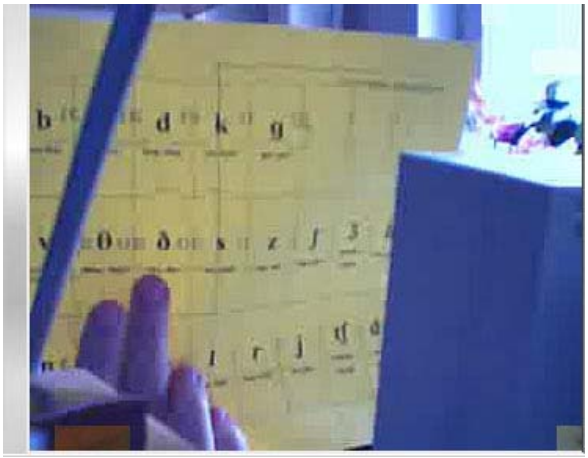

Figure 8. This is the symbol I mean.

As long as the teacher keeps the limited refresh rate in mind, it is in fact possible to use the camera to demonstrate aspects of pronunciation in Marratech. Particular sounds of English, such as the interdental fricatives, can be usefully shown using the camera as long as the teacher is prepared to pronounce the sound in slow motion.

Voice Channel

In synchronous seminars in Marratech, the voice channel is primary and is used extensively by both teachers and students. If the students cannot make themselves understood on the voice channel, this can be compensated for by using text chat, but a student who cannot hear the voice channel will not be able to take part in the seminar. In a study of asynchronous communication in online education, King and Ellis (2009) found that the addition of a voice channel does not add to the social presence perceived by students. This is not in line with the findings of Rothwell (2008) and Salmon and Nie (2008), who looked at various kinds of podcasts used for asynchronous voice communication in blended learning contexts where the podcasts were very positively received. In synchronous communication, of course, the position is another. The interlocutor is there, in real time, and voice does add a dimension of closeness and contact between participants, given the paralinguistic information it contains in terms of emotion, pace, sociogeographic background, personality, etc. Yamada (2009) found that voice communication had a strong effect on learners' output, making learners aware that they are, in fact, taking part in natural communication with real interlocuters. Lamy and Hampel (2007), however, found that synchronous environments seem to stress learners, making them speak more quickly and in short sentences, which may not be conducive to language learning. It seems likely that this will depend on the student group. If many students are keen to speak in the seminar, there will be pressure to hold the floor.

Nonnative listeners are, as has been documented by previous work (Mayo, Florentine, et al. 1997; van Wijngaarden, Bronkhorst, et al. 2004; van Wijngaarden, Steeneken, et al. 2002, Hazan & Simpson 2000; Takata & Nabelek, 1990), particularly susceptible to the effects of noise. Transcript 5 shows one such case where a Chinese student in China has (possibly unwittingly) pressed the microphone button, which then turns red, an often used signal from students that they

want to say something. She has poor sound quality compounded by a heavy accent and finds it difficult to make herself understood. The teacher is faced with either asking the student to repeat what she said again or to write her question in the chat box, or he can just let it go, which is what happens in Transcript 4.

Transcript 4: I didn't quite get that.

(The teacher has asked the students to find synonyms for *silent.* The last word mentioned was *dumb*. Student 8 presses the mike button briefly. Background noises heard)
Teacher: Ah student 8?
Student 8: Yes?
Teacher: Did you want to say something?
Student 8: (heavy Chinese accent) Yes, I said, what is [unclear] wordlist? What about the wordlist?
Teacher: mm, I didn't quite get that
Student 8: I am not sure that right.
Teacher: Ah, um, yeah, dumb can be a touchy word to use. It can also mean stupid, especially in American English

Transcript 5 is an example where one of the students was speaking fairly quietly and another student asked for clarification. Although the students were apparently able to resolve the difficulty themselves, the teacher stepped in and expanded what had been said in an attempt to lead students to a different interpretation.

Transcript 5: What did Student 1 say?

Teacher: What did he mean by a yellow wood? "Two roads diverged in a yellow wood."
Student 2: So that you mean is a meaning with the color yellow or?
Teacher: Yes
Student 1: (low volume) It could mean the sun?
Teacher :Ah! Other suggestions?
Student 2: I sorry I didn't hear. What did she say? What did Student 1 say?
Student 1: (louder) The sun.
Student 2: Ah, the sun.
Teacher: Yeah, the sun shining through the trees and the leaves down. Oh it can be so beautiful. And um could also be a certain time of the year?
Student 1: The fall?
Teacher: Yes

The voice channel is quite sensitive to connectivity problems as well as other technical problems, with occasional poor sound quality, including hum, buzzing, screeching, and low-volume as well as distorted or intermittent sound. In such conditions, the compensatory visual mechanisms available in Marratech are necessary.

The Whiteboard

In pronunciation teaching, one of the exercises used to practice clear speech in the face of a relatively unintelligible pronunciation requires students to read one of a number of potentially easily confused utterances, while their fellow students attempt to identify which of the alternatives has been read. An example of this, part of a screen dump showing the whiteboard, can be seen in Figure 9 below.

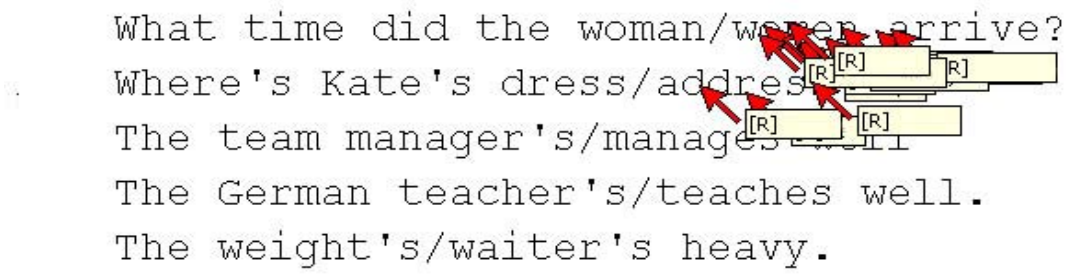

Figure 9. What did I say? *Woman* or *women*? (names removed from image).

Using the individual pointers, which ordinarily have the student's name on the pointer label, it is possible for students to indicate which of the written words they heard. Students who are unsure can wait until other students have made their choice. Marratech's whiteboard facility can be used in this way to support and supplement oral communication during a seminar (see Xinyou, Yanru, et al., 2006).

In Figure 10, students are responding to an exercise in sound identification. The teacher points at a word in the list on the left; in this case, the word *the* has just been dealt with, and a named student pronounces the word. The other students then indicate on the whiteboard, which, if any, of the five possible IPA symbols correspond to the sounds they heard. In the example shown, the students were not agreed on which of the sounds they heard. (In fact none of the sounds were in the word *the* in this context.)

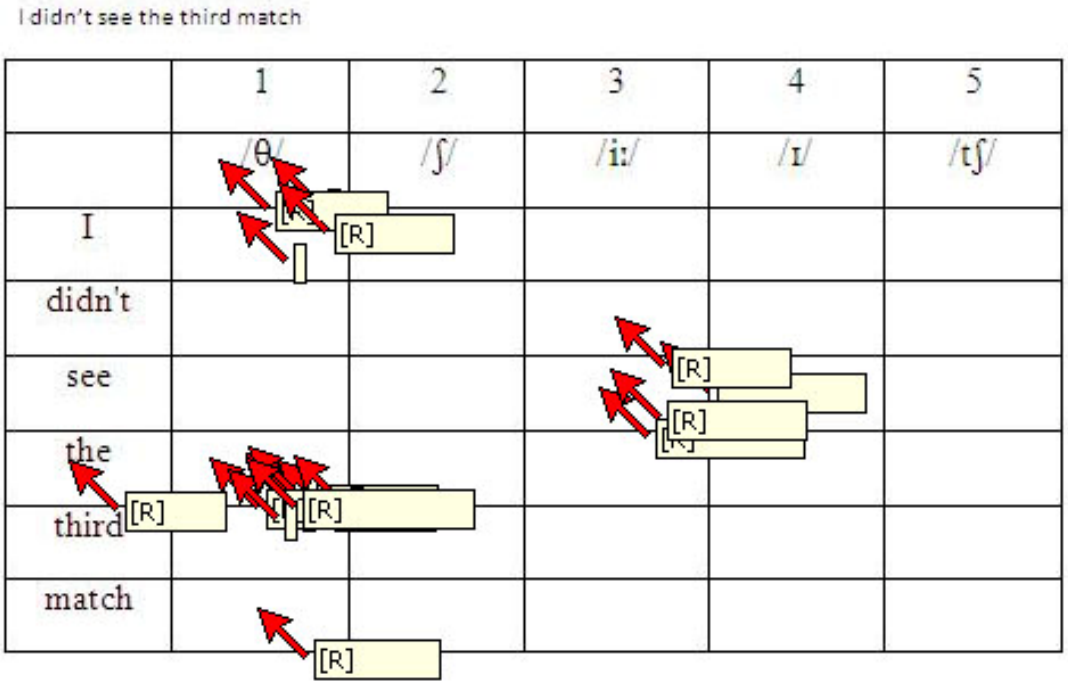

Figure 10. Using IPA symbols on the whiteboard (names removed from image).

The use of the visual element of the students' individual pointers on the whiteboard allows a collaborative way of working that is not possible in face-to-face teaching. Everyone is involved, working simultaneously on the task at hand.

Discussion

It is apparent that there are many ways in which students and teachers can fail to understand each other in Marratech seminars. As described by Jenkins (2002), more is required of the learner who needs to make him or herself understood to a group with mixed language backgrounds than in cases where a class has a common first language. It is not possible for the learners to rely on their common language background to facilitate communication. Features of pronunciation that are associated with a particular first language background will not often be helpful in communication with those who do not share this language background. Nonetheless, most of the time communication does actually work in the seminar. The participants are very creative in finding ways to compensate for their communicative failing, using the modes in the Marratech environment. Net-based teaching carries with it a set of constraints and a set of possibilities. Depending on which of the available tools we use at any given time, the constraints and possibilities will be different. Synchronous online seminars are an essential part of net-based language learning and teaching at Dalarna University. They provide an aural component to learning, which is obviously essential in modern, communicative language learning and teaching. They also provide real-time contact between teachers and students, and, in fact, our net-based courses are very similar to campus courses. Our campus students use the learning platform in the same way as the online students and will often interact with the online students in forum

discussions. The only difference is that the campus students come to campus for the seminars, while the net-based students go to the virtual seminar rooms of Marratech.

Many universities have moved into the field of net-based teaching. But not all universities are willing to undertake language teaching online. One reason for this may be that they view net-based teaching as a primarily text-based activity. In such cases, net-based teaching is simply a 21st-century version of correspondence classes. This is clearly not suitable for modern language learning and teaching, nor indeed, arguably, for any modern learning activities. A modern communicative approach to language learning requires both synchronous channels and voice, although text-based and asynchronous communication channels are also necessary to develop written proficiency and to enable students to develop proficiency in less spontaneous forms of communication. As new generations of software are developed, new pedagogical activities will follow.

The problems experienced by learners of English in the kinds of EAP settings we have described here are both exacerbated and ameliorated by the computer-mediated channels open to learners and teachers. Patchy connectivity, poor quality equipment inexpertly used, the lack of a synchronized video channel, and less-than-perfect software compound the fundamental proficiency deficits which limit the perception and production of our students. However, the multimodality offered by the software enables students and teachers to compensate for these problems in a way that more than makes up for the disadvantages.

Net-based language learning and teaching is a demanding application for new technology, but pedagogical considerations must be at the center, not the technology. Nevertheless, new technologies will inspire new pedagogical approaches. This study concerns a particular synchronous environment for online seminars. Other software will offer other possibilities and other challenges for students and teachers. Technological advances will quickly enable these environments to be refined, making their limitations less problematic as well as adding new functions, which can be filled with pedagogical content for the benefit of students.

Acknowledgements

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References

Ahern, T.C. (2008). CMC for language acquisition. In F. Zhang & B. Barber (Eds.), *Handbook of research on computer-enhanced language acquisition and learning* (295-306). Hershey: Information Science Reference.

Beers Fägersten, K., Holmsten, E., & Cunningham, U. (in press). Multimodal communication and meta-modal discourse in the video-conference environment. In R. Taiwo (Ed.), *Handbook of research in discourse behavior and digital communication: Language structures and social interaction*. Hershey: IGI Global.

Bian, L. (2009). Application of digital technology in open and distance education. *2009 International Conference on Networking and Digital Society* 1 (pp. 273-276).

Ciekanski, M., & Chanier, T. (2008). Developing online multimodal verbal communication to enhance the writing process in an audio-graphic conferencing environment. *ReCALL 20*(2), 1-8.

Cogbuan, D.L., & Kurup, D. (2006). The world is our campus. *Network Computing, 17*(7), 57-64.

Foster, A.L. (2008). Professor Avatar. *Education Digest, 73*(5), 12-18.

Hazan, V., & Simpson, A. (2000). The effect of cue-enhancement on consonant intelligibility in noise: Speaker and listener effects. *Language and Speech, 43*, 273-294.

High, A.C., & Caplan, S.E. (2009). Social anxiety and computer-mediated communication during initial interactions: Implications for the hyperpersonal perspective. *Computers in Human Behavior, 25*(2), 475-482.

Jenkins, J. (2002). A sociolinguistically based, empirically researched pronunciation syllabus for English as an international language. *Applied Linguistics, 23*(1), 83-103.

Joinson, A.N. (2003). *Understanding the psychology of internet behaviour*. Basingstoke: Palgrave Macmillan.

Kenning, M.-M. (2010). Differences that make the difference: A study of functionalities in synchronous CMC. *ReCALL, 22*(1), 3-19.

King, K., & Ellis, T.J. (2009). Comparison of social presence in voice-based and text-based asynchronous computer conferences. *42nd Hawaii International Conference on System Sciences*, 1-10.

Lamy, M.-N., & Hampel, R. (2007). *Online communication in language learning and teaching*. Basingstoke: Palgrave Macmillan.

Mayo, L.H., Florentine, M., & Buus, S. (1997). Age of second-language acquisition and perception of speech in noise. *Journal of Speech, Language and Hearing Research, 40*, 686-693.

Mendler, J., Simon, D., & Broome, P. (2002). Virtual development and virtual geographies: using the Internet to teach interactive distance courses in the global South. *Journal of Geography in Higher Education, 26*(3), 313-325.

Pick, J.B., & Azari, R. (2008). Global digital divide, Influence of socioeconomic, governmental, and accessibility factors on information technology. *Information Technology for Development, 14*(2), 91-115.

Rice, L., & Markey, P.M. (2009). The role of extraversion and neuroticism in influencing anxiety following computer-mediated interactions. *Personality and Individual Differences, 46*(1), 35-39.

Rothwell, L. (2008). Podcasts and collaborative learning. In G. Salmon & P. Edirisingha (Eds.), *Podcasting for learning in universities* (pp. 121-131). Maidenhead: Open University Press.

Salmon, G., & Nie, M. (2008). Doubling the life of iPods. In G. Salmon & P. Edirisingha (Eds.), *Podcasting for learning in universities* (pp. 1-11). Maidenhead: Open University Press.

Senem, Y. (2009). Social presence in the web-based classroom, implications for intercultural communication. *Journal of Studies in International Education, 13*(1), 46-66.

Shepherd, R.-M., & Edelmann, R.J. (2005). Reasons for internet use and social anxiety. *Personality and Individual Differences, 39*(5), 949-958.

Slovak, P. (2007). Effect of videoconferencing environments on perception of communication. *Cyberpsychology, 1*(1).

Suler, J. (2004). The online disinhibition effect. *Cyberpsychology and Behavior, 7*(3), 321-326.

Takata, Y., & Nabelek, A.K. (1990). English consonant recognition in noise and in reverberation by Japanese and American listeners. *Journal of the Acoustical Society of America, 88*, 663-666.

Thurlow, C., Lengel, L., & Tomic, A. (2004). *Computer mediated communication*. London: Sage Publications.

van Wijngaarden, S.J., Bronkhorst, A.W., Houtgast, T., & Steeneken, H.J.M. (2004). Using the Speech Transmission Index for predicting non-native speech intelligibility. *Journal of the Acoustical Society of America, 115*(3), 1281-1291.

van Wijngaarden, S.J., Steeneken, H.J.M., & Houtgast, T. (2002). Quantifying the intelligibility of speech in noise for non-native listeners. *Journal of the Acoustical Society of America, 111*(4), 1906-1916.

Xinyou, Z., Yanru, Z., & Matsumoto, M. (2006). A real-time interactive shared system for distance learning. *Multi-Media Modelling Conference Proceedings, 12th International,* 102-107.

Yamada, M. (2009). The role of social presence in learner-centered communicative language learning using synchronous computer-mediated communication, Experimental study. *Computers and Education, 52*(4), 820-833.

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Book Review

Distance and Blended Learning in Asia

Authors: Latchem, C. and Jung, I. (2010). Distance and Blended Learning in Asia. New York/London: Routledge.

Reviewer: Tony Bates, on October 5th, 2009[1]

This is one of the best books I have read recently on distance education, and it has lots of good material on e-learning in Asia as well. It casts its net amazingly wide, from Turkey and Syria in the west through Mongolia, Afghanistan, India, and China to Indonesia, Japan, Korea, and the Philippines and everywhere in between – yes, including Myanmar and Bhutan. All this is accomplished within about 300 pages of very readable text.

I strongly recommend this book to everyone with an interest in e-learning and distance education, and especially those in Asia, but it will also be of particular value to African institutions as it provides some clear pointers for how e-learning and distance education can be, and has been, developed in less economically advanced countries. There are also some important messages for institutions in North America and Europe, as I will discuss later. But first, let's look in more detail at what this book covers.

Contents

Chapter 1: Technology, E-Readiness and E-Learning Readiness

This chapter provides data and information on the state of technology access for nearly all Asian countries in terms of mobile phones, Internet access, and world rankings for e-readiness and e-learning readiness, and it outlines different national strategies in these areas. There is a fascinating section in this chapter about cultural differences in the use of technology.

Chapter 2: Open Schooling, SchoolNets, and ICT Integration in Classrooms includes a detailed analysis of success and failure characteristics of ICT integration in the K-12 school sectors across Asia.

Chapter 3: Higher Education

This chapter includes a section on the 33 open universities in Asia, another section on dual-mode, blended, and cross-border institutions, followed by a section on the *Third Wave*, recent newcomers to e-learning and distance education. The final section is a critical look at the challenges facing distance and blended learning in Asian higher education.

Chapter 4: Lifelong Learning, Workplace Training, Professional Development and Nonformal Adult and Community Development

This chapter has sections on policy, planning, and provision for lifelong learning, workplace training, gender issues, and basic and nonformal adult and community education. It ends with a set of lessons learned.

Chapter 5: New Providers and New Markets

This chapter includes discussion of virtual/cyber institutions in Asia, of which there are many more than I expected especially but not exclusively in South Korea and Malaysia, national and international consortia, partnerships and networks, national for-profit providers, and a final section of conclusions, again analysing success and failure factors.

Chapter 6: ICT Integration In and Beyond the School

This chapter focuses on how schools (K-12) are integrating ICTs in the classroom, including the different types of pedagogy being used in the different countries of Asia with a final section on out-of-school applications of ICTs.

Chapter 7: Instructional Design, Learner Support, and Assessment in E-Learning

This chapter focuses on the design of e-learning with sections on instructional design, mobile learning, blended learning, learner support, and e-assessment.

Chapter 8: Leadership for Educational Change and Innovation

This chapter focuses on leadership in Asian distance and blended learning with sections on strategic planning, leadership styles, leadership and Asian culture, strategies for leadership in change management, and leadership recruitment and development. Although the examples are all from Asia, this should be mandatory reading for senior administrators in universities and colleges everywhere.

Chapter 9: Quality Assurance and Accreditation

After a brief discussion of quality assurance, there are sections on QA in schooling, technical and vocational education and training, and higher education, followed by an analysis of QA in Asian

open and distance learning (ODL), including the different national strategies for QA. There is then a more detailed discussion of administering QA in ODL institutions, including a short section on QA in e-learning. The chapter ends with discussions of international recognition and accreditation and transnational QA.

Chapter 10: Staff Training and Development

This chapter starts by linking the need for staff development to change management, describes the general lack of training and staff development in Asia for distance and blended learning activities, and provides a model and different strategies or approaches to staff development and training, including a comprehensive list of online training resources.

Chapter 11: Research, Publication, and Translating Research into Practice

This chapter is basically a plea for more and better research in distance and blended learning by Asian researchers, particularly focusing on the Asian context. It includes a comprehensive agenda for research, some useful tips about how to get published, and analysis of why Asian researchers tend to be under-represented in publications in this area.

Chapter 12: Conclusions

This is a very short, four-page chapter (probably due to exhaustion by the authors!), which nevertheless provides some very useful lessons and conclusions drawn from the book as a whole.

There is also an extensive bibliography of publications, most of which are by Asian authors.

Evaluation of the Book

I have provided this detailed description of the contents to convey the breadth and scope of this publication. It is not only comprehensive in the countries it covers, but also in the key topics it discusses. It is embedded with examples from different countries, and the analysis and conclusions are convincing.

There are times when it reads like a list of activities, but I would rather the discussion was drawn from multiple examples than isolated cases, and the authors do this well.

What I took particularly from the book is the tremendous energy and drive in Asia towards distance and blended learning. Yes, mistakes are being made, and these are well identified by the authors, but overall one gets the feeling of a huge juggernaut of innovation and change sweeping through many Asian educational institutions. While there are many laggards, countries such as South Korea, Singapore, Malaysia, India, and China are making rapid progress in distance education and e-learning. In particular, there seems to be more appetite for fundamental changes, such as the cyber-universities, in some Asian countries than in North America or Europe.

Underlying the book are both differences in ethnic cultures, which is well discussed in the book, and the academic culture, which is less well discussed. It is therefore not always easy to identify those problems that are generic to educational institutions and those that are specific to particular countries or cultures or even to Asia.

Nevertheless, there are many lessons in this book not only for Asian institutions, but also for those in North America, Europe, and Australasia. The importance of training and staff development if e-learning is to be successful, the benefit of national strategies for e-readiness, of which e-learning is a part, the need to focus on the design of learning environments as well as the technology, the value of visionary and professional leadership, and the critical role that research in e-learning can and should play in adapting technology-based teaching to local environments and cultures are all clearly set out in this book and are relevant everywhere, not just in Asia.

Although the particular ODL and e-learning initiatives in Asia will gradually fade from memory, the lessons learned from these experiences and described in this book will last much longer. This is a book that I will refer to constantly. Congratulations, Colin and Insung!

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[1] Originally published at E-learning and Distance Education Resources:
http://www.tonybates.ca/2009/10/05/book-review-distance-and-blended-learning-in-asia/