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Richard Lynch and Myron Dembo

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Article abstract

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The Relationship between Self-Regulation and Online Learning in a Blended Learning Context

Richard Lynch
Woosong University
South Korea

Myron Dembo
University of Southern California, Los Angeles
USA

Abstract

This study reviewed the distance education and self-regulation literatures to identify learner self-regulation skills predictive of academic success in a blended education context. Five self-regulatory attributes were judged likely to be predictive of academic performance: intrinsic goal orientation, self-efficacy for learning and performance, time and study environment management, help seeking, and Internet self-efficacy. Verbal ability was used as a control measure. Performance was operationalized as final course grades. Data were collected from 94 students in a blended undergraduate marketing course at a west coast American research university (tier one). Regression analysis revealed that verbal ability and self-efficacy related significantly to performance, together explaining 12 percent of the variance in course grades. Self-efficacy for learning and performance alone accounted for 7 percent of the variance.

Keywords: self-regulated learning; blended learning; online learning

The advent of the personal computer and the Internet in the 1970s, and their subsequent refinement and global diffusion, have occasioned a revolution in education generally and in distance education specifically (Bandura, 1997). Within the industrialized world, online education, either singly or as part of blended (part online, part face-to-face) education models, has become increasingly extensive in a wide array of learning domains (Bates, 2000, 1995; Edelson and Pittman, 2001; Kearsley, 2000). The dramatic growth of online education is demonstrated by recent reports from the National Center for Education Statistics (Sikora and Carroll, 2002) and the Council for Higher Education Accreditation (2002).

Bates (2000) characterized distance education as a continuum ranging from mixed face-to-face and distance teaching/ learning on one end to complete distance teaching/ learning on the other end. Distributed education represents an eclectic blend of technologies and modalities to enable both synchronous (real time) and asynchronous (anytime) teacher-learner and learner-learner interactions in a single course or program. Blended education is a form of distributed education, utilizing both distance and face-to-face modalities to deliver instruction. This paper is intended as a contribution to investigating the role of learner self-regulation in a blended learning context.

This review will first discuss social cognitive self-regulation theory as the theoretical framework underpinning the research. It will then describe within that framework five self-regulatory attributes identified in the distance education literature as important elements of distance learner success.

Theoretical Framework

Much distance education research has been atheoretical. It has focused on three general areas: descriptive studies of distance education programs, group academic outcomes comparison studies (distance class versus face-to-face class), and studies matching individual learner traits with media variables (Perraton, 2000, 1995; Saba, 2000). These approaches, while necessary and valuable in their own right, have generally lacked a pedagogically relevant theoretical underpinning and have not generated advances in teaching/ learning theory that have served to benefit both distance teachers and learners (Diaz, 2000; Phipps and Merisotis, 1999).

Moore (1993) developed transactional distance theory as a descriptive framework for understanding distance education programs. Moore's theory consists of three primary descriptive variables: interaction (dialogue), structure, and autonomy. He contended that these three interrelated variables are characteristic of all distance programs. While interaction and structure concern primarily how a distance course is designed and conducted, and hence "belong" to the course designers and instructors, the third variable, autonomy, is centered on distance learners themselves and their ability to control their own learning.

Numerous distance education researchers have identified learner autonomy as an important factor in academic success (Holmberg, 1995; Jung, 2001; Kearsley, 2000; Keegan, 1996; Peters, 1998). Merely knowing the importance of this factor in distance learning, however, does not help in understanding precisely how autonomous distance learners function, how they exercise their autonomy effectively, or what specific factors are involved in successful autonomous distance learning.

The social cognitive perspective of self-regulation provides a framework for online education research that can offer insights into the functioning of autonomous learners. Working within this perspective, Zimmerman (1989) defined academic self-regulation as the extent to which learners are meta-cognitively, motivationally, and behaviorally active in achieving their learning goals. Self-regulated learners set task-specific learning goals and employ appropriate strategies to attain those goals. They monitor and evaluate their progress and adjust their learning strategies as necessary. They motivate themselves and focus on learning in the face of distractions. They seek assistance as necessary and ensure that their learning environment is conducive to learning. In short, self-regulated learners are active, adaptive constructors of meaning who control important aspects of their cognition, behavior, and environment in attaining their learning goals (Pintrich, 2000).

Zimmerman (1998, 1994) argued that a learner's personal choice and control are a defining condition for self-regulation. This emphasis on personal choice and control, important elements of learner autonomy, is important for distance learners (Doherty, 1998). Zimmerman (2002) pointed out that self-regulation is also important because it addresses a major educational goal, i.e., it enables the development of lifelong learning skills. The advent of online education has provided a context ideally suited to this pursuit of on-going education.

Self-Regulatory Attributes Predictive of Distance Learner Success

Based upon a review of the literature, five self-regulatory attributes were selected as being especially important for distance learner success: motivation (self-efficacy and goal orientation), Internet self-efficacy, time management, study environment management, and learning assistance management (see Table 1). Each of these self-regulatory attributes and related psychological processes is discussed below.

Motivation

Motivation for learning focuses on why learners choose to learn (Pintrich and Schunk, 1996), and is a dimension of distance learner autonomy frequently cited in the distance education literature (Bates, 1995; Holmberg, 1995; Kearsley, 2000; Keegan, 1996; Moore, 1998; Olgren, 1998; Schrum and Hong, 2002). Simply knowing that motivation is an important variable in successful distance learner autonomy, however, is not particularly helpful. It is necessary to isolate specific components of motivation that can contribute to learner autonomy. Two important components of motivation are beliefs about one's personal efficacy (ability) for mastering a specific task and the personal goal orientation one brings to a course of study.

Personal perceptions of self-efficacy are a critical element of motivation (Bandura, 1997; Pintrich and Schunk, 1996). Bandura (1997) defined self-efficacy as individuals' judgments of their abilities to plan and carry out the necessary behaviors to achieve specific goals. Linnenbrink and Pintrich (2002) pointed out that adaptive self-efficacy beliefs can function as enablers of academic success. Learners with high self-efficacy are likely to employ adaptive self-regulatory learning strategies and study skills. Learner perceptions of personal efficacy, therefore, have a reciprocal relationship with the self-regulatory processes that affect motivation and performance. A high sense of self-regulatory efficacy enhances task performance efficacy, which in turn motivates further self-regulation in pursuit of further academic attainment.

Self-efficacy has been noted as important in successful distance learning (Gibson, 1998). A study of online learners by Wang and Newlin (2002a, 2002b) found that self-efficacy for course content as well as self-efficacy for technology skills were predictive of learner performance in the class. A study by Joo, Bong, and Choi (2000) indicated that self-efficacy for self-regulated learning related significantly though indirectly (through more specific self-efficacy variables) to student performance. A study by Zhang, Li, Duan, and Wu (2001) found that self-efficacy was positively related to students' goal orientation and self-regulatory learning skills.

A second component of motivation is a learner's personal goal orientation. Pintrich, Smith, Garcia, and McKeachie (1991) defined goal orientation as a learner's general goals or orientation toward a course. Intrinsic goal orientation is defined as the degree to which a learner participates in a learning task in order to meet a personal challenge, satisfy personal curiosity, and/ or attain personal mastery over the elements of the task. Task performance, therefore, is an end in itself and not a means to an end. Intrinsic goal orientation contrasts with extrinsic goal orientation in that the latter signifies participation in a task as a means to an end (such as grades or rewards) and not as an end in itself.

Beatty-Guenter (2001), in reviewing the literature on course completion rates for distance students in Canadian community colleges, identified goal orientation as a significant attribute of those learners who completed their courses. Thompson (1998) noted that the fact that distance

learners set clear goals is an important element of performance. Gibson (1998) suggested that it is important for distance learners to be able to assume control over their learning goals, methods, and evaluation strategies. Several research studies have found that goal setting by distance learners contributes to performance (Curry, Haderlie, and Ku, 1999; Schrum and Hong, 2002; Whipp and Chiarelli, 2001). Learners who are goal oriented (either intrinsically or extrinsically) are more likely to set specific learning goals than learners with poor goal orientation. Those learners with an intrinsic goal orientation, however, are more likely to set mastery oriented goals.

Motivation, then, is a key element of autonomous learning. One component of motivation is self-efficacy – i.e., learners' judgments about their ability to accomplish a task, as well as their confidence that they possess the skills to perform the task. Another component is a learner's goal orientation, either intrinsic or extrinsic. It is important to note that there are other components of motivation not so prominent in the distance education literature – e.g., the value learners ascribe to specific learning tasks (how important, interesting, or useful they are to the learner), control of learning beliefs (the learner's belief that success in performing a task is determined by his or her own efforts and not by an external agent), and affective factors (e.g., test anxiety).

Internet Self-Efficacy

Experience with technology is another important element of success for online learners (Schrum and Hong, 2002). Wang and Newlin (2002a, 2002b) found that both self-efficacy for learning course content, as well as self-efficacy for technology skills, were predictive of learner performance. Joo, Bong, and Choi (2000) found that Internet self-efficacy was an important variable in online learner success. Developing positive beliefs (self-efficacy) about one's ability to work effectively with Internet technology is in part a result of successful experience using that technology. Ensuring that online learners are both comfortable and competent with using the technological tools central to their study experience is an important consideration in online learning.

Time Management

A third important element of distance learner success is the ability to effectively manage learning time (Kearsley, 2000; Phipps and Merisotis, 1999). Palloff and Pratt (1999) pointed out that interacting in a Web-based course can require two to three times the amount of time investment than in a face-to-face course. Roblyer (1999) noted that students who have difficulty managing time are more likely to achieve less in a distance course or drop out altogether. Gibson (1998) pointed out that a key construct relating to distance learners' persistence is their self-efficacy for learning at a distance and that personal perceptions of competence (self-efficacy) are related to learners' perceptions of their ability to manage time effectively.

Students who use their time efficiently are more likely to learn and/or perform better than students who do not have good time management skills. Self-regulated learners know how to manage their time because they are aware of deadlines and how long it will take to complete each assignment. They prioritize learning tasks, evaluating more difficult from easier tasks in terms of the time required to complete them. They are aware of the need to evaluate how their study time is spent and to reprioritize as necessary (Zimmerman and Risemberg, 1997).

Study Environment Management

Self-regulated learners are proactive in managing not only their study time, but also their study environment (Zimmerman and Martinez-Pons, 1986). They are sensitive to their environment and resourceful in altering or changing it as necessary. Since they do not study in a structured and controlled classroom context, online learners must be able to structure their own physical learning environment, whether at home or elsewhere. Whipp and Chiarelli (2001) found that social environmental structuring strategies were important attributes of successful online learners.

In terms of physical space, online learners generally have the option of accessing their courses via computers at home or elsewhere (e.g., library or computer lab). If they are working at home, they have the option of where the computer is situated – a quiet place such as a den or bedroom, or a louder more distracting environment, such as a living room or kitchen. If learners are unable to restructure their learning environment at home, they can access their course from a university or library computer. Learners must also ensure that they have access to and are proficient at using the equipment they require in order to study effectively – e.g., a computer of sufficient RAM and with the necessary software to access course materials, whether text, video, and/ or graphic. Mastery of these elements contributes to the learner's control over the virtual space within which online learning occurs.

Learning Assistance Management (Help Seeking)

Self-regulated learners also are aware of the important role other people can play in their learning. One of their distinguishing characteristics is their ability to seek academic assistance in an adaptive manner to optimize learning. Several authors have noted the importance of help seeking behavior in distance learning (Hara and Kling, 2000; Holmberg, 1995; Wang and Newlin, 2002a, 2002b). Autonomous distance learners are able to seek appropriate learning help from others. Since an element of online education is social isolation from classmates and instructors, online learners need to be proactive in employing the technology, through email, chat rooms, bulletin boards, as well as occasional face-to-face meetings, to lessen the social distance involved in their learning situation. Henderson and Cunningham (1994) argued that effective use of instructional technology systems requires that the learner be sufficiently motivated and self-regulated to effectively and efficiently utilize the features of the technology. In an online learning context, this means that learners either have or mindfully develop their skills in using the specific elements of the technology that permit interaction with other learners and with instructors. Online learners must be able to determine where and how to seek help, and make decisions concerning the most appropriate sources for such help.

Summary

Learner autonomy (or independence) is a critical factor in successful online distance learning. Autonomy, however, is not a monolithic construct. As indicated above, it is comprised of a number of self-regulatory learning attributes that together contribute to learner autonomy in online learning contexts (see Table 1).

A critical component is motivation for learning. Two elements of motivation are efficacy beliefs and goal orientation. Efficacy beliefs reflect a learner's confidence to successfully accomplish a learning task. Goal orientation refers to the reasons why a learner engages in a learning task. A second component of online learner autonomy is experience with Internet technologies, which

contributes to the learner's confidence (self-efficacy) in effectively using the technology in order to learn. A third component of autonomy is the learner's ability to manage study time effectively and productively along with the other time demands in his or her life. A fourth component is the learner's ability to manage their study environment to ensure that it is supportive of learning and to restructure it as necessary. A fifth component of autonomy is the learner's ability to seek learning assistance as and when necessary and in the appropriate manner through the appropriate channels. This latter component involves knowing when help is needed, knowing where to seek that help, knowing how to request the help, and knowing how to evaluate the effectiveness of the help received (Aleven, Stahl, Schworm, Fischer, and Wallace, 2003).

These five components of learner autonomy are self-regulatory learning attributes that have been identified in the self-regulation literature as important factors in classroom-based learning. They have also been cited in the distance education literature as important elements of distance learning success. The purpose of this research was to investigate whether they are also significant predictors of academic success in a blended (part face-to-face, part online) learning context.

It is important to note, however, that these are not the only variables that contribute to self-regulatory behavior, merely those that have been selected for investigation in this study based upon their prominence in the distance education literature. There are other self-regulatory attributes, both motivational and behavioral, that comprise self-regulated behavior. These include such components of motivation as the value learners assign to specific tasks, locus of control beliefs, and affective factors. They also include cognitive and meta-cognitive learning strategies such as rehearsal, organization, critical thinking, and elaboration, among others. Any of these self-regulatory attributes also may be potentially significant aspects of online learning success.

Table 1. Selected Self-Regulatory Attributes and Related Psychological Processes Comprising Online Learner Autonomy

Self-Regulatory Attributes	Psychological Processes
Motivation	Efficacy beliefs: confidence in ability and skills to successfully perform specific learning tasks Goal orientation: reasons why a learner engages in a learning task
Experience with Internet technology	Internet self-efficacy: confidence in using and/or learning the technologies employed in online education
Time management skills	The ability to manage and structure learning time effectively and productively
Study environment management skills	The ability to ensure that the study environment is conducive to learning and restructure it as necessary
Learning assistance management skills (help seeking)	The ability to know when help is needed, identify sources of help, obtain help, and evaluate the help received

Method

Participants

The research participants (*n* = 94) were students in a blended undergraduate marketing class at a west coast American research university (tier one). The course consisted of eight sections, three of which employed online learning. Students were free to select the section they wished to register in, blended or traditional.

The course was blended in the ratio 75 percent online to 25 percent face-to-face, the mix decided by the course professor. Other mixes are possible depending upon the needs of the programs employing them. The course consisted of weekly topic modules for which the lectures and assignments were posted on the class website, and which the students were expected to regularly access and complete. They would meet with lab instructors for a 45-minute session once every two weeks. Each online module consisted of four elements: introduction, focus topics (assisting the students to focus on key points in the module), tasks (assignments for that module), and reading guide (comprehension questions to assist students understand the main points in the online lecture and/ or in an assigned textbook chapter). The professor was online three days each week for two hours each day. Students could contact the professor online at those times and receive immediate feedback regarding any questions or problems that they might have been having with the course. Assessment consisted of four elements: two mid-term tests worth 44 percent of the final grade for which the material tested was taken from the online modules; class participation, 4 percent; a marketing simulation, 30 percent; a video group project, 22 percent.

The age range of the sample was 18-41 (*m* = 20.6). The sample was split evenly between genders, 47 male and 47 female. The ethnicities represented were 46 (48.9%) Caucasian; 14 (14.9%) Asian; 10 (10.6%) Hispanic; 6 (6.4%) African American; and 18 (19.1%) of unknown ethnicity. Thirty-eight (40.5%) were sophomores, 39 (41.5%) were juniors, and 17 (18.1%) were seniors.

Instrumentation

The criterion variable was the students' online academic performance, operationalized as their final grades scaled as percentages. Six predictor variables were selected from the literature review based upon their hypothesized importance for performance in online blended learning. Five were self-regulatory variables: intrinsic goal orientation, self-efficacy for learning and performance, time and study environment management, help seeking, and Internet self-efficacy. The first four variables were operationalized in the form of the relevant subscales on the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, and McKeachie, 1991).

The MSLQ was developed over a period of three years in the 1980s and early 1990s, during which it was validated through factor analyses, reliability analyses, and correlations with measures of achievement (Pintrich, Smith, Garcia, and McKeachie, 1991; see also, Pintrich, Smith, Garcia, and McKeachie, 1993; Winne and Perry, 2000). It contains 81 items in two sections, a motivation section and a learning strategies section. The motivation section contains 31 items in six subscales: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performances, and test anxiety. The learning strategy section contains 50 items in nine subscales: rehearsal, elaboration, organization, critical thinking, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, and help seeking. The MSLQ subscales selected for this study (with

their reported alpha reliability coefficients) were intrinsic goal orientation (.74), self-efficacy for learning and performance (.93), time and study environment management (.76), and help seeking (.52).

Internet self-efficacy was operationaized through the eight-item Internet Self-Efficacy Scale developed by Eastin and LaRose (2000). Construct validity of the scale was obtained by a confirmatory factor analysis. As social cognitive theory suggests, Internet self-efficacy correlated positively with Internet usage, prior Internet experience, and outcome expectancies. It correlated negatively, as expected, with Internet stress and self-disparagement. Also, Internet self-efficacy was unrelated to measures of general psychological well-being (Eastin and LaRose, 2000). The reported alpha reliability coefficient of this scale was .93.

Verbal aptitude, operationalized as the 50-item verbal IQ section of the Schubert General Ability Battery (1986), was included as a control variable because online education remains largely text-based. It was assumed that those learners with higher verbal IQ would tend to perform better in online education than those students with lower verbal IQ, regardless of the degree of their academic self-regulation. The Schubert General Ability Battery was validated through being correlated with four other mental ability tests administered to entering college students, with the word meaning section correlating in a range from .55 to .80. The General Ability Battery also was normed with a variety of sample populations and found to discriminate between groups that are expected to differ in the ability measured. The battery was normed at three academic levels, high school, college, and graduate school, and found to discriminate among those levels with the scores increasing as academic level rose. A test-retest reliability coefficient of .67 was reported for this subscale.

The survey instrument used in this study consisted of 82 items in four sections. Section one was eight demographic items adapted from the MSLQ. Section two was 24-items measuring four self-regulatory attributes: intrinsic goal orientation, self-efficacy for learning and performance, time and study environment management, and help seeking, also adapted from the MSLQ. Section three was the eight-item Eastin and LaRose Internet Self-Efficacy Scale. Section four was the 50-item word meaning section of the verbal IQ measure from the Schubert General Ability Battery.

Procedure

A non-experimental correlational research design using non-random sampling was employed to explore the predictive value of the six independent variables in terms of the criterion variable (final grades).

The research questionnaire was distributed to students in the blended sections of an undergraduate marketing class at an American west coast university over two offerings of the course, Spring and Fall, 2002. Students took the questionnaires home to complete, and those wishing to participate in the research returned the completed questionnaires during the next on-campus session. Of a total of 352 questionnaires distributed, 94 useable questionnaires were returned, representing an overall return rate of 26 percent.

Results

The study employed both descriptive and inferential statistics. The descriptive analysis included an overview of the demographics of the sample and means, standard deviations, and simple

correlations of the variables investigated in the study, as well as reliability analysis of the subscales. The inferential analysis was a stepwise multiple regression run on SPSS Version 9.0. The level of significance used for the analyses was .05.

Reliability analysis revealed that all subscales had good internal consistency reliabilities: intrinsic goal orientation (.71); self-efficacy for learning and performance (.92); time and study environment management (.80); help seeking (.67); Internet self-efficacy (.93); and verbal ability (.82).

Simple correlations of all the variables in the study (see Table 2) revealed that self-efficacy for learning and performance and verbal ability correlated significantly with final grades at r=.29, p<.01 and r=.26, p<.05 respectively.

Table 2. Pearson Product-Moment Correlations of the Variables. N = 94

	1	2	3	4	5	6	7
1. Intrinsic Goal Orientation	-	.467**	.314**	.118	.009	.072	.157
2. Self-Efficacy for Learning and Performance	.467**	-	.324**	.044	.128	.150	.291**
3. Time and Study Environment	.314**	.324**	-	.052	.012	-.045	.146
4. Help Seeking	.118	.044	.052	-	-.086	-.247*	-.102
5. Internet Self-Efficacy	.009	.128	.012	-.086	-	-.043	-.089
6. Verbal Ability	.072	.150	-.045	-.247*	.043	-	.264*
7. Final Grades	.157	.291**	.146	-.102	-.089	.264*	-

Note. *Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

The significant correlation between intrinsic goal orientation and self-efficacy (r = .47, p<.01) reflected the relationship between them as attributes of motivation. The significant correlation of time and study environment management with intrinsic goal orientation (r = .31, p<.01) and self-efficacy (r = .32, p<.01) indicated the relationship between learner motivation and the behavioral strategies involved in learner control of study time and study environment. The small negative correlations of help seeking and Internet self-efficacy with final grades indicated that as grades increased help seeking and Internet self-efficacy decreased marginally.

The partial regression coefficients (b) in the model for the significant predictors were 1.74 (self-efficacy) and .236 (verbal ability). The standardized regression coefficients (Beta) in the model were .257 (self-efficacy) and .225 (verbal ability). Approximately the same relationship held between verbal ability and final grades.

A stepwise multiple regression analysis revealed that only self-efficacy for learning and performance, and verbal ability made significant contributions to predicting the variance in final grades (R Square value = .134; Adjusted R Square value = .115; $F_{2,91}$ = 7.06, $p < 0.05$). The regression model with two predictors (self-efficacy and verbal ability) was significantly related to

the criterion variable (final grades), $F_{2,91} = 7.058$, $p < .01$. Adding the second predictor (verbal ability) to the regression model rendered a significant R square change of .05, $F_{2,91} = 5.215$, $p < .025$. Self-efficacy and verbal ability together accounted for about 12 percent of the variance in final grades. None of the other predictor variables made significant contributions to the regression model.

The semi-partial correlations for each of the significant predictor variables were self-efficacy, *r(91) = .254, p < .011* and verbal ability, *r(91) = .223, p < .025*. The semi-partial correlation for self-efficacy squared gives a value of .07, indicating that self-efficacy accounted for 7 percent of the variance in final grades, with verbal ability held constant. The semi-partial correlation for verbal ability squared rendered a value of .05, indicating that verbal ability accounted for 5 percent of the variance in final grades with self-efficacy held constant. Together, therefore, self-efficacy and verbal ability accounted for about 12 percent of the variance in final grades. The other self-regulatory variables did not contribute significantly to the regression equation.

Discussion

The sample studied was likely one in which self-regulation was not problematic. Since it was comprised of students at a tier-one research university with rigorous selection procedures, the sample likely was relatively highly self-regulated. How the course modules were presented online also probably influenced the results. Embedded within each module was a number of self-regulation enhancing elements, including focus topics and a reading guide.

The significant and positive relationship between verbal ability and performance (final grades) was not surprising. It was assumed that verbal ability, as a measure of intelligence, would have a significant and positive relationship with performance generally, given the heavily text-based nature of the course.

Self-efficacy has been demonstrated to be an important aspect of performance in classroom-based learning (Pintrich and Schunk, 1996). The significant correlation between self-efficacy and final grades in this study supported findings by Wang and Newlin (2002a, 2002b), Joo, Bong, and Choi (2000), and Zhang, Li, Duan, and Wu (2001) that there is a significant and positive relationship, either direct or indirect, between self-efficacy and performance in online education. Given the importance of learner motivation indicated in the distance education literature (Bates, 1995; Holmberg, 1995; Kearsley, 2000; Moore, 1998; Olgren, 1998), and the role played by self-efficacy as a critical component of motivation, a closer scrutiny of online learner self-efficacy perceptions by course designers and instructors therefore seems appropriate. Self-efficacy perceptions should be assessed pre-course in order to identify learners potentially at risk of course dropout or low performance. Efficacy enhancing activities and feedback should then be designed into the course as a means of assisting these students to successfully complete the course.

The blended nature of the course also likely contributed to the research findings. The sample studied was part of a blended class and this may explain why help seeking was not a significant predictor of final grades, since the students were receiving regular input from the class professor and lab instructors as well as other students during the on-campus meetings.

The blended nature of the class may also explain why time and study environment management and Internet self-efficacy were not significant predictors of performance. Regular on-campus meetings would lessen the need for individual time and study environment management since much of that management was built into the course, thus increasing its structured nature and

reducing both the importance of and the scope for learner autonomy. As course structure and interaction between students and instructor increase, the importance of learner autonomy decreases (Moore, 1993; Moore and Kearsley, 1996).

The lack of a significant relationship between Internet self-efficacy and academic performance may be partly explained by the blended nature of the class. Students were not entirely dependent upon the Internet, as they would have been in a purely online distance course, thus lessening the importance of individual autonomy in this variable as well. Also, the nature of the sample may have been such that Internet proficiency was high.

In summary, this research found that of the self-regulatory learning variables selected for investigation, intrinsic goal orientation, Internet self-efficacy, help seeking, and time and study environment management were not significant predictors of performance in the sample studied. The study did find a significant and positive correlation between self-efficacy and course grades and also between verbal ability and course grades. Correlation, of course, does not prove causality. It can, however, indicate that a pattern of influence between two variables may exist – i.e., in this case, that self-efficacy and verbal ability may both be significant predictors of performance in online blended learning contexts. Further research is required to test this relationship.

In terms of verbal ability, course designers and instructors should be aware that online text-based presentations demand as much verbal intelligence as course readings in equivalent classroom-based courses. This of course raises issues of online course design and course entry criteria for students. Depending upon the target clientele, text material may be "written down" to a lower grade level, or greater reliance may be placed upon video and/ or graphic presentations. However, given that universities offering pure online and/or blended courses are likely to wish to maintain (or be required to maintain) equivalent content and grading standards for both classroom-based and online offerings, student selection criteria therefore must also be equivalent for both course types.

In terms of the relationship found in this study between self-efficacy and performance, course designers, administrators, and instructors should be aware that learners with low self-efficacy perceptions will likely be less autonomous and will therefore have greater difficulty completing the course successfully than those learners with high self-efficacy perceptions. It is important, therefore, to identify such at-risk students prior to the beginning of a course in order to either direct them to a face-to-face course where less learner autonomy is required or to implement efficacy enhancing activities and feedback in the online course.

There are several suggestions for further research. First, research should be conducted employing a sample from a less homogeneous population than that employed in this study. Community college students studying online are likely to exhibit greater individual variability in terms of their self-regulatory skills. Secondly, although age and gender were not part of the research design for this study (they were included in the demographic section simply to provide a richer profile of the sample), such individual difference variables should be investigated in future research into the relationship between self-regulation and online learning generally. A third area meriting further research is investigation of the predictive value of those components of motivation (e.g., extrinsic motivation, value beliefs, control of learning beliefs, affective factors) and learning strategies (e.g., critical thinking, elaboration, meta-cognitive self-regulation, effort regulation) not included in this study. A fourth research area worth pursuing concerns identifying precisely which efficacy enhancing interventions are most effective in an online context.

Finally, there is also a need to investigate whether there are significant differences in the self-regulatory attributes that contribute to performance in different types of online education – e.g., blended versus purely online courses, more highly structured versus less highly structured courses, and the various blended course models now being designed and implemented in higher education. Research is required to investigate the unique characteristics of various blended learning models employing different blends of technologies, as well as different blends of face-to-face and online delivery of instruction, and how those varied characteristics affect learner performance.

References

Aleven, V., Stahl, E., Schworm, S., Fischer, F. and Wallace, R. (2003). Help seeking and help Design in interactive learning environments. *Review of Educational Research, 73*(3), 277 – 320.

Bandura, A. (1997). *Self-Efficacy: The exercise of control*. New York: W. H. Freeman and Company.

Bates, A. W. (2000). Managing Technological Change: Strategies for college and university leaders. San Francisco: Jossey-Bass.

Bates, A. W. (1995). *Technology, open learning and distance education*. New York: Routledge.

Beatty-Guenter, P. (2001). Distance education: does access override success? Paper presented *Canadian Institutional Research and Planning Association 2001 conference*. Victoria, British Columbia. Retrieved January 29, 2004, from: www.cirpa-acpri.ca/prevConferences/victoria2001/papers/bg_paper.htm

Council for Higher Education Accreditation. (2002). *Accreditation and assuring quality in distance education*. CHEA Monograph Series 2002, Number 1. Retrieved November 14, 2003, from: http://www.chea.org/Research/

Curry, J., Haderlie, S., and Ku, T. (1999). Specified learning goals and their effect on learners' representations of a hypertext reading environment. *International Journal of Instructional Media 26*(1), 43 – 51.

Diaz, D. P. (2000). Commentary – Carving a new path for distance education research. *The Technology Source March/ April*. Retrieved November 14, 2003, from: http://technologysource.org/article/carving_a_new_path_for_distance_education_research/

Doherty, P. B. (1998). Learner control in asynchronous learning environments. *Asynchronous Learning Networks Magazine, 2*(2). Retrieved January 31, 2004, from: http://www.aln.org/publications/magazine/v2n2/doherty.asp

Eastin, M. S., and LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer Mediated Communication, 6*(1). Retrieved November 14, 2003, from: http://www.ascusc.org/jcmc/vol6/issue1/eastin.html

Edelson, P. J., and Pittman, V. V. (2001). E-learning in the United States: new directions and opportunities for university continuing education. *Global E-Journal of Open, Flexible & Distance Education, 1*(1), 71 – 83.

Gibson, C. C. (1998). The distance learner's academic self-concept. In C. C. Gibson (Ed.) *Distance learners in higher education: institutional responses for quality outcomes* (p. 65-76). Madison, WI.: Atwood Publishing.

Hara, N., and Kling, R. (2000). Students' distress with a web-based distance education course. *CSI Working Paper*. The Center for Social Informatics, Indiana University. Retrieved November 14, 2003, from: http://www.slis.indiana.edu/CSI/wp00-01.html

Henderson, R. W., and Cunningham, L. (1994). Creating interactive socio-cultural environments for self-regulated learning. In D. H. Schunk and B. J. Zimmerman (Eds.) *Self-regulation of learning and performance: issues and educational applications* (p. 255-281). Hillsdale, NJ.: Lawrence Erlbaum Associates.

Holmberg, B. (1995). *Theory and practice of distance education*. London: Routledge.

Joo, Y., Bong, M., and Choi, H. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in web-based instruction. *Educational Technology Research and Development 48*(2), 5 – 17.

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

Kearsley, G. (2000). *Online education: learning and teaching in cyberspace*. Belmont, CA.: Wadsworth.

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

Linnenbrink, E. A., and Pintrich, P. R. (2002). Motivation as an enabler for academic success. *The School Psychology Review 31*(3): 313 – 327.

Moore, M. G. (1998). Introduction. In C. C. Gibson (Ed.), *Distance learners in higher education: institutional responses for quality outcomes* (p. 1-7). Madison, WI.: Atwood Publishing.

Moore, M. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (p. 22-38). London: Routledge.

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

Olgren, C. H. (1998). The effects of learning strategies and motivation. In C. C. Gibson (Ed.) *Distance learners in higher education: institutional responses for quality outcomes* (p. 77-96). Madison, WI.: Atwood Publishing.

Palloff, R. M., and Pratt, K. (1999). *Building Learning Communities in Cyberspace: Effective strategies for the online classroom*. San Francisco: Jossey-Bass.

Perraton, H. (2000). Rethinking the Research Agenda. *International Review of Research in Open and Distance Learning*. Retrieved January 28, 2004, from: www.irrodl.org/content/v1.1/hilary.html

Peters, O. (1998). *Learning and Teaching in Distance Education: Analyses and interpretations from an international perspective.* London: Kogan Page.

Phipps, R., and Merisotis, J. (1999). *What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education.* Washington, D.C.: The Institute for Higher Education Policy.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, and M. Zeidner (Eds.) *Handbook of Self-Regulation* (p. 452-502). San Diego, CA.: Academic Press.

Pintrich, P. R., and Schunk, D. H. (1996). *Motivation in Education: Theory, research*, *and application*. Englewood Cliffs, NJ.: Prentice Hall.

Pintrich, P. R., Smith, D. A. F., Garcia, T., and McKeachie, W. J. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ). 91-B-004. Ann Arbor: The Regents of the University of Michigan.

Pintrich, P. R., Smith, D. A. F., Garcia, T., and McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801 – 813.

Roblyer, M. D. (1999). Is Choice Important in Distance Learning? A study of student motives for taking Internet-based courses at the high school and community college levels. *Journal of Research on Computing Education, 32*(1), 157 – 171.

Saba, F. (2000). Research in Distance Education: What is research? *International Review of Research in Open and Distance Learning 1*(1), Retrieved January 28, 2004, from: www.irrodl.org/content/v1.1/farhad.html

Schubert, H. J. P. (1986). *Schubert general ability battery manual*. East Aurora, NY.: Slosson.

Schrum, L. (1998). On-line Education: Astudy of emerging pedagogy. *New Directions for Adult and Continuing Educatio*n *78*, 53 – 61.

Schrum, L., and Hong, S. (2002). Dimensions and Strategies for Online Success: Voices from experienced educators. *Journal of Asynchronous Learning Networks* 6(1). Retrieved November 14, 2003, from: http://www.aln.org/publications/jaln/v6n1/index.asp

Sikora, A. C., and Carroll, C. D. (2002). A Profile of Participation in Distance Education: 1999-2000.*National Center for Education Statistics.* NCES 2003-154. U.S. Department of Education. Retrieved November 14, 2003, from: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003154

Thompson, M. M. (1998). Distance learners in higher education. In C. C. Gibson (Ed.) *Distance Learners in Higher Education: Institutional responses for quality outcomes* (p. 9-24). Madison, WI.: Atwood Publishing.

Wang, A. Y., and Newlin, M. H. (2002a). Predictors of Web-Student Performance: the role of self- efficacy and reasons for taking an on-line class. *Computers in Human Behavior 18*(2), 151 – 163.

Wang, A. Y., and Newlin, M. H. (2002b). Predictors of performance in the virtual classroom. *The Journal Online* 29(10). Retrieved November 14, 2003, from: http://www.thejournal.com/magazine/vault/A4023.cfm

Whipp, J. L., and Chiarelli, S. (2001). *Proposal: Self-regulation in web-based courses for teachers*. Retrieved November 14, 2003, from: http://edtech.connect.msu.edu/Searchaera2002/viewproposaltext.asp?propID=1696

Winne, P. H., and Perry, N. E. (2000). Measuring self-regulated learning. In M. Boekaerts, P. R. Pintrich, and M. Zeidner (Eds.) *Handbook of self-regulation* (p. 532-566). San Diego, CA.: Academic Press.

Zhang, J., Li, F., Duan, C., and Wu, G. (2001). Research on self-efficacy of distance learning and its influence to learners' attainments. Retrieved November 14, 2003, from http://www.icce2001.org/cd/pdf/p13/CN100.pdf

Zimmerman, B. J. (2002). Becoming a Self-Regulated Learner: an overview. *Theory into Practice,41*(2), 64 – 70.

Zimmerman, B. J. (2000). Attaining Self-Regulation: a social cognitive perspective. In M. Boekaerts, P. R. Pintrich, and M. Zeidner (Eds.) *Handbook of self-regulation* (p. 13-39). San Diego, CA.: Academic Press.

Zimmerman, B. J. (1998). Developing self-fulfilling cycles of academic regulation: an analysis of examplary instructional models. In D. H. Schunk and B. J. Zimmerman (Eds.) *Self-Regulated Learning: From teaching to self-reflective practice* (p. 1-19). New York: The Guilford Press.

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

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology 81*(3), 329 – 339.

Zimmerman, B. J., and Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies, *American Educational Research Journal, 23*, 614 – 628.

Zimmerman, B. J., and Risemberg, R. (1997). Self-regulatory dimensions of academic learning and motivation. In G. D. Phye (Ed.) *Handbook of Academic Learning: Construction of knowledge* (p. 105-125). San Diego, CA.: Academic Press.