The Amer. Jrnl. of Distance Education, 22: 72–89, 2008

ISSN 0892-3647 print / 1538-9286 online
DOI: 10.1080/08923640802039024

Routledge
Taylor & Francis Group

Online Technologies Self-Efficacy and Self-Regulated Learning as Predictors of Final Grade and Satisfaction in College-Level Online Courses

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Abstract: This study was designed to examine performance as a function of grade and course satisfaction in online undergraduate level courses, specifically students' self-efficacy for online technologies and self-regulated learning strategies. This research included a sample (N = 815) of community college students enrolled in liberal arts online courses during a single semester. The results of this study showed that online technologies self-efficacy scores were not correlated with student performance. Of the Motivated Strategies for Learning Questionnaire subscales, time and study environment and effort regulation were significantly related to performance. Students who scored higher on these subscales received higher final grades. In addition, rehearsal, elaboration, metacognitive self-regulation, and time and study environment were significantly positively correlated with levels of satisfaction.

SELF-EFFICACY AND ONLINE LEARNING

Self-efficacy theory refers to one's convictions about her or his ability to perform a specific task at a designated level (Bandura 1997). Individuals are proactively engaged in and responsible for their own development toward goals, and their progress is related to their self-beliefs. The reciprocal causation-effect relations among personal factors, environment, and behavior form the foundation of self-efficacy theory. Self-efficacy, the learner's belief about his or her ability to perform a given task, is the personal aspect that accounts for why a person engages in the task. Individual behavior is not directly affected by personal variables; rather those personal variables affect individuals to the extent that they influence

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self-efficacy beliefs. Self-efficacy beliefs, in turn, act as a motivational influence and affect individual action, performance, and behavior. In essence, perceived self-efficacy has a mediating influence on behavior, specifically whether a behavioral task is attempted at all, and the effort to persist in that task.

This theory has particular importance to online learning. For example, the situational factors that might affect an online student's decision to withdraw may not directly affect the outcome (withdrawal); rather, the student's self-efficacy beliefs are impacted by the personal factors, and the resulting efficacy beliefs affect the decision to persist in the course. This is significant and promising for student success administrators. Although the personal factors may not be practicably variable, the efficacy beliefs may be.

Educational researchers have employed self-efficacy instruments in a wide range of academic and technology-related settings and have found positive and strong influence of efficacy beliefs on achievement and persistence with regard to specific, criterial tasks. Schunk (1982, 1983, 1984, 1989, 1991), in a series of experiments, demonstrated that as students' self-efficacy perceptions strengthened, their academic performance improved. Pintrich and de Groot (1990) found that academic self-efficacy beliefs were positively related to intrinsic value and cognitive and self-regulatory strategy use. In addition, strong self-efficacy beliefs were negatively correlated with test anxiety. House (2000) found that self-efficacy beliefs were significantly related to grade performance and persistence in science, engineering, and mathematics. Hannafin and Land (1997) found that learners' computer self-efficacy had a positive effect on the ability to search for information. Levine and Donitsa-Schmidt (1998) found that as participants expressed stronger computer confidence, they also demonstrated more positive attitudes toward computers and also reported more knowledge about computers. Similarly, Obsorn (2001) found that students who have strong confidence in their computer skills and less computer anxiety were more likely to persist in an online course.

There are very few studies defining and addressing various types of self-efficacy for online learning. DeTure (2004) examined learner attributes, including the online technologies self-efficacy scores (OTSES) and cognitive style; however, it was found that these were poor predictors of student success in online courses. Joo, Bong, and Choi (2000) examined academic self-efficacy, self-efficacy for self-regulated learning, and Internet self-efficacy on learners' performance in Web-based instruction. The study did find that computer self-efficacy (a skills-level measure) is a key variable that may determine student success in distance education. Wang and Newlin (2002) found that self-efficacy for understanding course content and self-efficacy for meeting the technological demands of an online course can predict performance. Specifically, they found that self-efficacy was related to the reasons students reported enrolling in Web-based courses. Students who preferred online learning reported higher general self-efficacy than students who enrolled because of course availability.

SELF-REGULATION AND ONLINE LEARNING

Whereas self-efficacy measures are task and domain specific, self-regulated learning refers to the motivational orientations and learning strategies that students employ to attain desired goals (Zimmerman 1989). Zimmerman and Martinez-Pons (1988) summarize the process of self-regulated learning as "the degree to which students are metacognitively, motivationally, and behaviorally active participants in their own learning process" (4). Metacognitive processes refer to a student's ability to plan, organize, and evaluate learning strategies for learning processes; motivation encompasses self-efficacy and high intrinsic motivation; and behavior refers to the characteristics of the strategies that students employ to optimize learning.

This study utilized Pintrich and de Groot's (1990) theory of self-regulated learning. Eight types of cognitive learning strategies are used to facilitate the process of information processing: (1) rehearsal, (2) complex rehearsal, (3) elaboration, (4) complex elaboration, (5) organizational, (6) complex organizational, (7) comprehension monitoring, and (8) affective and motivational. Cognitive strategies are the strategies employed by a learner to acquire knowledge in the learning process. Specific strategies are rehearsal, elaboration, and organization. Metacognitive strategies refer to self-awareness about one's own cognitive processes, thus implying the ability to affect those processes. Metacognition relates to the skills learners employ to plan their strategies for learning, monitor how well those strategies are working, and regulate the effort needed to facilitate learning. Resource management strategies refer to the learner's ability to manage learning resources, such as time, effort, peers, and instructors in such a way as to independently facilitate the learning process. Strategies and resources are employed and used in the context of motivation. Motivation accounts for why students engage in and persist at particular tasks (Diener and Dweck 1978; Nolen 1988; Pintrich and de Groot 1990).

Jonassen et al. (1995) suggest that the necessity for self-regulation in online learning environments may be even more important than in the traditional environment because of the less active role of the teacher. Online courses entail a high degree of peer interaction and teamwork, which requires more proactive and self-directed involvement on the part of individual learners. Learners must access the course independently and structure the time, pace, and strategy of their own learning processes.

King, Harner, and Brown (2000) also hypothesized that self-regulation of learning is more important in the distance education context than the traditional context. They employed a forty-item instrument designed to measure the effect of video technology on students, distance learning-related self-regulatory behaviors, and self-efficacy. They found that of various self-regulation factors, goals and study skills were highly significant. They also found that students who had taken online courses previously scored higher on study skills than those who had not. This suggests that prior experience could be an important variable.

Shih et al. (1998) found significant relations between achievement in online courses and motivation and learning strategies. Students who reported using strategies such as memorization, elaboration, and organization were more likely to do better than students who reported lower frequency of the use of these strategies. In 2001, Shih and Gamon studied the relations between learning styles and learning strategies and final grade in online courses. Thirteen questions from the Motivated Strategies for Learning Questionnaire (MSLQ) were used as part of the learning strategies measurement. They found that student use of learning strategies accounted for one-fourth of student achievement in the online courses in the study.

The distance learning literature suggests that self-efficacy, self-regulation, and student experiential variables may be related in important ways (Feather 1988; Fincham and Cain 1986; Paris and Oka 1986; Pintrich and Schrauben 1992; Pokay and Blumenfeld 1990; Schunk 1982, 1983, 1984, 1989). Generally, learners who have high confidence in their ability to perform certain academic tasks tend to use more cognitive and metacognitive strategies and show higher task-persistence than those who have lower confidence levels.

RESEARCH DESIGN

Out of a total of 350 online course sections listed in the Fall 2005 published schedule for a southeastern community college, a cluster random sample of 163 course sections was selected for the study. Courses were proportionally representative of liberal arts disciplines and taught entirely online in twelve- or sixteen-week sessions.

All students enrolled in the selected classes were invited to participate in the study. Students who were enrolled in multiple online courses included in the sample were surveyed for only one course (randomly selected) to ensure independence in the sample. There were two surveys: Questionnaire A (measuring OTSES, MSLQ, experiential and demographic factors at the beginning of the course) and Questionnaire B (measuring satisfaction, instructor and course variables at the end of the course). A modified questionnaire (Questionnaire C) was administered to students who withdrew from the course. The response rate for the first survey was 43% (N = 815) and the response rate for the second questionnaire (B or C) was 78%. The mean age of participating students was twenty-nine. Eighty percent were female and 20% were male.

DEFINING STUDENT SUCCESS AND PERFORMANCE

Student success has been operationalized in the literature in three ways: grade performance, completion, and satisfaction. Studying final grade, attrition, or satisfaction exclusively can be unreliable. Despite the inherent

limitations of using grade as a measure of performance, it does convey practical meaning for measuring academic success; transferability of certain grades, honors such as dean's list, and scholarships all depend on grade performance. The mean final grade (excluding sixty-nine withdrawals, such that $N = 746$) was 3.00, with a standard deviation of 1.308. Frequencies for final grade are reported in Table 1.

This study also included an analysis of the significance of satisfaction reported on a four-point Likert-type scale ranging from 4 (very) to 1 (not at all) as a component of performance. Frequencies for satisfaction are reported in Table 2.

Student satisfaction may help refine our understanding of performance. Student satisfaction in online courses has been examined and correlations found with a number of variables, such as instructor variables, technical issues, interactivity level, motivation to enroll in the course, student prior experience in online courses, and demographic factors such as gender (Kirtley 2002; Shea et al. 2002; Thurmond et al. 2002). If students are satisfied, they are more likely to be successful.

Instrumentation

The Online Technologies Self-Efficacy Scale (OTSES) was used to measure online learning self-efficacy (Miltiadou and Yu 2000). The instrument is com-

Table 1. Final Grade Distribution for Sample

Grade	Frequency	%	Valid %	Cumulative %
F, FN	78	9.6	10.5	10.5
D	28	3.4	3.8	14.2
C	84	10.3	11.3	25.5
B	179	22.0	24.0	49.5
A	377	46.3	50.5	100.0
W	69	8.5		
Total	815	100.0	100.0	

Table 2. Frequencies: Overall Satisfaction with Course

Satisfaction	Frequency	%	Valid %	Cumulative %
Not at all	26	3.2	4.1	4.1
Not very	56	6.9	8.8	12.8
Somewhat	208	25.5	32.6	45.4
Very	349	42.8	54.6	100.0
Total	639	78.4	100.0	

prised of twenty-nine items clustered into four subscales: (a) Internet Competencies, (b) Synchronous Interaction, (c) Asynchronous Interaction I, and (d) Asynchronous Interaction II. Students rate their confidence level of the items on each subscale using a four-point Likert scale. Miltiadou and Yu established construct validity and internal consistency in order to validate the instrument. The original scale consisted of four subscales and thirty items; however, factor analysis demonstrated that the items could not be loaded into the four subscales, and correlational analysis revealed that the subscales were highly interrelated. Therefore, all subscales were combined into a single construct, and one item was deleted because the factor loading was indeterminable. Internal consistency reliability (Cronbach's coefficient alpha) was estimated at .95 for the entire twenty-nine-item instrument.

The range of the OTSES scale is 29–116. Students' raw scores were used for comparison; 29 = very confident with everything and 116 = not confident at all with everything. Lower scores indicate higher self-efficacy, and higher scores indicate lower self-efficacy. The minimum OTSES score was 29 and the maximum was 115 (M = 37.63, SD = 11.07).

The Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al. 1993) consists of two sections: a motivation section and a cognitive learning strategies section. There are a total of eighty-one items scored on a seven-point Likert scale, from 1 (not at all true of me) to 7 (very true of me). The motivation section consists of thirty-one items that assess goals and value beliefs for a specific course, beliefs about learning skills, and test anxiety. The cognitive learning strategies section includes fifty questions: thirty-one items related to students' use of different cognitive and metacognitive strategies and nineteen items related to student management of various types of learning resources. Scores are derived from the mean of the items comprising the various subscales. There are fifteen distinct subscales in the MSLQ, designed to be used together or individually.

The authors have established internal consistency, reliability, and predictive validity of the MSLQ (Pintrich et al. 1993). Confirmatory factor analysis confirmed the underlying theoretical model. Internal consistency estimates of reliability were computed using final course grade. Most of the Cronbach coefficient alphas for the cognitive learning strategies scales are above .70. It can be concluded that the MSLQ has relatively good reliability in terms of internal consistency, and the subscales have good predictive validity.

The subscales addressing cognitive learning strategies were selected for this study because of their relevance to the present research. Descriptive statistics for the MSLQ subscales are shown in Table 3. The lowest subscale mean was peer learning (M = 3.54, SD = 1.52), and the highest was effort regulation (M = 5.86, SD = 1.07). This indicates that, overall, students were less likely to report that they engaged in peer learning activities (talking about material to a friend or classmate, working with other students to complete assignments, studying with a group) but were more likely to indicate that they work to

Table 3. Descriptive Statistics for the Motivated Strategies for Learning Questionairre (MSLQ) Subscales

MSLQ Subscale	Range	Minimum	Maximum	*M*	*SD*	Variance
Rehearsal	6.00	1.00	7.00	5.21	1.23	1.52
Elaboration	6.00	1.00	7.00	5.27	1.11	1.23
Organization	6.00	1.00	7.00	4.73	1.37	1.88
Critical thinking	6.00	1.00	7.00	4.74	1.35	1.82
Metacognitive self-regulation	5.42	1.58	7.00	4.88	.88	.77
Time and study environment	6.00	1.00	7.00	5.34	1.06	1.13
Effort regulation	6.00	1.00	7.00	5.86	1.07	1.15
Peer learning	6.00	1.00	7.00	3.55	1.52	2.32
Help seeking	6.00	1.00	7.00	4.26	1.25	1.56

Note: Valid *N* (listwise) = 815.

control the effort and attention they devote to their course, particularly in the face of distractions.

RESEARCH QUESTIONS AND FINDINGS

The first research question addressed whether students' OTSES would differ significantly by final grade or satisfaction in an online course. Based on Analysis of Variance (ANOVA) results, there were no significant differences in the OTSES scores by final grade or satisfaction comparison groups.

The second research question addressed whether scores on the subscales of the MSLQ would differ by final grade or satisfaction levels. The following subscales of the MSLQ were included in this study: rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking. An ANOVA was used to test for mean differences in each MSLQ subscale score by final grade. As shown in Table 4, significant results for Levene's test of homogeneity of variance were observed for rehearsal, $F(4, 810) = 4.09$, $p = .00$ and organization, $F(4, 810) = 2.93$, $p = .02$.

As shown in Table 5, the ANOVA revealed that significant differences in mean scores by final grade existed for time and study environment, $F(4, 810) = 4.41$, $p = .00$ and for effort regulation, $F(4, 810) = 5.46$, $p = .00$.

The least squares difference post hoc test was run to determine where the specific differences were. Table 6 shows the results for time and study environment; the significant differences were between the W and A groups ($p = .00$) and the W and B groups ($p = .01$) and between the D/F/FN and the A groups ($p = .01$) and the D/F/FN and B groups ($p = .03$). This suggests that students who received higher grades in the online course reported that they

Table 4. Levene's Test of Homogeneity of Variances for Comparison of MSLQ Subscale Scores by Final Grade

MSLQ Subscale	Levene Statistic	Significance
Rehearsal	4.09	.003
Elaboration	2.35	.052
Organization	2.93	.020
Critical thinking	1.08	.365
Metacognitive self-regulation	.94	.439
Time and study environment	.94	.438
Effort regulation	2.01	.091
Peer learning	.97	.423
Help seeking	.41	.803

*Note: d.f.*1 = 4, *d.f.*2 = 810. The mean difference is significant at the .05 level.

were more likely to manage the scheduling, planning, and managing of their study time, as well as their study environment, so that it is most effective for their study style than students who received lower grades or withdrew from the online course.

As shown in Table 7, there was a similar pattern for effort regulation. Significant differences were noted between the W and A (p = .00), B (p = .00), and C (p = .01) groups. Effort regulation refers to the ability of students to manage their tasks, and also reflects the level of commitment students maintain when faced with obstacles or difficulties (Pintrich et al. 1991). The students who withdrew demonstrated a lower ability to regulate and manage effort than students who received A, B, or C grades. The D/F/FN group was also significantly different from the A (p = .00) and the B (p = .04) groups.

An ANOVA was conducted to test for differences in the mean scores of the MSLQ subscales across the satisfaction level comparison groups. As shown in Table 8, significance was observed for rehearsal, $F(2, 636) = 4.78$, p = .01; elaboration, $F(2, 636) = 2.30$, p = .05; metacognitive self-regulation, $F(2, 636) = 5.00$, p = .01; and time and study environment $F(2, 636) = 3.30$, p = .04. All other subscales yielded p values greater than .05 and were thus not significant.

As shown in Table 9, a least squares difference post hoc test was run to identify where the specific differences were. For all three significant subscales, the specific differences were between the "very" and "somewhat" groups (all p <.01). For rehearsal, metacognitive self-regulation, and time and study environment, it would appear that students who scored higher on these subscales were more likely to be more satisfied at the end of the online course than those students who scored lower.

Table 5. ANOVA: Comparison of MSLQ Subscale Scores by Final Grade

MSLQ Subscale	Comparison	Sum of Squares	*d.f.*	Mean Square	*F*	Significance
Rehearsal	Between groups	4.49	4	1.12	.74	.566
	Within groups	1230.50	810	1.52		
	Total	1234.99	814			
Elaboration	Between groups	10.57	4	2.64	2.17	.071
	Within groups	988.41	810	1.22		
	Total	998.98	814			
Organization	Between groups	8.02	4	2.01	1.07	.372
	Within groups	1523.20	810	1.88		
	Total	1531.22	814			
Critical thinking	Between groups	6.41	4	1.60	.88	.474
	Within groups	1471.94	810	1.82		
	Total	1478.35	814			
Metacognitive self-regulation	Between groups	3.43	4	.86	1.11	.350
	Within groups	624.49	810	.77		
	Total	627.92	814			
Time and study environment	Between groups	19.59	4	4.90	4.41	.002
	Within groups	900.33	810	1.11		
	Total	919.92	814			
Effort regulation	Between groups	24.55	4	6.14	5.46	.000
	Within groups	910.56	810	1.12		
	Total	935.11	814			
Peer learning	Between groups	9.35	4	2.34	1.01	.402
	Within groups	1876.71	810	2.32		
	Total	1886.06	814			
Help seeking	Between groups	9.68	4	2.42	1.55	.185
	Within groups	1261.84	810	1.56		
	Total	1271.52	814			

Note: The mean difference is significant at the .05 level.

LIMITATIONS

The interpretation of results from this study is subject to limitations and assumptions related to measurement and uncontrollable variables. First, grading systems in all courses may not be consistent, as the grading rubrics are not identical among the courses. In addition, the importance of some cognitive strategies (as measured by the MSLQ) may vary depending on the format of each individual course. Second, the OTSES and MSLQ are both self-report instruments, where students are reporting what they believe to be true about them. Third, this study measured cognitive attributes at the start of the course only and does not account for how perceptions and self-regulation strategies may change over the course of the term.

Table 6. Least Squares Difference Post Hoc Test for Differences in Mean Final Grade by Time and Study Environment

Dependent Variable: MSLQ Time and Study Environment
LSD

(I) Final Grade	(J) Final Grade	Mean Difference (I–J)	*SE*	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W	W					
	D, F, FN	–.12	.16	.460	–.44	.20
	C	–.20	.17	.246	–.53	.14
	B	–.40*	.15	.007	–.70	–.11
	A	–.45*	.14	.001	–.72	–.17
D, F, FN	W	.12	.16	.460	–.20	.44
	D, F, FN					
	C	–.08	.15	.612	–.38	.22
	B	–.28*	.13	.029	–.54	–.03
	A	–.32*	.12	.005	–.55	–.10
C	W	.20	.17	.246	–.14	.53
	D, F, FN	.08	.15	.612	–.22	.38
	C					
	B	–.20	.14	.143	–.48	.07
	A	–.25	.13	.053	–.50	.00
B	W	.40*	.15	.007	.11	.70
	D, F, FN	.28*	.13	.029	.03	.54
	C	.20	.14	.143	–.07	.48
	B					
	A	–.04	.10	.660	–.23	.15
A	W	.45*	.14	.001	.17	.72
	D, F, FN	.32*	.12	.005	.10	.55
	C	.25	.13	.053	.00	.50
	B	.04	.10	.660	–.15	.23
	A					

**Note:* The mean difference is significant at the .05 level.

CONCLUSIONS AND RECOMMENDATIONS

The results of this study add to the literature about student success and satisfaction in online courses and indicate important points that advisors, faculty, and policymakers should focus on as they advise, teach, and create programs and services for online students. Being able to make predictive assertions about the likelihood of success or nonsuccess in online courses enhances the

Table 7. Least Squares Difference Post Hoc Test for Differences in Mean Final Grade by Effort Regulation

Dependent Variable: MSLQ Effort Regulation
LSD

(I) Final Grade	(J) Final Grade	Mean Difference (I–J)	*SE*	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
W	W					
	D, F, FN	–.20	.16	.232	–.52	.13
	C	–.47*	.17	.006	–.81	–.14
	B	–.46*	.15	.002	–.76	–.17
	A	–.55*	.14	.000	–.82	–.28
D, F, FN	W	.20	.16	.232	–.13	.52
	D, F, FN					
	C	–.28	.15	.074	–.58	.03
	B	–.27*	.13	.040	–.52	–.01
	A	–.36*	.12	.002	–.58	–.13
C	W	.47*	.17	.006	.14	.81
	D, F, FN	.28	.15	.074	–.03	.58
	C					
	B	.01	.14	.946	–.27	.28
	A	–.08	.13	.539	–.33	.17
B	W	.46*	.15	.002	.17	.76
	D, F, FN	.27*	.13	.040	.01	.52
	C	–.01	.14	.946	–.28	.27
	B					
	A	–.09	.10	.360	–.28	.10
A	W	.55*	.14	.000	.28	.82
	D, F, FN	.36*	.12	.002	.13	.58
	C	.08	.13	.539	–.17	.33
	B	.09	.10	.360	–.10	.28
	A					

**Note:* The mean difference is significant at the .05 level.

ability of advisors and administrators to build precourse assessments to identify specific weighted characteristics.

Although the study found no statistically significant differences in OTSES score by grade performance or satisfaction, this finding is quite important to practice. Many institutions focus student support and retention strategies for online learning on technology training and support. However, as noted, the OTSES score ranged from 29 (very confident) to 116 (not confident), with a mean score of 37.63. The majority of the

Table 8. ANOVA: Comparison of MSLQ Subscale Scores by Satisfaction

MSLQ Subscale	Comparison	Sum of Squares	*d.f.*	Mean Square	*F*	Significance
Rehearsal	Between groups	14.06	2	7.03	4.78	.009
	Within groups	936.03	636	1.47		
	Total	950.09	638			
Elaboration	Between groups	7.08	2	3.54	2.96	.052
	Within groups	759.78	636	1.19		
	Total	766.85	638			
Organization	Between groups	6.87	2	3.43	1.81	.164
	Within groups	1204.01	636	1.89		
	Total	1210.87	638			
Critical thinking	Between groups	12.54	2	6.27	3.47	.032
	Within groups	1150.13	636	1.81		
	Total	1162.67	638			
Metacognitive self-regulation	Between groups	7.75	2	3.88	5.00	.007
	Within groups	492.99	636	.78		
	Total	500.74	638			
Time and study environment	Between groups	7.42	2	3.71	3.29	.038
	Within groups	716.62	636	1.13		
	Total	724.04	638			
Effort regulation	Between groups	3.46	2	1.73	1.49	.225
	Within groups	735.22	636	1.16		
	Total	738.68	638			
Peer learning	Between groups	3.30	2	1.65	.70	.495
	Within groups	1493.46	636	2.35		
	Total	1496.77	638			
Help seeking	Between groups	5.33	2	2.66	1.69	.185
	Within groups	999.69	636	1.57		
	Total	1005.02	638			

Note: The mean difference is significant at the .05 level.

students reported relatively high confidence using the Internet in an academic setting.

The OTSES instrumentation should be examined to add and revise items to reflect the most current technologies. For example, some of the items addressed confidence with opening an e-mail, attaching a file to an e-mail, and participating in an asynchronous bulletin board. These tasks are becoming ubiquitous in home and work settings, such that many of the participants in the sample would answer the items similarly.

Whereas the OTSES scores yielded no effect on performance in an online course, self-regulated learning did. One of the main premises of this research was that a key factor in predicting online student performance and success is students' ability to monitor, regulate, and manage resources to facilitate their

Table 9. Least Squares Difference Post Hoc Test for Differences in MSLQ Subscale Scores (Rehearsal, Metacognitive Self-Regulation, and Time and Study Environment) by Satisfaction

Dependent Variable	(I) Overall Satisfaction	(J) Overall Satisfaction	Mean Difference (I–J)	*SE*	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Rehearsal	Not very or not at all	Not very or not at all					
		Somewhat	.05	.16	.774	−.27	.36
		Very	−.26	.15	.077	−.56	.03
	Somewhat	Not very or not at all	−.05	.16	.774	−.36	.27
		Somewhat					
		Very	−.31*	.11	.004	−.52	−.10
	Very	Not very or not at all	.26	.15	.077	−.03	.56
		Somewhat	.31*	.11	.004	.10	.52
		Very					
Metacognitive self-regulation	Not very or not at all	Not very or not at all					
		Somewhat	.05	.11	.671	−.18	.27
		Very	−.18	.11	.089	−.40	.03
	Somewhat	Not very or not at all	−.05	.11	.671	−.27	.18
		Somewhat					
		Very	−.23*	.08	.003	−.38	−.08
	Very	Not very or not at all	.18	.11	.089	−.03	.40
		Somewhat	.23*	.08	.003	.08	.38
		Very					

Time and study environment	Not very or not at all	Not very or not at all					
		Somewhat	.05	.14	.702	–.22	.32
		Very	–.18	.13	.177	–.43	.08
	Somewhat	Not very or not at all	–.05	.14	.702	–.32	.22
		Somewhat					
		Very	–.23*	.09	.014	–.41	–.05
	Very	Not very or not at all	.18	.13	.177	–.08	.43
		Somewhat	.23*	.09	.014	.05	.41
		Very					

**Note:* The mean difference is significant at the .05 level.

own learning. Time and study environment and effort regulation were the two MSLQ subscales that were significantly related to grade performance. Students who scored higher on these subscales received higher final grades. Time and study environment relates to scheduling, planning, budgeting study time as well as regulating the general study environment. Effort regulation refers to the management of academic tasks and also reflects the level of commitment students maintain when faced with obstacles or difficulties (Pintrich and Garcia 1991).

When differences in subscale scores were analyzed by satisfaction levels, rehearsal, elaboration, metacognitive self-regulation, and time and study environment were significantly positively correlated with levels of satisfaction. It appeared that students who scored higher on these subscales reported higher levels of satisfaction with the online course than students who scored lower.

Serendipitous findings regarding the self-regulation subscales were also observed and corroborated by current literature. Peer learning and help seeking subscale scores had the lowest overall item means, meaning that students scored the lowest on these scales relative to other scales. This implies that students in this sample did not report engaging in learning strategies that are peer based or involve seeking help from others. Similarly, Blocher at al. (2002), in a study of graduate-level students using the MSLQ, found that students were likely to interact with the instructor but less apt to engage in peer collaboration activities. More research is needed to identify possible differences in peer collaboration behaviors between community college and other populations. And, it is also possible that peer collaboration behaviors are influenced by various other factors not addressed in this study (such as type of degree program, institutional culture, and instructor cues).

An established approach to distance learning course design emphasizes peer collaboration as a means to develop learning communities. It is widely accepted in distance learning theory and practice that as interaction with the instructor is reduced, peer interaction becomes more important as a means to overcome isolation and promote social engagement (e.g., Gunawardena 1995; Jonassen et al. 1995; Palloff and Pratt 1999; Rovai 2002; Wegerif 1998). Though this study did not find any relations between help seeking and peer learning and final grade performance, other recent research indicates that there may be significant relations. As noted previously, further research should control for course format to measure the actual importance of these learning strategies in courses that specifically require them.

This study provided insight into online student success factors that could be of use to those involved in the design, administration, and management of online programs at the postsecondary level. The evidence demonstrated that technical skill factors, specifically those included in the OTSES instrumentation, are not significant predictors of student success or satisfaction in online courses. However, skills such as time management and self-regulation of factors such as study environment and effort regulation were significant. The results of this study provide direction for further research into orientation programs, support services, and advisement models for online learners.

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