

**SELF-REGULATED LEARNING: A KEY OF A
SUCCESSFUL LEARNER IN ONLINE LEARNING
ENVIRONMENTS IN THAILAND**

BUNCHA SAMRUAYRUEN

Phibulsongkram Rajabhat University

JUDITH ENRIQUEZ

University of North Texas

ONJAREE NATAKUATOONG

Phibulsongkram Rajabhat University

KINGKAEW SAMRUAYRUEN

Phibulsongkram Rajabhat University

ABSTRACT

This study identified five effective self-regulated learning (SRL), investigated the correlation of demographic information and SRL, and measured significant predictor of prior experiences on SRL. Eighty-eight Thai learners participated in the SRL survey, which was adapted from the MSLQ. The findings indicated that Intrinsic Goal and Self-Efficacy were correlated with Cognitive Strategy and Study Management, but Test Anxiety was not significantly related with any component. Multiple regressions indicated that Internet and Hybrid-course experiences were significant predictors of Study Management. The same results indicated that learners who had more Internet experience reported a significantly higher level of Self-Efficacy and Cognitive Strategy.

Nowadays, several forms of educational technologies have been invented to assist and facilitate the process of teaching and learning at all educational levels. At the university level, the development of online learning has become more and

more important during recent decades. Today, online learning has been finding increased use widely all over the world in the form of web-based learning and Internet-based learning, and it may prove effective in facilitating advanced study coursework for both urban learners and rural students. For instance, the majority of universities in the United States are adding asynchronous web-based instruction to their undergraduate degree programs (Lynch & Dembo, 2004). Collins, Schuster, Ludlow, and Duff (2002) found that online learning can provide effective strategies for offering courses and field experiences in special education teacher preparation programs. Organizations apply online learning to employ web-based training in their employee training programs (Gravill & Copeau, 2008). In developed and developing countries, online learning has been used as a major form of distance education (Palmer & Holt, 2009).

While E-Learning has grown, many concerns about the quality of online education and self-learners have surfaced. At the same time, advances in learning strategies such as self-regulated learning (SRL) have been used in many countries as a specific form of learning strategies to influence students' achievement (Boekaerts & Cascallar, 2006). According to Pintrich (2000), self-regulated learning has been defined as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features of the environment" (p. 453). Puzziferro (2008) also pointed out that students who are self-regulating are much more likely to be successful in school, to learn more, and to achieve at higher levels. Some studies, however, showed that students have difficulty with self-regulated learning when learning in online learning environments (Lee, Shen, & Tsai, 2008; Tsai, 2010).

Online learning environments are a subcategory of distance education and are platforms where educational courses are delivered through the Internet, or using web-based instructional systems either in real-time (synchronously) or asynchronously. Reid (2005) stated that a web-based instructional system or online learning is easy for instructors and administrators, and inexpensive compared to traditional learning methods. According to Moore and Kearsley (2005), web-based instruction can make extensive use of network technologies to incorporate a variety of organizational, administrative, instructional, and technological components in offering flexibility concerning the new methodology of learning. Gravill and Copeau (2008) pointed out that online learning is self-managed when an instructor provides the software programs and resources to transfer new skills while the learners control the process to achieve their own objectives to acquire those new skills. Thus, the process of online learning is going to be implemented by the learners, and the learners will become active controllers instead of passive learners, which had been the study norm in past decades.

It is important for students to learn new skills and improve their self-learning strategies as technology rapidly changes or is introduced into the learning environments (Perry, Phillips, & Hutchinson, 2006). Learners are increasingly expected to

assess and manage their own learning needs. Wageman (2001) mentioned self-management, which is a subgroup of self-regulated learning, saying that it is a disciplinary skill that offers benefits, and learners have to learn this particular skill. Cheng (2011) also pointed out that students need to employ self-assessing, self-directing, controlling, and adjusting in order to acquire knowledge. Self-regulated learning will be one of the effective strategies to improve appropriate skills for students in the age of Technology-Enhanced Learning Environments (TELE).

Self-regulated learning has become a central topic in facilitating learning in online learning environments during the past decade. Self-regulated learning strategies have been identified widely in the field of Educational Psychology. Boekaerts and Corno (2005), Dweck (2002), and Perry and colleagues (2006) have defined self-regulated learning as a learning behavior that is guided by "metacognition" (thinking about one's thinking including planning, monitoring, and regulating activities), "strategic action" (organizing, time management, and evaluating personal progress against a standard), and "motivation to learn" (self-confidence, goal setting, and task value). Learners will choose their own best approach to learn the educational material and gain the study skills they need. To manage these self-regulated learning strategies effectively, learners have to make self-directed choices of the actions they will engage in, or of the strategies they will invoke to meet their learning goals. Self-regulated learning strategies have the potential of becoming study skills and regularly used behaviors. Individuals who are self-regulated learners believe that opportunities to take on challenging tasks, practice their learning, develop a deep understanding of subject matter, and exert effort will bring them to success in an academic area (Perry et al., 2006).

Self-regulated learning has been acknowledged in Thai educational research and development for over a decade. Educators, instructors, and researchers have applied the social cognitive theories of self-regulated learning (Bandura, 1997) in Thai learning processes in different ways, as shown in Teeraputon's dissertation (2003): Jaradol (1999, cited in Teeraputon, 2003) used the social cognitive theories in the training process for primary school teachers; Arnmanee (1996, cited in Teeraputon, 2003) studied the comparison of 9th grade students using SRL in reading techniques; Panmongkol (1999, cited in Teeraputon, 2003) studied the effect of the SRL program on academic achievements of 12th grade students; Techakomol (1998, cited in Teeraputon, 2003) studied the factors that influence SRL in middle school students in Bangkok; Watchai (1997, cited in Teeraputon, 2003) studied the effect of SRL on English reading; Teeraputon (2003) applied SRL strategies into the computer network for undergraduate students; etc. However, the majority of the recent research on self-regulated learning, especially in Thailand, either focuses on the relationship between SRL and academic performance, or implementation of self-regulated learning strategies into instructional processes by creating and applying a new instructionally designed model or prototype into traditional classrooms, but little in online learning courses.

Neither of these has described the existing SRL of online learners, nor examined the demographic factor differences. Therefore, this study intended to reduce the research gap mentioned above and provide guidelines for educators and instructors to design appropriate activities for online courses, and provide guidelines for online learners to improve their self-regulated learning strategies for online learning environments in Thailand.

The purpose of this study was to find out the relationship between two broad categories of SRL based on the study model of Pintrich, Smith, Garcia, and McKeachie (1993), which are motivation section and learning strategies section, and to investigate the relationship between the learner's demographic information and SRL. Three questions for this study were:

1. How are the learners' motivational characteristics related to the learners' self-regulation strategies?
2. Does learners' demographic information affect self-regulated learning strategies?
3. Does prior experience in online learning environments affect self-regulated learning strategies?

This study focused on the challenges faced by learners in online learning environments or web-based learning. The results of this study will be used in the future studies in the field of educational research by providing information regarding how the student's demographic information reflect to their self-regulated learning. Also, the result in this study will be used in the orientation process for novice learners in order to prepare and improve their learning skills to become successful learners in Thai's online learning environments.

REVIEW OF LITERATURE

There are a number of different theoretical views of self-regulated learning (SRL) that describe different constructs and different conceptualizations. This section review intends to focus on the most two SRL theories have been found in many educational researches in SRL field, two of which are Zimmerman's A Cyclic Phase Model and Pintrich's Conceptual Framework for Self-Regulated Learning.

Zimmerman's A Cyclic Phase Model

Zimmerman's self-regulated learning model is based on Bandura's Social Cognitive Theory, which consists of three main factors: the person, the person's behavior, and the person's environment. These factor interact with each other in a cyclical process; when one factor changes during learning, the changes will be monitored, and will lead to changes in the other factors. Based on this concept, Zimmerman conceptualized a cyclic phase model that acts in a cyclical manner

(Schunk, Prinrich, & Meece, 2008). A cyclic phase model has three phases, which are Forethought, Performance, and Self-Reflection. *Forethought or planning* is the phase that precedes learning and sets the stages. This phase consists of two major self-regulatory skills: Task analysis (goal setting and strategic planning) and Self-motivation beliefs (self-efficacy, outcome expectations, intrinsic interest/value, and learning goal orientation). *Performance or volitional control* is the phase that processes occurrences during learning to help the learner stay on the task. There are two major self-regulatory skills in this phase, which are Self-control (task strategies, imagery, self-instructions, time management, environmental structuring, and help seeking) and Self-observation (metacognitive self-monitoring and self-recording). The last phase is *Self-reflection*, which evaluates a task that cycles back and influences Forethought. This phase has two major subprocesses, which are Self-judgment (self-evaluation and causal attribution) and Self-reaction (self-satisfaction/affect and adaptive/defensive) (Zimmerman, 2002).

Pintrich's Conceptual Framework for SRL

According to Pintrich's definition of SRL (2000), "self-regulated learning is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior in the service of those goals, guided and constrained by both personal characteristics and the contextual features in the environment" (p. 453). Pintrich and Zusho (2002) pointed out that this definition is relatively simple, but the remainder of this definition had outlined the various processes and areas of regulation such as the application to learning and achievement in the academic domain. As a result, they developed a framework of four-phase self-regulated learning model for classifying the different phases and areas for regulation. These four phases include:

- Phase 1. Forethought, planning, and activation, which involves planning and goal setting as well as activation of perceptions and knowledge of the task and context and the self in relation to the task;
- Phase 2. Monitoring, which concerns various monitoring processes that represent metacognitive awareness of different aspects of the self and task or context;
- Phase 3. Control, which involves efforts to control and regulate different aspects of the self or task and context; and
- Phase 4. Reaction and reflection, which represents various kinds of reactions and reflections on the self and the task or context (Pintrich & Zusho, 2002).

Research found that self-regulation is an important aspect of learning and achievement in academic contexts. For instance, Puziffero (2008) found students who are self-regulating are much more likely to be successful in school, to learn

more, and to achieve at higher levels. Self-regulated learning will result in student achievement and scores as presented in many standardized tests. Although many studies have been written about SRL in the traditional classroom, there are some studies emerging that begin to examine the impact of SRL in distance and distributed learning environments; specifically, whether SRL strategies should be implemented in a similar way to those that are implemented within traditional classroom environments, and whether there is a need to develop and recommend additional SRL strategies (Kitsantas & Dabbagh, 2004; Whipp & Chiarelli, 2004). Those studies begin to provide general evidence that SRL can be facilitated in online learning environments. They also begin to provide guidance on general web-based pedagogical tools that can facilitate such learning outcomes.

Whipp and Chiarelli (2004) conducted case study research that investigated the general question of how SRL strategies could be translated to online environments, and they also attempted to identify whether SRL strategies recommended for traditional classroom instruction could be applied to online learning environments or if different strategies were needed. They concluded that some traditional SRL strategies, such as time management and goal setting, were directly able to apply to the online learning environments. Also, much of the research on SRL in online education assumed that effective SRL depends on students' confidence in their ability to attain designated types of performances (Zimmerman, 2002).

Eom and Reiser (2000) examined the effects of SRL strategies use on achievement and motivation in 37 middle school students taking a computer-based course. Importantly, the authors were trying to determine how varying the amount of learner control within the computer-based course might effect the achievement and motivation of students with high or low SRL skills. The authors used a self-report instrument; students were classified as being either high or low self-regulated learners and then were randomly assigned to either a learner-controlled or program-controlled version of a computer-based course. Results revealed that, regardless of how students rated their SRL skills, "learners in the program-controlled condition scored significantly higher on a posttest than did learners in the learner-controlled condition" (Eom & Reiser, 2000, p. 247). Also, experts in SRL believe that online learning environments require the learner to assume greater responsibility for the learning process (Artino, 2007; Kitsantas & Dabbagh, 2004; Schunk & Zimmerman, 1998). Furthermore, many of these same experts argue that self-regulatory skills are essential for success in these highly autonomous learning situations (Artino, 2007; Kitsantas & Dabbagh, 2004).

Zimmermann and Martinez-Pons (1990), experts in self-regulated learning, examined 5th, 8th, and 11th grade students' differences in self-regulated learning with respect to several variables including gender. They found that male and female students demonstrated differences to using self-regulated learning strategies in their learning; girls tend to employ self-monitoring, goal setting, planning, and structuring of their study environment much more often than boys. Similarly, Lee (2002) found three main gender difference issues in SRL strategies, which are:

1. the styles, purposes, and dynamics of social interactions;
2. motivational factors; and
3. the styles and frequencies of expression, discussion, or feedback.

Chyung (2007) also found that female student improved their self-efficacy significantly more and scored significantly higher on the final exam than male students.

The theoretical framework for this study was an adaptation of a general expectancy-value model of motivation, which is composed of three motivational components: a) Intrinsic value or a value component, which includes students' goals and beliefs about the importance and interest of the task; b) Self-efficacy or an expectancy component, which includes students' beliefs about their ability to perform a task; and c) Test Anxiety or an affective component, which includes students' emotional reactions to the task. The expectancy component of student motivation will be positively related to the three self-regulated learning components, which are:

1. cognitive strategy use;
2. metacognitive strategy use; and
3. management of effort (Pintrich & De Groot, 1990).

The Motivated Strategies for Learning Questionnaire (MSLQ) was developed at the National Center for Research to Improve Postsecondary Teaching and Learning at the University of Michigan. The instrument has been under development since 1986 when the Center was founded. It was designed to assess college students' motivational orientations and their use of different learning strategies in college courses (Pintrich & De Groot, 1990). The original MSLQ contains 81 items in two sections, a motivation section and a learning strategies section. The motivation section contains 31 items in 6 subscales: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performances, and Test Anxiety Awareness. The learning strategy section contains 50 items in 9 subscales: rehearsal, elaboration, organization, critical thinking, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, and help seeking (Lynch & Dembo, 2004). The MSLQ instrument has been used widely in investigating students' motivation and learning strategies in many countries, and has been used in various disciplines: educational psychology, biology, social science, accounting, dietetics, and teacher education, etc. (Chen, 2002).

METHOD

Participants

In this study, the research participants ($n = 88$) were drawn from a simple convenience sampling from current Thai undergraduate and graduate students over the age of 18, who are enrolled in online courses and hybrid courses at

Chulalongkorn University in Thailand. Participants who enrolled in online courses and hybrid courses were asked to complete the survey online. Participants were asked about their demographic information, their experience in online learning, and their self-regulation behaviors. An online web survey system, "Kwik Surveys," was used to gather data about students' self-regulation behaviors in online learning environments. The survey was opened and accessible for 4 weeks and received 88 responses, and they were all completed ($n = 88$). The current level of education of the sample was 35% Doctoral, 32% Master, 26% Other (Certificate), and 7% Undergraduate students. There were 48 males, 17 males enrolled as full-time students, and 31 males as part-time students. There were 40 females, 17 participants as full time students and 23 participants as part time students (see Table 1).

The demographic information having been considered in correlation and comparison process in this study consists of current level of education, highest level of education, academic status, GPA, gender, age range, and marital status. Seventy-three percent of participants graduated with a Master's degree, 19% graduated with a Bachelor degree, 4.5% of participants graduated with a Ph.D, and 2.3% had high school. Sixty-one percent of participants were part-time students and 39% were full-time students. Seven level of GPA of participants were found; 40% were in the highest grade level, about 35% were in the high grade level, and about 6% were in the low grade level. Almost 60% were single, 38% were married, and 2% were divorced. Forty percent were 31-40 years old, and only 2% were 18-20 years old.

Instrumentation

The instrument has two parts: part 1 consisted of demographic questions and learners' experiences; part 2 was 44 questions from the MSLQ. The independent variables were the students' demographic information, which consist of current level of education, highest level graduated, academic status, GPA, gender, age range, and marital status. Other independent variables gathered from the survey part 1 concerned the information about the prior experiences using the Internet and taking online courses. These include Internet experience, Internet usage daily, online course experience, and hybrid course experience. The majority of the participants (77%) had 7 years or more using the Internet, and only 1% of them had experiences of less than 6 months using Internet. Thirty-three percent of participants used 8 hours or more of the Internet daily. About 30% of them used the Internet 3-4 hours/day; the least, 1% spent 1 hour/day using the Internet. The question about the number of online courses and hybrid courses that participants have taken before taking the current course showed that almost 40% of learners had never taken the online course and half of participants had never taken the hybrid course before; 20% had experienced at least one online

Table 1. The Number of Participants' Demographic Data

Current level		Graduated level		Study		GPA		Gender		Age range		Status	
UnderGrad	6	High school	2	Full-time	34	Below 2.50	3	Male	48	18-20	2	Single	52
Master	28	College	18	Part-time	54	2.51-3.00	12	Female	40	21-30	28	Married	34
Ph.D.	31	Master	64			3.01-3.50	23			31-40	35	Divorced	2
Other	23	Ph.D.	4			3.51-4.00	50			41-50	18		
										51-60	5		
Total	88		88		88		88		88		88		88

course, another 20% had experienced five or more online courses, and about 24% of participants had experienced at least one online or hybrid course before taking this class.

The dependent variables were selected from the literature review and were based on the Motivated Strategies for Learning Questionnaire (MSLQ) in the study of Pintrich and De Groot (1990). The five self-regulatory variables used in this study were: a) intrinsic goal, b) self-efficacy, c) test anxiety awareness, d) cognitive strategy, and e) self-regulation (Pintrich & De Groot, 1990). However, the name of the last dependent variable from the original study, self-regulation, might confuse readers because the word self-regulation covers the meaning of all dependent variables of this study. Thus, to avoid confusion meaning, researchers renamed the last dependent variable "self-study management," which covered all items for this factor in the MSLQ.

The original MSLQ of Pintrich and De Groot (1990) were used to measure students' motivational beliefs and self-regulated learning. There were 81 items on the original questionnaire, but some items indicated were used for traditional classroom measurement. Therefore, only 44 items were selected to be used in this study to assess learners' motivated and self-regulated learning strategies used during an online or hybrid course. The questionnaire was developed and translated into two languages, English and Thai. The online web survey system known as "Kwiksurveys" was used to collect data from Thai undergraduate and graduate students who enrolled in online courses or hybrid courses at Chulalongkorn University, Bangkok, Thailand. The URL link of the Kwiksurveys was sent via e-mail directly to each student by the instructors of those courses. The survey instrument consists of two parts. Part 1 of the survey collected basic demographic data: current level of education, highest level graduated, academic status, GPA, gender, age range, and marital status. Part 1 also collected data about prior experiences using the Internet and online learning environments, general Internet experience and usage, online course experience, and hybrid course experience. For part 2, the MSLQ was adapted to gather the data about learners' motivated and self-regulated learning during the course. The questionnaire was used to collect responses to 44 questions about self-regulation behaviors. The participants responded to questions about their intrinsic goals, self-efficacy, test anxiety awareness, cognitive strategy, and self-study management. Learners were instructed to respond to the items on a 7-point Likert scale (1 = *not at all true of me* to 7 = *very true of me*) in terms of their behavior in their current online learning course environment.

Data Analysis

For the MSLQ questions, factor analysis was used to guide scale construction, resulting in exclusion of some of the items from the scales because of a lack of correlation or stable factor structure. Analysis of the motivational items revealed

three distinct motivational factors: intrinsic goals, self-efficacy, and test anxiety awareness. The Intrinsic Goal scale ($\alpha = 0.91$) was constructed by taking the mean score of the learner's response to 13 items concerning intrinsic interest in and perceived importance of course work as well as preference for challenge and mastery goals. The Self-Efficacy scale ($\alpha = 0.89$) consisted of seven items regarding perceived competence and confidence in performance of class work. Nine items concerning worry about and cognitive interference on tests and reading for class work were used in the Test Anxiety Awareness scale ($\alpha = 0.86$). Analysis of the self-regulated learning strategy items shows two SRL strategy factors: cognitive strategy and self-study management. The Cognitive Strategy scale ($\alpha = 0.87$) consisted of nine items pertaining to the use of rehearsal strategies and elaboration strategies. The last scale, Self-Study Management scale ($\alpha = 0.77$), was constructed from five items related to the metacognitive and effort management such as planning, skimming, organizing, and comprehension monitoring were adapted. However, one item about testing preparation ("When I study for a test I try to remember as many facts as I can") was not used in any factor because the factor analysis of the items did not support the construction of that item.

In total, 88 valid surveys were collected. After retrieving those data from the results of the online survey system, Kwiksurveys, and keying the code into the computer spreadsheet, SPSS was then used to process the data. Descriptive Analysis is the first step of analysis. This was done to try to reproduce the fundamental data set on SPSS and to confirm the same picture was obtained from this data set. With the descriptive statistic result, all 44 SRL-questions, including the negative questions that were reflected before the analyzing process, have been responded to by 88 subjects ($N = 88$). The highest mean score of the total 44 questions is question number SRL-15, "I think that what I am learning in this class is useful for me to know," ($\bar{x} = 6.16$), the minimum and maximum are between 1 and 7. That means all of the respondents found intrinsic value in learning in their class. On the other hand, the lowest mean score of these data is at question number SRL-41, "When I read materials for this class, I say the words over and over to myself to help me remember," ($\bar{x} = 3.41$), and the minimum and maximum are between 1 and 4. Also, the standard deviation score is quite high ($SD = 1.82$). It is assumed that respondents' self-regulation strategies for this question reflect diversity, or that this strategy is not used in the culture of Thai students.

Reliability analysis found the value of Cronbach's alpha of the instrument. The alpha is a conservative measure which sets an upper limit on reliability (Nunnally, 1967). According to DeVellis (1991) in Table 2, a Cronbach's alpha coefficient of over 0.7 implies respectable to high reliability. Cronbach's alpha theoretically ranges from zero to one with the following guidelines (Dunn-Rankin, Knezek, Wallace, & Zhang, 2004). The internal consistency reliability of the instrument with 44 Likert-scaled items was determined calculating Cronbach's

Table 2. Cronbach's Alpha Theoretically Ranges

DeVellis Reliability Guidelines	
Below .60	Unacceptable
Between .60 and .65	Undesirable
Between .65 and .70	Minimally acceptable
Between .70 and .80	Respectable
Between .80 and .90	Very good
Much above .90	Consider shortening the scale

Source: DeVellis, 1991, p. 85.

alpha for the study data ($\alpha = 0.911$). It was found to have a high reliability score at 0.91, or very good reliability ($\alpha > 0.90$) on the Cronbach's alpha theoretically ranges for this survey instrument.

An exploratory factorial analysis was performed to measure scale construct validity in order to find the possible factorial structure of the SRL-items. The 88 subjects for 44 items were submitted to Principal Component Analysis and Varimax rotation with Kaiser Normalization. The results showed nine rotated components matrix at the first time or produced nine factors; however, some of those items in each factor were weak and were negative. Also, examination of the Scree Plot (Figure 1) illustrated that there were approximately five or six factors. From the factor analysis results and the scree plot, the researcher decided to run the factor analysis again by forcing the results into six factors, but the results from six factors showed one weakest factor that consists of one item. Thus, the researcher decided to use only five strong factors, and removed the factor with one item. The results and analysis can be viewed in Table 3. Reviewing the questions and checking with the scree plot and the results of the factor analysis, the researcher decided to use five factors, and named the new factors (1) Intrinsic goal, (2) Self-Efficacy, (3) Test Anxiety Awareness, (4) Cognitive Strategy, and (5) Study Management, and then ran a reliability test on each factor. The results can be seen in Table 4.

Reliability analysis revealed that all subscales had good internal consistency reliabilities. As shown in Table 4, it appears that the alpha values for the first four factors were quite strong, $\alpha = 0.91$, $\alpha = 0.89$, $\alpha = 0.86$, and $\alpha = 0.87$ respectively, while the alpha value of the fifth factor was considerably weaker than the others ($\alpha = 0.77$), and the number of questions has only five items. Although the alpha

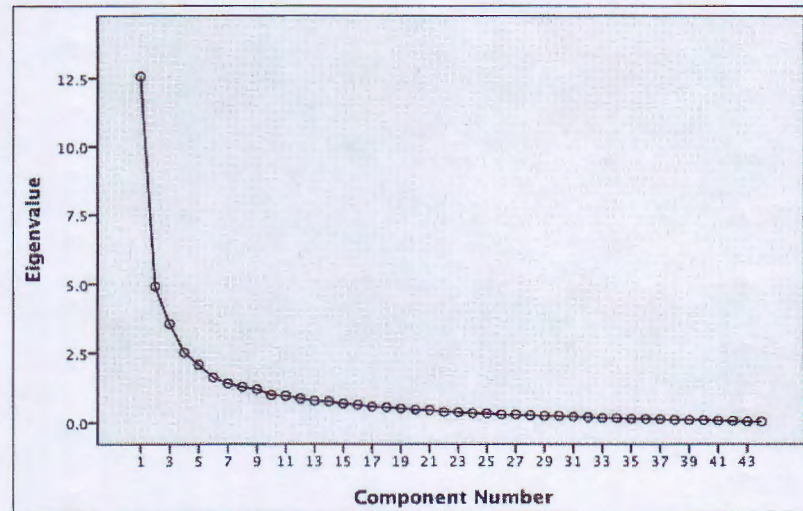


Figure 1. Scree Plot of factorial analysis illustrated five-six factors.

value of the last factor was high enough to be acceptable at the level of respectable (DeVellis, 1991), the researcher felt that a review of the questions and increasing the number of questions associated with this factor is desirable to increase its reliability in measuring the construct.

RESULTS

This 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, a Multivariate Analysis of Variance (MANOVA), and a Multiple Regression Analysis were run on SPSS/PASW program. The level of significance used for the analyses was .01.

The first question of this study concerned the relations between the motivation factor and the self-regulation strategy. The convergent and discriminate validity were examined through the inter-factor correlations. The results were generally as expected. Table 5 displays the correlations among the three motivational components (Intrinsic Goal, Self-Efficacy, and Test Anxiety Awareness) and the two self-regulation strategies (Cognitive Strategy and Study Management). Higher levels of Intrinsic Goal ($r = .67$) and Self-Efficacy ($r = .40$) were correlated with higher levels of Cognitive Strategy at the .01 of significance level

Table 3. Factorial Analysis by Forcing into Six Factors

Rotated Component Matrix ^a						
	Component					
	1	2	3	4	5	6
SRL-15	.839			.153		.177
SRL-17	.818	.259	.108			
SRL-7	.747	.149		.244	-.160	.135
SRL-14	.717	.114	.114	.313		.225
SRL-5	.675	.317	.110			
SRL-21	.647		.159	.303	.178	.232
SRL-19	.617	.455	.111	.199	.119	
SRL-6	.546	.444	.151		.175	-.370
SRL-1	.546			.140		-.198
SRL-23	.534			.481	.208	.251
SRL-10	.531	.410	.116	.160	.225	-.104
SRL-29	.524		-.360		.332	
SRL-4	.487	.359		.239	.201	.360
SRL-9	.230	.852				.199
SRL-2		.794				
SRL-16		.791	-.243			
SRL-13	.117	.779	.129	.168	.130	.130
SRL-18	.347	.710	-.190	.100		-.170
SRL-11	.485	.575		.156	.141	-.104
SRL-8	.374	.555	.135	.132	.160	.358
SRL37_r	.209		.764		.197	-.106
SRL38_r	.270		.746			.195
SRL26_r	.101		.740	.139		-.232

Table 3. (Cont'd.)

Rotated Component Matrix ^a						
	Component					
	1	2	3	4	5	6
SRL22_r	-.144		.715	.192	-.259	.188
SRL20_r			.707	.113	-.304	-.284
SRL27_r		.159	.627	-.149	.300	.190
SRL12_r		-.101	.613		-.185	-.136
SRL3_r			.577			-.448
SRL40_r	.109		.563	.170		.312
SRL-33	.212			.801	.155	
SRL-32				.728		
SRL-28	.290	.136		.669		-.103
SRL-44	.477		.166	.607	.159	
SRL-43	.251	.258		.591	.179	.359
SRL-24	.230	.399		.501		.402
SRL-36	.302	.337	.198	.480	.205	.226
SRL-25	.403	.222	.147	.469		
SRL-39	.349	.289	.199	.440		.194
SRL-34	.133	.113		.157	.836	.141
SRL-41	-.138		-.321	.124	.700	
SRL-31			-.108	.394	.574	
SRL-35	.365	.109		.420	.522	
SRL-42	.150	.219		.299	.487	-.567
SRL-30	.305		-.202	.176		.464

Note: Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.

^aRotation converged in nine iterations.

Table 4. Factor Names and Alpha Values with All Questions Included

Factor	Factor name	SRL-items number	Cronbach's alpha
1	Intrinsic Goal (13)	15, 17, 7, 14, 5, 21, 19, 6, 1, 23, 10, 29, 4	.91
2	Self-Efficacy (7)	9, 2, 16, 13, 18, 11, 8	.89
3	Test Anxiety Awareness (9)	37r, 38r, 26r, 22r, 20r, 27r, 12r, 3r, 40r	.86
4	Cognitive Strategy (9)	33, 32, 28, 44, 43, 24, 36, 25, 39	.87
5	Study Management (5)	34, 41, 31, 35, 42	.77

Table 5. The Inter-Factor Correlations

		Intrinsic Goal	Self- Efficacy	Test Anxiety	Cognitive Strategy	Study Management
Intrinsic Goal	Pearson Correlation	1	.554**	.150	.666**	.320**
	Sig. (2-tailed)		.000	.162	.000	.002
	N	88	88	88	88	88
Self-Efficacy	Pearson Correlation	.554**	1	.007	.403**	.208
	Sig. (2-tailed)	.000		.949	.000	.052
	N	88	88	88	88	88
Test Anxiety	Pearson Correlation	.150	.007	1	.161	-.141
	Sig. (2-tailed)	.162	.949		.134	.189
	N	88	88	88	88	88
Cognitive Strategy	Pearson Correlation	.666**	.403**	.161	1	.468**
	Sig. (2-tailed)	.000	.000	.134		.000
	N	88	88	88	88	88
Study Management	Pearson Correlation	.320**	.208	-.141	.468**	1
	Sig. (2-tailed)	.002	.052	.189	.000	
	N	88	88	88	88	88

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

Figure 2. Two-dimensional output graphic of all SRL-items.

The second question concerned the effect of demographic information on SRL strategies. The seven demographic variables—current education level, highest level graduated, academic status, GPA range, gender, age range, and marital status—were entered into the simple correlation process. Then, a Multivariate Analysis of Variance (MANOVA) was used to infer the differences of means in each demographic variable to see whether or not the demographic information affected self-regulated learning strategies. As indicated in Table 6, when all seven demographic variables were included in the simple correlations, only Study Management was significantly correlated at the 0.01 level ($p < .01$) with education level, highest graduation, and age range at positive levels, $r = .36$, $r = .34$, and $r = .23$ respectively. Learners with higher levels of education, degree, and age range tend to have higher levels of Study Management. Academic status (full-time, part-time), however, was negatively significant ($r = -.363$) with Self-Efficacy, indicating that part-time learners tend to have lower Self-Efficacy than full-time learners. MANOVA results revealed that some of the SRL strategies were affected by some of the demographic sources; Study Management was significantly affected by education level ($F = 5.00$, $p < .003$, $MS = 6.49$) and highest graduation ($F = 4.07$, $p < .005$, $MS = 5.26$); Self-Efficacy was significantly affected by academic status (full-time had higher mean scores than part-time) at the level $F = 13.02$, $p < .001$, $MS = 12.29$.

The last question of this study concerned the effect of prior experience predicted the SRL strategies. To examine the independent relations between Internet experience and online course experience on learners' SRL strategies, five separate multiple regression analyses were run with the two Internet experiences (Internet experience and Internet using daily) and two online course experience variables (Online course experience and Hybrid course experience) as predictors of the affects of learners' SRL strategies on Intrinsic Goal, Self-Efficacy, Test Anxiety Awareness, Cognitive Strategy, and Study Management. When the variables were entered into the multiple regression analysis, results revealed three predictors of learners' experiences related to three learners' SRL strategies. Multiple regression of Intrinsic Goal showed an adjusted R^2 of .012, revealed that daily Internet usage was positively related to Intrinsic Goal ($\beta = .19$, $p < .05$); Daily Internet use accounted for about 1.2% of the variance in Intrinsic Goal component. The results of Self-Efficacy showed an adjusted R^2 of .201, revealed that Daily Internet use made significant contributions in predicting the variance in Self-Efficacy ($\beta = .48$, $p < .0001$; accounting for about 20% of the variance in Self-Efficacy). The results on Study Management component showed an adjusted R^2 of .034, revealed that Internet experience was positively related to Study Management ($\beta = .20$, $p < .05$). The second predictor, Hybrid course experience, was significantly related to Study Management at an adjusted R^2 of .229 ($\beta = .19$, $p < .05$). Together, therefore, Internet experience and Hybrid course experience accounted for about 26% of the variance in Study Management component. The online course experience did not contribute significantly in the multiple regression equation.

Table 6. Compare Means (MANOVA): Test of Between-Subjects Effects of Self-Regulated Learning and Demographic Groups

	Current edu. level		Graduated level		Study part/full		GPA		Gender		Age range		Status	
	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Intrinsic Goal	1.838	.146	.622	.648	1.663	.201	.961	.457	1.438	.234	.263	.932	1.589	.210
Self-Efficacy	1.938	.130	.539	.707	13.02	.001	.904	.496	.321	.572	.818	.540	.662	.519
Test Anxiety	1.000	.397	.806	.525	1.725	.192	1.637	.148	.584	.447	1.563	.180	4.407	.015
Cognitive Strategy	.519	.670	1.386	.246	.002	.968	.482	.820	.126	.723	1.300	.272	1.958	.147
Study Management	5.004	.003	4.073	.005	.038	.845	1.732	.124	.309	.580	2.248	.057	.682	.508

DISCUSSION AND CONCLUSION

The findings showed the overall correlation between the learners' motivational components and the learners' self-regulation strategies had a correlated significance at .01 ($r = .37, p < .01$). A closer look at sub-factors found that Intrinsic goal and Self-efficacy were correlated with Cognitive strategy and Intrinsic goal correlated with Study management. Also, there was significant correlation between Intrinsic goal and Self-efficacy, and between Cognitive strategy and Study management. These correlations support the findings of Pintrich and De Groot (1990), that the motivational components were linked in important ways to student cognitive engagement and the Intrinsic value was very strongly related to use of cognitive strategies and self-regulation (Pintrich & De Groot, 1990). Wang and Newlin (2002, cited in Lynch & Dembo, 2004) pointed that self-efficacy was positively related to student cognitive engagement. Assuming that if online learners applied these two motivation components in their learning habits, they will be accommodated with these two self-regulation strategy components. However, it was found that one of the learners' motivational components, Test Anxiety Awareness, was not significantly related with any factor in any component. Similarly, Pintrich and De Groot (1990) stated that Test Anxiety Awareness was not significantly related in a linear or nonlinear fashion to use of cognitive strategies or self-regulation. In contrast, Hill and Wigfield (1984, cited in Pintrich & De Groot, 1990) found that high-anxious students reported less self-regulation and persistence. Also the theory of cognitive models of Test Anxiety, Benjamin, McKeachie, and Lin (1987, cited in Pintrich & De Groot, 1990) posted that for some test-anxious students who actually have adequate cognitive skills, test anxiety during exams engenders worry about their capabilities that interferes with effective performance (Pintrich & De Groot, 1990). From this point, Test Anxiety Awareness was supposed to be related with some components of self-regulation strategies. One reason that could explain the difference in this study is that some questionnaire items in Test Anxiety Awareness factor were not directly related to Test Anxiety Awareness (such as item 26 "it is hard for me to decide what the main ideas are in what I read," and item 27 "when work is hard I either give up or study only the easy parts"), but the Factorial analysis allows the researcher to group the items that were somewhat related to other items. Another explanation would be that the negative questions were asked of Thai learners, so it might be a translation error or cultural issue that led to the error in an analyzing process. This is one concern for further research.

The next finding was about the influence between learners' demographic information and SRL strategies. While most research studies tried to investigate the affect of SRL strategies on student achievement or student performance or the affect of other factors on SRL strategies, this study intended to report on the different characteristics of online learners as determined from their demographic information in order to improve Self-regulatory skills for online learning

environments. This study found only one SRL component, Study management, that was significantly affected by three of seven demographic information, which were Education level, Highest graduation, and Age range. Pintrich and colleagues (1993) pointed out, for example, that boys differ from girls in self-efficacy; boys rated themselves more efficacious than did girls, and boys felt less test anxious than did girls. Lynch and Dembo (2004) suggested in their research study that individual difference variables (such as age and gender) should be investigated in future research into the relationship between self-regulation and online learning generally. In this study, MANOVA was used to analyze the differences in learners' demographic data. Research found that learners who had a higher level of education, degree, and age range tend to have a higher level of Study management. This implies that learners who have a lower level of education, degree, or younger age may need to improve their study management habits. This study did not find any significant relationship to other demographic variables such as Academic status, GPA, Gender, and Marital status. An appropriate research design and data analysis might help further research to reveal the individual differences among learners' demographic information.

The last finding concerned the affect of learners' experience with the Internet and prior online coursework. Multiple regression analysis was used to examine the predictor variables that would influence SRL strategies. Three of four predictor variables were found to be statically significant in relation to SRL strategies. Daily Internet usage was positively related to both Intrinsic goal and Self-efficacy variables. It can be predicted that learners who used the Internet more tend to have high levels of Intrinsic goals and more Self-efficacy. In Thailand, Internet access is not facilitated the same way as in the United States; only learners who live in urban areas will have full facilities. Thus, for learners who lack Internet access, other ways to improve their SRL strategies might be needed. "Study management" was statistically significantly affected from two factors of learners' experience: Internet use and having studied before in a hybrid course. Fifty percent of Thai learners who participated in this study reported that they have studied in hybrid course(s). It was not surprising that Study management was affected by these two predictor variables because the more experience learners have, the higher the level of Study management they practiced. What was surprising was that online course experience, which was similar to hybrid course, was not related to any component of SRL strategies. However, as per prior expectation, learners who have more Internet experience and online learning experience have higher levels in all components of SRL strategies. Test Anxiety Awareness and Cognitive strategy also were not related to any of the learners' experience. Chen (2002) found in his study that prior computer experience did not help students achieve higher test scores.

In conclusion, this study found the answers for three research questions. There were significant correlations between five components of SRL strategies, except that the Test Anxiety Awareness was not found to be significantly related to the

others. This study found that there were some correlations between learners' demographic information and SRL strategies. Study management was related to education level, highest graduation, and age range; Self-efficacy had an inverted relationship with Academic status. The third finding was that the three SRL strategies were accurately predicted for Internet experience, Internet using daily, and experience with hybrid courses. However, not all findings were as expected. Several limitations were found. One is that the sample size needs to be increased and/or the sample needs to be drawn from a wider geographic area. Another would be that the MSLQ instrument, which was adapted from the research studies by Pintrich and De Groot (1990) and translated into Thai, might not be an appropriate instrument to assess effective learning strategies in Thai culture, since it differs from American culture. Also, the instrument might not cover all learners' behaviors because it was cut down from original 81-item to 44-item questions, which were involved with online learning environments. Hence, learners in online learning environments need more than five SRL strategies to be successful online learners, especially in Thailand.

REFERENCES

- Artino, A., Jr. (2007). Self-regulated learning in online education: A review of the empirical literature. *International Journal of Instructional Technology and Distance Learning*, 4(6), 3-18.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman and Company.
- Boekaerts, M., & Cascallar, M. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review*, 18(3), 199-210.
- Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology: An International Review*, 54(2), 199-231.
- Chen, C. S. (2002). Self-regulated learning strategies and achievement in an introduction to information systems course. *Information Technology, Learning, and Performance Journal*, 20(1), 11-25.
- Cheng, E. (2011). The role of self-regulated learning in enhancing learning performance. *International Journal of Research*, 6(1), 1-16.
- Chyung, S. Y. (2007). Age and gender differences in online behavior, self-efficacy and academic performance. *Quarterly Review of Distance Education*, 8(3), 213-222.
- Collins, B. C., Schuster, J. W., Ludlow, B. L., & Duff, M. (2002). Planning and delivery of online coursework in special education. *Teacher Education and Special Education*, 25(2), 171-186.
- DeVellis, R. F. (1991). *Scale development: Theory and applications*. Newbury Park, CA: Sage.
- Dunn-Rankin, P., Knezek, G. A., Wallace, S., & Zhang, S. (2004). *Scaling methods*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Dweck, C. S. (2002). Beliefs that make smart people dumb. In R. J. Sternberg (Ed.), *Why smart people do stupid things*. New Haven, CT: Yale University Press.
- Eom, W., & Reiser, R. A. (2000). The effects of self-regulation and instructional control on performance and motivation in computer-based instruction. *International Journal of Instruction Media*, 27(3), 247 (research library).
- Gravill, J., & Compeau, D. (2008). Self-regulated learning strategies and software training. *Journal of Information & Management*, 45, 288-296.
- Kitsantas, A., & Dabbagh, N. (2004). Supporting self-regulation in distributed learning environments with web-based pedagogical tools: An exploratory study. *Journal on Excellence in College Teaching*, 15(1/2), 119-142.
- Lee, C. (2002). The impact of self-efficacy and task value on satisfaction and performance in a Web-based course. *Dissertation Abstracts International*, 63(05), 1798. (UMI No. 3054599)
- Lee, T.-H., Shen, P.-D., & Tsai, C.-W. (2008). Applying web-enabled problem-based learning and self-regulated learning to add value to computing education in Taiwan's vocational schools. *Educational Technology & Society*, 11(3), 13-25.
- Lynch, R., & Dembo, M. (2004). The relationship between self-regulation and online learning in a blended learning context. *The International Review of Research in Open and Distance Learning*, 5(2). Retrieved June 1, 2010 from <http://www.irrodl.org/index.php/irrodl/article/viewArticle/189/271>
- Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Belmont, CA: Wadsworth.
- Nunnally, J. C. (1967). *Psychometric theory*. New York, NY: McGraw-Hill.
- Palmer, S., & Holt, D. (2009). Students' perceptions of the value of the elements of an online learning environment: Looking back in moving forward. *Interactive Learning Environments*. Retrieved from <http://www.informaworld.com/smpp/content~db=all?content=10.1080/09539960802364592>
- Perry, N. E., Phillips, L., & Hutchinson, L. R. (2006). Preparing student teachers to support for self-regulated learning. *Elementary School Journal*, 106, 237-254.
- 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* (pp. 451-502). San Diego, CA: Elsevier Academic Press.
- Pintrich, P. R., & De Groot E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33-40.
- Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, 53, 801-803.
- Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In A. Wigfield & J. S. Eccle (Eds.), *Development of achievement motivation* (Chap. 10, pp. 249-284). San Diego, CA: Elsevier Academic Press.
- Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *American Journal of Distance Education*, 22(2), 72-89.
- Reid, R. (2005). Public works takes its IT learning to the web. *Computer World Blogs*, (February, 2005).

- Schunk, D. H., Prinrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications* (3rd ed.). Upper Saddle River, NJ: Pearson Merrill/Prentice Hall.
- Schunk, D. H., & Zimmerman, B. J. (Eds.). (1998). *Self-regulated learning: From teaching to self-reflective practice*. New York, NY: Guilford.
- Teeraputon, D. (2003). *Implementation of self-regulated learning strategy on computer network for undergraduate students*. Dissertation (Ph.D). Chulalongkorn University, Bangkok, Thailand.
- Tsai, C. W. (2010). The effects of feedback in the implementation of web-mediated self-regulated learning. *CyberPsychology & Behavior*, 13(2), 153-158.
- Wageman, R. (2001). How leaders foster self-managing team effectiveness: Design choices versus hands-on coaching. *Organization Science*, 12(5), 559-577.
- 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.
- Zimmerman, B. J. (2002, Spring). Becoming a self-regulated learner: An overview. *Theory into Practice*, 41(2), 64-70.
- Zimmerman, B., & Martinez-Pons, M. (1990). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology*, 80(3), 284-290. doi: 10.1037/0022-0663.80.3.284

Direct reprint requests to:

Dr. Buncha Samruayruen
 Faculty of Education
 Phibulsongkram Rajabhat University
 66 Wangchan Road
 Muang, Phitsanulok 65000
 Thailand
 e-mail: bs0142@unt.edu