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Learning Skills and Academic Stress Coping Styles in Senior High School Students

Wilaiwan Srisongkhram[1] and Worawan Srisongkhram[2]
[1]Rajamangala University of Technology Thanyaburi, Thailand
[2]Kasetsart University Laboratory School Center for Educational Research and Development, Thailand

Abstract

This study focused on the fundamental variables affecting how learning skills predict stress coping styles. Data were gathered from 279 students in Grades 10–12 from a demonstration school. Questionnaire answers were analyzed by stepwise multiple regression and canonical correlation to identify the best predictors of each learning skill and stress coping style. Learning skills were correlated strongly with student lesson attendance 4–7 times per week, and especially when they were in Grade 10. Stress coping style usage was shown consistently by male students studying in the science program, and attending lessons 4–7 times per week. Finally, results from the study revealed that surface learning skills positively correlated with passive emotion and passive problem coping styles, but negatively correlated with active problem coping. These results will help teachers plan lessons that will encourage positive learning styles in students.

Keywords: *Learning skills, academic stress, stress coping styles, fundamental variables*

Introduction

Senior high school students face several learning issues as they prepare to enter higher education (Elias, Ping, & Abdullah, 2011; Thenga, Mutshaeni, & Mashau, 2015). Several external and internal factors affect how successful a student is while managing these issues. Internal factors that allow students to successfully cope with the challenges they face include their academic backgrounds, core learning skills, study techniques and ability to meet personal learning goals (Lei, 2015). In contrast, external factors affecting these students include academic stress, work load, classroom environment, subject difficulty, and interpersonal relationships with teachers and friends (Feld & Shusterman, 2015; Kosheleva, Amarnor, & Chernobilsky, 2015; Shahmohammadi, 2011). Since stress is an important factor affecting students' ability to meet their learning goals, they must choose suitable methods for managing their stress levels. Unfortunately, evidence from previous research has shown decreasing rates of positive coping methods amongst students, along with increased rates of using negative, inferior coping methods (Ben-Eliyahu & Kaplan, 2015). Additionally, students are not always flexible with their stress management techniques and may not orient their learning goals properly. Since students choose negative stress management techniques, their level of stress does not decrease. This can significantly affect their ability to receive, process, or recall information. Over time, this can lead to reduced academic performance and brain functionality (Owens, Stevenson, Hadwin, & Norgate, 2008, 2012).

Whenever students cannot master or apply learning skills, stress occurs through the operation of a physiological mechanism. When this occurs, students tend to use familiar, constant coping mechanisms, which may not actually reduce stress (Owens et al., 2004, 2012). As a result, the students' level of stress remains and continues to build over time (Putwain, Woods, & Symes, 2010). When students experience too much stress, cognitive function may be impaired; the level of impairment varies from student to student depending on their individual characteristics. Therefore, determining how the individual characteristics of the students, such as gender, level of study and individual study habits, affect their coping styles may significantly benefit a teacher's ability to plan study activities to encourage effective learning.

Literature Review

Learning skills are methods that students use in confronting learning situations by using appropriate, effective styles that accord to the learning environment.

In demonstration schools, students can choose a variety of study programs due to differences in core subjects. Study programs are designed to offer two basic study streams: 1. Humanities and social science programs: students tend to choose one of three options – Languages (French, Japanese or Chinese); mathematics and languages; or languages and social sciences. 2. Science and technology programs: students who choose to study in this program will focus on the sciences and mathematics.

In this study, two groups were used. The first group studied in the humanities and social science program, which is referred to as the arts program because it included a greater language component than science and mathematics. The second group was a science and technology program, which is referred to hereafter as the science program. The variety of programs available meant that students needed different skills in learning and ability to cope with academic stress. In this research, the view was taken that the basic variables in predicting results might be achieved by using gender, study program, level of study, and time spent on lessons as the predictors.

Fundamental Variables and Learning Skills

Extensive research efforts have been undertaken to explain differences between how males and females learn, especially in three key areas: deep learning, strategic learning and surface learning. Other researchers have correlated these types of learning with academic performance and shown that deep learning increased student performance the most, whereas surface learning correlated with improved academic performance the least (Diseth & Kobbeltvedt, 2010; Duff, 2004; Haarala-Muhonen, Ruohoniemi, & Lindblom-Ylänne, 2011; Rytkönen, Parpala, Lindblom- Ylänne, & Postareff, 2012). When comparing males and females, male students engaged in more strategic learning than female students, but they were not significantly different to females regarding deep learning or surface learning (Brown, White, Wakeling, & Naiker, 2015).

Study programs was one variable in this study. Researchers have found that students who were in different learning programs or fields had different learning skills or learning habits (Ludlum, Hongell, Tigerstedt, & Alsobrook, 2016). For instance, students who study science always use learning patterns based on independence, self-study, and internal motivation, whereas students who study arts always use learning patterns based on dependence, teacher-centered approaches, and external motivation (Dembo, 1991; Witkin, Moore, Goodenough, & Cox, 1977).

When students pass to higher study levels and grow older through each year of study, they increase in maturity of terms of cognitive and experiential development. In order to collect more knowledge and experience, students must increase their learning skills each year. This issue was addressed by the work by Stegers-Jager, Cohen-Schotanus, and Themmen (2012). They found that deep learning strategies were negatively correlated with first-year medical students, even though a positive relationship with resource management strategies and value beliefs were positively related to deep learning strategies only. This may reflect the idea that first-year students might have more surface learning strategies than senior students, who were able to develop increasingly deep learning strategies with each advancing year.

One of the important factors in learning is time spent on lessons. In daily situations, students require a variety of skills to succeed in an academic environment. Researchers have found that of these skills, effective time management is one of the most essential skills that students require (Zekeri & Baba, 2014), and it significantly influences academic achievement amongst college students (Abdulghani et al., 2014; Stelnicki, Nordstokke, & Saklofske, 2015). Information from George, Dixon, Stansal, Gelb, and Pheri (2008) identified that a student's time management skills and time spent on lessons would predict both GPA and success at learning. Being able to use time effectively and allotting time for study has been associated positively with outcomes in terms of both language and spatial abilities, which is valuable for learners (Krueger, 2012).

Fundamental Variables and Stress Coping Styles

When faced with stress, females tend to use emotional techniques due to feelings of not being in control, whereas males tend to use more familiar problem-solving strategies (Anshel, Sutarso, & Jubenville, 2009; Hammermeister & Burton, 2004; Lewis, Salzberg, & Steinberg, 2015; Lovell, Lee, &

Brotheridge, 2009). The differences between genders result from the perceived ability to control conflict, as well as feminine and masculine components. Dyson and Renk (2006) showed that femininity was predictive of emotion-focused coping, whereas both masculinity and femininity predicted problem-focused coping. Overall, males still used more positive and negative coping strategies than females, especially negative coping strategies (Hvidtjorn, Hielmborg, Skytthe, Christensen, & Hvidt, 2014).

In terms of study programs, previous researchers have found evidence that study programs also affected both the levels of perceived stress and the preferred coping mechanism, as students from different fields of study engaged in different coping methods (Deasy, Coughlan, Pironom, Jourdan, & Mannix-McNamara, 2014). For instance, students in the hard sciences experienced significantly more perceived stress than those studying soft sciences (May & Casazza, 2012). Additionally, non-traditional students coped with stress differently than traditional students (Forbus, Newbold, & Mehta, 2011).

Students are more able to use increasingly sophisticated approaches for coping with stress because of their past performance. The greater the number of years of study, the more mature a student is in choosing an appropriate or positive method to eliminate stress independently. To date, only one study group has attempted to link stress management approaches to years of study. Deasy et al. (2014) found a statistically significant positive relationship between years of study and coping with stress using escape-avoidance.

Lastly, time spent on lessons is a highlighted variable. In general, students who spend many hours studying experience higher academic achievement; however, they also experience higher levels of academic stress. As a result, students must find a balance between studying and relaxation time to achieve academic success. Previous research by Forbus, Newbold and Mehta (2011) identified that time management characteristics amongst students lead to different levels of stress and coping abilities.

Relationship between Learning Skills and Academic Stress Coping Styles

It can be said that learning skills are unique skills that develop from cognitive processes of the brain in terms of analyzing, thinking, and connecting information. Due to this connection between the two, when a person is unable to effectively manage stress, their learning skills will suffer, and they will not achieve learning mastery due to the continuous accumulation of stress (Ab Latif & Mat Nor, 2016). Hence, a person must find an effective way to manage stress in order to reduce stress level. Similarly, a high stress level combined with insufficient academic skills can relate to negative academic outcomes (Stelnicki, Nordstokke, & Saklofske, 2015). From the research by Ab Latif and Mat Nor (2016), students who had better abilities in alleviating pressure were able to accomplish higher academic performance.

Objectives Identified

In order to clarify the learning skills and stress coping styles used by senior high school students studying in a demonstration school, three objectives were identified as follows:

1. To predict the learning skills from the fundamental variables: genders, study programs, levels of study, and time spent on lessons.
2. To predict the stress coping styles from the fundamental variables: genders, study programs, levels of study, and time spent on lessons.
3. To study the relationship between the set of learning skills and the set of academic stress coping styles.

Research Methodology

Population Group and Sampling

The sample group was selected from senior high school students in a demonstration school containing 21 classrooms and 647 students. Participants were collected from a group of senior high school students (Grades 10–12). They were collected by using a multistage random sampling of 279

students at three levels (Grades 10–12). Each grade was combined from three classes; therefore, there were nine classes in this study separated into three class levels: Grade 10 (93 students), Grade 11 (81 students) and Grade 12 (105 students).

The questionnaires were distributed to 279 sample students, and all were completed and returned. They were then coded and scores were checked before analyzing and processing the data.

Data Collection Instruments

Data were collected using two instruments:

1. Instrument 1: The Approaches and Study Skills Inventory for Students (ASSIST) is an adapted test that identifies three learning skills (Deep, Strategic and Surface Approaches). ASSIST is composed of 52 items assessed on a five-point Likert scale; sub-items are discriminated as follows:

1.1 Deep approach (16 items) is characterized by a type of learning based on understanding, analyzing and connecting ideas. The students aim to understand subjects clearly. The deep items are designed to capture four sub-divisions: (1) seeking meaning, (2) relating ideas, (3) use of evidence, and (4) interest in ideas.

1.2 Strategic approach (20 items) is characterized by a type of learning engaging with various strategies and demands for assessment. The students placed in this type aim to monitor their own abilities. The items of strategic learning measure five sub-divisions: (1) organized studying, (2) time management, (3) alertness to assessment demand, (4) achieving, and (5) monitoring effectiveness.

1.3 Surface approach (16 items) is defined as a type of learning that is lacking in creativity in the production of information and concentrates on producing routine answers and memorization. Surface learners cannot use strategies in learning, but still aim to succeed in learning. The 16 items of surface are focused on four sub-divisions: (1) lack of purpose, (2) unrelated memorizing, (3) syllabus-focused, and (4) fear of failure.

2. Instrument 2: This involved a stress coping style inventory. This instrument was adapted from the research of Lin and Chen (2010). The scoring used was a five-point Likert scale. According to Lin and Chen (2010), the questionnaire consists of total 28 questions assessing four factors:

2.1 Active problem coping (six items) questions are designed to measure the following: solving the problem by focusing on the center and main point of the problem, being optimistic, and encouraging external sources for assistance.

2.2 Active emotion coping (eight items) questions are designed to capture the following: adjustment of attitudes, changing emotions by seeking appropriate external sources and methods for assistance in reducing stress.

2.3 Passive problem coping (eight items) questions provide information on: procrastination, selecting methods such as drug use and alcohol drinking, limiting the problem by reducing standards.

2.4 Passive emotion coping (six items) questions seek to measure the following: tendency to face a problem with frustration and anger, choosing self or other persons as a source to blame and accuse, and lacking ability to control one's own emotions.

Validity and Reliability of Instruments

Confirmatory factor analysis (CFA) was introduced to test validity and reliability of all instruments. Data were analyzed using a structural equation modeling software package (SmartPLS 2.0 m3) for testing validity and reliability.

The ASSIST and the stress coping styles inventories were composed of 52 items and 28 items, respectively. CFA techniques was used to select items that reached the stipulated criteria by considering average variance expected (AVE) for measuring convergent and discriminant validity. The internal consistency was investigated through composite reliability values and Cronbach's alpha.

The report from analyzing ASSIST showed that, in this study, AVE ranged between .572 – .757, composite reliability ranged between .772 – .862, and Cronbach's alpha ranged between .714 – .869. Furthermore, the stress coping style inventory gave AVE values between .538 – .871, composite reliability between .812 – .931, and Cronbach's alpha between .653 – .852.

Statistical Analyses

The statistical analyses were performed by using a technique to investigate hypotheses through: (1) Calculating the fundamental data of the student sample separated by sex (male, female), level (Grades 10–12), and major of study (Sciences or Arts); (2) using stepwise multiple regression to predict learning skills and academic stress coping styles with fundamental variables; and (3) using a canonical correlation technique to calculate the relationship between the set of variables describing learning skills with the set of variables describing academic stress coping styles.

Results

Completed questionnaires were analyzed by gender, level, and subject field. The majority of the respondents were male (*n* = 150, 53.8%) as opposed to female (*n* = 129, 46.2%). The level of study ranged from Grades 10–12, with the number of each as follows: Grade 10 (*n* = 93, 33.3%), Grade 11 (*n* = 81, 29.0%), and Grade 12 (*n* = 105, 37.6%). From the 279 participants, the majority of respondents were studying in the field of science (*n* = 163, 58.4%), and the rest of the respondents were in the field of arts (*n* = 116, 41.6%).

Objective 1: Predicting learning skills from gender, level of study, study program, and time spent on lessons. As indicated in Table 1, the deep and strategic learning skills were predicted only by time spent on lessons, with the students who had 4–7 lessons per week showing more deep (2.5%) and strategic learning (3.6%) skills than those who had eight or more lessons per week. Surface learning, on the other hand, was predicted by two factors, which were time spent on lessons and level of study, with a predictive power of 4%. From this data, students who had 4–7 lessons per week showed less surface learning skills than those who had eight lessons per week. Also, students who studied in Grade 10 had less surface learning skills than Grade 12 students. These results show that an allocation of 4–7 lessons per week is most suitable to support the development of deep and strategic learning (lessons eight times and more was the referent group).

Table 1. Predicting Learning Skills from Gender, Study Level/Program, and Time Spent on Lessons

Learning Skill	Predictor	*b*	Beta	*t*-value	*p*-value
Deep Time	(4–7 Times/week)	2.081	.159	2.674 **	.008 **
Predictive Equation: Deep = 28.504 + 2.081 times (4–7 times/week)					
		(95.530)	(2.674)		
R^2 = .025 F = 7.149 ** *p*-value = .008 **					
Strategic Time	(4–7 Times/week)	4.528	.190	3.217 **	.001 **
Predictive Equation: Strategic = 48.521 + 4.528 times (4–7 times/week)					
		(89.944)	(3.217)		
R^2 = .036 F = 10.352 ** *p*-value = .001 **					
Surface Time	(4–7 Times/week)	– 2.153	– .154	– 2.615 **	.009 **
	Grade 10	– 1.327	– .127	– 2.147 *	.033*
Predictive Equation: Surface = 28.899 – 2.153 times (4–7 times/week) – 1.327 (Grade 10)					
		(76.775)	(– 2.615)	(– 2.147)	
R^2 = .040 F = 5.764 ** *p*-value = .004 **					

*$p < .05$, ** $p < .01$

Objective 2: Predicting academic stress coping styles from gender, level of study, study program, and time spent on lessons. The data in Table 2 illustrates the predictors of all coping styles addressed in this study. In terms of an active emotion coping style, only males showed a predictive value of 3.8% by preferring to use a less active emotion coping style than females. When compared with a passive emotion coping style, male students were more engaged in passive emotion coping than female students, and science students were less engaged in passive emotion coping than arts students.

Table 2. Predicting Academic Stress Coping Styles from Gender, Study Level/Program, and Time Spent on Lessons

Stress Coping Style	Predictor	*b*	Beta	*t*-value	*p*-value
Active Emotion	Male	– .980	– .195	– 3.313 **	.001 **
Predictive Equation: Active emotion = 17.240 – .980 male					
		(79.454) (– 3.313)			
R^2 = .038 F = 10.974 ** *p*-value = .001 **					
Passive Emotion	Male	.808	.153	2.577 *	.010 *
	Science Program	– .644	– .120	– 2.031 *	.043 *
Predictive Equation: Passive emotion = 9.003 + .808 male – .644 science					
		(31.060) (2.577) (– 2.031)			
R^2 = .036 F = 5.140 ** *p*-value = .006 **					
Active Problem	4–7 Times/week	.837	.132	2.217 *	.027 *
Predictive Equation: Active problem = 10.773 + .837 times (4–7 times/week)					
		(74.475) (2.217)			
R^2 = .017 F = 4.916 * *p*-value = .027 *					
Passive Problem	Male	1.557	.317	5.634 ***	.000 ***
	Science Program	– .946	– .190	– 3.384 **	.001 **
Predictive Equation: Passive problem = 3.923 + 1.557 male – .946 science					
		(15.349) (5.634) (– 3.384)			
R^2 = .130 F = 20.709 *** *p*-value = .000 ***					

*$p < .05$, ** $p < .01$, *** $p < .001$

In the case of active and passive problem coping, having 4–7 lessons per week returned an active problem coping predictive value of 1.7%, indicating that students who had 4–7 lessons per week preferred to use more active problem coping style than those who attended eight or more.

With passive problem coping, being male and studying in the science program predicted this style of coping with a value of 13%. Additionally, the statistical outcomes indicated that male students preferred to use more passive problem coping than female students; additionally, the students who studied in the science program preferred to use less passive problem coping than the students who studied in the arts program.

Objective 3: The relationship between sets of learning skill and sets of academic stress coping style by using canonical correlation. Results presented in Table 3 show the statistical significance of functions 1 and 2, i.e., between the set of learning skills and the set of academic stress coping styles. These details are extended in Table 4 with positively correlated results between the two sets of variables in function 1, with a total explanation ability of 42.3%. Function 2 results indicate that surface learning skills had a positive relation with both passive types of emotion and problem coping,

but had a negative relation with active problem coping. In total, function 2 results indicate the potential explanation of 23.9% of correlational results.

Table 3 Canonical Correlation between Learning Skills and Academic Stress Coping Styles

Function (F)	Canonical Correlation (R_c)	Square Canonical Correlation (R_c^2)	Wilks' Lambda	F	*df*	Error	*p value*
1.	.651	.423	.437	22.021	12	719.94	.000
2.	.489	.239	.758	13.514	6	546.00	.000
3.	.058	.003	.997	.468	2	274.00	.627

Multivariate Tests of Significance (Wilks' Lambda = .437, F(12, 719.94) = 22.021, p = .000)

Table 4 Standardized Canonical Coefficients, Structural Coefficients between Learning Skills and Academic Stress Coping Styles

Variables	Function 1			Function 2			Function 3		
	Coef	r_s	r_s^2(%)	Coef	r_s	r_s^2(%)	Coef	r_s	r_s^2(%)
Deep	.332	.812	65.93	-.573	-.440	19.36	1.247	.383	14.67
Strategic	.553	.875	76.56	-.105	-.306	9.36	-1.293	-.374	13.99
Surface	.408	.603	36.36	.925	.773	59.75	.197	.195	3.80
R_c^2			42.32			23.93			0.34
Active Emotion	.580	.703	49.42	.165	-.160	2.56	-.537	-.301	9.06
Passive Emotion	.331	.450	20.25	.634	.736	54.17	.888	.476	22.66
Active Problem	.456	.705	49.70	-.718	-.622	38.69	.515	.241	5.81
Passive Problem	.281	.435	18.92	.241	.472	22.28	-.886	-.329	10.82

Remarks: Both functions 1 and 2 are statistically significant (p = .01), function 3 is not statistically significant, and underlined numbers refer to values that are equal to or higher than .45.

Discussion

From stepwise multiple regression analyses, there were two variables that predicted learning skills. The first was having 4–7 lessons per week, and the other was studying at the Grade 10 level.

Results obtained confirmed that having lessons 4–7 times per week was effective in increasing the level of deep and strategic learning skills, but decreased the level of surface learning. In fact, this number of lessons gave increased cognitive functionality and learning effectiveness over having more than eight lessons per week due, presumably, to lack of motivation or interest due to excessive lessons, along with decreased concentration and ability to retain knowledge. In addition, students in Grade 10 showed less surface learning than students in Grade 12. However, previous research found no relationship between the two (Can, 2009).

In terms of academic stress coping styles, gender, study program, and time spent on lessons predicted the style of stress coping adopted. Outcomes observed were that: First, males engaged less with active emotion styles than did females. In contrast, males engaged more with passive emotion and passive problem coping skills than did females. These results both agreed and diverged from those obtained in previous research (De Anda et al., 2000; Lee & Mason, 2014; Parveen & Javed, 2015). Second, students who studied in the science program used the academic stress coping style as a type of passive emotion coping, and passive problem coping less than students who studied in the arts program. This may be due to science students enjoying new experiences through hypothesis testing, learning independently, and using deep learning to solve complex problems; all of these were correlated with deep learning as opposed to surface learning (Byrne, Flood, & Willis, 2002; Davidson,

2002; Dembo, 1991; Duff, 2004; Elias, 2005; Jackling, 2005). Third, students who studied 4–7 times per week used more active problem coping strategies than students who studied more often than that. These results showed that students studying 4–7 times per week and using positive learning skills could be influenced to use a positive style of coping with stress as well (Nonis et al., 1998). It reflected that the medium of time (4–7 times per week) was sufficient time for students to review lessons, and also that they had sufficient time to plan for other activities–for example, to relax, to entertain, to exercise or to undertake other activities that were essential for their lives. Moreover, it could protect their brains from too much academic stress, and students were happier when they engaged in various types of activities. Therefore, positive learning skills and active problem coping occurred because students' brains were not fatigued. They were better prepared to use their skills and manage stress.

Additionally, canonical analyses indicated that surface learning correlated positively with all passive stress coping styles and negatively correlated with active problem coping. This shows that encouraging students to develop effective higher learning habits is essential in developing deep learning and strategic learning characteristics instead of surface learning. One possible effect that may occur after encouraging these types of either deep or strategic approaches is that students are motivated to use an active approach with positive stress coping styles. Past research confirmed that students who studied using a surface learning approach possessed inferior stress coping styles. As a result, students' learning achievement was lower. They were motivated extrinsically, did not enjoy learning, and showed lower interest and lower active performance (Donald, 1991; Lucas, 2001; Tang, 1994).

Implications

Results from this study have provided direct applications for the classroom as follows:

1. Time used for learning is an essential factor because it develops learning skills; at the same time, it can increase stress. The correct amount of time can trigger potential cognition by setting a suitably balanced program in the various activities, and also allocating sufficient time for both relaxation and academic learning.

2. Outcomes from this study indicate that the more students study at a higher level, the more they engage in a surface approach. School should encourage activities that provide additional cognitive processes via classroom activities, assignments, and using questions to trigger thinking and aid potential styles of stress coping.

3. From an applied level, these results suggest teachers should plan classroom activities designed to aid superior styles of learning instead of inferior ones. Limiting these surface learning techniques can also prevent students from using inferior stress coping styles. In the classroom, teachers should enhance various types of homework and assignments, trigger students to think about their own views, ask questions, and summarize when each core content section is finished. They might encourage students to select and use appropriate and flexible skills in solving problems. They should discourage students from using the same skills or familiar skills continually. Helping students learn to experience which skills should be matched with which type of problem encountered would be most beneficial.

Limitations

The limitations inherent in the study still remain. First, each person has more than one style of coping. Measurement by separation into sub-categories may prejudice the results and give a lower percentage estimate. Second, this study emphasized some basic variables, but did not extend to other potentially relevant and broader variables that may have predictive capabilities.

Recommendations

1. Further study may result in other variables being added to the list already established.

2. Besides fundamental variables, other variables can influence learning skills and stress coping styles. The fundamental variables were used in this study to predict outcomes. However, in

reality each student has a unique style. Therefore, the next study may give more emphasis to integrated characteristics of learning skills rather than looking at pure characteristics.

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