Investigating the Relationship Between Homework and Self-Regulated Learning Strategies among Malaysian Secondary School Students

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Abstract
The primary purpose of this study is to investigate the relationship between homework and self-regulated learning strategies among secondary school students. In addition, the present study also examines gender differences in the mean of homework management scores. This study conducted a cross-sectional survey to collect responses from 970 high school students in the northern state of Penang. The data were analysed using descriptive statistics, independent t-tests, and Pearson correlation. The findings showed that the students' most frequent homework management strategy was arranging the environment. We also reported that the female students demonstrated significantly higher mean scores in all homework management dimensions. Furthermore, homework management demonstrated a significant correlation with other related variables: expectancy, value, homework effort, homework completion, and self-regulated learning strategies. These correlations were consistent in magnitude and direction with theoretical predictions, thus providing evidence for the applicability of the HMS to high school students in Malaysia for Mathematics homework. The findings of this study also give parents helpful information for assisting their children with their homework. In addition, the results of this study may help teachers to have a better understanding of the differences between the needs of male and female students in completing their homework, which can help the teachers create a more effective assignment and schedule proper times for their students to manage and complete the homework assignments.
Keywords: Homework, Homework Management Scale, Expectancy, Value, Homework Effort, Homework Completion, Self-Regulated Learning Strategies, Self-Regulation

Introduction

Teachers and schools have conducted various initiatives to ensure that students master various knowledge and skills that have been taught. One of these initiatives is providing homework to students. Homework is a significant academic endeavour for students, parents, and teachers (Bembenutty, 2010). Homework can help students master the concepts well, as well as it serves as a review, practice, preparation, extension, and integration before the teacher moves on to a new topic. Homework is defined as tasks given to children by school

teachers intended to be completed during non-school hours (Cooper, 1989). Homework assignments may be completed during personal study time, library time, or during additional classes. Bembenutty (2011) defines homework as an assignment given to students by teachers intended to be implemented after the time of teaching and learning. Van Voorhis (2004) emphasizes that homework is an extension of what has been learned at school to help students understand, review, and reinforce the things students have learned and enrich the students' existing knowledge from previous lessons.

Homework is important for several reasons. Homework ensures students are able to attain the skills and knowledge they learn, monitor the students' development, and ensure that students understand what they are learning (Ramdass & Zimmerman, 2011). Epstein & Voorhis (2001) quote that the two main goals that are usually discussed in the literature review of homework are (1) understanding the concepts learned; (2) prepare before the next topic is taught to the student. These process is a continous process so that students can recall what the teacher has taught. With that, students can reinforce the lesson, especially when it comes to learning new concepts or topics. In addition, homework is believed to be able to develop learning skills, nurture students' sense of responsibility, improve communication skills and other factors that are more difficult to measure (Cooper et al., 2006). The teachers assume that by completing homework, students will be able to grasp deeply about a concept and lead to greater achievement in students (Epstein & Voorhis, 2001). Teachers can also give homework before a topic is taught, for example asking the students to read and find information related to a topic.

In addition, managing homework is crucial because, in contrast to other educational activities, managing homework issues at home are extremely different from those in the classroom and frequently lead to complaints and conflicts between home and school. Homework are allegedly overly long, short, difficult, or confusing, according to parents (Cooper et al., 2006). Xu (2008) has identified several aspects in homework management, namely arranging the environment, time management, handling distraction, monitoring motivation, and controlling emotion in managing homework well and effectively. If students are able to manage some aspects of managing their homework, they will be more focused and able to complete the assignment.

It is hardly unexpected that there are numerous studies about managing homework given its significance. To illustrate, a study by Xu (2006) examined gender with five dimensions of homework management on 426 high school students in South America. Results showed that female students were able to organize the environment, manage time, and control emotion better than their male compatriot. Similar results were found during subsequent study conducted among 238 students in the middle east of Tennessee (Xu & Corno, 200). These two findings were consistent with previous studies which shows that female students have a positive attitude towards homework compared to male students conducted by (Mau and Lynn, 2000). Similar results were also replicated in the study of Xu (2007) involving 194 middle school students as well as Xu (2010) involving 370 eight graders and 315 eleventh graders as well as . Differences between gender show consistently significant findings. Nevertheless, not all studies reported consistent findings. For example, in a study by Yang & Tu (2019) which involved 305 Chinese students in grades 7, 8 and 9, results showed that gender was not related to homework management strategies. One possible explanation is due to the Chinese culture that tends to put more emphasis on effort (rather than innate ability) as the means for educational success and a highly regarded virtue (Li, 2001; Xu, 2018).

Most motivational theorists argue that research related to self-regulated learning has neglected the most important component of self-regulated learning, which is the continuous effort to complete a task (Velayutham & Aldridge, 2013). According to Trautwein & Ludtke (2009), homework is a good illustration of an educational psychology topic that necessitates a methodical approach. Most of the time, teachers will assign homework to students while they are in class and expect them to finish it outside of class. As rightly observed by Killoran (2003), One of the most regular and annoying behaviour issues for teachers is attempting to convince pupils to finish their assignments. Students will only be able to complete homework if they tend to increase effort and focus on the task. Therefore, the construct of homework effort is needed in the learning process of self-regulation to complete homework.

Apart from management strategies and homework effort, self-regulated learning strategies is often associated to the students' ability in organizing, monitoring, and controlling their cognition, motivation, and behavior to ensure that learning goals are achieved. In order to gain a deeper understanding of self-regulated learning strategies used by students, past researchers have categorized self-regulated learning strategies into several dimensions. Among the dimensions of self-regulated learning strategies that have been explored are rehearsal, organizing, critical thinking, metacognitive self-regulation, time and environment management, effort regulation, peer learning and the help of others. (Pintrich et al., 1991).

In additions, researchers also argue that students are able to manage homework well and complete homework if they give a high expectancy and value to their academic assignment. Eccles et al (1983) defined expectancy as beliefs about self-efficacy as an individual's assessment of their competence to achieve a goal. Wigfield et al (2015) defined expectancy as the extent to which an individual thinks that he can do a task successfully, and it is closely related to the assessment of self-efficacy, for example, "Can I do this task?". Students will be more inclined to do a task if they are confident that they are able to do the task successfully and this is closely related to expectancy belief (Eccles & Wigfield, 2002; Xu, 2017). Other than expectancy, giving a high value to homework as a tool that can help the students to increase their academic performance also plays an important role in completing the homework. Eccles et al (1983); Eccles & Wigfield (2002) define value as a subjective belief about a certain task that affects the individual's desire to engage in the task, and consists of four dimensions of value, namely : (a) intrinsic value; (b) achievement value; (c) utility value and (d) cost value. According to Eccles & Wigfield (2002), how individuals give value to a task, for example understanding the value of the task to them directly affects their choice of task, diligence and performance. When individuals place a high value on a task, they will engage actively and will provide better results (Battle & Wigfield, 2003). Students will be able to complete homework well if they place high values on homework assignments, in terms of intrinsic value, achievement value, utility value and cost value.

Thus, the aim of the present study is (a) to investigate how high school students manage their homework based on the five features of homework management involving arranging the environment, time management, handling distraction, monitoring motivation, and controlling emotion, (b) determine the effects of gender on overall homework management, and (c) to examine the relationship between scores on the homework management and scores related to homework measures (i.e., expectancy, value, homework effort, homework completion and self-regulated learning strategies). It would be informative to focus on homework management in one important domain (i.e., Mathematics) in the present investigation.

Method

Sample

970 high school students (average age = 16 years old) willingly participated in the survey. The students represented 20 schools in the northern state of Penang. There were 387 (39.9%) males and 583 (60.1%) females in the study. Additional information of the sample is given in the following Table 1.

Table 1
Sample of Study

Demographic Characteristics		Number of Students (N=970)	Percentage (%)
Gender			
	Male	387	39.9%
	Female	583	60.1%
Ethnicity			
	Malay	735	75.8%
	Chinese	155	16.0%
	Indians	73	7.5%
	Others	7	0.7%
Stream			
	Science	482	49.7%
	Arts	488	50.3%

Instrument

The 22-items Homework Management Scale (HMS) (Xu, 2008) instrument was developed to assess students' homework management. The HMS is a Likert-type instrument with five response possibilities for each statement ranging from never to routine. HMS consists of five subscales, namely, arranging environment, time management, handling distraction, monitoring motivation, and controlling emotion. Table 2 provides example of items for each dimension.

Table 2
The Homework Management Scale

No	Dimension	Number of Items	Example of Item
1	Environment	5	Before working on my homework, I prepare the appropriate materials.
2	Time Management	4	While working on my homework, I keep track of what remains to be done.
3	Distraction	5	While doing my homework, I chat about unrelated things with my friends.
4	Motivation	4	While working on my homework, I try to find ways to make my homework more interesting.
5	Emotion	4	While doing my homework, I tell myself to calm down.
	Overall	22	

Examining Relationship between Homework Dimensions and Self-Regulated Learning Strategies
Five external measures were considered to examine the relationship between HMS scores and other variables.

HMS and Expectancy
In the present study, this Expectancy scale included ten items to measure expectancy beliefs about Mathematics homework (i.e., confidence to keep up in Mathematics class and to complete Mathematics homework), adapted from Trautwein et al. (2006). A 4-point format was used, asking students to select a response from 1 (strongly disagree) to 4 (strongly agree). One type of construct-related validity evidence would be the pattern of relationships between HMS and Expectancy.

HMS and Value
Students were questioned about the purpose of doing their homework as determined by four types of value which are intrinsic value (Gaspard, 2015; Trautwein et al., 2012), achievement value (Eccles, 2009; Gaspard, 2015; Trautwein et al., 2012), utility value (Xu, 2010b) and cost value (Gaspard, 2015; Guo et al., 2016). The Value Scale consists of 38 items, using a 4-point format in which students were asked to select a response from 1 (strongly disagree) to 4 (strongly agree).

HMS and Homework Effort
The students were asked about their homework effort, adapted from the items used by Trautwein et al. (2006). The scale used in the present study includes five items, ranging from copying from others to trying best on Mathematics homework. It used a 4-point format in which the students are asked to select a response from 1 (strongly disagree) to 4 (strongly agree).

HMS and Homework Completion
Five items were used to assess homework completion, adapted from Horn & West (1992) and studies by (Cooper et al., 1998). Students were asked to indicate the amount of homework completion and the frequency of coming to class without homework. Students are asked to select a response from 1 (strongly disagree) to 4 (strongly agree).

HMS and Self-Regulated Learning Strategies
The students were also asked about learning strategies used in completing Mathematics homework such as rehearsal, organization, elaboration, planning, monitoring, regulation, help-seeking, time and study environment management. The scale was adapted from (Berger & Karabenick, 2011). The Learning Strategies Scale consists of 33 items, using a 4-point format in which students were asked to select a response from 1 (strongly disagree) to 4 (strongly agree).

Data Analysis
In line with the purpose of the study, we conducted the independent sample t-test to investigate the gender difference in homework management. Pearson correlation was also conducted to examine the relationship between dimensions of homework management with

other related variables, namely, expectancy, value, homework effort, homework completion, as well as self-regulated learning strategies.

Findings
Reliability
Based on the results for the study in Table 3, the Cronbach's Alpha coefficients for overall HMS was .85. For scores on the five subscales, the values were .65 for arranging the environment, .73 for time management, .83 for handling distraction, .79 for monitoring motivation, and .77 for controlling emotion. These reliability estimates are in adequate to good range except for arranging the environment (Nunnally & Bernstein, 1994).

Table 3
Reliability of HMS

Dimension	Number of Items	Cronbach's Alpha Coefficients
Homework Management Scale	22	.85
Environment	5	.65
Time Management	4	.73
Distraction	5	.83
Motivation	4	.79
Emotion	4	.77

Using the 22-items in the questionnaire, the students were asked about how often they arranged the environment, managed their time to do homework, handled distraction, monitored motivation, and controlled their emotion while doing homework. The means and standard deviations for each dimension in HMS were summarized in Table 4.

Table 4
Mean and Standard Deviation of HMS

Dimension	Mean	Mean Scale Score	Std. Dev.
Homework Management Scale	77.35	3.52	11.24
Environment	18.95	3.79	3.36
Time Management	14.90	3.73	2.94
Distraction	14.61	2.92	4.24
Motivation	14.16	3.54	3.45
Emotion	14.73	3.68	3.04

The students showed the highest level of homework management for arranging the environment (Mean=3.79, Std. Dev. = 3.36), followed by time management (Mean=3.73, Std. Dev. = 2.94). Meanwhile, controlling emotion was the third highest homework management practiced by the students(Mean=3.68, Std. Dev. = 3.04) followed by monitoring motivation (Mean=3.54, Std. Dev. = 3.45) and finally handling distraction (Mean=2.92, Std. Dev. = 4.24).

An independent t-test was carried out to determine significant differences in students' perceptions on homework management based on gender. The independent variable used was

gender and the dependent variable was homework management. Based on Table 5, there was a significant difference in homework management between male and female students [t (968) = -7.73, p<.001]. By comparing the mean, female students (Mean=79.55, Std. Dev. = 10.74) managed their homework more frequently than male students (Mean=74.02, Std. Dev. = 11.17).

Table 5
Students' Perceptions on overall Homework Management based on Gender

	Mean		Std. Dev.		t-test for Equality of Means					95% Confidence Interval of the Difference	
	Male	Female	Male	Female	t	df	p-value	Mean Difference	Std. Error Diff.	Lower	Upper
HW Mgmt	74.02	79.55	11.17	10.74	-7.73	968.00	<.001	-5.53	.72	-6.94	-4.13

Further, independent t-tests were performed on each homework management dimensions (Environment, Time Management, Distraction, Motivation, Emotion) as dependent variables and gender as the independent variable. Results are shown in Table 6.

Table 6
Students' Perceptions on Homework Management based on Gender

	Mean		Std. Deviation		t-test for Equality of Means					95% Confidence Interval of the Difference	
	Male	Female	Male	Female	t	df	p-value	Mean Difference	Std. Error Diff.	Lower	Upper
Environment	17.88	19.66	3.33	3.19	-8.37	968.00	<.001	-1.78	.21	-2.20	-1.37
Time Management	14.18	15.38	2.96	2.82	-6.35	968.00	<.001	-1.20	.19	-1.57	-.83
Distraction	14.64	14.59	4.07	4.34	.17	862.53	.86	.05	.27	-.49	.59
Motivation	13.12	14.85	3.61	3.16	-7.68	749.51	<.001	-1.73	.23	-2.17	-1.29
Emotion	14.20	15.07	2.98	3.04	-4.39	968.00	<.001	-.87	.20	-1.26	-.48

The results revealed a significant difference in arranging environment between male and female students [t (968) = -8.37, p<.001]. The means comparison showed that female students (Mean = 19.66, Std. Dev. = 3.19) took more effort in arranging their environment than male students (Mean = 17.88, Std. Dev. = 3.33). There was a significant difference between male and female students in terms of time management [t (968) = -6.35, p<.001]. Female students (Mean = 15.38, Std. Dev. = 2.82) more frequently managed the time compare to male students (Mean = 14.18, Std. Dev. = 2.96). However, there were no significant differences in handling distraction between male and female students [t (862.53) = 0.17, p=0.86]. There was also a significant difference in monitoring motivation between male and female students [t (749.51)

= -7.68, p<.001] with female students (Mean = 14.85, Std. Dev. = 3.16) working more frequently to monitor their motivation while doing homework than male students (Mean = 13.12, Std. Dev. = 3.61). The independent t-test results also revealed a significant difference in controlling emotion between male and female students [t (968) = -4.39, p<.001]. Female students (Mean = 15.07, Std. Dev. = 3.04) working more frequently in controlling emotion than male students (Mean = 14.20, Std. Dev. = 2.98).

Next, we further examined the relationship between Homework Management Dimensions (Environment, Time Management, Distraction, Motivation, Emotion) with other homework variables (Expectancy, Value, Homework Effort, Homework Completion) and Self-Regulated Learning Strategies. We hypothesized that the HMS and its five dimensions would be positively correlated with Expectancy, Value, Homework Effort, Homework Completion and Self-Regulated Learning Strategies.

Table 7
Pearson Correlations between Homework Dimensions and Self-Regulated Learning Strategies

Variable / Dimension	Homework Management Dimensions					
	Environment	Time	Distraction	Motivation	Emotion	Total
Expectancy	.25	.30	.39	.24	.26	.44
Value	.32	.45	.39	.39	.41	.59
Homework Effort	.27	.40	.46	.30	.36	.55
Homework Completion	.24	.34	.37	.21	.30	.45
Self-Regulated Learning Strategies	.43	.53	.24	.54	.57	.68

**. Correlation is significant at the .01 level (2-tailed).

As shown in Table 7, homework management and its dimensions were found to correlate significantly with all of the independent variables. Correlations coefficients among Homework Management Dimensions with other homework variables and Self-Regulated Learning Strategies were positive and statistically significant, ranging from .21 to .68. These correlations demonstrated magnitude and direction alignment with theoretical predictions, thus providing evidence of the applicability of the HMS with high school students in Malaysia for Mathematics homework.

Discussion
The main objectives of this study were to examine how high school students manage their homework based on the five characteristics of homework management involving arranging the environment, time management, handling distraction, monitoring motivation, and controlling emotion, determining the effects of gender on overall homework management, and to examine the relationship between scores on the homework management and scores related to homework measures (i.e., expectancy, value, homework effort, homework completion and self-regulated learning strategies). The students showed the highest level of homework management for arranging the environment followed by time management. The third most common practiced of homework management was controlling emotion, followed by monitoring motivation and finally handling distraction. Female students put more effort into managing their homework compared to male students. This finding was

in line with Patton et al (1983), which reported that female students spent more time on homework than male students, while Abu-Hilal et al (2013) study reported that female students spent more time doing Mathematics homework than male students. Furthermore, Trautwein (2007) also reported that female students spent more time on Mathematics homework than male students. Looking in detail at homework management strategies, female students arranged their homework place, managed their time, monitored their motivation, and controlled their emotions more often than male students. These findings are in line with previous findings with upper secondary school students (Xu, 2006), middle school students (Xu & Corno, 2006), and eighth and eleventh graders students (Xu, 2010a). In Xu & Corno's (2006); Deslandes & Rousseau's (2008) studies, female students were self-motivated while doing homework. Other than that, female students more frequently worked to maintain their calmness and control destructive emotions, which might interfere with their commitment to homework (Xu & Corno, 2006). However, there were no significant differences between the two groups regarding handling distraction.

Our findings further revealed that the HMS and its five dimensions were positively related to expectancy, value, homework effort, homework completion, and self-regulated learning strategies. These findings are consistent with previous research by (Xu, 2007; Xu et al., 2015; Xu et al., 2017; Xu & Wu, 2013; Yang & Xu, 2015). The present study revealed that HMS and its five dimensions aligned with theoretical expectations. Therefore, researchers and practitioners in various countries interested in self-regulation, particularly homework management, are likely to find the HMS findings to be of great value. For those interested in the relationship between homework management and other crucial factors in the homework process, such as expectancy, value belief, homework effort, homework completion, self-regulated learning strategies, and academic achievement, the HMS is likely to have substantial utility.

The present study has some limitations. It should be noted that the findings are based on self-reported measurements they may cause common method bias since data for all the variables are obtained from the same person in the same measurement context using the same item context and similar item characteristics. Regarding future research, it would be informative if the study could be carried out for other subjects such as Science, Physics, English, History, and many more. Students may have a different approach to doing homework for certain subjects, influencing their judgment on how homework is done. Therefore, it is recommended for future research be specified into different subjects. Other than that, there is a need to examine the HMS with students at different developmental stages (primary school, middle school, or college) and in different learning environments (i.e., online homework). While the current study found that the HMS and its subscales were positively related to expectancy, value belief, homework effort, homework completion, and self-regulated learning strategies based on self-reported data, there is a need to include other measures of homework behaviors (i.e., observations and homework completion recorded by teachers) and other measures of self-regulation. This study is expected to help the students, parents, teachers, schools, and the Ministry of Education to develop, plan and enhance efforts for improvement in homework management (i.e., managing time, and controlling negative emotions) to improve homework performance for all students as homework has proven to be beneficial to students.

Conclusion

This research investigated how homework was managed at the high school level and how it differed based on gender. Additionally, this study looked deeper into five strategies of homework management and how each strategy was carried out based on gender. In summary, female students practice homework management more frequently than male students. In detail, female students more frequently arranged their homework places, managed their time, monitored their motivation, and controlled their emotions compared to male students. These findings provide valuable insights into the differences between male and female students in managing their homework. Equally important, findings from the correlation showed that HMS is likely to have substantial utility to researchers who are interested in investigating the linkage between homework management and other essential variables in the homework process, such as expectancy, value, homework interest, homework effort, homework completion, self-regulated learning strategies and many more.

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