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Factors Affecting the General Academic Achievement of University Students: Gender, Study Hours, Academic Motivation, Metacognition and Self-Regulated Learning

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Cover Page Footnote

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Factors Affecting the General Academic Achievement of University Students:

Gender, Study Hours, Academic Motivation, Metacognition and Self-Regulated Learning

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Abstract

This study aimed to determine the effects of university students' gender, weekly study hours, academic motivation, metacognition, and self-regulated learning levels on their overall academic achievement and to examine whether academic motivation, metacognition and self-regulated learning total scores predicted their GPAs. This study utilized a survey and prediction research design to analyze the research questions posed. The participants of the study consisted of 86 undergraduate students attending various programs of a university in Western Canada. The research data were collected using the "Metacognitive Awareness Inventory (MAI)" developed by Schraw and Dennison (1994), the "Survey of Academic Self-Regulation (SASR)" developed by Andrade and Dugan (2011), the "Academic Motivation Scale (AMS-C 28) College Version" developed by Vallerand, Pelletier, Blais, Brière, Senécal and Vallières (1992), and the "demographic form". A significant relationship between the university students' self-regulated learning, metacognition and academic motivation scores, and their grade point averages (GPAs) was found. It was also determined that the total scores related to the university students' self-regulated learning, metacognition and academic motivation significantly predicted their GPAs, and that the gender and weekly study hours of the university students did not have a significant effect on their self-regulated learning, metacognition, academic motivation and academic GPA.

Keywords: Academic motivation, Metacognition, Self-regulated learning, GPA, University students.

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Introduction

There are many variables in the related literature shown to affect the learning processes of university students. Some of these variables include self-regulated learning, metacognitive skills, academic motivation, gender and weekly study hours. In this study, I investigated the

level of the effect of these variables on the general academic achievement (GPA) of university students.

Self-Regulated Learning (SRL)

Self-regulation refers to self-generated thoughts, feelings, and actions which are planned and adapted cyclically to achieve personal goals (Zimmerman, 2010). Self-regulation includes students' ability to control their efforts and attention in the face of distracting and irrelevant tasks (Pintrich et al., 1991). According to Pintrich (2000), self-regulated learning is an active and constructive learning process, and helps students set goals and monitor, regulate and control their cognition, motivation and behavior that are guided and constrained by these goals and contextual features in the environment.

Self-regulated learning assumes that, through the selective use of metacognitive and motivational strategies, students can personally develop their learning abilities; select, structure, and create appropriate learning environments; and can play an important role in choosing the form and amount of instruction they need (Zimmerman, 1989b). Self-regulation processes are divided into three cyclical stages: forethought, performance, and self-reflection processes. Forethought refers to those influential processes which precede action and efforts to prepare the ground for it. Performance includes those processes which affect attention and action occurring during motoric efforts. Self-reflection includes those processes which emerge after performance efforts and change an individual's response to this experience (Zimmerman, 2010).

Students with self-regulation skills participate actively in their own learning processes metacognitively, motivationally, and behaviorally (Zimmerman, 1989a). Students with self-regulation skills are autonomous, reflective, and efficient learners, and have cognitive and metacognitive skills as well as motivational beliefs and attitudes which are required to understand, monitor and direct their own learning (Wolters, 2003). In addition, these students can combine various self-regulation processes, task strategies and self-motivational beliefs and take responsibility (Cleary & Zimmerman, 2004).

Metacognition

Metacognition is defined as "knowledge and cognition about cognitive objects, that is, about anything cognitive" (Flavell, 1987, p.21). The term metacognition refers to a person's ability to know about cognition; in other words, it is related to the person's knowledge of cognitive processes and situations such as memory, attention, knowledge, assumption, and illusion (Wellman, 1985). Metacognition refers to thinking about thinking and focuses on the self-regulated thought process. It also focuses on what people know and how they apply this knowledge to specific tasks (Jacobs & Paris, 1987). It is the ability to reflect, articulate and control an individual's learning process (Schraw & Dennison, 1994). It means the knowledge people have about their own thought processes. It is part of our cognition which controls other lower-level cognitive functions such as perception and attention (Bruning et al., 2004).

Metacognition includes knowledge of cognition and regulation of cognition (Schraw & Moshman, 1995). Cognitive knowledge refers to what we know about our cognition and includes three sub-components of cognition knowledge (Schraw et al., 2006). Cognitive knowledge includes declarative, procedural, and conditional information (Jacobs & Paris, 1987; Schraw & Moshman, 1995). Declarative information refers to knowing "about" things.

Procedural knowledge means knowing how to do things (Schraw, 2002). Conditional knowledge refers to knowing the "why" and "when" aspects of cognition (Schraw et al., 2006). Regulation of cognition refers to a series of activities which lead students to control their learning (Schraw, 2002). Regulation of cognition usually includes at least three components which include planning, monitoring, and evaluation (Schraw & Moshman, 1995).

Self-Determination Theory (SDT)

According to SDT, the need for competence, autonomy, and relatedness are the three innate psychological needs; however, competence and autonomy are more central to intrinsic motivation (Deci & Moller, 2005). SDT assumes that people are inherently active and self-motivated, curious and interested, vital and willing to be successful. It suggests that all people should feel competent, autonomous, and related to others (Deci & Ryan, 2000). Self-determination behaviors are initiated and regulated by choices based on the awareness of the person's biological needs and integrated goals (Deci & Ryan, 1985). Based on Self-Determination Theory, Deci and Ryan (1985) determined the types of motivation as intrinsic and extrinsic motivation and amotivation.

The concept of intrinsic motivation is used to explain various spontaneous behaviors (Montgomery, 1954, as cited in Rigby, Deci, Patrick, & Ryan, 1992). Intrinsic motivation is described as doing an activity for natural satisfaction (Ryan & Deci, 2000). Intrinsic motivation and the need to be competent with the environment are based on the basic biological need for self-defined interactions (Deci & Ryan 1980). Intrinsic motivation strengthens and directs people's interaction with their environment (Deci, 1976). Intrinsic motivation positively affects academic performance, learning and achievement (Ryan & Deci, 2009).

Extrinsic motivation refers to doing an activity because one enjoys the activity itself (Ryan & Deci, 2000). Extrinsic motivation is performed for external rewards or outcomes arising from performances (Rigby et al., 1992). Extrinsic motivation involves participating in an activity. The most obvious examples of extrinsically motivated behaviors are those performed to get a concrete reward or to avoid a punishment (Deci & Ryan, 2008). Extrinsic motivation is defined as behaviors performed to obtain a specific result or reward (Deci, 2004).

Amotivation is a condition in which people lack the intention to act. In the process of lack of motivation, people do not act effectively since they believe they cannot perform the behavior successfully or they think that the behavior will not lead to desired results (Münster Halvari et al., 2012).

The current study

Literature points to the idea that students achieve in learning when they are able to self-regulate. Students who achieve this gain lifelong learning skills which are accepted as the main objective of education. Lifelong learning occurs through self-regulated learning skills (Boekaerts, 1997, Zimmerman, 1990, as cited in Hoyle & Dent, 2018). Self-regulated learning serves a general framework for acquiring metacognitive knowledge and skills, and contributes to both career building and lifelong learning students (White & DiBenedetto, 2015, as cited in White & DiBenedetto, 2018). It is thought that students with lifelong learning skills should have self-regulated learning skills in order to organize their own

learning. The fact that students studying at the university can access information more easily together with technological developments makes it necessary for university students to gain self-regulated learning skills. For this reason, it is necessary to equip university students with self-regulated learning skills and metacognitive skills. In addition, determining the self-regulated learning skills level of university students is considered to be important. In the literature, no research was found on the effects of university students' gender and weekly study hours on their academic motivation, metacognition, self-regulated learning and GPAs. We conducted this study within this context, and it is important because it is the first in the literature and is an original and current study. The results of this research aim to contribute to the relevant literature. This study aims to determine the effects of gender and study hours, which affect the overall academic success of university students, on academic motivation, metacognition, self-regulated learning, and GPA and to examine whether the academic motivation, metacognition and self-regulated learning total scores of university students predict their GPAs. In line with this general objective, we sought answers to the following questions:

1) Is there a significant relationship between university students' self-regulated learning, metacognition and academic motivation total scores and their GPAs?
2) Do self-regulated learning, metacognition and academic motivation total scores of university students predict their GPAs?
3) To what extent do university students' gender and study time affect their GPA, self-regulated learning, metacognition and academic motivation total scores?

Methods

This study used a cross-sectional survey design (Creswell, 2012) which is a descriptive research model aiming to define the relationships between academic motivation, metacognition, self-regulation learning, and GPA variables. In addition, the study used a predictive design, one of the correlational designs (Creswell, 2012), in order to determine the predictive relationships between academic motivation, metacognition, and self-regulated learning total scores regarding the participants' GPAs.

Data sources

The participants of this study include a total of 86 volunteer students who were first-, second-, third-, and fourth-year undergraduate students and postgraduate students in different faculties, such as Faculty of Education and Faculty of Art and Social Sciences, in a university in Western Canada. Seventy-two of the students were male, whereas 14 were female, and their ages varied between 18 and 38 years. Please see Table 1.

Materials

Metacognitive Awareness Inventory (MAI)

MAI was developed to measure different metacognitive sub-dimensions. MAI has a 5-point Likert-type scale ranging from 'strongly disagree' to 'totally agree' with 52 items. This scale consists of two sub-dimensions: 17 questions related to knowledge of cognition (KC) and 35 questions related to regulation of cognition (RC). The Cronbach alpha coefficient value of the sub-dimensions of the scale is 0.88 to 0.93, and the Cronbach α for the whole scale is .95 (Schraw & Dennison, 1994).

Table 1

Descriptive Statistics of University Students Regarding Their Level of Education, Gender and The Type of Faculty They Study

Variable		n
Gender	Female	14
	Man	72
Grade level	Freshman	6
	Sophomore	8
	Junior	15
	Senior	50
	Post bachelor's degree	3
	Master	4
Faculty type	Faculty of Education	32
	Faculty of Art and Social Science	46
	Other Faculties	8

Survey of Academic Self-Regulation (SASR)

SASR was developed to identify self-regulated learning behavior and studying strategies used in an academic course to support learning. The scale consists of six factors and 63 items. It is a 6-point Likert-type scale ranging from Strongly Disagree and Strongly Agree (Dugan, 2007; Andrade & Dugan, 2011). The sub-factors and item numbers in this scale are as follows: Metacognition (15 items), Personal Relevance and Control (10 items), Intrinsic Motivation (10 items), Self-Regulation (13 items), Self-Efficacy (9 items), and Extrinsic Motivation (6 items). The Cronbach alpha coefficient values for the sub-dimensions of the scale are 0.80 and 0.88, and the total Cronbach alpha coefficient is 0.92 (Dugan,2007; Andrade & Dugan, 2011).

Academic Motivation Scale (AMS-C 28) College Version

This scale, which is based on Deci and Ryan's (1985) self-determination theory, was developed by Vallerand, Pelletier, Blais, Brière, Senécal, & Vallières (1992) in order to determine reasons for students to attend university. The scale includes 28 items and seven sub-factors. Each factor has four items, and each item has seven response options. The scale includes three intrinsic motivation factors, three extrinsic motivation factors and one amotivation factor. The sub-dimensions of intrinsic motivation are intrinsic motivation to know (IM to know), intrinsic motivation toward accomplishments (IM to accomplish things), and intrinsic motivation to experience stimulation (IM to experience stimulation), whereas the sub-dimensions of extrinsic motivation are 'identified regulation', 'introjected regulation', 'external regulation', and 'amotivation'. The scores obtained from the sub-factors range between 4 and 28. There are no reverse scored items in the scale. The internal consistency coefficients of the sub-factors range between 0.62 and 0.86 (Vallerand et al., 1992).

***Grade point average* (GPA)**

GPA was calculated using the average grades of the students at a university in Western Canada, which included all courses from the first to the seventh semester. GPA corresponds to the general average of all course grades. GPA was collected according to the students' own declarations.

Procedure and Data Analysis

We obtained the ethics committee approval from a university in Western Canada in the spring semester of 2016 in order to conduct research. In order to collect the data of the research, "Metacognitive Awareness Inventory (MAI)", "Survey of Academic Self-Regulation (SASR)", "Academic Motivation Scale (AMS-C 28) College Version", and "demographic form" were applied face to face to the volunteer students, who were studying at a university in Western Canada in the spring semester, by the researcher. We analyzed the sum of the arithmetic mean of the total scores obtained from the MAI, SASR and AMS-C 28 scales with the Kolmogorov-Smirnov technique using the SPSS 26.00 statistical program. As the distribution was normally distributed as a result of the analysis, we used parametric techniques. Whether there was a relationship between self-regulated learning, metacognition, academic motivation and GPA was examined by Pearson Product Moment Correlation Coefficient Analysis. We used the Multiple Regression Analysis method in order to determine whether independent variables, including self-regulated learning, metacognition, and academic motivation, predicted the participants' GPAs.

Before performing the Two-way Multivariate Analysis of Variance (MANOVA), we tested whether it provided normality, linearity, and variance-covariance homogeneity required for the data. We determined that the skewness values of the total scores of dependent variables, including GPA, self-regulated learning, metacognition, and academic motivation, used in the study ranged from -.066 to .164, whereas the kurtosis values were found to be between-.648 and 1.083. In this respect, the data used in this study show a normal distribution, considering the fact that "skewness and kurtosis coefficients related to the scores of the dependent variables should be in the range of ± 2 for the assumption of normality" (Tabachnick & Fidell, 2013, p. 79).

We used Box's M in order to determine the homogeneity of the covariance matrices, whereas we employed Levene's Test in order to determine the homogeneity of the variances. The Box's M = 53.312, $p > .05$ and Levene's Test ($p > .05$) results are not statistically significant, which indicates the homogeneity of the variance-covariance matrices. Then, we determined the effect of two independent variables (gender and study hours per week) on four dependent variables (self-regulated learning, metacognition, academic motivation and GPA) using a multi-directional MANOVA analysis (Meyers et al., 2006). In the interpretation of the data, .05 significance level was taken as basis.

Results

In this section, self-regulated learning total scores, metacognition total scores, academic motivation total scores and arithmetic mean, standard deviation results related to GPA, correlation analysis, multiple regression analysis and multi-directional MANOVA test results are included.

First sub-problem: Is there a relationship between university students' total self-regulated learning, metacognition and academic motivation scores and their GPAs?

Table 2

Means, Standard Deviations and Intercorrelations Between Self-Regulated Learning Total Scores, Academic Motivation Total Scores, Metacognition Total Scores and GPA

Variable	M	SD	1	2	3	4
1.GPA	3.1287	.54495	1	.133	.252*	.327**
2.AMS-C 28 total scores	3.6981	.47478	.133	1	.127	.445**
3.MAI total scores	3.3715	.36224	.252*	.127	1	.646**
4.SASR total scores	3.0927	.57673	.327**	.445**	.646**	1

* p<.05
** p<.01

According to Table 2, we determined a significant relationship between the students' GPAs and the self-regulated learning total scores (p <.01). We found a significant relationship between the students' GPAs and the metacognitive total scores (p <.05). No significant relationship was found between the students' GPAs and their academic motivation total scores (p> .05). We found a statistically significant relationship between the total metacognition scores and the self-regulation learning total scores (p <.01). No significant relationship was determined between the metacognitive total scores and the academic motivation total scores (p >.05).

Second sub-problem: Do university students' total scores of self-regulated learning, metacognition and academic motivation predict their GPAs?

Table 3

Multiple Regression Analysis Results Regarding The Prediction of GPA

Variables	B	Std. Error	Beta	t	p
Constant	1.455	.581		2.504	.014
MAI total scores	.113	.166	.096	.684	.496
SASR total scores	.448	.246	.300	1.821	.073
AMS-C 28 total scores	-.082	.135	-.082	-.610	.544

R=.330, R^2= .109
$F_{(3-78)}$ = 3.057, p<.05

In Table 3, a multiple regression analysis was carried out on whether academic motivation, metacognition and self-regulated learning predicted GPAs. We determined that the academic motivation, metacognition and self-regulation learning total scores predicted the students' GPAs at a statistically significant level [F (3-78) = 3.057, p <.05]. The total scores obtained from the scales of academic motivation, metacognition and self-regulated learning explained .109 % of the variance in the GPAs.

Third sub-problem: To what extent do university students' gender and study time affect their GPA, self-regulated learning, metacognition and academic motivation total scores

Table 4

Two-way MANOVA Results of Metacognition Total Scores, Self-Regulated Learning Total Scores and Academic Motivation Total Scores According to the Variables of Gender and Study Hours Per Week

Effect	*Multivariate Tests*	Value	F	Hypothesis df	Error df	p	η2
Study hours	Wilks' Lambda	.935	.600	8.000	140.000	.776	.033
Gender		.942	1.074	4.000	70.000	.376	.058
Study hours * Gender		.850	1.482	8.000	140.000	.169	.078

According to Table 4, considering the Wilks' Lambda test results, we determined that study hours per week [Wilks' $\lambda = .93$, $F(8.000, 140.000) = .600$, $\eta2=.033$, $p>.05$]; gender [Wilks' $\lambda = .94$, $F(4.000, 70.000) = 1.074$, $\eta2=.058$, $p>.05$], study hours and gender [$\Lambda=.85$, $F(8.000, 140.000) = 1.482$, $\eta2=.078$, $p>.05$] had no effect on self-regulated learning total scores, metacognition total scores, academic motivation total scores and GPA scores.

Table 5

ANOVA Results of Metacognition Total Scores, Self-Regulated Learning Total Scores and Academic Motivation Total Scores According to the Variables of Gender and Study Hours Per Week

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	p	η2
Study hours	GPA	.538	2	.269	.936	.397	.025
	MAI total scores	.497	2	.249	1.192	.309	.032
	SASR total scores	.342	2	.171	1.335	.270	.035
	AMS-C 28 total scores	.438	2	.219	.724	.488	.019
Gender	GPA	.778	1	.778	2.706	.104	.036
	MAI total scores	.146	1	.146	.700	.405	.010
	SASR total scores	.352	1	.352	2.745	.102	.036
	AMS-C 28 total scores	.237	1	.237	.782	.380	.011
Study hours * Gender	GPA	1.488	2	.744	2.587	.082	.066
	MAI total scores	.019	2	.009	.045	.956	.001
	SASR total scores	.597	2	.298	2.326	.105	.060
	AMS-C 28 total scores	.159	2	.079	.262	.770	.007
Error	GPA	20.995	73	.288			
	MAI total scores	15.222	73	.209			
	SASR total scores	9.367	73	.128			
	AMS-C 28 total scores	22.108	73	.303			
Total	GPA	796.493	79				
	MAI total scores	1093.628	79				
	SASR total scores	909.797	79				
	AMS-C 28 total scores	785.399	79				

According to Table 5, we determined that the effect of study hours per week [F (2, 73) = .936 p> .05, η2 = .025] on GPA was not significant, that the effect of study hours per week [F (2, 73) = 1.192, p> .05, η2 = .032] on metacognition total scores was insignificant, that the effect of study hours per week [F (2, 73) = 1.335, p> .05, η2 = .035] on self-regulated learning total scores was insignificant, and that the effect of study hours per week [F (2, 73) =. 724, p> .05, η2 = .019] on academic motivation total scores was not significant.

We found that the effect of gender [F (1,73) = 2.706, p> .05, η2 = .036] on GPA did not make a statistically significant difference, that the effect of gender [F (1,73) = .700, p> .05, η2 = .010] on metacognition total scores was not significant, that the effect of gender [F (1, 73) = 2.745, p> .05, η2 = .036] on self-regulated learning total scores did not make a significant difference, and that the effect of gender [F (1, 73) =. 782, p> .05, η2 = .007] on academic motivation total scores was not found to be statistically significant.

We determined that the effect of study hours and gender [F (2, 73) = 2.587, p> .05, η2 = .066] on GPA was not significant, that the effect of study hours and gender [F (2, 73) = .045, p> .05, η2 = .001] on metacognition total scores was not significant, that the effect of study hours and gender [F (2, 73) = 2.326, p> .05, η2 = .060] on self-regulated learning total scores was not significant, and that the effect of study hours and gender [F (2, 73) =. 262, p> .05, η2 = .007] on academic motivation total scores was not significant.

Conclusion and Discussion

In this study, our aim was to determine to what extent university students' gender and study hours per week affected their GPAs, self-regulated learning, metacognition, and academic motivation total scores. We also examined the degree to which university students' academic motivation, metacognition, and self-regulated learning total scores predicted their GPAs. At the end of this study, we determined a significant relationship between the university students' self-regulated learning, metacognition and academic motivation scores and their GPAs. The research results supporting this result are as follows: Ning and Downing (2015) determined that university students with sufficient self-regulated learning skills showed high academic performance. Dörrenbächer and Perels (2016) found that university students with high levels of self-regulated learning and motivation had a very high academic success. Ergen and Kanadlı (2017) determined that self-regulated learning had a wide impact on academic achievement. Önder et al. (2014) revealed that the academic motivation of university students had a significant effect on academic achievement. Clark et al. (2014) determined that there was an indirect correlation between first-year university students' intrinsic motivation sub-factor scores and GPAs. The results of this study are not supported by the following research results. Meriac (2015) did not find a significant relationship between university students' intrinsic motivation and extrinsic motivation scores and GPAs. According to the result obtained in this study, we can state that university students with high levels of metacognition, academic motivation and self-regulated learning will have a higher academic success. Based on the findings of this study and other studies mentioned above, we can point out that self-regulated learning, metacognition, and academic motivation scores are an important concept related to GPA.

This study determined that the self-regulated learning, metacognition and academic motivation total scores of the university students significantly predicted their GPAs. In addition, based on the results obtained from this study, it was shown that the university students' metacognition, academic motivation, and self-regulated learning had a significant

share in the prediction of their GPAs. In other words, as the university students' levels of metacognition, academic motivation, and self-regulated learning increased, their GPA increased significantly. The three variables explained approximately 11% of the university students' GPAs. The self-regulated learning, metacognition, and academic motivation total scores are the variables which had the power to predict the GPAs of the university students examined in this study. The independent variables discussed in this study explained the GPAs of the university students at a medium level. The findings supporting this result in the related literature are as follows. Kim and Seo (2013) determined that self-regulated learning predicted the academic success of university students at a level of 26.8%. Komarraju et al. (2009) determined that university students' intrinsic motivation scores for achievement explained 5% of the variance in their GPAs.

In this study, we found out that the university students' gender and weekly study hours did not have a significant effect on their self-regulated learning, metacognition, academic motivation scores and GPAs. Considering the literature, similarities or differences could not be discussed because there was no research on whether university students' gender and weekly study hours had an effect on their self-regulated learning total scores, metacognition total scores, academic motivation total scores and GPAs. Considering the findings of this research, the following recommendations were made:

1) Studies can be conducted in different sample groups on whether university students' self-regulated learning, metacognition and academic motivation grand total scores predict their GPAs or not.

2) Students can work with different sample groups to determine to what extent university students' gender and study hours are affected by their GPA, self-regulated learning, metacognition and academic motivation total scores.

3) Studies on university students' metacognition levels based on online measurement methods can be planned.

Limitations

In this study, we examined factors such as gender, study hours, self-regulated learning total score, metacognition total score, and academic motivation total score which only affected the general academic achievement of the university students. In addition, we used techniques based on offline measurements in order to determine the metacognition levels of the university students. In the interpretation of the results of this study, the university students only reported what they believed to be true about themselves on the MAI, SASR, and AMS-C 28 scales. In this study, we used the students' GPAs as a measure of academic success since they were suitable for various disciplines and academic programs. Another potential limitation is that most of the participants who participated in this study were undergraduate students.

Future Research

University students may be suggested to explore different self-regulation learning and metacognitive strategies during their undergraduate period. The MAI, SASR and AMS-C 28 scales were applied once in this study. In future studies, it may be beneficial to apply the MAI, SASR and AMS-C 28 scales to students more than once during an academic term. For

future studies, a copy of students' GPAs and transcripts can be obtained formally from their university.

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