Does the Number of Hours Spent on Learning Affect Academic Achievement?

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Abstract

Examinations are measurement tools designed to assess learners' achievement of course learning outcomes. Past studies have shown that factors such as motivation and study time play a part in enhancing learner achievement in assessment. The objective of this exploratory study is to develop a Regression Model that will be used to identify the possible relationship between the learners' study time with their academic achievement. An online questionnaire survey was administered to 98 respondents of year 1 distance learners of the Principle of Management course in the January 2021 semester at Open University Malaysia. The data on the self-report of study time by the learners for the two variables were analysed. A regression analysis via Statistical Package for Social Sciences (SPSS) analysis tool was performed to study the relationship between the study time (for completing the assignment and preparing for the final examination) and academic achievement. The findings of this study suggest that a regression model can significantly predict academic achievement. However, based on this model, only the study time allocated for completing the assignment appears to be significantly correlated to the course assessment achievement. It is hoped that the findings gathered will lay the foundation for future research that take into consideration other relevant factors associated with study time and academic achievement.

Keywords: *Open and Distance Learning, Academic Achievement, Study Hours, Regression Model*

Introduction

Students start each new semester with high expectations. Besides, they foresee themselves being productive and successful in their studies by achieving good grades and CGPA. But there are only so many hours in a day, days in a week, and weeks in a semester for students to achieve this. As such, given these constraints, students must put together a realistic plan or establish a routine that will enable them to achieve academic success. A student's academic achievement will be at risk if they don't pay serious attention to managing their study time. Thus, students must wisely manage their study time on a daily, weekly, and semesterly basis to achieve academic success. This is not unachievable as the structure of conventional learning and open & distance learning (ODL) provides learners with the greatest possible control over their time in addition to place and pace of education (Dzakiria et al., 2005). As stressed earlier, time plays an important role in a student's learning. A study of this is an important reporting criterion in the courses and program accreditation. Study time is the amount of time a student dedicates solely to himself or herself to acquire or comprehend the knowledge and it may be flexible. For example, students may have to study at different times with different total hours of learning for the days in a week. It is intriguing to note that study time also includes some external activities that affect the internal process of learning such as hunger, lack of affection, care, etc. (Rothkopf, 1982).

Barbarick & Ippolito (2003) researched to determine if study time can be a factor to predict academic achievement. Prediction of a learner's academic achievement has been studied in education to identify learners' performance, so the instructors can take necessary proactive measures for learners that are at risk in their studies. According to Hand (1998), classical statistical methods such as regression analysis, discriminate analysis, and cluster analysis have been employed to develop various models to predict relationships. Among these, the multivariate linear regression model is commonly employed as the predicted results can be interpreted in a reasonable and meaningful way (Cohen, 2000).

Research Problem

A learner's academic achievement is deemed important for successfully achieving the intended learning outcomes of any academic programme. There appears to be unanimous agreement that learners' study time affects their academic performance (Barbarick & Ippolito, 2003; Logunmakin, 2001; Kumar, 2002; Gbore, 2006; Ukpong & George, 2013). However, other researchers have concluded that study time is not the sole factor that affects academic achievement; it becomes significant when other factors are also considered together with it in determining a student's academic achievement (Plant et al., 2005). Conversely, in a study conducted by Oreopoulos et al. (2018), it was found that even when the study time among the treatment group was significantly increased it did not have an impact on the course grade. The diverse results of these studies designate varying degrees of relationship between study time and academic achievement, which indicates that the nature of the relationship between study time and academic achievement is still not clearly understood.

In addition, research on the impact of study time and academic achievement in distance learning appears to be scarce. Furthermore, an online search on three databases, namely ERIC, ProQuest Education Journals, ProQuest Dissertation & Theses Global, and Taylor & Francis Online, using the title search terms of "study time distance learning academic achievement" and "time management distance learning academic achievement" seems to bear this assertion out as it yielded only two results! The two results dealt on the effect of time management on academic achievement in distance learning by Ahmad et al.

(2019) and Puspitasari, K. (2012). However, none of the databases yielded any results on study time for distance learning. This indicates a clear gap in the literature. Often, the learning time in the distance learning environment, which involves scheduled interaction with the instructor, can be accounted for and it is limited. Distance learners are also required to allocate time to study for completing the assignment and preparing for the examination. However, how the number of study hours impacts academic achievement in distance learning remains unclear. This study attempts to address the gap in the literature by focusing on the effect of study time on academic achievement in a distance learning setting.

Research Objectives

In this exploratory study, we aim to develop a Regression Model that will be used to identify the possible relationship between a learner's study time with their academic achievement.

The specific objectives of the study are:

1) To determine the relationship that exists between learners' study hours and academic achievement by using a regression model.

2) To determine which independent variables in the regression model significantly impact academic achievement.

3) To validate the regression model for predicting student academic performance.

Hence, this study seeks to answer the following research questions:

1) What is the relationship between study hours for completing assignment and study hours for preparing for the examination with the academic achievement?

2) Which of the independent variables (study hours for completing assignment and study hours for preparing for the examination) have significant relationship with academic achievement?

3) How well does the regression model predict the predictions of the academic achievement?

The following hypothesis was formulated to guide the study:

1) There is significant relationship ($p < 0.05$) between at least one of the independent variables (study hours for assignment and study hours for examination) with the dependent variable (academic achievement) as determined by the regression model.

2) The hours studied for completing the assignment should significantly ($p < 0.05$) affect the academic achievement as determined by the regression model.

3) The hours studied for preparing for the final examination should significantly ($p < 0.05$) affect the academic achievement as determined by the regression model.

Research Method

Respondents in this study consisted of 98 undergraduate students in their first semester of study in the January 2021 semester. 62% of them were female. The data was collected from the respondents who were registered for the Principle of Management course at Open University Malaysia. Close to 70% of the respondents were less than 30 years old and the remaining were within the age group of 30 to 49 years except for one respondent whose age was more than 50 years. All respondents in this study had voluntarily given their consent to participate in the study.

The online questionnaire was uploaded on the OUM's learning management system, myINSPIRE. There were 5 items on demographics and 7 items enquired on matters related to study hours. The focus of this paper addressed the following 2 items in the survey:

    i.   How many hours per week did you spend on your assignment / coursework?

    ii.   How many hours per week did you spend on preparing for the final examination?

The respondents self-reported their study hours spent for completing assignment on a weekly basis for 8 weeks, because the assignment due date was on the 8th week of the semester. However, the self-report of weekly hours data for preparing for the examination was collected for 12 weeks from the respondents, because the semester's examinations commence during the 13th to 14th week of the semester.

Findings and Discussion

This study attempted to find out whether a relationship existed between academic achievement in the Principle of Management course and the learners' study hours and whether it can be used to predict the academic performance of learners. For this study, learners' study hours were made up of two parts: (i) the average hours per week learners spent completing the assignment component and (ii) the average hours the learners spent a week in preparing for the final examination component of the course. We also define academic achievement as the overall final marks obtained by the learners for the course which is determined by combining the marks from the assignment and final examination components.

Towards this end, multiple linear regression was used to develop a regression model to obtain the relationship that is given by the following equation:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2$$

where, the dependent variable, *Y* is the academic achievement. The two independent variables, X_1 and X_2 represent the average hours a week spent by the learners in completing the assignment component and the average hours spent per week preparing for the final exam component of the course, respectively. β_o is the *y* axis intercept while β_1 and β_2 denote the regression coefficients for X_1 and X_2, respectively.

The SPSS software was used to analyse the descriptive statistics, determine the regression coefficients and check the model assumptions. The findings from the analysis are discussed below:

Table 1 displays that the overall average course assessment mark (average academic achievement) for the Principle of Management course is 78 marks (SD = 7.4), whereas the average hourly study time per week for completing the assignment and preparing the examination is 2.2 hours (SD = 0.9) and 1.2 hour (SD = 0.6) respectively. The findings seem to imply that learners spend more time completing their assignment rather than studying for the final examination. This could be due to the fact that in the overall assessment of this course, a higher weightage of 60% is allocated for the assignment component compared with 40% for the final examination component in the assessment of this course.

Table 1

Average of the Overall Assessment Marks, Study Hours for Completing Assignment and Study Hours for Preparing for Examination

	Mean	Std. Deviation	N
Assessment Marks	77.9	7.4	98
Hours for Assignment	2.2	0.9	98
Hours for Examination	1.2	0.6	98

a) Determining the Relationship between the Independent Variables and Academic Achievement

In order to determine whether there is any relationship that exists between learners' study hours and academic achievement in the Principle of Management course, a regression model was used. Table 2 depicts that $R^2 = 0.08$, which suggests that 8% of the variability in the academic achievement can be explained by the regression model.

Table 2

Predictive Linear Regression Model Developed based on Study Hours and Academic Achievement

Model	R	R^2	Adjusted R^2	Std Error of the Estimate
1	0.282[a]	0.080	0.060	7.193

a. Dependent Variable: *Y*
b. Predictors: (Constant), X_1, X_2

Then, to determine the significance of the relationship between the independent variables (X_1 and X_2) and the dependent variable, *Y*, an ANOVA statistical analysis was conducted. Table 3 depicts the results of the analysis. There was a significant interaction of the independent variables and the dependent variable, $F_{(2, 95)} = 4.10$, $p = 0.02$. Therefore, the regression model is able to significantly predict academic achievement.

Table 3

ANOVA Statistics for Linear Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	424.607	2	212.304	4.104	0.020*
	Residual	4914.803	95	51.735		
	Total	5339.410	97			

a. Dependent Variable: *Y (Academic Achievement)*
b. Predictors: (Constant), X_1, X_2
* $p < 0.05$

b) Determining the Variable that affect Academic Achievement

Next, it was important to determine which of the independent variables in the regression model significantly impact academic achievement in the Principle of Management course.

Table 4

Coefficients of Determination to Measure Goodness of Fit of the Regression Model

Model		Unstandardised Coefficients		Standardised Coefficients			95% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	74.418	1.853		40.172	0.000*	70.740	78.096
	X_1	3.194	1.123	0.407	2.845	0.005*	0.965	5.422
	X_2	-3.079	1.681	-0.262	-1.832	0.070	-6.416	0.258

a. Dependent Variable: *Y (Academic Achievement)*
b. Predictors: (Constant), X_1, X_2
* $p < 0.05$

From the values in Table 4, the linear regression equation for the model can be fitted to the data by the following formula:

$$\hat{Y} = 74.42 + 3.19X_1 - 3.08X_2$$

It provides the relationship between the study hours (for assignment and examination) and academic achievement for the course; here $\hat{Y}$ = prediction of the academic achievement based on the model, X_1 = study hours for completing the assignment and X_2 = study hours for preparing for the examination. The β_1 expresses a positive relationship between the study hours for assignment and academic achievement, which means that the more study hours spent on completing the assignment, the higher the results are for the final academic achievement. However, β_2 expresses a negative relationship between study hours for preparing examination and academic achievement, which means the lesser study hours spent for preparing for the examination, the higher are the results for the final academic achievement.

The statistical analysis in Table 4 confirms that study hours for completing assignment significantly predicted academic achievement, β_1 = 0.407, t (95) = 2.85, p < 0.05. On the contrary, the study hours for preparing for examination variable did not have a significant impact on academic achievement. It may also explain the negative relationship between the study hours for preparing examination and academic achievement.

The findings show that the amount of time spent on examination preparation does not significantly impact the overall final academic achievement for the course. The possible reasons for these results are as follows:

i.   The assignment assessment component comprises 60% of the course assessment. As such, learners tend to spend more study hours completing the assignment to pass the course.

ii.   The learners who have done well for their assignment assessment would have prepared themselves in learning the course and will not require much effort to study. Any further study time will not predict better results in the final examination and subsequently in the whole course assessment marks.

iii.   Some of the learners who were satisfied with their assignment marks may put in little or no effort for their final examination.

iv.   Due to the Covid-19 pandemic, the current final examination is a take-home examination in multiple-choice questions (MCQ) format for this course. Hence, learners may not put in much time to study because they can access their course materials to answer the questions. Learners may also feel they have a better chance of doing well and have reduced anxiety on MCQs as options are made available, as opposed to sitting for an essay-type exam.

c)   Validating the Regression Model

The residual analysis was conducted to determine how well the model fit to the data. Table 5 shows the actual academic achievement of 15 learners in the sample data with the predicted academic achievement using the regression model equation. Figure 1 illustrates that the residuals appear to behave randomly, which suggests that the model fits the data well.

Figure 1

Residual Plot for the Data in Table 5
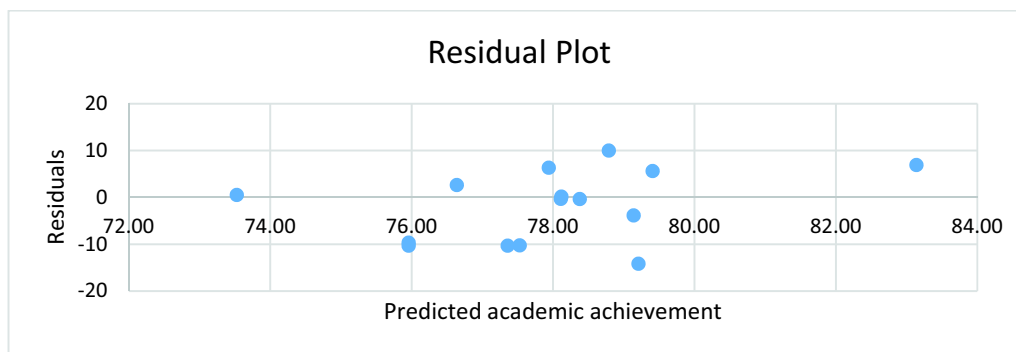
However, the validation of the model is limited as it had only considered the effect of study hours. The potential influential variables such as attitude, motivation, and GPA that were not studied during the model development stage may affect the academic achievement. Hence, possibly rendering the predictions unreliable.

Table 5

Comparison between the Observed and Predicted Academic Achievement

Student	Observed Academic Achievement	Predicted Academic Achievement	Residual
1	66.25	75.96	-9.71
2	78.25	78.12	0.13
3	79.25	76.64	2.61
4	67.25	77.53	-10.28
5	67.00	77.36	-10.36
6	88.75	78.79	9.96
7	65.62	75.96	-10.34
8	78.00	78.38	-0.38
9	85.000	79.41	5.59
10	65.00	79.21	-14.21
11	90.00	83.14	6.86
12	75.25	79.14	-3.89
13	84.25	77.94	6.31
14	74.00	73.53	0.47
15	77.75	78.11	-0.36

Verifying that the regression model satisfies the following basic assumptions in multiple linear regression:

i.   Linearity

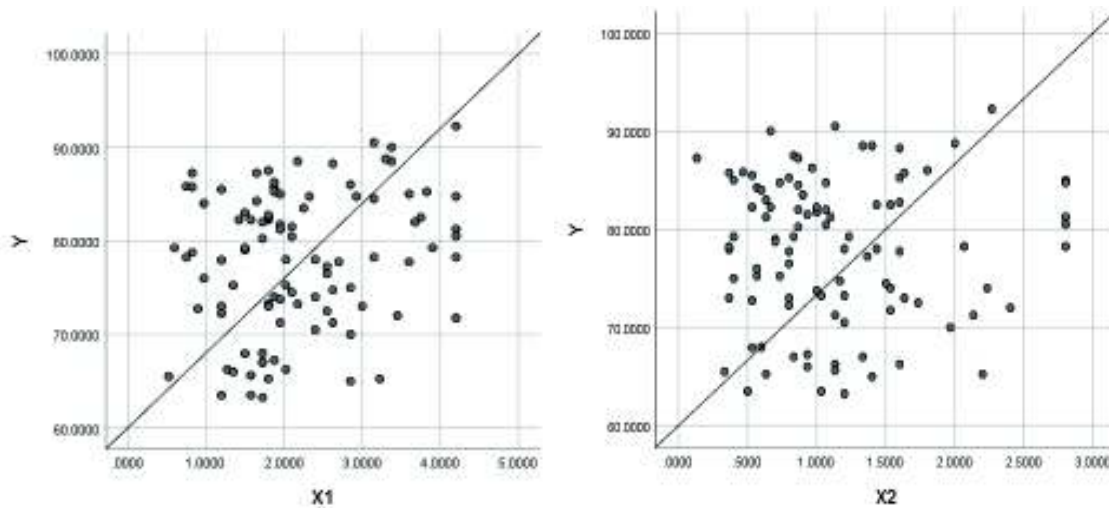ii. Normality, and

iii. Homoscedasticity

i.   Linearity

Scatter plots were used to check for linearity between the variables used in the model. The two scatter plots in Figure 2 shows that there exists a linear relationship between each independent variable and the dependent variable:
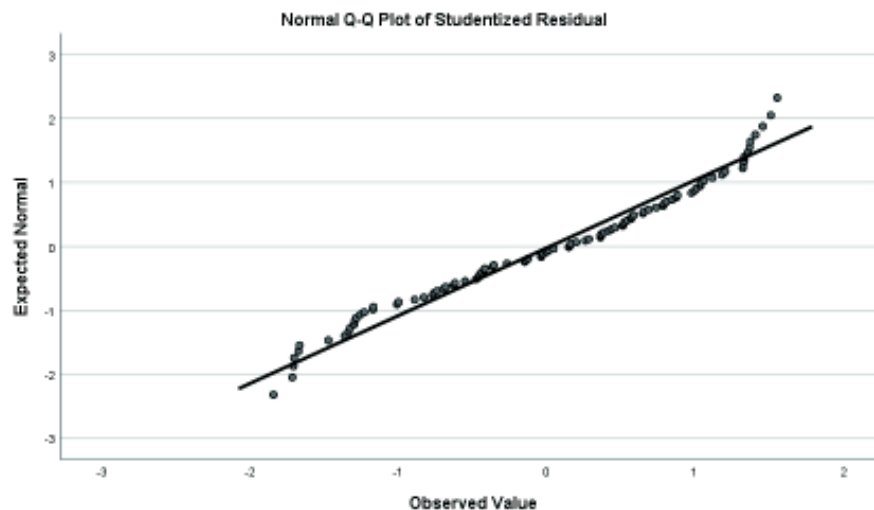
Figure 2

The Assumption of Linearity

ii.   Normality

The Kolmogorov-Smirnov (KS) test was used in conjunction with the P-P plot to check for normality of the studentised residuals. The KS test was $0.053 > 0.05$, indicating that the variables have an approximately normal distribution. A Q-Q plot in Figure 3 confirmed this result.

Figure 3

The Assumption of Normality

iii.   Homoscedasticity

Homoscedasticity describes a situation in which the error term (that is, the "noise" or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables. This means the variance must be consistent across all the independent variables. From our graph in Figure 4 below, we can see that this assumption has been met since all of the data lie between -2 and 2.

Figure 4

The Assumption of Homoscedasticity

Scatterplot
Dependent Variable: Y
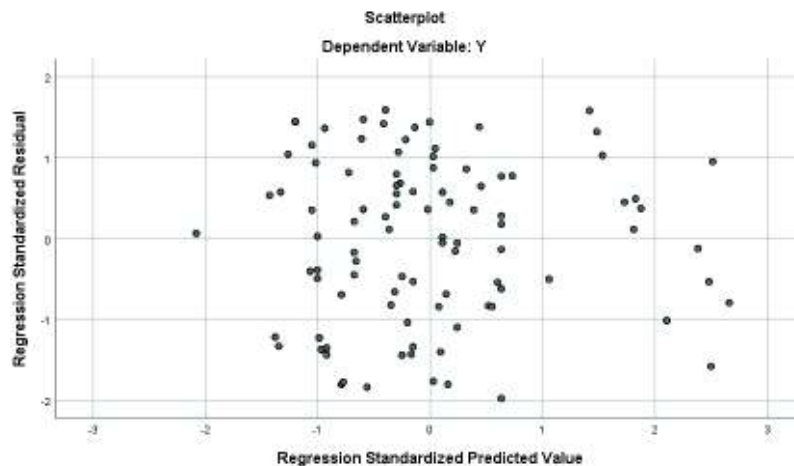
Thus, all the variables that were used in developing the multiple linear regression model have met all the 3 basic assumptions for a multiple regression model.

Conclusion

In this exploratory study, a simple regression model was successfully developed that correlates the study hours spent with academic achievement for the Principle of Management course. This model was found to be statistically significant in predicting academic achievement. However, of the two independent variables used in the model, only the one representing the average hours spent per week completing the assignment component was found to be significant in influencing academic achievement for the course. That may be the case since 60% of the overall final exam mark for the entire course comes from the assignment component. One major limitation of this exploratory study is that the model had only considered the effect of learners' study hours on their academic achievement. Notwithstanding this limitation, the model was still able to predict 8% of the variation in the academic achievement in this course. Other factors that can affect academic achievement, such as self-motivation, self-discipline, interest in the course, GPA, etc., were not included in the model. Future work will attempt to include these and other relevant confounding variables in the hierarchical regression analysis to further improve the model.

References

Ahmad, S., Batool, A., & Choudhry, A. H. (2019). Path relationship of time management and academic achievement of students in distance learning institutions. *Pakistan Journal of Distance and Online Learning, 5*(2), 191–208.

Barbarick, K. A., & Ippolito, J. A. (2003). Does the number of hours studied affect exam performance? *J. Nat. Resour. Life Sci. Educ*. *32*, 32-35. https://www.agronomy.org/files/jnrlse/issues/2003/e02-14.pdf

Cohen, B. H. (2000). Explaining Psychological Statistics *(2nd edition)*. John Wiley & Sons, Inc., New York, NY.

Dzakiria, H., M. Idrus, R., & Atan, H. (2005). Interaction in open distance learning: Research issues in Malaysia. *Malaysian Journal of Distance Education*, 7(2), 63–77.

Hand, D. J. (1998). Data mining: Statistics and more? *The American Statistician, 52*(2), 112–118. https://storm.cis.fordham.edu/~gweiss/selected-papers/data-mining-and-statistics-hand.pdf

Oreopoulos, P., Patterson, R.W., Petronijevic, U., & Pope, N. G. (2018). Lack of study time is the problem, but what is the solution? Unsuccessful attempts to help traditional and online college students. *(Working Paper 25036). National Bureau of Economic Research.* https://www.nber.org/system/files/working_papers/w25036/revisions/w25036.rev0.pdf

Plant, E. A., Ericsson, K. A., Hill, L., & Asberg, K. (2005). Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance. *Contemporary Educational Psychology, 30*, 96–116. http://edianas.com/portfolio/proj_EricssonInterview/articles/2005_Plant_Ericsson_Hill_Asberg_reprint.pdf

Puspitasari, K. (2012). The effect of learning strategy intervention and study time management intervention on students' self-regulated learning, achievement, and course completion in a distance education learning environment. *(Publication No 3540208) [Doctoral dissertation, Florida the State University]. ProQuest Dissertations & Theses Global.*

Rothkopf, E. Z. (1982). Adjunct aids and the control of mathemagenic activities during purposeful reading. *In W. Otto & S. White (Eds.) Reading expository material. New York: Academic Press.*

Ukpong, D. E., & George, I. N. (2013). Study-time behaviour and academic achievement of social studies education students in the University of Uyo. *International Education Studies, 6*(3). https://files.eric.ed.gov/fulltext/EJ1067747.pdf