

Factors Contributing to Academic Performance of Students in a Tertiary Institution in Singapore

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Abstract This study was conducted to examine different factors influencing the academic performance of students in a tertiary institution in Singapore. The main method of data collection was a semi-structured questionnaire administered to 144 students. The specific objectives of the study were to determine if factors such as gender, age, nationality of student, part-time employment, extracurricular activities and interest in pursuing higher studies affected academic success. The study also examined the learning methods used by students and how these affected their academic scores. The students' cumulative Grade Point Average (cGPA) was used as a measure of academic performance. The data were analyzed quantitatively and the results showed that factors such as gender, nationality of student, co-curricular activities and an interest in pursuing higher degrees affected students' academic scores. The use of past year examination papers as a learning method improved students' academic scores compared to other methods.

Keywords: school education, academic performance, tertiary institution, Singapore education, Singapore students

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1. Introduction

Academic success has a great influence on a student's self-esteem, motivation, and perseverance in higher education. Poor academic performance or high failure rates may result in unacceptable levels of attrition, reduced graduate throughput and increased cost of education. This also reduces admission opportunities for tertiary students seeking higher degrees. Hence, students' academic performance has always been a topic of interest for educators. Educators and researchers have long been interested in identifying and understanding the variables that contribute to academic excellence. Many researchers have identified demographic, socio-economic, family and school factors as variables contributing to students' academic performance [1,2].

Academic performance according to the Cambridge University Reporter [3] is frequently defined in terms of examination performance. In this study academic performance was characterized by the overall performance in each year which culminates in a Grade Point Average (GPA). The GPA score would take into account students' performance in tests, course work and examinations. The method of computing the GPA is as shown below:

$$\text{Current GPA} = \frac{\text{Sum of (Credit Units x Grade Points)}}{\text{Total number of modules taken by student}}$$

The minimum and maximum GPA scores are 0 (Grade F) and 4.0 (Grade A) respectively. This GPA score implies that the higher the score, the better the students' had performed academically. As such, the GPA will be a good measure of a students' academic performance.

The students enrolled in any tertiary institute in Singapore may come from various educational backgrounds. However, they are provided the same educational services in the tertiary institute. But some students perform much better than others academically. The researchers are interested to know what makes some students perform well compared to others.

The purpose of this research was to understand the possible causal factors and ways of addressing them so that students' academic performance can be improved. This study aims to contribute to the existing knowledge by documenting the factors associated with students' academic success or failure in a tertiary institute in Singapore.

2. Literature Review

Past research studies have identified several factors that affect academic performance of students in various centres of learning. Some of these factors include class attendance [4], age, learning styles or preferences [5], gender [6], class size [7], entry qualifications [8], family income [9],

etc. This literature review provides a brief examination of some of the factors that have been evaluated in this study.

2.1. Gender and Academic Performance

Research done by Borde [10] showed that gender did not play a role in academic performance. Another study by Meece and Jones [11] also revealed that gender differences did not influence students' standardized science test scores. However, Haist et al., [6] showed that men performed better than women in certain settings while women outperformed men in other settings. A study by Hedges and Newell [12] showed male students outperformed female students in science, but in reading and writing female students did much better. However, educational statistics have indicated that female students are outperforming their male counterparts at all levels of the education system and attaining higher qualifications [13,14]. After analyzing more than a million graduating students, Woodfield and Earl-Novell [15] observed that female students did better than male students. Woodfield and Earl-Novell [15] attributed this partly to female students being more academically responsible and thus less likely to be absent from lessons.

2.2. Nationality and Academic Performance

Several studies have shown that academic performance differs across nationality [16,17,18]. A study by Yousef [19] showed that foreign students outperformed local students in business studies. In a study by Nasirudeen et al. [20], it was shown that international students in Singapore experienced substantial levels of stress, which are often a result of homesickness, cultural shocks, or perceived discrimination. This, in turn, may have a negative influence on their participation in activities that contribute to important learning and personal development. One common coping mechanism used by international students is to focus more on academic achievement [21,22]. However, a study by Rienties et al. [23] showed that non-Western students scored significantly lower on GPA compared to Western students.

2.3. Students' Learning Styles or Preferences and Academic Performance

It is believed that learning styles play a small role on academic performance [24,25]. However small the effect on learning outcomes, it is accepted that learning styles can help students enhance their own learning and thus encourage self-directed learning [26]. Fielding [27] showed that it is necessary for students and educational institutions to understand learning styles. Students usually have preferences for the ways by which they learn or understand a subject and it is advisable for students to tailor these styles to suit their own learning needs [28]. As stated by Cuthbert [29], understanding the students' learning styles is important for allowing adjustment in the educators' pedagogic approaches. Several studies [30,31,32] have used standardized tools (such as the Visual, Aural, Read/write and Kinesthetic (VARK) questionnaire [33], Grasha-Reichmann Student Learning Styles survey [34]) to identify and understand the learning preference of their students, but none have looked at the association of student specific preference(s) with academic performance.

2.4. Other Determinants of Academic Performance

School students across Singapore participate in a wide variety of extracurricular activities (also known as co-curricular activities). These can be sports, clubs, debate, drama, school publications, student council, and other social events. These activities are, voluntary, usually conducted outside the normal school hours, and students do not receive grades for their involvement [35]. Silliker and Quirk [36] concluded that participation in athletics (such as soccer) for high school students enhances academic performance. Gerber [37] also found that participation in extracurricular activities promoted greater academic achievement. Many extracurricular activities have proven to be beneficial in enhancing academic performance, even if the activities are not obviously related to academic subjects [38]. Students participating in extracurricular activities did better academically than students who did not participate [38].

The concept of academic self-efficacy was devised by Albert Bandura [39]. Self-efficacy concept is defined "A conviction that one can successfully execute the behavior required to produce outcome" (pg. 193). It has been proven that students high in academic self-efficacy set higher academic goals [40].

2.5. Objectives of the Study

The main objective of the study was to analyze the effect of gender differences, age, nationality, involvement in extra-curricular activities, part-time employment, and intention to pursue higher studies on students' academic performance.

Null Hypothesis: There is no significant effect of gender, age, nationality, involvement in extra-curricular activities, part-time employment, and intention to pursue higher studies on quality of students' academic performance.

3. Methods

A convenient sample of 160 students from a tertiary institute in Singapore was recruited to complete a questionnaire for this study. Usable questionnaires were obtained from 144 students. Table 1 summarises the demographic characteristics of the participants. The research methodology was approved by the institutional review board and all participants provided written informed consent.

The study was conducted using the correlation research design because the study was intended to investigate the relationship between gender, nationality, extra-curricular activities, intention to pursue higher studies and academic performance. According to Fraenkel and Wallen [41], correlation research describes an existing relationship between variables. The study took the quantitative approach because it was based on variables measured with numbers and analyzed with statistical procedures. The questionnaire comprised of mostly two-item scale questions. For the present study, Cronbach's alpha ($r = 0.71$), Spearman-Brown's split half technique ($r = 0.89$) and Guttman's split half technique ($r = 0.88$) all revealed acceptable reliability coefficients. To ensure validity of the

research instrument, the researchers asked research supervisors in the School of Health Science to validate the questionnaire. The rated findings were used to calculate the content validity of individual items (I-CVI) and the content validity of the overall scale (S-CVI/UA) using the method described by Polit and Beck [42]. The mean I-CVI and S-CVI/UA for the questionnaire used in this study was 0.93 and 0.75 respectively. Kathuri and Palls [43] argue that instruments with validity confident of at least 0.7 are accepted as valid in research.

Written permission to conduct the research was obtained from the director of the school in which the research was conducted. Written and verbal information about the study were given to all participating students. Written consent was sought from the students before administering the survey. The confidentiality of information gathered on the survey form was guaranteed. Individual responses were not reported. Students were also informed that their participation in the study was voluntary and they can withdraw from the study at any time without negative consequences.

Data from the survey were transferred to Microsoft Excel 2010. Standard data entry and quality control procedures were used including double entry, range and consistency checks, and manual review of outliers. All statistical analyses were performed using SPSS software (version 20.0).

4. Results & Discussion

Figure 1 shows a comparison of the mean cGPA for the different variables and Cohen's d was calculated to determine effect size. A study might result in a statistically significant result but have a small effect size and, hence, be considered unimportant [44]. Cohen's d quantifies the magnitude of the difference between populations or the relationship between dependent and independent variables. The meaning of effect size varies by context, but the standard interpretation offered by Cohen [45] is: 0.8 or more = large effect size, 0.5 = moderate effect size and 0.2 = small effect size.

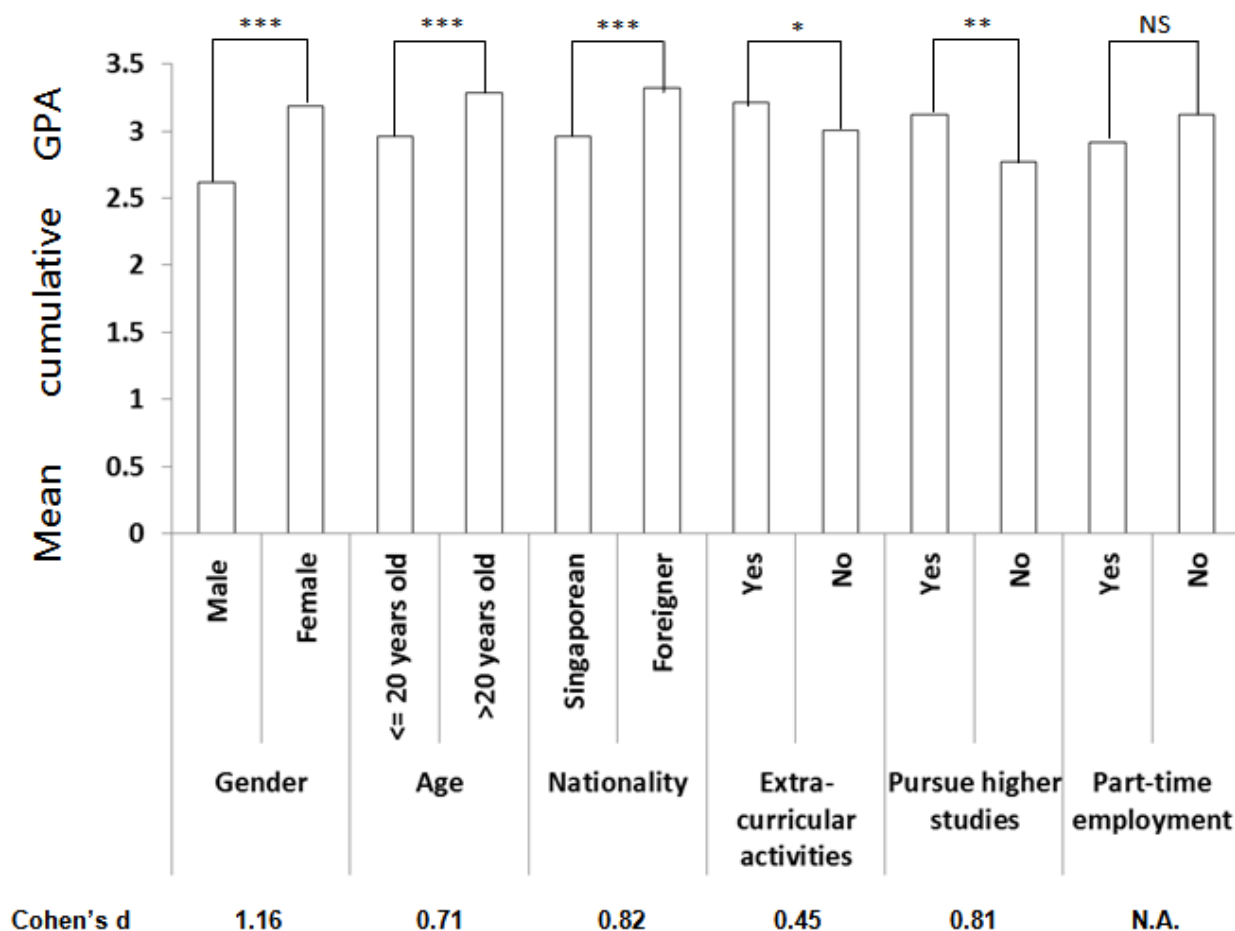


Figure 1. Graphical representation of mean cumulative GPA and variables

*** $p < 0.001$ (2 tailed), ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed), NS (Not significant).

Linear regression analysis (Table 2) revealed the value of R^2 as approximately 37%. This shows that 37% variations in academic performance can be attributed to gender, age, nationality, ECA and intention to pursue higher studies.

4.1. Gender Differences and Academic Performance

There were 119 females (82.6%) compared to 25 males (17.4%) who participated in this study. Table 1 illustrates the data regarding gender of the respondents.

Figure 1 illustrates that an independent t-test analysis revealed female students had higher cGPA scores than the scores of their male counterparts. Female students had a statistically significant higher mean cGPA score ($m = 3.189$) than male students ($m = 2.616$). Apart from the

statistical differences between the cGPAs of female students and male students, Cohen's d ($d = 1.16$) revealed a large effect size indicating a meaningful statistical difference.

In Table 2, the coefficients of Female (Gender) show that test score will increase by 0.508 units if the student is female, holding other factors constant. This coefficient is very highly significant with a p value less than 0.001. The null hypothesis that there is no significant difference in the quality of academic performance of students in relation to their gender is therefore rejected.

The findings of this study are in agreement with several other studies. Studies have indicated that gender plays a part in the student academic achievement. Previous studies have shown female students performing better academically than males [2,46,47,48]. Leonard and Jiang [47] suggest that females have better study skills than their male counterparts. Wainer and Steinberg [49] believe that female students perform academically better than males because they work harder and attend class more frequently. However, other studies have shown that gender had minor

impacts upon academic performance and gender differences exist depending on subject matter [6,50].

Table 1. Characteristics of the sample, n = 144

Socio-Demographic characteristics	n	%
<i>Gender</i>		
Male	25	17.4
Female	119	82.6
<i>Age</i>		
20 and below	86	59.7
Above 20	58	40.3
<i>Nationality</i>		
Singaporean	92	63.9
Foreigner	52	36.1
<i>Extra-curricular activities (ECA)</i>		
Yes	58	40.3
No	86	59.7
<i>Intention to pursue higher studies</i>		
Yes	129	89.6
No	15	10.4
<i>Part-time employment</i>		
Yes	23	16.0
No	121	84.0

Table 2. Regression statistics for independent and dependent variables

Regression statistics

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.606	0.368	0.340	0.4020

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.874	6	2.146	13.277	0.000
Residual	22.141	137	0.162		
Total	35.014	143			

Coefficients

	Unstandardized Coefficients		Standardized Coefficients Beta	T stat	P-value	95.0% Confidence Interval for B	
	B	Std. Error				Lower bound	Upper bound
(Constant)	2.279	0.127		17.940	0.000	2.028	2.530
Female	0.508	0.091	0.391	5.594	0.000	0.329	0.688
Age (above 20 years)	0.070	0.039	0.139	1.775	0.078	-0.008	0.148
Foreigner	0.105	0.039	0.205	2.689	0.008	0.028	0.183
Involvement in ECA	0.156	0.071	0.155	2.185	0.031	0.015	0.297
Pursue higher studies	0.238	0.112	0.147	2.127	0.035	0.017	0.458

4.2. Age and Academic Performance

In this study, 40.3% of the students were aged twenty years and above ($n=58$) while the rest were below twenty years of age ($n=86$) (Table 1). Older students had a statistically significant higher mean cGPA score ($m = 3.286$) than younger students ($m = 2.957$). Cohen's d ($d = 0.71$) revealed a moderate effect size. Coefficient from linear regression analysis was not significant at 5% level of significance. The null hypothesis that there is no significant difference in the quality of academic performance of students in relation to their age is therefore upheld.

Age might be beneficial but in results its effect is not significant on students' academic performance. Richardson [51] reported that mature students performed well in most academic settings than younger students. Richardson [51] reasoned that mature students seek a deeper understanding of their academic work unlike younger students who may adopt a surface approach.

However, the results obtained in this study shows that although being older in age may lead to better cGPA scores, age does not have a significant impact on academic performance ($p>0.05$). The results of this study on age and academic performance are in agreement with that of Mlambo [8].

4.3. Nationality and Academic Performance

About 36.1% of students in this study were foreigners or international students (Table 1). Figure 1 illustrates that international students scored better mean cGPA ($m=3.319$) compared to Singaporean students ($m=2.960$). Cohen's d ($d=0.82$) showed large effect size with a high statistical significance ($p<0.001$). Linear regression analysis coefficient showed that cGPA will increase by 0.105 units if the student is a foreigner, holding other factors constant (Table 2). This coefficient is highly significant with a p value less than 0.01. The null hypothesis that there is no significant difference in the quality of academic

performance of students in relation to their nationality is therefore rejected.

The international students in this study are from Asian countries such as China, Malaysia, Vietnam, Myanmar and Indonesia. Most of the international students in Singapore are offered scholarships or bursaries to finance their studies in Singapore [20]. Funding agencies keep track of students' performances and decide if scholarships should be continued. As such, international students are highly focused and motivated to do well academically to retain continued funding from their sponsors. Moreover, international students who may have a weak social support system may encounter high levels of acculturative stress [20] and one common coping mechanism is to focus more on academic achievement [21,22].

4.4. Extra-curricular Activities and Academic Performance

About 40.3% of students in this study participated in ECAs and scored statistically significant cGPA ($m = 3.217$) than students who had no ECA ($m = 3.003$) (Figure 1). However Cohen's d ($d=0.45$) showed a small/moderate effect size with statistical significance ($p<0.05$). The researchers are of the view that the small/moderate effect size of this group may prevent meaningful comparisons. Linear regression analysis coefficient showed that cGPA will increase by 0.156 units if a student is involved in ECA, holding other factors constant (Table 2). This coefficient is significant with a p value less than 0.05. The null hypothesis that there is no significant difference in the quality of academic performance of students in relation to their involvement in ECA is therefore rejected.

The results of this study showed that student involvement in ECA led to an improvement in cGPA scores. Fredricks and Eccles [52] found that participation in extra-curricular activities can lead to positive academic outcomes, including improved grades and test scores. According to Gardner et al., [53], participation in such

activities is positively associated with educational and civic success in young adulthood.

4.5. Higher Studies and Academic Performance

Students who reported an intention in pursuing higher studies performed better (mean cGPA = 3.127; $n=129$) than those who did not (mean cGPA = 2.767; $n=15$) (Table 1 & Figure 1). Cohen's d ($d = 0.81$) revealed a large effect size. Regression statistics for this relationship gave a coefficient value of 0.238. This coefficient is significant with a p value less than 0.05. The null hypothesis that there is no significant difference in the quality of academic performance of students in relation to their intention to pursue higher studies is therefore rejected.

Most of the students (89.6%) who participated in this study have the intention to pursue higher studies after graduation. Zimmerman et al., [40] showed that students with high academic self-efficacy set higher academic goals and willingly choose more challenging academic tasks [54].

4.6. Students' Learning Styles or Preferences and Academic Performance

The mean cGPA scored by students when they used at least one of the six learning preferences was compared and presented in Table 3. Students who included "Practice past year exam papers" as one of their learning preferences scored better cGPA ($m = 3.218$) compared to those who did not ($m = 2.946$) include this as one of their methods of study. Bivariate correlational analysis was used to study the relationship between students' learning preferences and cGPA scores. As shown in Table 4, a significant relationship is observed between "practice past year examination papers" and cGPA. As such, it can be concluded that the most effective learning style that affected cGPA was practicing past year examination papers.

Table 3. Learning preferences and mean cumulative GPA

Learning preference	Yes		No		Significance (2-tailed)
	Number of students	Mean cumulative GPA	Number of students	Mean cumulative GPA	
Listening and taking notes during lesson	130	3.1	14	2.993	0.443
Discussion with friends	112	3.087	32	3.097	0.925
Practice past year exam papers	76	3.218	68	2.946	0.001
Learn by touching and exploring models	57	3.09	87	3.032	0.086
Learn by watching videos or virtual learning	57	3.177	87	3.032	0.355
Learn by drawing or using pictures in books	74	3.09	70	3.091	0.965

Table 4. Bivariate correlations among variables, mean, and standard deviations

Variables	1	2	3	4	5	6	7
1. Cumulative GPA	-						
2. Listening and taking notes during lesson	0.064	-					
3. Discussion with friends	-0.008	0.219**	-				
4. Practice past year exam papers	0.276**	0.065	0.164	-			
5. Learn by touching and exploring models	0.144	0.170*	0.159	0.197*	-		
6. Learn by watching videos or virtual learning	0.078	0.074	0.194*	0.168*	0.361*	-	
7. Learn by drawing or using pictures in books	-0.04	-0.085	0.215**	0.138	0.134	0.191*	-
Mean	3.090	0.90	0.78	0.53	0.40	0.40	0.51
SD	0.49	0.297	0.417	0.501	0.491	0.491	0.502

SD = standard deviation. ** $p<0.01$ level (2-tailed), * $p<0.05$ level (2-tailed).

The results of this study showed that using past year examination papers as one of the learning styles, improved cGPA significantly. Students who did not use this method of learning scored significantly lower cGPA scores. The results herein are in agreement with Felder [55] who reported that an association exists between students' learning preference, teaching style and academic performance. However, Mlambo [8] reported that there is no significant difference in academic performance among different learning preferences.

5. Conclusion and Limitations

The list of factors investigated in this study was not exhaustive. There are several other factors such as socioeconomic status, parents' education level, attendance, etc. that can influence academic performance. However, it can be concluded from this study that gender, nationality, involvement in ECA, intention to pursue higher studies and learning preferences contributed to students' academic performance significantly. It is necessary for educators to understand the factors that may contribute to students' academic success so as to plan better classroom activities and strategies of teaching and learning [2]. Further research is necessary to explore other factors that may affect students' academic performance.

There are a number of limitations in this study that limit its generalizability. The study relied on self-report measures and the cGPA reported were obtained via a questionnaire. Our study used correlational analysis in certain aspects, which does not prove causal relations between variables. The sample population was selected from a single tertiary institution and hence there is limited generalizability of our results.

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