



Factors Affecting Academic Performances of Undergraduates: A Case Study with Third Year Science Undergraduate of Eastern University, Sri Lanka

P. J. N. Thayamathy¹, P. Elango¹ and K. A. N. K. Karunarathna^{1*}

¹*Department of Mathematics, Faculty of Science, Eastern University, Sri Lanka.*

Authors' contributions

This work was carried out in collaboration between all authors. Author PJNT designed the study. Authors PJNT and KANKK managed literature searches, the analyses of the study and wrote the first draft of the manuscript. Author PE wrote the protocol. All authors wrote the final draft of the manuscript. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Academic performances of undergraduates may depend on several factors and they may vary from area to area and time to time. Identification of such factors is much useful in developing their education. Main objective of this study was to find key factors that affect academic performances of undergraduates of Faculty of Science, Eastern University, Sri Lanka. Data for this study were collected from students in the third year of study through a questionnaire that covers socio-economic factors, performances in primary and secondary education in schools, extra studies and extracurricular activities, and other status within the University. Grade Point Average (GPA) up to the third year of study was used as the response for academic performances. This study could reveal that academic performances (GPA) of third year undergraduates depend on gender, performances in mother language, English language, and stream of study at University.

*Corresponding author: E-mail: nkkarunarathna@gmail.com;

Performances of female undergraduates are higher than that of male undergraduates meanwhile undergraduates in the biology stream show better performances. Performances of undergraduates are positively correlated with the fluency in English.

Keywords: Undergraduates; academic performances; GPA; proficiency in English.

1. INTRODUCTION

In Sri Lankan education system, government and private sector play significant roles in both formal and informal education. The government provides free education at all stages: primary (year 1-5); junior secondary (year 6-9); senior secondary (year 9-11); senior secondary (year 12-13), and thereafter university education. At the end of the primary stage, students are supposed to sit for the year 5 scholarship examination. Based on result of this examination, students can move to better schools. In the secondary level, students are offered nine subjects including English and they have to sit for General Certificate of Education of Ordinary Level (GCE (O/L)) examination at the end of year 11. Based on results of GCE (O/L), students are allowed to continue their studies for another two years for General Certificate of Education of Advanced Level (GCE (A/L)) examination, under one of five streams: Biological science; Physical science; Commerce, Arts, and Technology with three subjects. Biological science stream students are offered Biology (consists both Zoology and Botany), Chemistry, and Physics as subjects. Meanwhile, physical science students are supposed to take Combined Mathematics (both Pure Mathematics and Applied Mathematics), Chemistry, and Physics as their subjects. In most of government schools, mother tongue (Sinhala or Tamil) is used as medium of instructions, while in almost all private schools the medium of instructions is English.

GCE (A/L) is becoming a more competitive examination in Sri Lanka and there is a general English test and a common general knowledge test. Although, the result of general English test is not taken into account for the university entrance selection criteria, students are expected to obtain a pass mark for common general knowledge test for the university entry. According to annual performance report in 2013 of department of education, Sri Lanka, with compared to physical science stream, percentage of biological science students who passed all three subjects at GCE(A/L) is higher. Figures in Table 1 indicate how it has changed during the past year.

Table 1. Percentage of students passed all subjects in GCE(A/L)

Year	2008	2009	2010	2011	2012
Biological Science	35.3	38.5	38.8	50.6	53.8
Physical Science	33.8	33.1	36.2	46.2	44.7

According to annual report of department of education, in 2015, percentage of students who failed all subjects in physical and biological science are about 26% and 15% respectively. According to these figures, it is clear that performances of students in biological science stream are higher with compared to students in physical science stream.

Based on GCE (A/L) examination results, about 15% of students, who are with the minimum qualification for university entrance, are admitted to 15 state universities by University Grants Commission (UGC), which is the governing body of state universities. The government policy for university admission is as follows: a total of 40% is allocated for island wide merit quota, 55% is allocated for district quota, and remaining 5% is allocated for students from under privileged districts of the country.

Eastern University, Sri Lanka, which is situated in Batticaloa district in the East province, is one of developing university in the country. It consists of five faculties: Agriculture; Arts and Culture; Commerce and Management; Health-care sciences; and Science. Further, Trincomalee campus and an institute called Svami Vipulananda Institute of Aesthetic studies (SVIAS) are also affiliated with Eastern University. Faculty of Science offers knowledge in different branches of pure sciences: Botany; Chemistry; Zoology; Computer Science; Applied Mathematics; Pure Mathematics; and Physics, under two streams biological science and physical science. Only one subject combination, Bio-1 (Botany, Chemistry, Zoology) is offered under the biological stream, while six combinations: Phy-1 (Chemistry, Applied Mathematics, Physics); Phy-2 (Pure Mathematics, Applied Mathematics, Chemistry);

Phy-3 (Pure Mathematics, Applied Mathematics, Computer Science); Phy-4 (Pure Mathematics, Applied Mathematics, Physics); Phy-5 (Applied Mathematics, Physics, Computer Science); Phy-6 (Pure Mathematics, Computer Science, Chemistry) are offered under the physical science stream. Faculty has general degree programs as well as special degree programs in all subjects offered. Faculty follows a semester based education system and uses grade point average (GPA) system in grading.

Within the faculty, students face a new academic environment where all academic activities like lecturers, practical session, presentations, and seminars are conducted in the English medium. University curricula are designed in alignment with student centered learning concept and students are encouraged to follow independent learning. Therefore, students may face difficulties to shift to university's environment. Romer [1], Newman- Ford, Lloyd, and Thoman [2], also have pointed out that due to assessment pressure, timing of lectures, poor delivery of lectures and working commitments, students are reluctant to attend lectures also.

Students should achieve good performance to attain a better employment and satisfy employer's needs. Therefore, faculty takes a significant role to produce qualified graduates required by the job market. Teaching panel and administration pay more attention on students' academic performances and have taken several actions. However, it could be observed that performances of majority of students are not at the levels that teaching panel expects.

1.1 Objective of Study

Academic performances of undergraduates may be affected by these difficulties and/or by some other factors. Investigation of such factors that affect academic performances of undergraduate is much important to take the necessary measures to improve undergraduates' academic performances. Objective of this study was to identify such factors affecting academic performances of undergraduates in the Faculty of Science, Eastern University, Sri Lanka.

1.2 Literature Review

Several researches have been conducted to identify factors affecting academic performances of undergraduates. A study conducted by Anderson, and Benjamin [3] has showed that

students' effort, previous schooling are significantly related to the students' performances. Win and Miller [4] conducted a research at the University of Western Australia and identified factors that affect students' performances. He has concluded that type of secondary education institute had a large impact on students' performances compared with individual factors. Osaikhiuwa [5] has investigated effects of some institutional factors such as unfavorable learning environment, inadequate water supply and insufficient library facilities. There were not any relationships between these factors and student's performances but overcrowded lectures room, break-downs of electricity supply, continuous strikes and closure of school has a significant impact on student's performance.

Some studies have been carried out by Devadoss and Folt [6], Durden and Ellis [7], Park, and Kerr [8] and Schmidt [9] to explore the relationship between student attendance to lectures and examination performance. These studies provide a consensus that students who attend classes perform highly compared to those who missed classes. Sattayanuwat [10] investigated factors affect students' performances in an international trade course in Srinakharinwirot University, Thailand. This study also showed that attendance to lectures and tutorial classes directed to improve students' achievement.

Robert and Keil [11] has reported that there was a positive relationship between students' success and socio-economic or wealth. According to Eweniyi [12], Okolie et al. [13] parents' supports and types of parenting are also involving on variance in students' performances. Based on a study at Rift Valley University in Ethiopia, Akessa and Dhufera [14] have stated that there was an important relationship between academic achievements and their parents' education level. Win and Miller [4] also have identified that education level of parents' also influenced on their academic outcomes.

Numbers of studies have investigated influence of age and gender on academic performances. Sattayanuwat [10] also has indicated that performance of male students were better than the female students. Win and Miller [4], Everett and Robins [15], Abbott-chapman, Gary, and O'Connor [16] also have discovered that the female students obtain better performance than their male counterparts. Pinyopornpanish,

Sribanditmongkok, Boonyanaruthee, Chan-ob, Maneetorn, Uuphanthasath [17] have conducted a study to identify factors affecting low academic performance by using medical students in the faculty of medicine, Chiang Mai University. They found that among students showed low performances, male to female ratio is 2:1. Based on a study conducted in the department of Pharmacology at a tertiary care hospital and medical college in Eastern India, Mandal, Ghosh, Sengupta, Bera, Das, and Mukherjee [18], have concluded that male students showed poor performance compared with female students. However, Borde [19], Marcal and Roberts [20], O'Malley and Stranahan [21], have stated that there is no evidence that gender influence on the performance of students.

Also Mandal et al. [18] have concluded that early failures, inability to understand the medium of instruction, self-assessed depression, burn out, sleep disorders and perceived parental and peer pressure were significantly related to poor performance. Dissatisfaction with career choice was also related to poor performance. Socioeconomic status and regularity in class were not linked to academic performance. Pinyopornpanish et al. [17] have found that most of factors affect related students themselves (frequent absence for classes, male, old age students, students from the Rural Doctor Project, mental problems, lack of academic motivation in studying medicine and personality disorders), related with university environment (extra-curricular activities, bad attitude towards the course, and relationships with and adjustment to teachers and friends), and students' family (attitude toward up-bringing such as overprotection and over control.)

Based on a study on graduated students of the Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka, Ranasinghe, Ellawela, and Gunatilake [22] have concluded that academic performance are affected by age, gender, district (Colombo or out of Colombo), residency in Western province, GCE A/L attempt entering university, GCE A/L English result, number of patient-oriented case discussions, self-concept and confidence, leadership qualities, preference of long range goals and academic familiarity.

According to study conducted by using students at Quaid-i- Azam University, National University of Modern Language and International Islamic University, Khurshid [23] has discovered that

students academic performances are related with students' personal characteristics, support from institution and family, their awareness and learning resource.

2. METHODOLOGY

Factors affect academic performances may be different from faculty to faculty depending on the learning disciplines and environment. The aim of this study was to identify factors that affect academic performances of undergraduates in the faculty of Science, Eastern University, Sri Lanka. With the permission of faculty authority, study was planned as follows.

The students in the third year of study only were considered for this case study because the students in the first year of study, did not have GPA because they had not sat for the examination. Even though, the second year students had faced the first examination, their GPA had not been released by the time this case study was conducted. In the third year of study, total numbers of students in biological and physical science streams were 58 and 52 respectively. It was planned to take 70% of total students in the third year, as a sample, proportionally to number of students in each stream. Then, the selection of students for sample was done by applying simple random sampling for both biological and physical streams separately by using the statistical package Minitab. Then, students were educated about objectives of this study, and confidentiality of information provided by them. Based on availability of students at the time of data collection, and students' agreement, a group of only 68 students, including 33 biological and 35 physical science students, could be selected for this study. It is 61.8% of total students in third year of study.

Then, information on factors of interest was collected from the students who were interested in attending this study as a responder, through a questionnaire that developed based on review of literature and discussion, while data for the main response, GPA, were collected from dean's office with the permission of faculty authority. Factors gathered by the questionnaire were gender, district of living, mother language, fluency in other languages (English and Sinhala/Tamil), results of grade 5 scholarship, name of school, district in which they sat for GCE(O/L), results for subjects: mother language; English language; Science and Mathematics at

GCE(O/L), stream of study, medium of study, Z-score, results for general English at GCE(A/L), attempt at which university admission obtained, followed English and Computer courses before entering to university, subject combination, type of degree (general/special) in university, involvement with extracurricular activities within university, following any other study parallel to university degree, bread winner's occupation, and status that any family member is a degree holder.

Factors affect performances (GPA) of students were identified based on some statistical techniques as in literature. Most of the factors considered in this study were qualitative (categorical) while the main response, GPA, was quantitative and it is in the continuous scale. Therefore, significance of each factor was evaluated separately based on ANOVA (analysis of variance) technique. If GPA does not depend on a factor considered, performances at each level of the factor are same and *P*-value of the test should be higher than the significance level (0.05) used. Otherwise, that is, if *P*-value is less than the significance level, factors are taken as significant. Performance at one level of the factor is different from the performances at the other levels. Mean while, the simple linear regression technique was used to test impact of quantitative variables (factors). Factors affect GPA were selected based on significance of coefficients in the regression model. Minitab 14 version was used for the analysis.

3. RESULTS AND DISCUSSION

In the sample used for this study, majority (77%) of students were female. Students in this sample were from 21 districts out of a total of 24. Students' fluency in English language is shown in Table 2, based on percentage of students. According to students' self-evaluation, they are good in speaking, reading/writing English. However, sample data show that with compared to reading/writing, higher numbers of students are weak in speaking English.

Table 2. Fluency in English language as a percentages of students

Component	Performance		
	Good	Moderate	Poor
Speaking English	31%	69%	0%
Reading/writing English	46%	54%	0%

According to sample data, almost 50% of students in this sample have passed grade 5 scholarship examination. Majority of students (about 51%) have entered to University at their 2nd attempt at G.C.E (A/L) examination, while the least number of students (21%) have entered to University at the 3rd attempt. The rest has (28%) entered at their 1st attempt. Sample data showed that higher percentage (76%) of students have not learnt computer in their schools. Higher percentages (67%) of students have followed English and Computer courses before entering to University. About 15% of students are following other courses parallel to University courses. According to sample data, it can be seen that lower percentage of students are involved with extra-curricular activities within the University. About 40% of students are having at least one graduate (may be farther, mother of siblings) at their home.

Among the all factors considered, only gender, performances in mother language at GCE (O/L) examination, performances in English language at GCE (O/L) examination and GCE (A/L) examination, and stream of study in university could be identified as factors that affect GPA. Results (estimates and *P*-values) of ANOVA test for each significant factor are given in Table 3. *P*-value of ANOVA for each factor in Table 1 is much smaller than the significance level 0.05. This indicates that GPA is highly dependent on variables (factors) that given in Table 3.

In case of gender, GPA of female students is higher than that of male students. And the difference between GPA of female students and GPA of male students is reasonably high. On average, it is about 0.7. Performances (grades) in languages (mother language and English language) are positively affects GPA in University. Those who are fluent in these languages show better academic performances during the undergraduate period. Further, according to the figures in the above table, it is clear that a stream wise difference in academic performance can be seen. Those students in biological stream show higher GPA with compared to students in physical science stream.

The fitted regression model for GPA with the predictor, Z-score, at GCE (A/L) is given by,

$$GPA = 1.86 + 1.22 Z \text{ score.}$$

Were, both intercept and regression coefficients are significant (*P*-values were less than significance level). This model implies that GPA

Table 3. Significant factors

Factor	Levels of factor	Estimates mean GPA for each level	P- value
Gender	Male	2.0356	.000
	Female	2.7937	
Grade for mother language at G.C.E.(O/L)	Grade A	2.7933	.014
	Grade B	2.3294	
	Grade C	2.2946	
Grade for English at G.C.E.(O/L)	Grade A	2.8676	.01
	Grade B	2.6745	
	Grade C	2.2613	
	Grade F	2.13	
	Grade S	2.0135	
Grade for English at G.C.E.(A/L)	Grade A	2.9087	.009
	Grade B	2.9794	
	Grade C	2.94	
Stream of study	Biological science	3.0469	.000
	Physical science	2.2301	

of undergraduates depends on Z-score positively. But, according to coefficient of Z-score in the model, it is clear that, on average, change of 1.22 in GPA can be observed for a unit change in Z-score. Z-score almost represents GPA, but, GPA is always higher than the Z-score. Coefficient of determination, R^2 , of this model was 22.9% and intercept also was significant. This implies that use of Z score only is not sufficient to represent GPA.

Further, it could be understood that students' performances do not depend on their district of

residency, results (pass/fail) of grade 5 scholarship examination, performances in Mathematics and Science subjects at the G.C.E(O/L) examination, attempts of G.C.E.(A/L) examination at which the students were selected for university, subject combination of undergraduate degree program (within physical science stream), following other courses parallel to degree program, extracurricular activities within the university, family income and the status of having another graduate at their home.

Table 4. Factors that do not affect GPA

Factor	P-value
District of residency	.14
Mother language	.35
English speaking ability	.15
English reading ability	.26
Grade 5 scholarship examination results (pass/fail)	.46
GCE (O/L) examination grade on the subject of Science	.48
GCE (O/L) examination grade on the subject of Mathematics	.94
Medium of studies at the GCE(A/L)	.08
Number of attempts in GCE(A/L) to enter to University	.39
Learnt computer at the school	.64
Following English classes after the GCE(A/L) examination	.64
Following Computer courses after the GCE(A/L) examination	.11
Following other courses parallel to degree programme	.49
Involving sports activities	.41
Being member (s) in the society/societies	.17
Playing in musical band	.57
Involvement in social activities	.95
Involvement in research activities	.24
Having a degree holders at the home	.92

Prior to this study, it was suspected that performances of students would depend on these factors, specially, on their district of residency, performances of G.C.E(O/L) examination, number of attempts for G.C.E.(A/L) examination for the university entrance, involvement of extracurricular activities and the status of having another graduate at home. This study did not support these assumptions. The following Table 4 shows factors which did not affect GPA of undergraduates.

The results of our study are consciences with the following studies: Win, and Miller [4], Everett and Robins [15], Abbott-chapman, Gary, O'Connor [16] have discovered that the female students obtain better performance than their male counterparts.

4. CONCLUSION

According to previous studies, it is clear that factors affecting academic performances differ from place to place and time to time. Based on results of this study, it can be concluded that academic performances of undergraduates at Faculty of Science, Eastern University, Sri Lanka, depend on gender, stream of study and proficiency in mother language and English language. Performances of female students are higher with compared to male students, while students in biological stream show better performances than students in physical stream. Fluency in language especially in English positively affects academic performances within university during the undergraduate period.

Students' academic performances do not depend on district of residency, performances in mathematics and science at schools except languages, number of attempts for G.C.E.(A/L) examination, subject combination of degree program (within physical science stream), involvement with outside studies during undergraduate period, extracurricular activities within the university, family economical and educational background. In addition to these factors, there may be several other factors that affect academic performances.

Even though, it is known that academic performances depend on gender and stream of study, there is no way to improve performances based on these two factors, because changing gender or stream of study is not possible. Stream wise difference in students' performances may depend on nature of these two streams

(Biological, Physical), and their evaluation components and criteria. Those students in biology stream have many practical courses with compared to students in physical stream. This may helps biology students to have a higher GPA. New teaching and learning techniques should be adopted to improve performances of students in physical science stream.

With compared to the female undergraduate students, male undergraduate involve with most of the extra activities. This may has affected their academic performance. However, specially, male undergraduates must be educated and motivated for better studies.

Further, necessary actions must be taken to improve students' fluency in English because students' performances are poor in English and it affects students' academic performance within the University. Few years back, most of universities conducted an English course called General English Language training (GELT) for university new entrants before their degree program started. It was much helpful for students in their studies within the universities. However, it has been stopped since several years back. Any how, current statuses in universities, specially, in developing universities require some fruitful actions to improve English knowledge and skills prior to start degree programs.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX 1. THE QUESTIONNAIRE

STUDY ON IDENTIFICATION OF FACTORS AFFECTING ACADEMIC PERFORMANCE OF UNDERGRADUATES IN FACULTY OF SCIENCE, EASTERN UNIVERSITY, SRI LANKA

Instructions: Please use (×) mark to select your options and write response in given space. The information given by you will be kept **confidentially** and will **not be exposed to others**.

INDEX NUMBER: **REGISTRATION NUMBER:**

1. Personal Information

1.1. Gender :

Male		Female	
------	--	--------	--

1.2. District of living :

1.3. Fluency in languages

1.3.1. Mother language:

Tamil		Sinhala	
-------	--	---------	--

1.3.2. Fluency in other language:

Language	Speaking			Reading and writing		
	Good	Moderate	Poor	Good	Moderate	Poor
Tamil						
Sinhala						
English						

2. Details of School Education

2.1. Grade 5 schools :

Passed		Failed	
--------	--	--------	--

2.2. G.C.E. (O/L) examination

2.2.1. Name of the School :

2.2.2. District :

2.2.3. Year & Results :

Subject	Result	Subject	Result
Mother Language		Science	
English		Mathematics	

2.3 G.C.E. (A/L) examination

2.2.4. Stream :

Biology		Mathematics	
---------	--	-------------	--

2.2.5. Medium :

Tamil		Sinhala		English	
-------	--	---------	--	---------	--

2.2.6. Which attempt you were selected for university:

1 st		2 nd		3 rd	
-----------------	--	-----------------	--	-----------------	--

2.2.7. Year & Z-Score in that (A/L) Exam :

Year		Z-Score	
------	--	---------	--

2.2.8. General English grade in (A/L) Exam :

2.2.9. Did you follow Computer science as a subject in GCE(A/L) or GCE(O/L)?

Yes		No	
-----	--	----	--

3. Details of University Academic

3.1. Subject Combination:

--	--	--

3.2. Type of degree :

General		Special	
---------	--	---------	--

3.3. Current year of studying :

1 st		2 nd		3 rd		4 th	
-----------------	--	-----------------	--	-----------------	--	-----------------	--

4. Details of additional learning

4.1. Did you follow any courses before you come to this university?

English Courses:

Yes		No	
-----	--	----	--

Computer application courses:

Yes		No	
-----	--	----	--

4.2. Are you currently following any courses except the university studies?

Yes		No	
-----	--	----	--

If yes ,

State the name of the course:

--

Name of the institution :

--

5. Family background

5.1. Bread winner's Occupation:

--

5.2. Is there any degree holder in your immediate family?

Yes		No	
-----	--	----	--

6. Extracurricular activities

Sports :

Yes		No	
-----	--	----	--

Societies :

Yes		No	
-----	--	----	--

Music band :

Yes		No	
-----	--	----	--

Social services :

Yes		No	
-----	--	----	--

Research activities :

Yes		No	
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