THE PSYCHOLOGICAL FACTORS INFLUENCING ON OBTAINING THREE A's IN G.C.E. ADVANCED LEVEL EXAMINATION IN WESTERN PROVINCE OF SRI LANKA

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ABSTRACT

The most competitive exam in secondary stage of education in Sri Lanka is G.C.E. Advanced Level examination. The students who qualified for Advanced Level can select their stream in Biological science, Physical science, Commerce, Arts or Technology stream. The maximum result a student can achieve is three A passes. This study is done to find out which psychological factors influence on achieving three A's. The research was conducted using a sample of 200 students and the necessary information were collected via a structural questionnaire. The results of the factor analysis revealed that Study Techniques, Study Pattern, Self- Competitiveness, Revision Work, Determination, Self- Motivation affect on obtaining three A's in A/L Examination. The dominant factors affect on this achievement are Study Techniques, Study Pattern and Self- Competitiveness.

Key Words: three A's, Study Techniques, Study Pattern, Self- Competitiveness

This report is dedicated to everyone who encouraged me

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS

Abbreviation	Description
BLS	identifying the best learning strategy
C	confidence
CC	Comparison with classmates
CL	maintained a check list to complete tasks
CM	compared marks of term/unit tests
CTC	changing tuition classes
CWC	comparison with classmates
DLS	had different learning strategies for different subjects
DSR	diagrams, sketches, flow charts, restating/rewrite
FR	finished revision
FS	finished studying
G.C.E (A/L)	G.C.E. Advanced Level
G.C.E (O/L)	G.C.E. Ordinary Level
GD	group discussions
GK	set goals and kept on track
LS	Learning Strategy
MGB	listened music and played games when bored
M	memorising
MOC	more than one class per subject
MR	more revision
NAS	nervous and scared
NB	took a nap when bored
PAF	Principal Axis Factoring
PC	had progress chart to check progress
PCA	Principal Component Factoring

PP	did 10-15years past papers
PW	pre-preparation work
QY	quiz yourself
RY	rewarding yourself
SDL	Self- Directed Learning
SE	Self -Esteem
SEF	Self-Efficacy
SLS	used same learning strategy for all subjects
SN	short notes
SRC	Self- Regulatory Capacity
STA	sure about 3A's
TC	teaching to a classmate
TT	time table
WA	identifying weak areas
WP	had lot of will power

CHAPTER 1

INTRODUCTION

1.1 The Educational System of Sri Lanka

The government policy in Sri Lanka is to provide free education for students from primary stage to first degree level of university education. All teachers in schools are appointed and paid by the government and the students are benefited by free text books, school uniforms, free health services including dental treatments, scholarships for deserving students and subsidised transport. The children who have disabilities are provided with special facilities to ensure opportunities.

There are two main divisions in Sri Lankan school system. The primary division covers the first five years of general education period which includes grade one to grade five. Secondary division covers eight years from grade six to thirteen. The structure of categorization of general education in Sri Lanka from grade one to grade thirteen is shown in Figure 1.1.
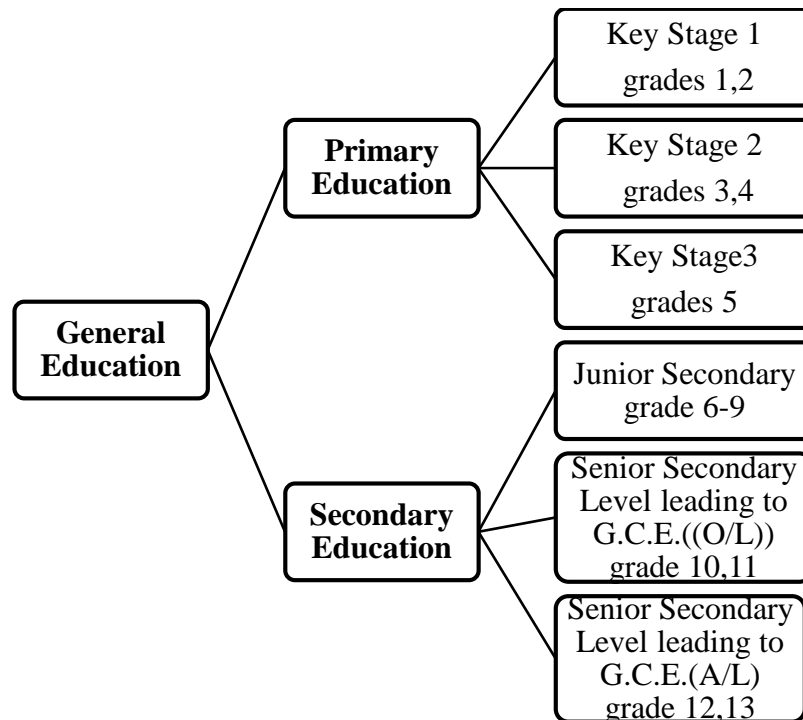
Figure 1.1: Categorization of general education in Sri Lanka

1.2 Primary Stage of Education in Sri Lanka

The first five years of schooling at the primary stage is crucial to lay a firm foundation for the child. This period consists of three key stages as shown in Figure 1.1. The main learning mode of the key stage 1 is the guided play with secondary emphasis on active learning and a minimum emphasis on deskwork. In key stage 2 which consists of grade 3 and 4 are given equal importance to all three modes of learning, play activity-based learning and deskwork. In key stage 3; the emphasis is on deskwork as students are prepared for the early stages of secondary education by active learning and play.

At every stage, education is child centred and activity based. There is less emphasis on examinations but more on developing the child's mind. At the end of the primary education, there is the grade 5 scholarship examination which is competitive and has an adverse effect on children.

1.3 Secondary Stage of Education in Sri Lanka

The secondary level consists of three sub levels as shown in Figure 1.1. At the junior secondary level, the students will begin to learn through a subject based curriculum. After completing the four years at junior stage, students proceed to G.C.E. (O/L) class at grade 10. Then the students sit for a public examination, the G.C.E (O/L) after two years duration. The curriculum consists of six core subjects and three or four optional subjects selected from several groups of subjects. Students who pass in six subjects with first language, mathematics and three subjects at credit or higher level will qualify to follow the G.C.E (A/L) course.

G.C.E (A/L) is a two-year course and constitutes the final stage of secondary education. It is an attainment examination as well as a selection examination for university entrance. The main features of the course are;

- There is an array of subjects for students to select three subjects for a given course.

- There are five broad streams such as Physical Science, Biological Science, Commerce, Arts and Technology stream. Students are expected to decide the stream and select three subjects in each stream accordingly.
- All students have to sit for General English and a Common General paper.
- Admission to universities are determined on merit but a district quota is reserved for students coming from educationally disadvantaged districts
- Students' performance is assessed by the mean z- score value based on the separate z- score values of the three subjects.

At G.C.E (A/L) examination; only about 15% of students are selected to universities. This has made the examination highly competitive. (Ministry of Education, 2013)

1.4 Examinations Conducted by Ministry of Education for School Children

There are three main examinations conducted by the Department of Examinations under Ministry of Education for school children. They are**,**

- Grade 5 scholarship and placement examination
- G.C.E (O/L) examination
- G.C.E (A/L) examination

Grade 5 scholarship and placement examination:

This examination is held at the end of grade 5 for the purpose of awarding bursaries to deserving students and to place bright students in schools with better facilities for secondary education.

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

This examination is held at the end of grade 11. Approximately 500,000 school students sit for this examination annually. Around 60% of this number qualify to enter the G.C.E (A/L) course and the balance leave the school to join vocational training or work.

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

This examination is held at the end of grade 13 and it is also a school leaving examination as well as an examination for selection to universities. Around 200,000 students sit this examination and nearly 15% of this number get selected to universities. Those who fail enter to a university join other tertiary level institutes in technical and professional areas.

1.5 G.C.E. Advanced Level Examination in Sri Lanka

The G.C.E. Advanced Level Examination is a General Certificate of Education qualification exam in Sri Lanka which is conducted annually by Department of Examinations of the Ministry of Education. This examination provides the qualification requirement for university entrance in Sri Lanka. The examinations are offered in three mediums: Sinhala, Tamil and English. Also; this diversifies over five major streams such as Physical Science stream, Biological Science stream, Commerce stream, Art stream and Technology stream.

Physical Science stream:

Physical Science stream is also known as Maths stream which has four main subjects such as Combined Mathematics, Physics, Chemistry and Information and Communication Technology (ICT). Combined Mathematics is a combination of Pure Mathematics and Applied Mathematics. In this stream, Combined Mathematics and Physics are mandatory subjects and the candidate can choose either Chemistry or ICT as the third subject.

Biological Science stream:

This stream consists of three main subjects which are Biology, Chemistry, Physics. The candidate can do Agricultural Science as an optional subject. Biology and Chemistry are mandatory subjects for Biological Science stream and the student can choose either Physics or Agricultural Science as the third subject.

Commerce stream:

Commerce stream contains of three main subjects such as, Accounting, Business Studies and Economics. The two optional subjects offer in this stream are Business Statistics and Information Technology (IT). The candidate can choose either Business Studies or Business Statistics and Economics or Information Technology (IT).

Art stream:

Art Stream offers five subjects for the candidate to select three out of them. The subjects offer by this stream are; Arts, Languages, Logic and Scientific method and Economics.

Technology stream:

This stream was introduced in 2013 and this includes Engineering Technology, Bio-system Technology, Science for Technology and ICT. The student can select one between includes Engineering Technology or Bio- system Technology. But, Science for Technology is compulsory for both Engineering and Bio- system candidates.

1.6 Research Problem

Examination is a way of assessing the quality of knowledge gained by the individual over a period of time. According to Crowther (1995) examination is a formal test of somebody knowledge or ability in a particular subject, especially by means of written questions or exercises in a particular subject.

Academic performance can be described as how extent the student, teacher or the institution achieve their academic goal over a short or long- term period. So, this academic performance is not the same for every person. It changes person to person, institution to institution. Some can perform a high level in their academics while others perform in medium or low levels. That means there must be some significant factors for these different levels of performances. For examples demographic factors, psychological factors, physical factors, family factors, literacy levels, economic factors can affect on these academic performances. Therefore, it is useful of studying which factors are significantly affect on students' academic performance.

1.7 Significance of the Study

The G.C.E. Advanced Level Examination in Sri Lanka is considered as a highly competitive examination in South Asia. Therefore, every student gets three attempts to sit for advanced level examination as a school candidate. Among the three attempts it is significant of achieving the three A passes at the first attempt.

However, there are no much studies have been carried out in Sri Lanka to find the factors influence on the students' G.C.E. (A/L) results. Nevertheless, the researches in education assume that Learning Strategy, Self-esteem, Self-regulatory Capacity, Self-efficacy and Self-directed Learning can influence on academic performance of a student.

Learning strategy is the preferred technique/s use by the student when learning. For an example, some students prefer writing short notes and some are like to read the same text several times. Self- regulatory capacity is the way students manage their thoughts, feelings and actions to accomplish their goals. As examples, some students have a work plan or their own time line, some are listening to music while studying, etc. Self-directed learning is the ability of assessing their own needs, establishing own targets and identifying their efficient learning strategy. For examples, identifying the need of a paper class or revision class, set a target of doing number of past papers in a limited time, etc. self- efficacy is the confidence of completing the task.

1.8 Research Objective

On view of above description, the objective of the current study is to identify how psychological factors effect on getting 3A's at G.C.E. (A/ L) examination.

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss about the past studies carried out for finding the factors affecting on academic performance of students in various examinations.

2.1 Factors Affect on Academic Performance

There are many studies done by researches by considering the factors which can be influenced on academic performance of students. On review of literature studies in past indicate that student's attitudes towards learning subjects, strategic learning and study habits, psychological characteristics, learning style, family background and any other factors related to academic performance of students. Further many studies have explored that psychological needs such as self- efficacy, motivation, communication skills, attitudes and behaviors, academic competency and team capabilities and cooperation can be affected on academic performance.

Kleign (1985) emphasized that the academic competence is associated students' ability of managing the work load. According to Diperna & Elliott (2002) academic competency consists of two domains such as academic skills and academic enablers. Academic skills subscales used in this study were reading/ learning, Arts, Mathematics and Critical Thinking. The subscales used for academic enablers include motivation, engagement, study skills and interpersonal skills. The Academic Competency Model created from this study reflected following aspects.

- Motivation indicates students' approach, persistence and level of interest towards academic subjects.
- Engagement reflects active participation and attention in the classroom.
- Study skills indicate the behaviour which enables the processing of new material and tests.
- Interpersonal skills reflect the cooperative learning behaviour.

The research done by Le (2016) focused on personal circumstances that every student has to face during their education period. He tested six hypotheses by considering six factors which can be affected on their academic performance by

gathering data from 100 random students from around the world. The factors considered for the research are gender, age, sleeping hours, music, gaming hours, and distance from home to school. The conclusions derived from this study are;

- There is a significant association between gender and academic performance. The study has shown that male performance is better than female performance in academic work.
- There is a significant association between age and academic performance. The study has depicted that the students who are in the age level between 25-35 years perform negatively compared to the students whose age is less than 30 years.
- The sleeping hours of a student have the strongest relationship with the academic performance. In other words, the student must get enough sleeping time to obtain best results academically.
- There is a significant relationship between gaming hours and academic performance. The study has revealed that the students who play game for less than two hours perform well compared to the students who addicted to games to play more than two hours.
- There is a significant relationship between distance from home to school and academic performance. The study has shown that the students who live far away around 30km perform less than the others.

The study carried out by Saima & Qadir (2011) was designed to find the factors affect on academic performance on university level students. The data were collected from 200 students from the university and the following conclusions were made on the basis of the findings of the study.

- Psychological, physical, socio-economic and educational factors affect on academic performance at university level.
- Change of the question patterns in papers near the examination affect student's academic performance.
- Lack of proper guidance affect student's academic performance.

A study was conducted by Farooq, Chaudhry, Shafiq, & Berhanu (2011) to examine the different factors influence on academic performance of secondary school students in a metropolitan city of Pakistan. The results of this study revealed that the socio-economic status and parents' educational level can significantly affect on overall academic performance of students' as well as he performance in the subjects Mathematics and English. Further the study has shown that the parents education affect on students' academic performance than the parents' occupation and it was found that female students perform better than male students in their academic period. Another conclusion done in this research was, there is a combined effect of home and school environment on poor academic performance. According to the study done by Caldas & Bankston (1997) stated that parental education and family social economic status have positive correlations with the students' quality of achievement.

Oladele, Ogunsola, Kazeem, Osuolale, & Akintayo (2003) conducted a study to find student and teacher related factors of secondary school students' academic performances. The study results reflected that study habits and attitudes had no significant and direct association with secondary school students' academic performance. The study has not revealed that the two factors did not have effect on performance, but concluded that the effects are not significant in the presence of teacher related factors such as qualifications of the teacher, experience and age.

Furthermore, the study which was done by Kasantra, Stephania, Tan, L., Tan, S.,& Tan, W.M (2013) tested five hypotheses based on results of undergraduates in Kampar. The test results of this study have concluded that all five hypotheses were supported under 0.05 level of significance. The findings of the study revealed that,

- There is a positive relationship between teaching method and academic performance
- There is a positive relationship between time management and academic performance
- There is a positive relationship between attendance of students and academic performance

- There is a positive relationship between sleep and academic performance
- There is a positive relationship between racial ideology and academic performance

Furthermore; Lacour & Tissington (2011) examined the effects of poverty on academic performance in 2011. This study revealed that poverty can directly affect on academic achievement due to the lack of resources available for students' success. The results from Nyankunga (2011) implied that the students from low-income families were more likely to perform low because of financial hardship and poor schools they attend.

2.2 Physical and Nutritional Factors Affect on Academic Performance

There are many researches done to analyze the physical and nutritional factors effect on academic performance of students.

The study conducted by Mickey, et al., (2000) considered several factors which can be affected on grade point averages of university students. The variables which included to this study were sleep habits, mood states, time management, social support, religious or spiritual habits, perceived stress, exercises, eating habits, number of hours worked, gender and age. The study revealed that sleep habits, mostly wake-up times have affected the largest amount of variance in grade point averages in university students while the number of paid or volunteer worked hours and later wake up times caused for lower grade points.

The research done by Gail, et al., (2005) have shown that there is evidence to suggest that breakfast consumption may improve memory, test grades and school attendance. The results of the research conducted by Catherine, et al., (2011) highlight that across all the studies, there are 251 associations between physical activity and academic performance. Furthermore, the conclusions done by the research were,

- Incorporation of movement activities and physical activity breaks during the period can increase the level of academic performance of students.

- Providing regular basis recess to students may develop academic behaviour of the students.
- Physical activities and extra-curricular activities have a significant impact on academic performance of students.

The results of the research done by Dawn, et al., (2006) using 214 number of students in grade six revealed that vigorous physical activity had higher grades than the students who performed no vigorous activities. Further the study results stated that moderate physical activity does not affect grades and the conclusion made through the research is higher grades are associated with vigorous physical activity.

The study done by Kohl, Duncan, Kelder, & Perry (2013) using 200 number of high school students reflect following results about academic performance and physical factors.

- Increasing physical activity and physical fitness improve academic performance.
- Mathematics and reading are the most influenced academic areas by physical activity.
- Cognitive functions related to attention and memory facilitate learning can be enhanced by physical activity and high aerobic fitness.

Most of the studies demonstrate that nutrition effects on academic performance. The research Nutrition and student's academic performance (2004) suggested that diets high in trans and saturated fats can negatively impact on learning and memory. The study pointed that children need essential nutrients such as vitamins, minerals, proteins and fat from their diets to optimize their academic potential. Furthermore, the study highlighted that the students have diets with more fruits and vegetables and lower fat have improved academic performance. (The link between nutrition and academic achievement, 2010)

The study done by Michelle, Mark, & Paul (2008) have stated through a statistical analysis that there is an association between academic performance with diet quality and also the students with low diet quality were significantly more likely to perform

poorly on the assessment. Furthermore, the study has emphasized that the students who consume decreased overall diet quality were significantly more likely to perform low in academic assessments and children who are from wealthy backgrounds and those who attending better schools perform well than others.

The research carried out by Ross (2010) by reviewing the literature of the past researches; states that there is an important link between nutrition and learning potential. The analysis has shown that healthy eating is essential for students to achieve full academic potential, development of the mentality and lifelong health.

2.3 Family Factors Affect on Academic Performance

According to Bozick (2007) using 94 number of second year students from a college in New York proved that the family income has been identified as a positive impact on students' academic performance. Furthermore, the findings reflected that the educational level of student's father has a great impact on student's academic performance. The study carried out by Sean (2013) in USA shows how students from high income families have better performance than students from low income families. The results indicate that the students from high income families have more opportunities to get into any college or university than the students from low income families.

The findings of the study done by Hijazi & Naqvi (2006) using data from 300 students explores that the relationship between students' performance and family income, attendance in class, study hours and mother's education are positively impact on students' performance but the students from more prosperous families do not give proper attention to their studies. This study was to check whether the variables; student's attitudes towards attendance in class, hours spent in study on daily basis after college, student's family income, student's mother's age and educational level are significantly related with student's performance. The research results emphasized following conclusions.

- Attendance has a positive relationship with academic performance such that a regular student is more serious in studies.

- Family income has a negative relationship with academic performance though it is hypothesised that affluence gives more facilities to learn.
- Study hours per day after college do not have a positive impact on academic performance.
- Mother's education does have a positive relationship with academic performance of the students as it helps children to improve.

Yousefi (2010) who has done a research to examine the effect of family income on test-anxiety and academic achievement concludes that family income is significantly affected on academic achievement of students.

When considering the correlation between parents' highest educational level and their children's academic achievement; some researchers argue about the correlation while some studies show a positive correlation. According to Mullis & Jenkins (1990) parental education is strongly correlated to academic achievement of students. But DeBary, Patterson, G, & Capadi (2002) argued that parental education is directly related to parental education but not students' academic performance. The finding in separate studies done by Sirin (2003), Chepcheing (1995), White, Salovey, Rivers, & Reyes (2012) conclude that there is no correlation between parental educational attainment and student's academic performance.

Melby & Conger (2008) support from their study that a mother's and father's educational attainment link positively to adolescents' academic performance. According to the researchers, their study highlights that 6th, 8th, 10th grade students were highly impacted by parental educational attainment.

Some studies indicate that there is a direct impact on children's academic performance by their father's educational level and indirect impact by mother's educational level. Oh-Hwang (1994) found that children who had higher performance had highly educational fathers and mother's educational level was not influential to student's academic achievement. According to Hudson (1991) parental educational attainment has long-term influence on students' academic achievement. Further the study has revealed that the students whose parents have degrees

predispose to an environment where pre-preparation reinforces for academic achievements.

Parental involvement is another factor which will be considered for the current study. The study results by Wilder (2013) indicate a positive relationship between parental involvement and students' academic achievement. Furthermore; the study revealed that this relationship can be strongest if the parental involvement is defined as parental expectations for academic achievement of their children. But this relationship can be weakest if the parental involvement is defined as homework assistance.

According to Winsten (2002) it is found that students who involve with parents are more likely to have higher grades and test-scores, enroll in high-level programs, attend school regularly, have better social skills and adopt well to school regardless of family income or background.

2.4 Psychological Factors Affect on Academic Performance

When reviewing the past researches, it can be seen that there are many studies done to analyze the psychological factors affect on academic performance.

According to the research done by Marzieh (2010) using 180 students in three school grades under two categories such as upper achiever students and under achiever students revealed that there is a relationship between learning strategies and academic achievements. Findings of the study has shown that upper achievers use more learning strategies than lower achievers. Furthermore, the results discovered that the first more girls venture learning strategies than boys. Another conclusion of the study was meta- cognitive learning strategies predict academic achievements better than cognitive learning strategies and there is no significant relationship between learning strategies and school grades.

The study carried out by Michael (2005) using 375 adult basic education participants concluded that there are clear differences to the learning and study strategies used by high school students with high academic performance, and those who with low academic performance. Furthermore, the findings of the study stated that the number

of learning and study strategies are effectively predicting the academic performance of the high school students.

The research done by Amy (2012) was about how academic achievements relate to self- regulatory learning in elementary and secondary school students. The research findings showed that self-regulatory capacity has an indirect effect on academic achievements and had the strongest correlation with course grades while self-regulatory capacities has a direct effect on academic achievements and had the strongest correlation with standardized tests.

According to various theoretical perspectives such as social comparison theory, symbolic interaction theory, much research has validated that high self-esteem is associated with the educational achievement (Marsh, Byrne, & Yeung, 1999). Another study done by Alves, Peixoto, Gouveia, Amaral, & Pedro (2002) collecting information from 838 secondary students in United States has revealed a significant relationship between self-esteem and academic achievement for grade 7 students but no such significant relationship for grade 9 students.

The study which was done using 80 students in G.C University Faisalabad has shown through a statistical analysis that there is a significant relationship (r=0.879, p<0.1) between self-esteem and academic performance(Education and Practice, 2015).

The statistical analysis done by Elaine (2012) examined the attributes of self-directed learning in grade 8 to grade 12 students by collecting information from 780 students in South-eastern United States. The results of the study revealed following facts.

- There is no significant difference in self-directed learning according to gender or ethnicity.
- There is a significant difference in self- directed learning by grade level.
- There is a significant difference in self- directed learning and academic performances.

The study done by Haron (2009) in Malaysia using adult learners who use the web to learn found that self-directed leaning and academic performance are positively related.

The finding of the study done by Heidari, Hoora, & Alsadat (2012) using 50 participants who were studying English at an Iranian university indicated that self-evaluation, self-directed and self-regulation are correlated with academic achievement and concluded that self-efficacy is a considerable factor in academic achievement. Furthermore, the research conducted by Stajkovic & Luthans (1998) found that there is a strong positive relationship between self-efficacy and performance. The research done by Multon, Brown, & Lent (1991) through 38 studies from 1977 to 1988 has found that there is a positive relationship between self-efficacy and the academic achievement.

2.5 Summary of Chapter 2

Many researchers have examined the factors which can be influenced on academic performance of students. Such factors can be categorized into demographic, psychological, physical, family factors. In addition, studies have claimed that time management, sleeping hours, gaming hours, studying hours can be affected on academic achievements. Therefore, the factors identified by the previous studies were useful in designing this study and in particularly preparing the questionnaire. It should also be noted that no studies have been found in finding the factors affect on obtaining three A's in G.C.E. (A/L) examination.

CHAPTER 3

DATA AND METHODOLOGY

The purpose of this study is to find out the psychological factors which affect on gaining three A's for G.C.E. Advanced Level Examination in Sri Lanka. This chapter outlines the data used and the statistical methodology used in this study.

3.1 Details of the Population

This research is based on the results of G.C.E Advanced Level examination which was held in 2015. According to the information shown in Table 3.1, the total number of school candidates who sat for the examination is 210, 340. Among them 5,960 students have obtained three A's and as a percentage it is 2.83%. According to the provincial performance, the highest percentage of obtaining 3 A's is from Western province which is 4.15%.

Table 3.1: Provincial performance in G.C.E. Advanced Level Examination in 2015

Province	No. Sat	Qualified for University Entrance		Obtained 3 A's	
		No.	%	No.	%
1. Northern	12,684	8,274	65.23	214	1.69
2. Sabaragamuwa	20,451	13,268	64.88	630	3.08
3. Western	56,521	35,516	62.84	2,343	4.15
4. Uva	14,093	8,852	62.81	303	2.15
5. Southern	29,945	18,668	62.34	963	3.22
6. Eastern	14,658	9,043	61.69	198	1.35
7. Central	26,046	15,967	61.3	486	1.87
8. North Western	24,032	14,455	60.15	521	2.17
9. North Central	11,910	7,094	59.56	302	2.54
All Island	**210,340**	**131,137**	**62.35**	**5,960**	**2.83**

Source:www.doenets.lk

The results in Table 3.2 indicates the all island G.C.E. (A/L) performance of each stream in 2015.

Table 3.2: Streamwise performance in G.C.E. Advanced Level Examination in 2015

Stream	No. Sat	Obtained 3 A's	
		No.	%
1. Bio Science	36,280	353	0.97
2. Physical Science	26,947	491	1.82
3. Commerce	53,333	3,164	5.93
4. Arts	79,036	1,931	2.44
5. Engineering Technology	7,782	8	0.10
6. Bio Systems Technology	4,761	11	0.23
7. Other	2,201	2	0.09
Total	**210,340**	**5,960**	**2.83**

Source:www.doenets.lk

3.2 Sample Size

The sample size is generally decided by different factors such as degree of precision, confidence level and population proportion. According to data shown in Table 3.2; it can be seen that Bio science, Physical science, Commerce and art streams are dominant in obtaining three A's than technology stream. Therefore, the study is conducted using the four main streams such as Biological science, Physical science, Commerce and Arts.

Based on the results in Table 3.1 and 3.2, the calculated population proportion of students who got 3 A's in Western Province for the selected four streams is 0.00126. The degree of precision was decided to take as 0.005 based on past data for five years in order to get an optimum sample of 200 by considering the time and the cost. The required sample size is calculated using the following formula.

$$n = \frac{z^2 p(1-p)}{d^2}$$ (3.1)

Where, n = sample size

   p = population proportion of students who got 3 A's in Western Province for
   four main streams. (Biology, Physical Science, Commerce, Arts)
   d = the degree of precision
   z = confidence level

Based on the formula 3.1,

$$n = \frac{1 \cdot 96^2 \times 0.0013 \times (1 - 0.0013)}{0.005^2} = 199.5$$

Then the sample size was taken as 200.

3.3 Sampling Frame

By considering Colombo district as a cluster in Western Province; the sample size was equally distributed in four streams for the convenience of collecting information due to limited time and cost. Table 3.3 shows the composition of the sample size in each stream correspond to gender.

Table 3.3: Composition of the sample size

Stream	Female	Male	Total
Biological Science	25	25	**50**
Physical Science	25	25	**50**
Commerce	25	25	**50**
Art	25	25	**50**
Total	**100**	**100**	**200**

3.4 Questionnaire

The structured questionnaire consists of 32 questions was designed to acquire the information for the study (Appendix). First two questions are to group the sample according to gender and A/L stream. The question numbers which are from 3 to 32 assess the responses under five main psychological factors and the questions are in Likert Scale. The objectives of the corresponding question are summarised in Table 3.4 below.

Table 3.4: Questions and objectives

Question number	Purpose
3-9	To assess responses about Learning Strategy
10-14	To assess responses about Self- esteem
15-19	To assess responses about Self- directed learning
20-24	To assess responses about Self- efficacy
25-32	To assess responses about Self- regulatory capacity

Learning strategy consists of seven variables, self-esteem, self- directed learning and self- efficacy consist of five variables each and self- regulatory capacity consists of eight variables as described below.

Learning Strategy (LS):

- Effectiveness of working according to a time table
- Effectiveness of short notes
- Effectiveness of reading the same paragraph several times (memorising)
- Effectiveness of group discussions
- Effectiveness of quiz yourself
- Effectiveness of teaching to a classmate
- Effectiveness of restating information in your own words, using diagrams/ sketches, flow charts

Self-Esteem (SE):

- Satisfaction of pre-preparation work
- Confidence for the exam
- Nervousness and fear for the exam
- Comparison of work with classmates
- Knowing that getting of 3 A's

Self- Directed Learning (SDL):

- Need of doing more revision
- Changing tuition classes several times
- Need of more than one class for subjects
- Identifying the best learning strategy and studying accordingly
- Identifying the weak areas in each subject and put more effort on them

Self- Efficacy (SEF):

- Had enough time to finish studying all three subjects before exam
- Had enough time for revision of all subjects
- Had enough time to do past papers for 10-15 years in all subjects
- Maintained a check list for completion of each task/topic when studying
- Had a progress chart to check the progress in each subject

Self- Regulatory Capacity (SRC):

- Rewarding yourself for the progress towards goals
- Comparison of academic performance in term tests/ unit tests with colleagues
- Will power
- Setting goals and keeping on track of the progress
- Listen to music, play games or engage in other activities when get bored of studying
- Take a nap when get bored of studying
- Had different learning strategies for every subject
- Used the same learning strategy for three subjects

3.5 Factor Analysis (FA)

Factor analysis is a method of investigating observed variables and their covariance structure in terms of unobservable (latent) factors. Generally, FA is an exploratory method which needs many subjective judgements. This method is more similar to Principal Component Analysis (PCA). But FA is more elaborative than PCA. FA identifies the latent variables (unobservable variables) to express observed variables as a linear function of unobserved variables. Thus, the general index formed by FA is;

$$x_i = \gamma_{i1}z_1 + \gamma_{i2}z_2 + \ldots\ldots + \gamma_{iq}z_q + e_i \text{(Observed variable = linear combination of}$$

unobserved variables $z_1, z_2, \ldots$ + error) $\hspace{4cm}$ (3.2)

However, FA is a data mining technique where it identifies the cluster variables into homogeneous sets and creates new variables (factors). Thus, in FA few factors are identified based on the linear combination of selected observed variables for different factors in order to represent the initial observed variance of the system. Also, it screens the variables such that identifies groupings to select one variable to represent many and this is very useful in regression. Further this allows to describe many variables using few factors and helps to select small group of variables of representative variables from larger set.

3.6 Factor Model

1- Factor Model:

$$x_i = \lambda_{i1}y + \varepsilon_i \ (i= 1, 2, 3, \ldots p) \hspace{4cm} (3.3)$$

where x_i are the observed variables and y is the common factor for each x_i. The ε_i's are called unique factors and the coefficients are known as pattern loadings.

2- Factor Model:

$$x_i = \lambda_{i1}y_1 + \lambda_{i2}y_2 + \varepsilon_i \ (i= 1, 2, 3, \ldots p) \hspace{3cm} (3.4)$$

p- Factor Model:

$$x_1 = \gamma_{11}z_1 + \gamma_{12}z_2 + \ldots\ldots + \gamma_{1q}z_q + \eta_1$$

$$x_2 = \gamma_{21}z_1 + \gamma_{22}z_2 + \ldots\ldots + \gamma_{2q}z_q + \eta_2$$

………………………………………….

$$x_p = \gamma_{p1}z_1 + \gamma_{p2}z_2 + \ldots\ldots + \gamma_{pq}z_q + \eta_p \tag{3.5}$$

Thus, the p-factor model can be expressed in matrix form as follows (Peiris, 2018).

$$
\begin{pmatrix} x_1 \\ \vdots \\ x_p \end{pmatrix} = \begin{pmatrix} \gamma_{11} & \cdots & \gamma_{1q} \\ \vdots & \ddots & \vdots \\ \gamma_{p1} & \cdots & \gamma_{pq} \end{pmatrix} \begin{pmatrix} z_1 \\ \vdots \\ z_q \end{pmatrix} + \begin{pmatrix} \eta_1 \\ \vdots \\ \eta_p \end{pmatrix}
$$

$$\mathbf{X} = \mathbf{AZ} + \boldsymbol{\eta}$$

3.7 Assumptions in Factor Analysis

The following assumptions can be made in a FA model (Peiris, 2018).

- Measurement error has constant variance and zero mean.
- There is no association between the factor and the measurement error.
- There is no association between errors.
- Given a factor, the observed variables are independent of one another.

Optional Assumptions

- Latent variables (F) are standardised such that $Var(F) = 1$ and $E(F) = 0$
- Observed variables (X_i) are standardised such that $Var(X_i) = 1$ and $E(X_i) = 0$

3.8 Requirements for Factor Analysis

There are four tests to be carried out before a Factor Analysis. The four tests are;

- Bartlett Test of Sphericity
- Kaiser- Meyer- Olkin (KMO) statistic
- Chronbach's Alpha Statistic
- Normality of the variables

Bartlett Test of Sphericity:

To conduct a factor analysis there must be a high significant correlation among variables which indicates that the variables can be categorised into homogeneous sets of variables. The partial correlations of other variables should be small compared to other original variables. That is, there must be a high significant correlation among variables and this can be tested using Bartlett test under hypotheses;

H_0: The original correlation matrix is an identity matrix ($\Sigma = \mathbf{I}$)

H_1: The original correlation matrix is not an identity matrix. ($\Sigma \neq \mathbf{I}$)

Here the null hypothesis has to be rejected in order to conduct a factor analysis.

Kaiser- Meyer- Olkin (KMO) statistic:

Factor analysis can be recommended according to Kaiser- Meyer- Olkin (KMO) statistic, which is a measure of homogeneity among variables. If the KMO value is greater than 0.9 then a FA can be highly recommended. If this value is greater than 0.8 then a FA can be recommended and it is reasonable to consider if KMO value is greater than 0.6. But factor analysis cannot be recommended when the KMO statistic is less than 0.6.

Chronbach's Alpha Statistic:

Chronbach's Alpha measures the reliability or the internal consistency of variables. A high level of alpha suggests that the variables are highly correlated and lower values may indicate a poor correlation between the items.

The Chronbach's Alpha formula is;

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$
(3.6)

Where,

N = the number of items

$\bar{c}$ = average covariance between item- pairs

$\bar{v}$ = average variance

Further, this tests the reliability of data which is acquired in multiple Likert scale questions. The general rule is; if this statistic is greater than 0.7 then FA is recommended.

Normality:

The normality test is required when objective criteria is used in FA. The Anderson - Darling test or standard Q-Q plots can be used to check the normality of the data set (Peiris, 2018).

3.9 Factor Extraction Methods

There are many methods which can be used to extract factors in factor analysis. They are,

a) Principal Component Factoring (PCF)

b) Principal Axis Factoring (PAF)

c) Maximum Likelihood Factoring (MLF)

d) Generalized Least Squares Factoring

e) Unweighted Least Squares Factoring

Among those; the most popular techniques for survey data which is collected through a likert scale are Principal Component Factoring (PCF), Principal Axis Factoring (PAF) and Maximum Likelihood Factoring (MLF). However, the techniques which use to this study are Principal Component Factoring (PCF) and Principal Axis Factoring (PAF).

3.10 PCF and PAF

In PCF; it is assumed that the initial communalities of all the variables are one and prior estimates are not required. Further the components of which the eigen values are greater than one; are considered as the variables which account the majority of the variance of the system. Therefore, those principal components consider as common factors while the other components consider as nuisance components. Further this extraction method builds uncorrelated linear combinations of observed

variables and the first component accounts the maximum variance and then reduces the variance eventually for other components. That is the amount of variance absorbed by components is reducing.

The PAF method depends on the conception of all variables fit in to the foremost group and when the factor is extracted, a residual matrix is calculated. This method attempts to estimate the communalities such that the initial communalities equal to the squared multiple correlation of each variable which has all of the other response variables. For an example; if x_1 is regressed with x_2, x_3, $x_{4, ...,}$ $x_{15;}$ and has 0.65 R^2 value, then the initial communality of x_1 is 0.65 (Rummel, 1970).

3.11 Factor Rotations

Rotation of factors is an essential part in FA. The use of factor rotation is to make the factors more meaningful and simpler. It tries to make some factor loadings close to zero and other factors to be large. Generally, the purpose of rotation is to reach an optimal simple structure which tries to get each variable load on as few factors as possible but maximises the number of high loadings on each variable (Rummel, 1970). The rotations can be classified as follows.
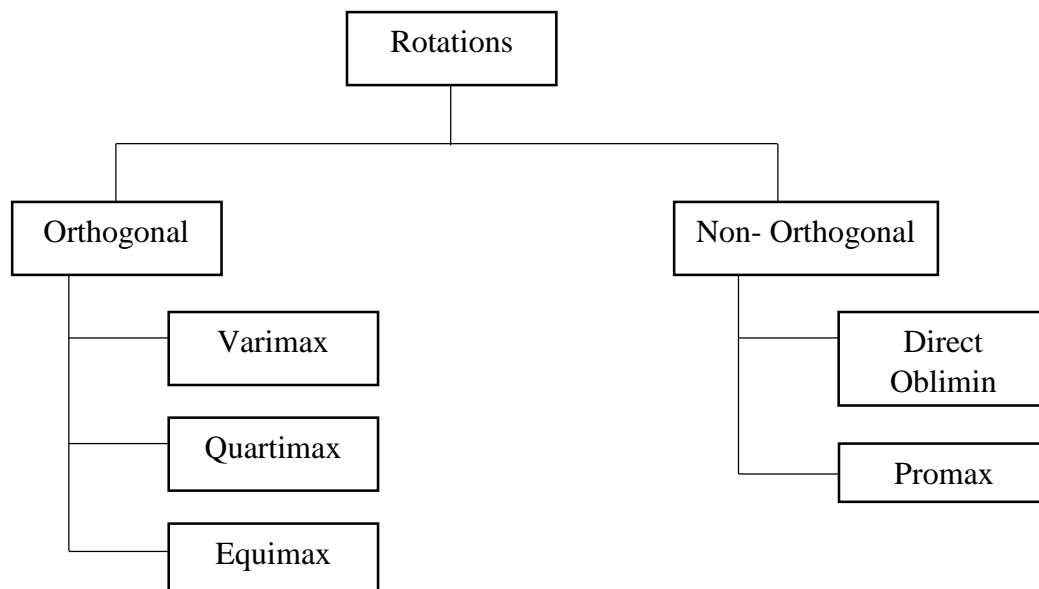
Figure 3.1: Types of Rotations in FA

Orthogonal rotations are when the factors are rotated 90^0 from each other and it is assumed that the factors are not correlated. Non- orthogonal rotations are when the factors are not switched by 90^0 from each other and the factors are considered to be correlated (Gorsuch, 1983). Furthermore, orthogonal factors are easy to interpret and thus it is commonly used in many applications.

In varimax solution, each factor gains small number of large loadings and large number of zero or small loadings. Therefore, the interpretation of factor solutions is simple since each original variable tend to be associated with one or small number of factors. Each factor represents only few numbers of variables. Generally, varimax creates a linear combination of original factors in a way that the variance of squared loadings is maximized across the variables. This method minimizes the number of variables which have high loadings on each factor. In quartimax method, it minimizes the number of factors needed to explain each variable. Direct oblimin rotation simplifies the structure and the mathematical output while promax is convenient due to its' speed in larger datasets (Gorsuch, 1983).

3.12 Factor Loadings and Factor Scores

Factor loadings are needed for the interpretation of factors and to determine the strength of the relationships between the variables. These factors can be recognised by the largest loadings and it is also vital to study zero and low factor loadings in order to confirm the identification of factors (Gorsuch, 1983).

A factor score is considered to be a variable re-counting how much an individual would score on a factor. These can be preserved as variables for further statistical analyses such as ANOVA or can be used to overcome the problem of multicollinearity as uncorrelated variables can be formed (Tabachnick & Fidell, 2007).

CHAPTER 4

EXPLANATORY DATA ANALYSIS

4.1 Reliability of Data

The validity of the questionnaire is checked using the Cronbach's alpha coefficient. Since this value which is shown in Table 4.1 is high (0.893>0.7), it can be concluded that the items in the questionnaire have a high consistency and it is reliable.

Table 4.1: Output of reliability test

Cronbach's Alpha	N of Items
.893	33

4.2 Preliminary Analysis

This section describes the descriptive statistics of psychological factors used for the study such as learning strategy, self-esteem, self- directed learning, self- efficacy and self-regulatory capacity. Learning strategy consists of seven variables, self-esteem, self- directed learning and self- efficacy consist of five variables each and self-regulatory capacity consists of eight variables.

Table 4.2: Descriptive statistics of learning strategy variables

Variable ⟍ Response (%)	Time table (TT)	Short notes (SN)	Memorising (M)	Group discussions (GD)	Quiz yourself (QY)	Teaching to a classmate (TC)	Diagrams, sketches, flow charts, restating/ rewrite (DSR)
Totally disagree (1)	13.5	11.0	10.5	11.5	30.5	10.5	12.0
Disagree (2)	20.0	17.0	30.5	18.0	22.5	24.0	24.5
Uncertain (3)	7.0	8.5	7.5	5.5	8.5	7.5	6.5
Agree (4)	39.0	36.0	35.5	35.0	25.0	35.5	29.5
Totally agree (5)	20.5	27.5	16.0	30.0	13.5	22.5	27.5

According to the percentages in Table 4.2; more than 50% of students have accepted that there is a high effectiveness of using a time table, short notes, reading the same paragraph several times (memorising), group discussions, teaching to a classmate and using diagrams/sketches, flow charts and by restating/writing. The percentage of agreeing for the effectiveness of quizzing yourself is 38.5 % which is more towards disagree level.

Among the seven variables the highest "totally agree" percentage (30%) is for high effectiveness of group discussions (GD). The total percentage of agree and totally agree for the effectiveness of this variable is 65%. The least "totally agree" percentage (13.5%) is from the variable QY. Most of the students have disagreed with this variable. The total percentage of "disagree" and "totally disagree" is 53%.

Table 4.3: Descriptive statistics of learning strategy variables by gender

Variable	Gender	totally disagree	disagree	uncertain	agree	totally agree
time table (TT)	female	8%	16%	7%	39%	30%
	male	19%	24%	7%	39%	11%
short notes (SN)	female	7%	14%	9%	33%	37%
	male	15%	20%	8%	39%	18%
Memorising (M)	female	7%	27%	7%	35%	24%
	male	14%	34%	8%	36%	8%
group discussions (GD)	female	8%	15%	5%	32%	40%
	male	15%	21%	6%	38%	20%
quiz yourself (QY)	female	23%	28%	12%	17%	20%
	male	38%	17%	5%	33%	7%
teaching to a classmate (TC)	female	6%	21%	6%	37%	30%
	male	15%	27%	9%	34%	15%
diagrams, sketches, flow charts, restating/rewrite (DSR)	female	7%	21%	7%	29%	36%
	male	17%	28%	6%	30%	19%

Table 4.3 demonstrates the response percentages for learning strategy variables by gender. Although the "agree" percentages (39%) are same for both genders in TT the totally disagree percentage of males are more than twice of the percentage value of

females. However, the female percentage (39% + 30% = 69%) of agreeing for the effectiveness of working according to a time table is higher than the percentage (39% + 11% = 50%) of males. That means more girls have agreed than boys, that there is an effectiveness of working according to a time table.

When considering the second variable SN, it can be seen that most of the girls have used short notes as an effective leaning strategy than boys. The percentage values for agreeing/ totally agreeing with this statement of girls and boys are 70% (33% + 37%) and 57% (39% + 18%) respectively.

The percentage of girls who have agreed with the statement of "reading the same paragraph several times is highly effective" is 59% while this percentage is 44% for boys. That means a high percentage of girls than boys have used to memorise lessons by hard as a studying technique.

In group discussions also, more girls than boys have stated that it is an effective method. The percentages are 72% (32% + 40%) and 58% (38% + 24%) respectively for girls and boys. When considering the percentages in "quiz yourself"; almost same percentage of boys (38% + 17% = 55%) and girls (23% + 28% = 51%) have disagreed with the statement. Also; more girls have agreed that "teaching to a classmate is highly effective" than boys. The percentages are 67% (37% + 30%) and 49% (34% + 15%) respectively.

The percentages in Table 4.3 show that more girls use diagrams/ sketches and rewriting/ restating methods than boys. The percentage of girls for agreeing for DSR is 65% and 49% is for boys.

The results in Table 4.2 and 4.3 depict that high percentage of students have accepted that the most effective methods are group discussions and preparing short notes.

Table 4.4: Descriptive statistics of learning strategy variables by (A/L) stream

Variable	A/L Stream	totally disagree	disagree	uncertain	agree	totally agree
time table (TT)	Physical Science	14%	22%	10%	38%	16%
	Biological Science	4%	12%	6%	48%	30%
	Commerce	14%	22%	6%	44%	14%
	Arts	22%	24%	6%	26%	22%
short notes (SN)	Physical Science	12%	16%	14%	34%	24%
	Biological Science	4%	12%	4%	42%	38%
	Commerce	12%	22%	6%	40%	20%
	Arts	16%	18%	10%	28%	28%
Memorising (M)	Physical Science	14%	34%	10%	30%	12%
	Biological Science	2%	26%	6%	42%	24%
	Commerce	10%	32%	6%	42%	10%
	Arts	16%	30%	8%	28%	18%
group discussions (GD)	Physical Science	10%	20%	10%	34%	26%
	Biological Science	4%	12%	0%	46%	38%
	Commerce	14%	22%	4%	36%	24%
	Arts	18%	18%	8%	24%	32%
quiz yourself (QY)	Physical Science	30%	36%	12%	14%	8%
	Biological Science	18%	10%	12%	40%	20%
	Commerce	34%	22%	4%	28%	12%
	Arts	40%	22%	6%	18%	14%
teaching to a classmate (TC)	Physical Science	10%	28%	10%	34%	18%
	Biological Science	6%	18%	6%	44%	26%
	Commerce	10%	24%	6%	42%	18%
	Arts	16%	26%	8%	22%	28%
diagrams, sketches, flow charts, restating/rewrite (DSR)	Physical Science	14%	30%	8%	28%	20%
	Biological Science	4%	14%	4%	30%	48%
	Commerce	14%	24%	6%	38%	18%
	Arts	16%	30%	8%	22%	24%

When considering the percentages in Table 4.4; it can be seen that biological science stream students show a highest percentage in every variable. But a high percentage of art stream students have not agreed with working according to a time table and using short notes as an effective method. These percentages are 46% (22% + 24%) and 34% (16% + 18%) respectively. When considering about the third variable which is reading the same paragraph several times; almost same percentage of physical science and art stream students have not agreed. The percentages are 48% (14% + 34%) and 46% (16% + 30%). The highest percentage of disagreeing for group discussion as an effective method is from commerce and art stream students. This percentage is 36% for both streams. Also, most of the physical science students have disagreed with the variable QY and this percentage is 66% (30% + 36%). The highest percentage of disagreeing with teaching to a classmate is from art stream students where this percentage is 42% (16% + 26%). When considering diagrams, sketches, flow charts, restating/rewrite methods as efficient methods; almost same percentage of physical science and art stream students have disagreed. The percentages are 44% (14% + 30%) and 46% (16% + 30%) respectively.

According to Table 4.4; it is clear that the most effective learning strategy for all four streams is group discussions. Furthermore, preparing short notes also considered as an effective method in four streams.

Table 4.5: Descriptive statistics of self- esteem variables

Variable \ Response (%)	Pre-preparation work (PW)	Confidence (C)	Nervous and scared (NS)	Comparison with classmates (CC)	Sure about 3 A's (STA)
Totally disagree (1)	11.0	11.0	10.0	28.0	10.0
Disagree (2)	16.0	25.5	18.0	40.0	22.0
Uncertain (3)	6.0	7.0	6.5	1.5	6.5
Agree (4)	41.0	34.5	33.0	22.5	30.5
Totally agree (5)	26.0	22.0	32.5	8.0	31.0

According to the Table 4.5; total percentage of "agree" and "totally agree" is more than 50% for all variables except CC. There is only 30.5% of students who have agreed/ totally agreed for the variable CC. The highest percentage of agreeing (41% + 26% = 67%) is for pre-preparation of work. That means around 67% of students are satisfied with their pre- preparation work for the exam. When considering the percentage of agreeing for the variable NS; it is also showing a close figure to the percentage value of PW. The percentage of being nervous and scared for the exam is 65.5%. The highest percentage (28% + 40% = 68%) of disagreeing/ totally disagreeing is for the variable CC which is implying that the students have not felt that they should study more compared to their classmates.

Table 4.6: Descriptive statistics of self- esteem variables by gender

Variable	Gender	totally disagree	disagree	uncertain	agree	totally agree
pre-preparation work (PW)	female	7%	16%	5%	36%	36%
	male	15%	16%	7%	46%	16%
Confidence (C)	female	8%	23%	9%	34%	26%
	male	14%	28%	5%	35%	18%
nervous and scared (NS)	female	8%	16%	7%	38%	31%
	male	12%	20%	6%	28%	34%
comparison with classmates (CC)	female	9%	53%	3%	24%	11%
	male	47%	27%	0%	21%	5%
sure about 3A's (STA)	female	6%	20%	6%	28%	40%
	male	14%	24%	7%	33%	22%

According to the percentage values in Table 4.6; it can be seen that the highest percentage for agreeing is from girls in every variable. The percentages are 72% (36% + 36%), 60% (34% + 26%), 69% (38% + 31%), 35% (24% + 11%) and 68% (28% + 40%) for PW, C, NS, CC and STA respectively. Most of the boys have disagreed for the statement "I felt that I should study more when compared to my classmates". This percentage is 74% (47% + 27%).

Furthermore, the results of Table 4.5 and 4.6 lead to a conclusion that pre-preparation is the most essential characteristic in self-esteem variable and most of the students were nervous and scared for the exam though they had confidence.

Table 4.7: Descriptive statistics of self- esteem variables by (A/L) stream

Variable	A/L Stream	totally disagree	disagree	uncertain	agree	totally agree
pre-preparation work (PW)	Physical Science	12%	22%	8%	32%	26%
	Biological Science	4%	6%	6%	48%	36%
	Commerce	10%	20%	2%	48%	20%
	Arts	18%	16%	8%	36%	22%
Confidence (C)	Physical Science	14%	28%	12%	32%	14%
	Biological Science	4%	20%	6%	38%	32%
	Commerce	12%	28%	4%	44%	12%
	Arts	14%	26%	6%	24%	30%
nervous and scared (NS)	Physical Science	10%	24%	10%	30%	26%
	Biological Science	2%	16%	6%	32%	44%
	Commerce	12%	14%	4%	40%	30%
	Arts	16%	18%	6%	30%	30%
comparison with classmates (CC)	Physical Science	38%	36%	4%	14%	8%
	Biological Science	24%	50%	2%	16%	8%
	Commerce	20%	42%	0%	28%	10%
	Arts	30%	32%	0%	32%	6%
sure about 3A's (STA)	Physical Science	12%	28%	6%	24%	30%
	Biological Science	4%	16%	6%	38%	36%
	Commerce	10%	20%	6%	38%	26%
	Arts	14%	24%	8%	22%	32%

Table 4.7 illustrates the descriptive statistics of self-esteem variables with respect to A/L stream. It can be identified that most of the biological stream students have agreed for the variables PW, C, NS and STA. the percentages are 84% (48% + 36%), 70% (38% + 32%), 76% (32% + 44%) and 74% (38% + 36%). But equal number of percentages of commerce and art stream students have shown that they agree for the statement of feeling to study more compared to their classmates. This percentage is 38%.

When comparing the disagree percentages in each variable the highest disagree percentage for PP is from physical science and art stream students. This percentage is 34% (12% + 22%). The percentage of disagreeing for the variable C is 40% in commerce, art streams and 42% in physical science stream. The least percentage is 24% which is from biology stream students. The percentages of disagreeing for the variable for NS are same for physical science and art stream students. The percentage is 34%. The highest percentages for disagreeing for comparing the amount of work done with classmates are from physical science and biological science stream students where the percentages are 74% in both streams. Also, most of the physical science students have not agreed for the statement of "sure about 3 A's in my first attempt". The disagreeing percentage is 40% (12% + 28%).

In streamwise analysis in Table 4.7; the most confident group for the examination is Biology stream students though they are nervous. That may be because they show that they are nervous and scared but their self-esteem is high psychologically. Simply they are psychologically confident than showing it physically. Furthermore; commerce and art stream students are more competitive than other two streams. They compare their academic level with classmates in order to do a self-evaluation.

Table 4.8: Descriptive statistics of self -directed learning variables

Variable / Response (%)	More revision (MR)	Changing tuition classes (CTC)	More than one class per subject (MOC)	Identifying the best learning strategy (BLS)	Identifying weak areas (WA)
Totally disagree (1)	9.5	11.0	9.5	11.5	00.0
Disagree (2)	23.0	42.0	41.0	18.5	10.0
Uncertain (3)	5.5	6.0	6.5	21.5	00.0
Agree (4)	37.5	26.0	28.5	31.5	61.0
Totally agree (5)	24.5	15.0	14.5	17.0	29.0

Table 4.8 is the descriptive analysis of self-directed learning variables. The highest percentage (61% + 29% = 90%) of agreeing/ totally agreeing is in WA which means

a high percentage of students have identified their weak areas in each subject and have put more effort on them. Also; the two variables MR and WA are the only two variables which exceed 50% in agreeing or totally disagreeing for the respective statements.

Table 4.9: Descriptive statistics of self -directed learning variables by gender

Variable	Gender	totally disagree	disagree	uncertain	agree	totally agree
more revision (MR)	female	6%	21%	5%	33%	35%
	male	13%	25%	6%	42%	14%
changing tuition classes (CTC)	female	5%	48%	5%	19%	23%
	male	17%	36%	7%	33%	7%
more than one class per subject (MOC)	female	7%	40%	6%	26%	21%
	male	12%	42%	7%	31%	8%
identifying the best learning strategy (BLS)	female	7%	15%	27%	28%	23%
	male	16%	22%	16%	35%	11%
identifying weak areas (WA)	female	0%	12%	0%	61%	27%
	male	0%	8%	0%	61%	31%

When considering the percentages in Table 4.9; more than 60% of girls have had the need of doing more revision before exam than boys. This percentage is 56% (42% + 14%) for boys. Also; nearly 40% of boys and girls both have wanted to change the tuition classes several times and approximately 50% of girls have gone more than one tuition class per subject. This percentage is nearly 40% for boys. Further around 50% of both girls and boys have identified their best learning strategy and studied accordingly. According to the table values around 90% of girls and boys both have identified their weak areas in each subject and have put more effort on them.

According to the results of Table 4.8 and 4.9; identifying weak areas is the most effective method in self- directed learning variables. That means it is important for students to recognise their weak areas in each subject and put more effort on that to perform well in examination. The second effective method is doing more revision for every subject. Therefore, the students have to pay more attention on these two methods.

Table 4.10: Descriptive statistics of self -directed learning variables by (A/L) stream

Variable	A/L Stream	totally disagree	disagree	uncertain	agree	totally agree
more revision (MR)	Physical Science	12%	28%	10%	30%	20%
	Biological Science	4%	18%	2%	46%	30%
	Commerce	10%	24%	4%	40%	22%
	Arts	12%	22%	6%	34%	26%
changing tuition classes (CTC)	Physical Science	14%	54%	6%	20%	6%
	Biological Science	2%	34%	4%	34%	26%
	Commerce	12%	42%	6%	30%	10%
	Arts	16%	38%	8%	20%	18%
more than one class per subject (OC)	Physical Science	10%	40%	10%	28%	12%
	Biological Science	4%	34%	4%	38%	20%
	Commerce	8%	50%	4%	28%	10%
	Arts	16%	40%	8%	20%	16%
identifying the best learning strategy (BLS)	Physical Science	12%	20%	26%	28%	14%
	Biological Science	4%	10%	28%	34%	24%
	Commerce	12%	22%	16%	40%	10%
	Arts	18%	22%	16%	24%	20%
identifying weak areas (WA)	Physical Science	0%	8%	0%	56%	36%
	Biological Science	0%	12%	0%	54%	34%
	Commerce	0%	10%	0%	60%	30%
	Arts	0%	10%	0%	74%	16%

According to Table 4.10 the highest percentage (46% + 30% =76%) of student category who have thought of doing more revision is from biological science stream while the least percentage (30% + 20% = 50%) is from physical science stream. The stream who have mostly needed of changing tuition classes is also from biological science stream while the least needed is from physical science stream. The

percentages are 60% and 26% respectively. Further biological science students have gone for more than one tuition class per subject compared to other streams. The percentage is around 60%. When considering the fourth variable most of the biology stream students have identified their best learning strategies compared to other streams. But all streams have identified their weak areas in each subject and this percentage is approximately 90% for all streams.

According to streamwise analysis which is shown in Table 4.10 shows that the two most essential self-directed learning methods are identifying weak areas in each subject and doing more revision for every subject.

Table 4.11: Descriptive statistics of self -efficacy variables

Variable / Response (%)	Finished studying (FS)	Finished revision (FR)	Did 10-15 years past papers (PP)	Maintained a check list to complete tasks (CL)	Progress chart to check progress (PC)
Totally disagree (1)	9.5	6.5	7.5	27.5	32.0
Disagree (2)	18.0	15.5	20.0	34.0	57.0
Uncertain (3)	7.0	.5	.5	1.5	00.0
Agree (4)	32.0	56.0	53.0	27.0	8.5
Totally agree (5)	33.5	21.5	19.0	10.0	2.5

The descriptive statistics of self-efficacy variables are shown in Table 4.11. The highest percentage of agree/ totally agree is for FR where this percentage is 77.5%. But this percentage for FS is 65.5%. This shows that more students have agreed with "Finished revision of all three subjects before examination" than "Finished studying all three subjects before examination". This may be because the unstudied parts must have been covered by revision. Nearly 72% have done past papers for 10-15 years in every subject. Among the students who got three A's; only 11% have maintained a progress chart to check their progress in each subject and 37% have maintained a check list to keep on track of completion of each task or topic.

Table 4.12: Descriptive statistics of self -efficacy variables by gender

Variable	Gender	totally disagree	disagree	uncertain	agree	totally agree
finished studying (FS)	female	4%	13%	6%	29%	48%
	male	15%	23%	8%	35%	19%
finished revision (FR)	female	4%	19%	1%	58%	18%
	male	9%	12%	0%	54%	25%
did 10-15years past papers (PP)	female	4%	27%	1%	50%	18%
	male	11%	13%	0%	56%	20%
maintained a check list to complete tasks (CL)	female	17%	38%	3%	28%	14%
	male	38%	30%	0%	26%	6%
had progress chart to check progress (PC)	female	36%	52%	0%	10%	2%
	male	28%	62%	0%	7%	3%

According to the results in Table 4.12; 77% (29% + 48%) of girls have agreed for" finished studying all three subjects" while this percentage is 54% (35% +19%) for boys. In revision work; almost same percentage of girls and boys have agreed for completing revision in all three subjects before exam. The percentages are 76% (58% + 18%) and 79% (54% + 25%) respectively. When considering of doing 10-15 years past papers most of the boys have done past papers than girls. This percentage for boys is 76% (56% + 20%) while this value is 68% (50% + 18%) for girls. Further it can be seen that most of the boys have disagreed for maintaining a checklist to complete tasks than girls. The percentages are 68% (38% + 30%) and 55% (17% + 38%) for boys and girls respectively. Also; almost same percentage of girls and boys have disagreed of having a progress chart to check their progress in three subjects. This percentage is approximately 90%.

The overall result of Table 4.11 and 4.12 emphasis that the students have agreed with completing revision work in all three subjects before examination is the most important requirement in self-efficacy irrespective of the gender. But this result changes with respect to gender because female students have agreed more on completion of studying rather than the completion of revision work. That means male

students tend towards more revision work while female students tend towards studying more. Furthermore, doing past papers for 10-15 years also plays a major role as well as revision work.

Table 4.13: Descriptive statistics of self -efficacy variables by (A/L) stream

Variable	A/L Stream	totally disagree	disagree	uncertain	agree	totally agree
finished studying (FS)	Physical Science	12%	20%	10%	26%	32%
	Biological Science	2%	10%	4%	36%	48%
	Commerce	10%	18%	6%	46%	20%
	Arts	14%	24%	8%	20%	34%
finished revision (FR)	Physical Science	4%	10%	2%	60%	24%
	Biological Science	10%	14%	0%	54%	22%
	Commerce	10%	22%	0%	44%	24%
	Arts	2%	16%	0%	66%	16%
did 10-15years past papers (PP)	Physical Science	8%	18%	2%	48%	24%
	Biological Science	10%	20%	0%	50%	20%
	Commerce	10%	22%	0%	50%	18%
	Arts	2%	20%	0%	64%	14%
maintained a check list to complete tasks (CL)	Physical Science	24%	28%	2%	32%	14%
	Biological Science	24%	42%	4%	22%	8%
	Commerce	32%	34%	0%	22%	12%
	Arts	30%	32%	0%	32%	6%
had progress chart to check progress (PC)	Physical Science	42%	50%	0%	8%	0%
	Biological Science	24%	56%	0%	18%	2%
	Commerce	22%	72%	0%	4%	2%
	Arts	40%	50%	0%	4%	6%

According to Table 4.13 the highest percentage of students who have finished studying all three subjects is from biological science stream and the least percentage is from art stream. The percentages are 84% (36% + 48%) and 54% (20% + 34%) respectively. Almost same percentage of physical science and art stream students

have finished their revision work in all three subjects before the exam. The percentage is more than 80% for both streams. When considering about doing past papers, most of the art and physical science stream students have done 10-15 years past papers in all three subjects compared to other two streams. The percentages are 78% and 72% respectively. Further more than 50% of students in all four streams have not maintained a checklist to complete their tasks and more than 75% have not had a progress chart to check their progress.

In streamwise analysis, the most effective method for physical science and arts stream students under self-efficacy variable is the completion of revision in all three subjects before examination. But the biology stream students prefer to complete studying all three subjects as their most effective method. Commerce stream students have two effective methods such as doing 10-15 years past papers as well as completing revision.

Table 4.14: Descriptive statistics of self -regulatory capacity variables

Variable / Response (%)	Rewarding yourself (RY)	Compared marks of term/unit teats (CM)	Had lot of will power (WP)	Set goals and kept on track (GK)	Listened music and played games when bored (MGB)	Took a nap when bored (NB)	Had different learning strategies for different subjects (DLS)	Used same learning strategy for all subjects (SLS)
Totally disagree (1)	18.5	24.5	11.5	10.0	16.5	14.5	36.0	6.5
Disagree (2)	78.5	42.5	43.0	56.5	21.0	43.0	44.0	13.5
Uncertain (3)	00.0	2.0	22.0	13.5	1.0	1.5	00.0	00.0
Agree (4)	00.0	20.0	9.0	6.5	44.5	24.5	13.5	61.0
Totally agree(5)	3.0	11.0	14.5	13.5	17.0	16.5	6.5	19.0

According to the percentages in Table 4.14 which illustrates descriptive statistics of self- regulatory capacity variables, only 3% of students have rewarded their selves for progress towards their goals. The highest percentage shows in SLS which implies that around 80% of students have used the same learning strategy for all subjects. The percentage of students who have used different learning strategies for different

subjects is approximately 20%. Around 61.5% of students claim that they listen to music, play games or engage in any other activity when get bored of studying. But there is 41% of students who take a nap when get bored.

Table 4.15: Descriptive statistics of self -regulatory capacity variables by gender

Variable	Gender	totally disagree	disagree	uncertain	agree	totally agree
rewarding yourself (RY)	female	14%	84%	0%	0%	2%
	male	23%	73%	0%	0%	4%
compared marks of term/unit tests (CM)	female	9%	51%	4%	21%	15%
	male	40%	34%	0%	19%	7%
had lot of will power (WP)	female	15%	39%	28%	7%	11%
	male	8%	47%	16%	11%	18%
set goals and kept on track (GK)	female	12%	61%	15%	3%	9%
	male	8%	52%	12%	10%	18%
listened music and played games when bored (MGB)	female	20%	28%	1%	37%	14%
	male	13%	14%	1%	52%	20%
took a nap when bored (NB)	female	11%	35%	2%	33%	19%
	male	18%	51%	1%	16%	14%
had different learning strategies for different subjects (DLS)	female	42%	45%	0%	10%	3%
	male	30%	43%	0%	17%	10%
used same learning strategy for all subjects (SLS)	female	3%	10%	0%	64%	23%
	male	10%	17%	0%	58%	15%

Table 4.15 show that both genders have not rewarded themselves for achieving goals and this percentage is more than 90%. Most of the girls have compared their term/unit tests marks with their classmates then boys. The percentages are 36% and 26% respectively. But boys have had more will power and have set goals and kept on track compared to girls. When considering the activities done when get bored of studying, more than 70% of boys have listened to music, played games or engaged in another activity than girls. This percentage for girls is approximately 50%. But around 52% of girls have taken a nap when get bored of studying and this percentage for boys is 30%. According to above percentages more than 70% of both girls and boys have not used different learning strategies for different subject. Among them most of the girls have showed the highest resistant for using different earning

strategies and the percentage is 87% (42% + 45%) while this value is 73% (30% + 43%) for boys. Further, the same percentages have shown in the table for using same learning strategy for all subjects.

The results in Table 4.14 and 4.15 reveal that most of the students have used the same learning technique for all subjects irrespective of the gender. Also; it is clear that more boys than girls tend to listen music and play games rather than taking a nap when bored of studying.

Table4.16: Descriptive statistics of self-regulatory capacity variables by (A/L)stream

Variable	A/L Stream	totally disagree	disagree	uncertain	agree	totally agree
rewarding yourself (RY)	Physical Science	18%	80%	0%	0%	2%
	Biological Science	20%	78%	0%	0%	2%
	Commerce	6%	92%	0%	0%	2%
	Arts	30%	64%	0%	0%	6%
compared marks of term/unit tests (CM)	Physical Science	34%	36%	4%	12%	14%
	Biological Science	18%	54%	4%	14%	10%
	Commerce	20%	42%	0%	24%	14%
	Arts	26%	38%	0%	30%	6%
had lot of will power (WP)	Physical Science	6%	40%	34%	6%	14%
	Biological Science	12%	36%	28%	8%	16%
	Commerce	14%	46%	12%	14%	14%
	Arts	14%	50%	14%	8%	14%
set goals and kept on track (GK)	Physical Science	6%	68%	12%	2%	12%
	Biological Science	8%	44%	24%	8%	16%
	Commerce	12%	56%	8%	10%	14%
	Arts	14%	58%	10%	6%	12%
listened music and played games when bored (MGB)	Physical Science	16%	24%	0%	42%	18%
	Biological Science	10%	20%	0%	52%	18%
	Commerce	20%	18%	0%	48%	14%
	Arts	20%	22%	4%	36%	18%
took a nap when bored (NB)	Physical Science	16%	38%	0%	26%	20%
	Biological Science	18%	50%	0%	22%	10%
	Commerce	8%	46%	2%	26%	18%
	Arts	16%	38%	4%	24%	18%
had different learning strategies for different subjects (DLS)	Physical Science	42%	42%	0%	12%	4%
	Biological Science	34%	44%	0%	16%	6%
	Commerce	30%	52%	0%	12%	6%
	Arts	38%	38%	0%	14%	10%
used same learning strategy for all subjects (SLS)	Physical Science	4%	12%	0%	58%	26%
	Biological Science	6%	16%	0%	60%	18%
	Commerce	6%	12%	0%	70%	12%
	Arts	10%	14%	0%	56%	20%

Table 4.16 displays that more than 95% of students have disagreed for rewarding themselves for achieving goals in all four streams. Commerce and art stream students have compared their term/ unit test marks with classmates than other two streams. This percentage is approximately 37%. Furthermore, it seems that all four streams have not showed a high will power according to the percentages. The percentage range is 20% - 28%. Also, more biological science and commerce stream students have set goals and kept on track compared to other two streams. In bored time activities, most of the biology stream students have used to listen music, gaming or engage in any other activity and most of the physical science students have used to take a nap compared to other streams. When considering the learning strategies almost 80% of all stream students have disagreed for using different learning strategies for different subjects and the same percentage have agreed for using the same learning strategy for all three subjects.

As a conclusion for the results in Table 4.16, it can be stated that most of the students in all four streams have not used different leaning strategies for each subject. They have had one learning strategy for all three subjects.

4.3 Summary of Chapter 4

The best effective leaning strategy method accepted by the students is "group discussions". The self-satisfaction of pre-preparation work for examination is the most required aspect in self-esteem. The most effective self-directed learning method selected by the students is "identifying weak areas in each subject and put more effort on that". Having enough time to complete revision work in all three subjects is the most essential aspect in self-efficacy. Also, it is noted that most of the students listen music or play games rather than taking a nap when they got bored when studying.

The most effective method in each factor LS, SE, SDL, SEF and SRC is GD, PW, WA, FS and SLS respectively for Biology stream students. This order is GD, PW, WA, FR and SLS for Physical science stream students. Commerce and Arts stream students follow the same order such as GD, NS, WA, FR and SLS.

CHAPTER 5

RESULTS AND DISCUSSION

In order to achieve the objective of this study Factor analysis was carried out and the results obtained from the analysis will be discussed in this chapter.

5.1 Conditions to Satisfy Factor Analysis

The SPSS output for KMO statistic and Bartlett Test is shown in Table 5.1.

Table 5.1: Homogeneity test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	5194.616
	Df	435
	Sig.	.000

According to KMO statistic value in Table 5.1, a Factor analysis can be highly recommended since the value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy is approximately 0.9. The Bartlett's test statistic is highly significant. It is confirmed that the original correlation matrix is significantly different from the identity matrix. That is; there is a high significant correlation among observed variables. Therefore; it can be concluded that the dataset is suitable to carry out a Factor analysis.

5.2 Factor Analysis Using PCF

The analysis was carried out by extracting factors using Principal Component Factoring and the outputs of eigen analysis is shown in Table 5.2.

Table 5.2: Communalities of Psychological Variables (PCF) for 7-Factor Model

Variable	Initial	Extraction
time table (TT)	1.000	0.954
short notes (SN)	1.000	0.751
Memorising (M)	1.000	0.607
group discussions (GD)	1.000	0.734
quiz yourself (QY)	**1.000**	**0.463**
teaching to a classmate (TC)	1.000	0.733
diagrams, sketches, flow charts, restating/rewrite (DSR)	1.000	0.745
pre-preparation work (PW)	1.000	0.681
Confidence (C)	1.000	0.646
nervous and scared (NS)	**1.000**	**0.571**
comparison with classmates (CC)	1.000	0.821
sure about 3A's (STA)	**1.000**	**0.548**
more revision (MR)	1.000	0.659
changing tuition classes (CTC)	1.000	0.610
more than one class per subject (MOC)	1.000	0.622
identifying the best learning strategy (BLS)	1.000	0.797
identifying weak areas (WA)	**1.000**	**0.500**
finished studying (FS)	1.000	0.665
finished revision (FR)	1.000	0.824
did 10-15years past papers (PP)	1.000	0.866
maintained a check list to complete tasks (CL)	1.000	0.745
had progress chart to check progress (PC)	1.000	0.768
rewarding yourself (RY)	1.000	0.774
compared marks of term/unit tests (CM)	1.000	0.903
had lot of will power (WP)	1.000	0.946
set goals and kept on track (GK)	1.000	0.942
listened music and played games when bored (MGB)	1.000	0.794
took a nap when bored (NB)	1.000	0.679
had different learning strategies for different subjects (DLS)	1.000	0.834
used same learning strategy for all subjects (SLS)	1.000	0.863

The initial communality values demonstrate the estimated variance in each variable accounted by all factors in the analysis and extracted communalities represent estimated variance in each variable accounted by factors in factor solution. Since the small communality values (<0.6) do not fit well for the factor analysis four variables are extracted according to the values shown in the Table 5.2. The removed variables are QY (0.463), NS (0.571), STA (0.548) and WA (0.5). The results of KMO and Bartlett's test, after removing those four variables are shown in Table 5.3.

Table 5.3: Communalities of Psychological Variables (PCF) after removing four variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.880
Bartlett's Test of Sphericity	Approx. Chi-Square	4698.518
	df	325
	Sig.	.000

The value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.880 according to the results in Table 5.3 obtained after removing four variables. Also, the Bartlett's Test of Sphericity is significant since the p-value is 0.000. Therefore, the results confirm again that the 26 variables are suitable to conduct a Factor analysis.

Table 5.4: Total Variance Explained by Psychological Variables (PCF)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.161	39.082	39.082	9.145	35.173	35.173
2	3.053	11.744	50.826	3.198	12.298	47.471
3	2.478	9.532	60.358	2.508	9.644	57.115
4	1.678	6.455	66.814	1.908	7.340	64.456
5	1.590	6.114	72.928	1.907	7.333	71.789
6	1.291	4.966	77.893	1.587	6.104	77.893
7	.744	2.860	80.753			
8	.551	2.121	82.874			
9	.527	2.028	84.902			
10	.445	1.713	86.615			
11	.421	1.619	88.234			
12	.388	1.492	89.726			
13	.361	1.388	91.114			
14	.341	1.310	92.425			
15	.321	1.235	93.659			
16	.291	1.119	94.778			
17	.249	.959	95.738			
18	.228	.878	96.616			
19	.219	.841	97.457			
20	.175	.675	98.132			
21	.131	.504	98.636			
22	.111	.425	99.061			
23	.090	.347	99.408			
24	.067	.259	99.667			
25	.048	.185	99.851			
26	.039	.149	100.000			

The results in Table 5.4 indicate that the initial eigen values are greater than one; only for first six factors and those six factors were able to capture 77.9% of the total variability of original 26-D system. Thus, it can be concluded that 26 variables can be reduced to 6- factors and then 6- factor model can be taken for further analysis. The variances captured by each of the six factors after varimax rotation are also given in the 6th column of Table 5.4. The corresponding values are 35.2%, 12.3%, 9.6%, 7.3%, 7.3% and 6.1% respectively. Nearly 50% of the variance of the original system is explained by the first two factors.

The scree plot can be used to confirm the number of factors obtained from Table 5.4.
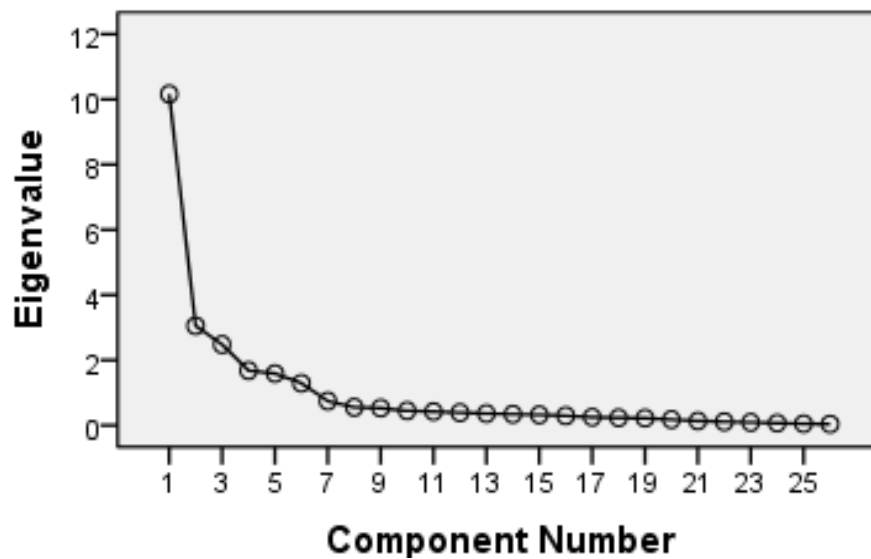

Figure 5.1: Scree Plot of Psychological Variables under PCF

The scree plot shown in Figure 5.1 also shows an elbow shape at the component number six and confirms that 6-D model can be considered as a suitable factor model.

Table 5.5: Factor loading matrix of 6- factor model (PCF and Varimax rotation)

Variable	Component					
	1	2	3	4	5	6
time table (TT)	**.957**	.165	.055	.076	.006	.010
short notes (SN)	**.864**	.105	.096	.056	.023	-.004
Memorising (M)	**.759**	.098	.024	.067	.054	.001
group discussions (GD)	**.844**	.127	.042	.054	.006	.083
teaching to a classmate (TC)	**.836**	.160	.051	.027	.030	.031
diagrams, sketches, flow charts, restating/rewrite (DSR)	**.786**	.363	.034	.029	-.014	.045
pre-preparation work (PW)	**.819**	.068	.024	.113	-.024	.043
Confidence (C)	**.787**	.178	.014	.038	.080	.022
comparison with classmates (CC)	.030	.046	**.896**	-.054	.035	-.013
more revision (MR)	**.808**	.073	-.030	.062	.007	-.021
changing tuition classes (CTC)	**.769**	.113	-.022	.050	-.001	-.097
more than one class per subject (MOC)	**.771**	.089	.049	.138	-.033	-.055
identifying the best learning strategy (BLS)	**.874**	.169	-.025	.065	.042	.006
finished studying (FS)	**.771**	.221	.087	.047	-.047	-.147
finished revision (FR)	.030	-.026	.195	.042	**.947**	-.060
did 10-15years past papers (PP)	.035	-.061	.231	.016	**.939**	-.028
maintained a check list to complete tasks (CL)	.068	-.001	**.853**	.042	.170	-.027
had progress chart to check progress (PC)	.002	-.060	.014	-.059	-.041	**.873**
rewarding yourself (RY)	-.026	.011	-.035	.073	-.033	**.877**
compared marks of term/unit tests (CM)	.069	.002	**.922**	-.022	.229	.018
had lot of will power (WP)	.207	.019	-.017	**.954**	.011	-.012
set goals and kept on track (GK)	.173	-.045	-.019	**.957**	.047	.028
listened music and played games when bored (MGB)	.383	**.800**	.024	.007	-.086	-.012
took a nap when bored (NB)	-.318	**-.747**	.012	-.027	.116	.051
had different learning strategies for different subjects (DLS)	-.147	**-.895**	-.012	.029	-.063	.004
used same learning strategy for all subjects (SLS)	.182	**.909**	.031	-.023	.011	-.008

According to the results under PCF with varimax rotation shown in Table 5.5; the six factors can be identified for the 26-D system. The loadings of the variables in each

factor are significantly higher than 0.7. Table 5.6 shows the identified variables for each factor.

Table 5.6: Variables identified for six factors under PCF and Varimax rotation

Factor	variable	factor loading
Factor 1	time table (TT)	0.957
	short notes (SN)	0.864
	Memorising (M)	0.759
	group discussions (GD)	0.844
	teaching to a classmate (TC)	0.836
	diagrams, sketches, flow charts, restating/rewrite (DSR)	0.786
	pre-preparation work (PW)	0.819
	Confidence (C)	0.787
	more revision (MR)	0.808
	changing tuition classes (CTC)	0.769
	more than one class per subject (MOC)	0.771
	identifying the best learning strategy (BLS)	0.874
	finished studying (FS)	0.771
Factor 2	listened music and played games when bored (MGB)	0.800
	took a nap when bored (NB)	-0.747
	had different learning strategies for different subjects (DLS)	-0.895
	used same learning strategy for all subjects (SLS)	0.909
Factor 3	comparison with classmates (CC)	0.896
	maintained a check list to complete tasks (CL)	0.853
	compared marks of term/unit tests (CM)	0.922
Factor 4	had lot of will power (WP)	0.954
	set goals and kept on track (GK)	0.957
Factor 5	finished revision (FR)	0.947
	did 10-15years past papers (PP)	0.939
Factor 6	had progress chart to check progress (PC)	0.873
	rewarding yourself (RY)	0.877

Factor 1 is a combination of thirteen variables with TT, SN, M, GD, TC, DSR, PW, C, MR, CTC, MOC, BLS and FS. Factor 2 is a collection of four variables such as MGB, NB, DLS, and SLS. Factor 3 consists of three variables CC, CL and CM. factor 4, 5 and 6 contain two variables each. Factor 4 has WP and GK. Factor 5 has FR and PP. factor 6 has PC and RY. The absolute value of all the factor loadings are significantly greater than 0.7 and only two factors have negative factor loadings.

For further confirmation of identified factors using varimax rotation, another orthogonal rotation Quartimax is also used for the analysis. The results are shown in Table 5.7.

Table 5.7: Factor loading matrix of 6- factor model (PCF and Quartimax rotation)

Variable	Component					
	1	2	3	4	5	6
time table (TT)	**.972**	.067	.038	.001	.033	.015
short notes (SN)	**.873**	.017	.081	.018	.018	.001
Memorising (M)	**.768**	.020	.010	.050	.033	.005
group discussions (GD)	**.855**	.041	.027	.002	.017	.088
teaching to a classmate (TC)	**.849**	.074	.037	.025	-.011	.036
diagrams, sketches, flow charts, restating/rewrite (DSR)	**.820**	.281	.020	-.018	-.006	.050
pre-preparation work (PW)	**.826**	-.016	.009	-.028	.076	.048
Confidence (C)	**.803**	.098	.001	.076	.002	.026
comparison with classmates (CC)	.048	.042	**.895**	.026	-.055	-.013
more revision (MR)	**.812**	-.009	-.044	.004	.026	-.017
changing tuition classes (CTC)	**.778**	.035	-.036	-.004	.015	-.092
more than one class per subject (MOC)	**.783**	.010	.035	-.037	.103	-.051
identifying the best learning strategy (BLS)	**.889**	.080	-.040	.038	.026	.011
finished studying (FS)	**.792**	.142	.073	-.051	.013	-.143
finished revision (FR)	.037	-.028	.203	**.945**	.041	-.060
did 10-15years past papers (PP)	.037	-.063	.239	**.937**	.015	-.028
maintained a check list to complete tasks (CL)	.086	-.008	**.854**	.162	.039	-.026
had progress chart to check progress (PC)	-.012	-.060	.014	-.041	-.058	**.872**
rewarding yourself (RY)	-.027	.014	-.036	-.033	.074	**.877**
compared marks of term/unit tests (CM)	.085	-.005	**.923**	.220	-.024	.019
had lot of will power (WP)	.250	-.004	-.022	.010	**.944**	-.011
set goals and kept on track (GK)	.209	-.065	-.023	.046	**.948**	.029
listened music and played games when bored (MGB)	.462	**.757**	.016	-.089	-.012	-.009
took a nap when bored (NB)	-.392	**-.711**	.019	.119	-.012	.049
had different learning strategies for different subjects (DLS)	-.236	**-.876**	-.009	-.061	.037	.003
used same learning strategy for all subjects (SLS)	.272	**.886**	.027	.009	-.032	-.007

The result under PCF with Quartimax rotation shown in Table 5.7 is also indicate that the 26-D system can be explained by six factors. The factor loadings of the variables in each factor depict in Table 5.8.

Table 5.8: Variables identified for six factors under PCF and Quartimax rotation

Factor	Variable	factor loading
Factor 1	time table (TT)	0.972
	short notes (SN)	0.873
	Memorising (M)	0.768
	group discussions (GD)	0.855
	teaching to a classmate (TC)	0.849
	diagrams, sketches, flow charts, restating/rewrite (DSR)	0.820
	pre-preparation work (PW)	0.826
	Confidence (C)	0.803
	more revision (MR)	0.812
	changing tuition classes (CTC)	0.778
	more than one class per subject (MOC)	0.783
	identifying the best learning strategy (BLS)	0.889
	finished studying (FS)	0.729
Factor 2	listened music and played games when bored (MGB)	0.757
	took a nap when bored (NB)	-0.711
	had different learning strategies for different subjects (DLS)	-0.876
	used same learning strategy for all subjects (SLS)	0.886
Factor 3	comparison with classmates (CC)	0.895
	maintained a check list to complete tasks (CL)	0.854
	compared marks of term/unit tests (CM)	0.923
Factor 4	finished revision (FR)	0.945
	did 10-15years past papers (PP)	0.937
Factor 5	had lot of will power (WP)	0.944
	set goals and kept on track (GK)	0.948
Factor 6	had progress chart to check progress (PC)	0.872
	rewarding yourself (RY)	0.877

Results in Table 5.8 show that the absolute value of factor loadings in each factor are significantly greater than 0.7 and there are two negative factor loadings in factor 2. When comparing the results obtain by Varimax rotation and Quartimax rotation

under PCF, it is observable that both results are same. The comparison of the results under two rotations are shown in Table 5.9.

Table 5.9: Factor comparison between Varimax and Quartimax rotations under PCF

| Factor | Principal Component Factoring | |
	Varimax Rotation	Quartimax Rotation
Factor 1	time table (TT)	time table (TT)
	short notes (SN)	short notes (SN)
	Memorising (M)	Memorising (M)
	group discussions (GD)	group discussions (GD)
	teaching to a classmate (TC)	teaching to a classmate (TC)
	diagrams, sketches, flow charts, restating/rewrite (DSR)	diagrams, sketches, flow charts, restating/rewrite (DSR)
	pre-preparation work (PW)	pre-preparation work (PW)
	Confidence (C)	Confidence (C)
	more revision (MR)	more revision (MR)
	changing tuition classes (CTC)	changing tuition classes (CTC)
	more than one class per subject (MOC)	more than one class per subject (MOC)
	identifying the best learning strategy (BLS)	identifying the best learning strategy (BLS)
	finished studying (FS)	finished studying (FS)
Factor 2	listened music and played games when bored (MGB)	listened music and played games when bored (MGB)
	took a nap when bored (NB)	took a nap when bored (NB)
	had different learning strategies for different subjects (DLS)	had different learning strategies for different subjects (DLS)
	used same learning strategy for all subjects (SLS)	used same learning strategy for all subjects (SLS)
Factor 3	comparison with classmates (CC)	comparison with classmates (CC)
	maintained a check list to complete tasks (CL)	maintained a check list to complete tasks (CL)
	compared marks of term/unit tests (CM)	compared marks of term/unit tests (CM)
Factor 4	had lot of will power (WP)	finished revision (FR)
	set goals and kept on track (GK)	did 10-15years past papers (PP)
Factor 5	finished revision (FR)	had lot of will power (WP)
	did 10-15years past papers (PP)	set goals and kept on track (GK)
Factor 6	had progress chart to check progress (PC)	had progress chart to check progress (PC)
	rewarding yourself (RY)	rewarding yourself (RY)

The comparison in Table 5.9 shows that factor 1, factor 2, factor 3 and factor 6 are same in both rotations under PCF. The two variables WP and GK in factor 4 which are under Varimax rotation are grouped under factor 5 in Quartimax rotation. The

two variables FR and PP in factor 5 under Varimax rotation are grouped as factor 4 in Quartimax rotation.

5.3 Factor Analysis Using PAF

The extraction method PAF with orthogonal rotations Varimax and Quartimax is used in this section in order to confirm the results obtained in section 5.2.

Table 5.10: Total Variance Explained by Psychological Variables (PAF)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative%
1	11.576	38.587	38.587	10.319	34.397	34.397
2	3.153	10.511	49.098	2.940	9.801	44.199
3	2.540	8.468	57.566	2.285	7.617	51.815
4	1.696	5.654	63.220	1.950	6.500	58.316
5	1.631	5.437	68.657	1.827	6.088	64.404
6	1.446	4.820	73.477	1.159	3.863	68.268
7	.878	2.928	76.406			
8	.736	2.455	78.860			
9	.656	2.188	81.048			
10	.603	2.011	83.060			
11	.518	1.727	84.787			
12	.489	1.630	86.416			
13	.432	1.439	87.855			
14	.397	1.322	89.177			
15	.378	1.260	90.437			
16	.358	1.193	91.630			
17	.338	1.128	92.758			
18	.322	1.072	93.830			
19	.283	.942	94.772			
20	.279	.930	95.702			
21	.235	.785	96.487			
22	.105	.350	99.218			
23	.090	.298	99.516			
24	.064	.213	99.729			
25	.043	.144	99.873			
26	.038	.127	100.000			

Table 5.10 shows the variance accounted by the factors under the extraction PAF. Accordingly, there are six factors which explain the 26-D system. The variances

accounted by six factors are 34.4%, 9.8%, 7.6%, 6.5%, 6.1% and 3.9% respectively. Here the total variance captured by six factors is 68.27% which is lower than the total variance (77.89%) captured by six factors under PAC. The first factor under PAF accounts 34.40% of the total variance whilst the first factor captures 35.15% of the variability under PAC.

Table 5.11: Factor loading matrix of 6- factor model (PAF and Varimax rotation)

Variable	Factor					
	1	2	3	4	5	6
time table (TT)	**.975**	.152	.057	-.007	.063	-.002
short notes (SN)	**.844**	.108	.094	.021	.051	-.023
Memorising (M)	**.746**	.104	.025	.043	.063	-.002
group discussions (GD)	**.832**	.125	.047	-.010	.051	.070
teaching to a classmate (TC)	**.830**	.153	.049	.025	.023	.026
diagrams, sketches, flow charts, restating/rewrite (DSR)	**.778**	.345	.037	-.025	.026	.029
pre-preparation work (PW)	**.798**	.076	.025	-.033	.101	.026
Confidence (C)	**.766**	.177	.031	.035	.048	.003
comparison with classmates (CC)	.031	.047	**.810**	.049	-.045	-.018
more revision (MR)	**.785**	.083	-.023	.007	.058	-.030
changing tuition classes (CTC)	**.742**	.115	-.016	.006	.047	-.097
more than one class per subject (MOC)	**.753**	.094	.035	-.010	.110	-.054
identifying the best learning strategy (BLS)	**.871**	.165	-.021	.028	.059	-.007
finished studying (FS)	**.746**	.217	.082	-.046	.044	-.148
finished revision (FR)	.030	-.017	.213	**.854**	.087	-.057
did 10-15years past papers (PP)	.035	-.045	.229	**.961**	.063	-.018
maintained a check list to complete tasks (CL)	.076	.001	**.743**	.196	.030	-.023
had progress chart to check progress (PC)	.004	-.054	.008	-.041	-.045	**.693**
rewarding yourself (RY)	-.012	.001	-.030	-.056	.059	**.787**
compared marks of term/unit tests (CM)	.067	.003	**.972**	.219	-.013	.021
had lot of will power (WP)	.219	.013	-.014	-.038	**.951**	-.019
set goals and kept on track (GK)	.189	-.052	-.017	.002	**.911**	.027
listened music and played games when bored (MGB)	.395	**.743**	.026	-.100	-.002	-.026
took a nap when bored (NB)	-.334	**-.650**	.005	.133	-.015	.060
had different learning strategies for different subjects (DLS)	-.162	**-.869**	-.013	-.048	.026	.005
used same learning strategy for all subjects (SLS)	.192	**.908**	.031	-.002	-.021	-.009

Table 5.11 shows the factor loadings of each variable for six factors. Thus, factor 1 is a collection of thirteen variables, factor 2 is a combination of four variables, factor 3 is a formation of 3 variables and factor 4, 5 and 6 consist of two variables each. The absolute value of all factor loadings is significantly greater than 0.65 and only factor 2 contains two negative loadings.

Table 5.12: Variables identified for six factors under PCF and varimax rotation

Factor	Variable	factor loading
Factor 1	time table (TT)	0.975
	short notes (SN)	0.844
	Memorising (M)	0.746
	group discussions (GD)	0.832
	teaching to a classmate (TC)	0.830
	diagrams, sketches, flow charts, restating/rewrite (DSR)	0.778
	pre-preparation work (PW)	0.798
	Confidence (C)	0.766
	more revision (MR)	0.785
	changing tuition classes (CTC)	0.742
	more than one class per subject (MOC)	0.753
	identifying the best learning strategy (BLS)	0.871
	finished studying (FS)	0.746
Factor 2	listened music and played games when bored (MGB)	0.743
	took a nap when bored (NB)	-0.650
	had different learning strategies for different subjects (DLS)	-0.869
	used same learning strategy for all subjects (SLS)	0.908
Factor 3	comparison with classmates (CC)	0.810
	maintained a check list to complete tasks (CL)	0.743
	compared marks of term/unit tests (CM)	0 .972
Factor 4	finished revision (FR)	0.854
	did 10-15years past papers (PP)	0.961
Factor 5	had lot of will power (WP)	0.951
	set goals and kept on track (GK)	0.911
Factor 6	had progress chart to check progress (PC)	0.693
	rewarding yourself (RY)	0.787

In order to check the invariant property of identified factors, the factor extraction using PAF was regenerated under Quartimax rotation. The results are shown in the Table 5.13.

Table 5.13: Factor loading matrix of 6- factor model (PAF and Quartimax rotation)

Variable	Factor					
	1	2	3	4	5	6
time table (TT)	**.989**	.041	.037	-.007	.016	.003
short notes (SN)	**.854**	.013	.077	.021	.011	-.019
Memorising (M)	**.755**	.020	.010	.043	.028	.001
group discussions (GD)	**.843**	.031	.030	-.010	.012	.074
teaching to a classmate (TC)	**.842**	.059	.032	.025	-.016	.030
diagrams, sketches, flow charts, restating/rewrite (DSR)	**.812**	.256	.021	-.026	-.012	.033
pre-preparation work (PW)	**.806**	-.014	.009	-.033	.063	.030
Confidence (C)	**.782**	.090	.015	.035	.012	.007
comparison with classmates (CC)	.050	.043	**.809**	.049	-.046	-.017
more revision (MR)	**.791**	-.006	-.038	.007	.021	-.027
changing tuition classes (CTC)	**.752**	.031	-.030	.006	.011	-.093
more than one class per subject (MOC)	**.764**	.009	.020	-.009	.075	-.050
identifying the best learning strategy (BLS)	**.885**	.066	-.038	.028	.018	-.003
finished studying (FS)	**.769**	.131	.067	-.046	.008	-.144
finished revision (FR)	.036	-.016	.212	**.854**	.087	-.056
did 10-15years past papers (PP)	.037	-.044	.228	**.962**	.063	-.016
maintained a check list to complete tasks (CL)	.092	-.008	**.741**	.197	.026	-.022
had progress chart to check progress (PC)	-.008	-.053	.008	-.042	-.045	**.693**
rewarding yourself (RY)	-.014	.003	-.030	-.057	.059	**.787**
compared marks of term/unit tests (CM)	.086	-.005	**.971**	.219	-.016	.022
had lot of will power (WP)	.264	-.014	-.019	-.039	**.940**	-.018
set goals and kept on track (GK)	.224	-.074	-.021	.001	**.901**	.028
listened music and played games when bored (MGB)	.476	**.694**	.018	-.104	-.023	-.025
took a nap when bored (NB)	-.405	**-.608**	.012	.136	.003	.059
had different learning strategies for different subjects (DLS)	-.257	**-.846**	-.009	-.043	.037	.005
used same learning strategy for all subjects (SLS)	.291	**.881**	.027	-.007	-.033	-.009

According to the results in Table 5.13, it also provides a similar image as results in Table 5.11. The variables under six factors can be classified as follows. Here the factor loadings of the variables in each factor are significantly greater than 0.61.

Table 5.14: Variables identified for six factors under PCF and Quartimax rotation

Factor	Variable	factor loading
Factor 1	time table (TT)	0.989
	short notes (SN)	0.854
	Memorising (M)	0.755
	group discussions (GD)	0.843
	teaching to a classmate (TC)	0.842
	diagrams, sketches, flow charts, restating/rewrite (DSR)	0.812
	pre-preparation work (PW)	0.806
	Confidence (C)	0.782
	more revision (MR)	0.791
	changing tuition classes (CTC)	0.752
	more than one class per subject (MOC)	0.764
	identifying the best learning strategy (BLS)	0.885
	finished studying (FS)	0.769
Factor 2	listened music and played games when bored (MGB)	0.694
	took a nap when bored (NB)	-0.608
	had different learning strategies for different subjects (DLS)	-0.846
	used same learning strategy for all subjects (SLS)	0.881
Factor 3	comparison with classmates (CC)	0.809
	maintained a check list to complete tasks (CL)	0.741
	compared marks of term/unit tests (CM)	0.971
Factor 4	finished revision (FR)	0.854
	did 10-15years past papers (PP)	0.962
Factor 5	had lot of will power (WP)	0.940
	set goals and kept on track (GK)	0.901
Factor 6	had progress chart to check progress (PC)	0.693
	rewarding yourself (RY)	0.787

The factor loadings of variables accounted by each factor under Quartimax rotation is shown in table 5.14. The two negative factor loadings are in factor 2 as same as the result obtained under Varimax rotation which is shown in Table 5.12. The magnitude of all the factor loadings are significantly greater than 0.61. The comparison of the identified factors using PAF under two rotations Varimax and Quartimax is summarised in the following table 5.15.

Table 5.15: Factor comparison between Varimax and Quartimax rotations under PAF

| Factor | Principal Axis Factoring | |
	Varimax Rotation	Quartimax Rotation
Factor 1	time table (TT)	time table (TT)
	short notes (SN)	short notes (SN)
	Memorising (M)	Memorising (M)
	group discussions (GD)	group discussions (GD)
	teaching to a classmate (TC)	teaching to a classmate (TC)
	diagrams, sketches, flow charts, restating/rewrite (DSR)	diagrams, sketches, flow charts, restating/rewrite (DSR)
	pre-preparation work (PW)	pre-preparation work (PW)
	Confidence (C)	Confidence (C)
	more revision (MR)	more revision (MR)
	changing tuition classes (CTC)	changing tuition classes (CTC)
	more than one class per subject (MOC)	more than one class per subject (MOC)
	identifying the best learning strategy (BLS)	identifying the best learning strategy (BLS)
Factor 2	listened music and played games when bored (MGB)	listened music and played games when bored (MGB)
	took a nap when bored (NB)	took a nap when bored (NB)
	had different learning strategies for different subjects (DLS)	had different learning strategies for different subjects (DLS)
	used same learning strategy for all subjects (SLS)	used same learning strategy for all subjects (SLS)
Factor 3	comparison with classmates (CC)	comparison with classmates (CC)
	maintained a check list to complete tasks (CL)	maintained a check list to complete tasks (CL)
	compared marks of term/unit tests (CM)	compared marks of term/unit tests (CM)
Factor 4	finished revision (FR)	finished revision (FR)
	did 10-15years past papers (PP)	did 10-15years past papers (PP)
Factor 5	had lot of will power (WP)	had lot of will power (WP)
	set goals and kept on track (GK)	set goals and kept on track (GK)
Factor 6	had progress chart to check progress (PC)	had progress chart to check progress (PC)
	rewarding yourself (RY)	rewarding yourself (RY)

The comparison of results under two rotations in PAF depicts that the results are identical for both rotations.

Table 5.16 shows a comparison between the factors under both extraction methods PCF and PAF with the two rotations varimax and Quartimax.

Table 5.16: Factor comparison between varimax and Quartimax rotations under PCF and PAF

Factor	PCA		PAF	
	Varimax	Quartimax	Varimax	Quartimax
Factor 1	TT	TT	TT	TT
	SN	SN	SN	SN
	M	M	M	M
	GD	GD	GD	GD
	TC	TC	TC	TC
	DSR	DSR	DSR	DSR
	PW	PW	PW	PW
	C	C	C	C
	MR	MR	MR	MR
	CTC	CTC	CTC	CTC
	MOC	MOC	MOC	MOC
	BLS	BLS	BLS	BLS
	FS	FS	FS	FS
Factor 2	MGB	MGB	MGB	MGB
	NB	NB	NB	NB
	DLS	DLS	DLS	DLS
	SLS	SLS	SLS	SLS
Factor 3	CC	CC	CC	CC
	CL	CL	CL	CL
	CM	CM	CM	CM
Factor 4	WP	FR	FR	FR
	GK	PP	PP	PP
Factor 5	FR	WP	WP	WP
	PP	GK	GK	GK
Factor 6	PC	PC	PC	PC
	RY	RY	RY	RY

According to the Table 5.16 the factors are same for both PCF and PAF under the two rotations Varimax and Quartimax. However, the conclusion of the study depends on the result under PCF with varimax rotation. In order to define the six factors, the

component score matrix of the 26 variables was considered which was derived from the result of PCF with varimax rotation. The factor scores are displayed in the Table 5.17 below.

Table 5.17: Component Score Coefficient Matrix for Psychological Variables

Variable	Component					
	1	2	3	4	5	6
time table (TT)	**.117**	-.036	.003	-.022	-.009	.011
short notes (SN)	**.110**	-.051	.021	-.028	-.008	.001
Memorising (M)	**.096**	-.039	-.016	-.018	.026	.006
group discussions (GD)	**.106**	-.038	-.001	-.029	-.002	.056
teaching to a classmate (TC)	**.103**	-.026	-.002	-.042	.010	.025
diagrams, sketches, flow charts, restating/rewrite (DSR)	**.074**	.059	-.003	-.027	-.003	.037
pre-preparation work (PW)	**.105**	-.058	.000	.005	-.024	.027
Confidence (C)	**.094**	-.010	-.028	-.034	.049	.022
comparison with classmates (CC)	-.017	.002	**.407**	-.004	-.149	-.006
more revision (MR)	**.108**	-.057	-.032	-.025	.005	-.012
changing tuition classes (CTC)	**.098**	-.039	-.027	-.026	-.003	-.059
more than one class per subject (MOC)	**.093**	-.047	.015	.025	-.039	-.035
identifying the best learning strategy (BLS)	**.106**	-.023	-.040	-.026	.030	.010
finished studying (FS)	**.085**	-.001	.031	-.017	-.049	-.090
finished revision (FR)	-.007	.027	-.091	-.007	**.538**	.005
did 10-15years past papers (PP)	-.001	.011	-.073	-.022	**.526**	.024
maintained a check list to complete tasks (CL)	-.013	-.010	**.364**	.040	-.064	-.010
had progress chart to check progress (PC)	.012	-.008	.013	-.042	.012	**.552**
rewarding yourself (RY)	-.009	.030	-.008	.036	.025	**.556**
compared marks of term/unit tests (CM)	-.011	-.009	**.382**	.004	-.037	.022
had lot of will power (WP)	-.045	.028	.016	**.526**	-.026	-.015
set goals and kept on track (GK)	-.043	.009	.010	**.525**	-.004	.011
listened music and played games when bored (MGB)	-.032	**.272**	.009	.014	-.025	.007
took a nap when bored (NB)	.036	**-.258**	-.001	-.028	.041	.021
had different learning strategies for different subjects (DLS)	.075	**-.342**	.023	-.010	-.076	-.022
used same learning strategy for all subjects (SLS)	-.072	**.341**	-.004	.014	.041	.017

Based on the factor scores in table 5.17, the selected six factors from the FA can be defined as follows.

Factor 1:

$F_1 = 0.117Z_{TT} + 0.110 Z_{SN} + 0.096 Z_M + 0.106 Z_{GD} + 0.103 Z_{TC} + 0.074 Z_{DSR} + 0.105 Z_{PW} + 0.094 Z_C + 0.108 Z_{MR} + 0.098 Z_{CTC} + 0.093 Z_{MOC} + 0.106 Z_{BLS} + 0.085 Z_{FS}$

Factor 1 is formed by thirteen variables such as TT, SN, M, GD, TC, DSR, PW, C, MR, CTC, MOC, BLS, and FS. The more weights are from TT and SN. That is; working according to a time table and preparing short notes are most effective methods in factor 1.

Factor 2:

$F_2 = 0.272 Z_{MGB} - 0.258 Z_{NB} - 0.342 Z_{DLS} + 0.341 Z_{SLS}$

Factor 2 is designed from four variables such as MGB, NB, DLS, and SLS. This factor has two negative effects from NB and DLS. The highest positive effect on the factor is from MGB. This shows that listening to music and play a game when bored of studying is better than taking a nap.

Factor 3:

$F_3 = 0.407 Z_{CC} + 0.364 Z_{CL} + 0.382 Z_{CM}$

Factor 3 is made out by three variables such as CC, CL, and CM. Here the biggest effect is from CC. Factor 3 shows that there must be a self -competition by comparing your level with classmates in order to improve the level of working.

Factor 4:

$F_4 = 0.526 Z_{WP} + 0.525Z_{GK}$

Factor 4 consists of two variables WP and GK. Here the two variables contribute almost equally for the factor. This shows that having lot of will power and keep goals to yourself are important when preparing for the exam.

Factor 5:

$F_5 = 0.538\ Z_{FR} + 0.526\ Z_{PP}$

Factor 5 is supported by two variables such as FR and PP. The highest effect is from FR. That is; the student should finish revision work in all three subjects before examination has a higher effect on achieving three A's.

Factor 6:

$F_6 = 0.552\ Z_{PC} + 0.556\ Z_{RY}$

Factor 6 is a combination of two variables such as PC and RY. The two variables show an almost equal effect on this factor. This shows that the student should maintain a progress chart to evaluate their progress in each subject and reward their selves when they achieved the goals set in the given period.

*Z_x is standardized value of the variable

Based on the formal discussion done with the school teachers the above six factors were named as follows.

Factor 1 - Study Techniques

Factor 2 - Study Pattern

Factor 3 - Self- Competitiveness

Factor 4 - Revision Work

Factor 5 - Determination

Factor 6 - Self- Motivation

Although six factors were identified through the Factor analysis, only one factor captures 35.17% of the total variance (Table 5.4). The first three factors capture more than half of the total variability of the system. Therefore, it can be stated that the most influencing factors for obtaining three A's are Factor 1, Factor 2 and Factor 3. That is; study techniques, study pattern and self- competitiveness are the most influential factors.

5.4 Summary of Chapter 5

The six factors which will affect on obtaining three A's in G.C.E.(A/L) examination in Sri Lanka are, Study Techniques, Study Pattern, Self- Competitiveness, Revision Work, Determination, Self- Motivation. But the most influential factors are study techniques, study pattern and self- competitiveness. The equations of the six factors are,

$F_1 = 0.117 Z_{TT} + 0.110\ Z_{SN} + 0.096\ Z_M + 0.106\ Z_{GD} + 0.103\ Z_{TC} + 0.074\ Z_{DSR} + 0.105\ Z_{PW} + 0.094\ Z_C + 0.108\ Z_{MR} + 0.098\ Z_{CTC} + 0.093\ Z_{MOC} + 0.106\ Z_{BLS} + 0.085\ Z_{FS}$

$F_2 = 0.272\ Z_{MGB} - 0.258\ Z_{NB} - 0.342\ Z_{DLS} + 0.341\ Z_{SLS}$

$F_3 = 0.407\ Z_{CC} + 0.364\ Z_{CL} + 0.382\ Z_{CM}$

$F_4 = 0.526\ Z_{WP} + 0.525 Z_{GK}$

$F_5 = 0.538\ Z_{FR} + 0.526\ Z_{PP}$

$F_6 = 0.552\ Z_{PC} + 0.556\ Z_{RY}$

*Z_x is standardized value of the variable.

CHAPTER 6

CONCLUSSIONS AND RECOMMENDATIONS

6.1 Conclusion

Based on the literature review and the results of the analysis it is conspicuous that psychological factors affect on academic performance of students. The analysis discovered six new factors such as Study Techniques, Study Pattern, Self- Competitiveness, Revision Work, Determination, Self- Motivation which can affect on obtaining three A's in G.C.E. (A/L) examination. The most influential factors among the six factors are Study Techniques, Study Pattern, and Self- Competitiveness.

6.2 Recommendations

The three main factors affect on obtaining three A's are Study Techniques, Study Pattern, and Self- Competitiveness. Study Techniques mainly depend on two variables such as working according to a time table and preparing short notes. When there is a time plan or a work schedule it is easy to manage the three subjects. As an advanced level student, it is very important to use the time effectively and efficiently. Especially when targeting on three A's. The time table or the work schedule can be arranged as you desired. It should not be the same time table which your colleagues use. Working according to an own time plan is a very effective way to allocate time for three subjects equally. It gives a self- motivation to cover up the lessons at the correct time lime. Short note is a very influential study technique on students. When you prepare a short note by yourself there is a high tendency of recalling the lessons you did because it pastes in your mind as a mind map. These short notes can be done in very creative ways. This is a very useful technique when need to study while travelling. Re reading the short notes time to time make the mind concentrated with theory parts. Therefore, it is very effective to work according to a time table and preparing short notes as study techniques.

Study pattern is also influence on obtaining three A's. Here this factor mostly depends on the activity you do when get bored of studying. According to the analysis

it is effective to listen music or play a game rather than having a nap when get bored. This is important because the mind gets free and relaxed quickly while the student is awakening. Music refreshes the mind and games make the mind active and eradicate the laziness. But the students should know to control the time they play without addicting to it. Having different learning strategies for three subjects and taking a nap have a negative effect on the factor. Therefore, it is better to use the same learning strategy for the three subjects as it is easier to continue with the same techniques you use to study.

The third impact is from self- competitiveness. This depends on comparison of work with classmates. It is important to have a competition between classmates as to improve the capacity of work you do. When the students felt that they are below the level of their classmates then they tend to work more and try to achieve better results at the examination. Also, the students can find out the sections or lessons that they are lacking in studying when compare the work with classmates.

Therefore, it is important to work according to a time table, preparing short notes, listen music or play a game rather than having a nap when get bored of studying and compare work with classmates when obtaining three A's at G.C.E. (A/L) examination.

6.3 Suggestions

- This research was done by considering Western province schools only. Therefore; it is suggested to carry out similar studies for other provinces as well.
- As this study was limited to psychological factors it is better to consider physical, demographic, nutrition and family factors.
- It is also better to check whether the identified factors are invariant of gender and the (A/L) stream.

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APPENDIX
Questionnaire for the Survey

Please read and follow the instructions before answering any question.

1.IndicateyourGender and A/L stream:

Gender		Physical Science	Biological Science	Commerce Stream	Art Stream
Male	Female				

2. z-score: ……………..

Answeritems from3 to24usingthescaleto theright.Indicatehowmuchdoyouagreeor disagreeonthefollowing statementsrelated to;	Totally disagree	disagree	Uncertain	Agree	Totally agree
a) Learning Strategy When studying forthe exam;					
3.workingaccordingtoatimetableishighly effective					
4. makingshort notes ishighlyeffective					
5.readingthesameparagraphseveraltimes is highlyeffective					
6. groupdiscussions are highlyeffective					
7. quizyourself is highlyeffective					
8. teach to aclassmateishighlyeffective					
9.restatinginformationinyourownwords, usecolouredpencilstorewrite important parts/drawing diagrams,sketches,flow charts arehighlyeffective					
b) selfesteem beforetheA/Lexamination					

10. I was satisfied with my pre-preparation work for the exam					
11. I felt that I am confident enought to face exam					
12. I was nervous and scared for exam					
13. I felt that I should study more when compared to my classmates					
14. I knew that I will take 3 A's in my first attempt					
c) self-directed learning					
15. I felt the need of doing more revision					
16. I changed my tuition classes several times					
17. I felt the need of more than one class for subjects					
18. I identified my best learning strategy and studied accordingly					
19. I identified my weak areas in each subject and put more effort on them					
d) self-efficacy					
20. I had enough time to finish studying all three subjects before the exam					
21. I had enough time for revisions of all subjects					
22. I had enough time to do past papers for 10-15 years in all subjects					
23. I maintained a check-list to mark when completing each task/topic when studying					
24. I had a progress chart to check my progress in each subject					

e) self-regulatorycapacity duringthe time,you studied for the exam					
25.Irewardedmyselfforprogresstowards mygoals					
26. Icomparedmyacademicperformancein term tests/unit testswithmycolleagues					
27.Ihad alotof will power					
28.Isetgoalsformyselfandkepttrackof myprogress					
29. Ilistened tomusic,played agameor any other activitywhenIgotbored of studying					
30.Itookanapwhen Igotboredofstudying					
31. I haddifferent learning strategies for everysubject					
32.Iusedthesamelearningstrategyforall threesubjects					

Thank you for your valuable participation