

**PREDICTIVE MODEL FOR SUCCESS IN ALGEBRA:  
A CASE STUDY**

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Department of Mathematics

University of Moratuwa

Sri Lanka

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A CASE STUDY**

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Electronic Theses & Dissertations

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Department of Mathematics

University of Moratuwa  
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## Declaration of the Candidate and the Supervisor

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material, previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief that it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Master's dissertation under my supervision.

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## Abstract

The objectives of this study were to identify noncognitive variables that would help to predict success (pass or fail) in Algebra and use these variables to develop and validate a statistical model to predict the outcome (pass or fail) of Algebra. First year students enrolled in Algebra (n=164) at a private higher education institute were surveyed on their past achievement, educational goals, parents' educational qualifications. A modified version of a validated noncognitive questionnaire was administered in this study. Significant categorical and continuous noncognitive variables were identified using chi square test of association and test for independent samples respectively. The significant categorical and continuous variables were used as explanatory variables in binary logistic regression with grade in Algebra (pass or fail) as the dichotomous response variable. The best-fitted model was identified using Backward Wald method. The model developed was significant, explained 56.2% the variance of the response variable based on Nagelkerke  $R^2$  and correctly classified 81.0% of cases. The errors were random. The significant noncognitive variables were gender, mother possessing a degree or a higher qualification, Realistic Self-Appraisal and the Availability of a Strong Support Person. The variables in the model did not correlate significantly as indicated by tolerance statistics and Variance Inflation Factors. Based on the model, a unit increase in Realistic Self-Appraisal and Availability of a Strong Support Person would increase the odds of passing the Algebra exam by 1.893 and 1.542 respectively. Being a female would increase the odds of passing the exam by .260 times, while the mother possessing a degree or a higher qualification would increase the odds of passing the exam by 8.511 times. Researchers, academics, academic administrators and student support services stand to benefit from this study as noncognitive variables could be used in statistical models to predict success of students from private universities and higher education institutes in Sri Lanka.

*Keywords:* Binary Logistic Regression, Noncognitive Questionnaire, Noncognitive Variables, Private Universities

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While I toiled the past couple of years with coursework, dissertation and my own work, my wife Mumthaz did a fantastic job of maintaining peace at home and supporting Tahira and Imad in their studies. For the painful sacrifices she makes every single day of *her* life so that my kids and I can continue to do well in our lives, it is only befitting that I, an ageing man on a cardiac stent, in this moment of ambivalence, dedicate this work for her.



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## Dedication

*Mumthaz – omnia amoris et multo amplius*



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## List of Abbreviations

AL	Advanced Level
ASSP	Availability of a strong support person
DCS	Demonstrated community service
HEI	Higher education institute
KAF	Knowledge acquired in field
LR	Likelihood ratio
MLE	Maximum likelihood estimation
NCQ	Noncognitive questionnaire
NCV	Noncognitive variable
OL	Ordinary Level
PRLG	Preference for long term goals
PSC	Positive self-concept
RSA	Realistic self-appraisal
SAT	Scholastic Aptitude Test
SLP	Strong leadership position
UDR	Understanding and dealing with racism



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