

Mathematics at matriculation level as an indicator of success or failure in the 1st year of the Veterinary Nursing Diploma at the Faculty of Veterinary Science, University of Pretoria

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ABSTRACT

Mathematics at matriculation level (Grade 12) is one of the subjects required for admission to the Veterinary Nursing Diploma in the Faculty at Veterinary Science of the University of Pretoria. The present study shows that there is no statistically significant relationship between the grade of mathematics at matriculation level and the success or failure in the 1st year of study. There is, however, a statistical difference in the adjusted mark obtained for mathematics at matriculation level between the groups that passed and failed the 1st year of the veterinary nursing course. The results of this research are not consistent with other research which showed that secondary school mathematics results are not a significant factor in tertiary education. It is recommended that selection criteria for veterinary nurses should in future still include mathematics, but that cognisance should be taken of the mark obtained and students with higher marks (above 57 %) given preference.

Key words: mathematics, paraveterinary education, SAQA, student selection, veterinary nursing.

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INTRODUCTION

The relatively high failure rate (mean = 26.76 % over the 5 years of this study) of students selected for the Diploma in Veterinary Nursing (DVN) at the Faculty of Veterinary Science, University of Pretoria (UP), is of concern not only to those involved in the lecturing but also to the students, their parents, members of the profession and the public at large. The difficulty in obtaining bursaries and favourable loans from the private and public sectors becomes even more difficult for students who have to repeat the 1st year of study.

Students become less motivated due to low marks obtained during the year, indicating that they might not have the ability to complete the programme successfully. Students that do not pass are often perceived as failures. Cotton² stated that

students receive credit for modules passed even if they do not pass a diploma or degree programme, but the common perception is that these students are a complete failure.

The approximate cost of the academic component for the 1st year of the DVN programme at current rates is R14 000. Combined with accommodation and food for the year, student costs are about R34 000, excluding additional study materials, uniforms, protective clothing, instruments and transport.

The DVN course, as presented by the Faculty of Veterinary Science, is the only qualification for veterinary nurses in South Africa. The programme entails 2 years of full-time study and students are expected to do after-hours and holiday clinic duties from the 1st year of study⁵. The diploma has been registered by the University of Pretoria, in terms of relevant legislation^{6,7}, with the South African Qualifications Framework (SAQA), as having a total number of 355 credits.

The 1st intake of students took place in 1977 when 30 students were selected to register for the programme. The number of students registered for the course gradually increased over the years as the

demand for veterinary nurses increased. Currently, 48 students have been selected to enrol. Students receive their skills training alongside veterinary students in the Veterinary Academic Hospital of the Faculty of Veterinary Science.

Veterinary nursing students have to pass all 8 prescribed examination subjects and 3 promotion subjects to be promoted to the 2nd year of study. Students who fail have to re-apply for selection and if re-admitted, have to repeat the 1st year of study. Students are awarded full exemption for subjects passed with a mark of 65 % or higher. Students may apply for exemption from examination in subjects already passed, provided that a year mark or semester mark of between 50 and 64 % was obtained in the relevant subjects in the year during which 1st-year studies are repeated⁸.

Students failing their 1st year of study have to re-apply for admittance to the programme. Even though only 5 places are reserved for repeating students, the restricted intake for this popular course means that they are denying access to new students for the very limited positions available. It was consequently felt that criteria used for the selection of students should be re-evaluated.

In the South African education system, students write a standardised, independently set, matriculation examination at the end of their school career (Grade 12). The results of this examination are used as the main criteria for admission to tertiary educational institutions. Subjects may be taken on 2 levels – higher grade and standard grade. A proposed new matriculation curriculum, however, will eliminate the difference between the standard and higher grades.

Selection for the DVN programme is based on academic merit, results of the UP Admission Test for students without tertiary experience, and a personal interview, where applicable. Mathematics at matriculation level is one of the requirements for selection in the DVN programme⁸. All students would thus have passed mathematics at matriculation level. The

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entrance requirements for the DVN programme, based on matriculation results, are summarised in Table 1.

In a study of an accounting course, no significant difference was found between students that had secondary school mathematics and those that did not⁴. This held for all courses except for the quantitative accounting examination.

In another study¹, the number of subjects passed by 1st-year students registered for the National Diploma in Accounting and the National Diploma in Cost and Management Accounting at the Technikon Natal did not depend solely on matric mathematics, which was found to play an insignificant roll in overall academic performance.

In order to facilitate the selection of students, the University of Pretoria applies a so-called 'M-score' calculated from the subjects and marks obtained either from the Grade 11 or matriculation examinations. The University of Natal makes use of a similar system, known as the 'points system', according to which points are allocated using symbols achieved in each subject³.

Different minimum 'M-scores' are required for different programmes. According to the selection criteria, a minimum 'M-score' of 10 is required for admittance to the DVN programme. The scale for calculating the 'M-score' is shown in Table 2.

Having met the acceptance requirements, students have the expectation that they will be able to achieve the required standard. To quote the National Qualifications Framework and Curriculum Development Document published by SAQA in May 2000^{6,7}: 'the expectation must be that learners are able to achieve these outcomes and therefore it is necessary for those who work in the system to behave and structure what they do in working with learners, in such a way that they are enabled to achieve these outcomes'.

Nair⁵ reported on the 'under preparedness' of school leavers for higher education: "It becomes questionable whether those who made it through Grade 12 under 'all is not well' circumstances were 'really well prepared' for higher education. This was evident from results of a test conducted by the Alternative Secondary Education Curriculum for Adults among failed matriculants, as well as students with matric exemptions. Both groups scored low levels of achievement – lower than the required Level 4 that exhibited the 'under preparedness' of school-leavers for higher education".

There is also the view expressed by Bargate¹ that 'If students meet the en-

Table 1: Entrance requirements for the Diploma in Veterinary Nursing.

Entrance requirements	Grade	Minimum score (%)
Grade 12 exemption certificate Minimum M-score of 10		
<i>with</i> Mathematics	HG* SG**	40 50
<i>and either</i> Biology	HG SG	40 50
<i>and/or</i> Physical science	HG SG	40 50

*Higher grade; **standard grade.

Table 2: Scale for calculating M-scores at the University of Pretoria using the six Grade 11 or 12 subjects. The maximum score is 30, representing A-levels in six higher-grade subjects.

Matriculation symbol	Higher grade	Standard grade
A (more than 80 %)	5	4
B (70–79 %)	4	3
C (60–69 %)	3	2
D (50–59 %)	2	1
E (40–49 %)	1	0

trance requirements set by the tertiary institution, why are they not successful in their chosen course of study? Are the entrance requirements and acceptance criteria too lenient?'

Although most of the students that apply meet the minimum criteria, there are limited places and those eventually accepted thus exceed the minimum requirements for selection.

This study investigates only the grade of mathematics at matriculation level and the marks obtained, as the admission criteria likely to influence the success or failure of DVN students in their 1st year.

MATERIALS AND METHODS

All 1st-year DVN students take the same prescribed subjects. The 1st year is devoted to basic courses in anatomy, physiology, pharmacology, ethology, microbiology, parasitology, laboratory techniques and general nursing. It also includes promotion courses in medical nursing, reproductive nursing and theatre practice⁸.

Marks for these subjects were taken from the UP database. For the purposes of this study, information from all 1st-year students that were registered for this programme from 1995 to 1999, were used. A number of students ($n = 12$) were registered for the extended course, which allowed these students to complete the 1st-year subjects over a 2-year period. Students registered for the extended course were excluded from this study, as

their numbers were too low for statistical analysis. As UP is the only tertiary institution in the country that offers this course, no students from the sample could have applied for credits obtained at other tertiary institutions.

The following information regarding each student in the sample was entered into a database: student number, grade of mathematics at matriculation level, mark obtained for mathematics and pass or fail at the end of the 1st year of study. Marks for mathematics obtained at higher and lower grades are not at the same level. To obtain adjusted marks for the statistical computations, 10 % was subtracted from the marks obtained for mathematics from the students that passed mathematics on the standard grade. Statistical analysis was performed using the SAS statistical package (ver. 8.2, Statistical Analysis Institute, Carey, NC).

RESULTS

Over the 5-year study period, 142 students were registered for the veterinary nursing programme. Table 3 shows that the pass rate of 1st-year DVN students was independent of the grade of the matriculation mathematics course.

A Chi-square test was used to determine if a relationship existed between the mathematic level and whether the students passed or failed. No significant relationship in pass rate between students with standard and higher-grade mathematics was found ($P = 0.1196$).

Table 3: Number of students that passed and failed the DVN 1 course, combined with their matriculation mathematics results, over the 5 years of this study.

Frequency	Matric mathematics		Total
	Higher grade	Standard grade	
Fail	12	26	38
Percentage	20.00	31.71	26.76
Pass	48	56	104
Percentage	80.00	68.29	73.24
Total	60	82	142
Percentage	42.25	57.75	100.00

Table 4: Average matriculation mathematics mark for students that passed and failed the DVN 1 course.

	Passed DVN 1	Failed DVN 1
Mean mathematics mark (%)	57.23	51.82
Standard deviation (%)	9.82	12.06

The average mark that students obtained for mathematics and the number of students that passed or failed, is shown in Table 4.

Students that passed the 1st year of study, obtained an average mark of 57.23 % for matric mathematics and students that failed, obtained an average 51.82 % for matric mathematics. According to the Mann-Whitney non-parametric test for difference between groups, there is a significant difference ($P = 0.0097$) between the average marks obtained for mathematics at matric level of the students that passed or failed the 1st year of study.

DISCUSSION

In contrast to other studies^{1,4}, where it was shown that mathematics had no correlation with tertiary education, it was found that the adjusted mark (standard grade minus 10 %) obtained for mathematics at matric level could be correlated with the success or failure of veterinary

nursing students at tertiary level.

The results of this study show that the marks obtained for matriculation level mathematics are relevant to the pass rate of 1st-year DVN students. It is thus suggested that the pass rate of 1st-year DVN students might be improved if candidates, in addition to the other selection criteria, are selected also on the mathematics mark obtained.

However, whether the student took standard grade or higher-grade mathematics had no significant effect on passing or failing the 1st year of the veterinary nursing course. No comparison could be made between mathematics and lack of mathematics, as all students had to have a minimum of 40 % (adjusted mark) in mathematics according to the selection criteria (Table 1).

CONCLUSIONS

The results of this study indicate that there was a statistical difference between the marks achieved for mathematics at

matric level of the groups that passed and failed the 1st year of study. There was, however, no significant relationship between standard and higher grade of mathematics at matriculation level and the ability to pass the 1st year of the DVN programme presented by the Faculty of Veterinary Science at UP. This supports the proposed new matriculation curriculum, where the differentiation between the standard and higher grades has been eliminated. It is recommended that selection criteria should in future still include mathematics, but that cognizance should be taken of the mark obtained and students with higher marks (above 57 %) given preference.

Further research into other selection criteria for acceptance into the DVN programme is indicated.

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