Minding the gap: Identifying risk profiles of first-time entrants for the Diploma in Nature Conservation at the Cape Peninsula University of Technology.

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INTRODUCTION

Foundation programmes have been established in most South African universities to enhance the access, success and throughput of students currently joining higher education, particularly those with 'inadequate' preparedness from school (Boughey 2007). However, there are also concerns about the university performance of students deemed to be adequately prepared and who are thus admitted into 'mainstream' (MS) programmes (e.g. Jansen *et al*., 2010; Scott *et al*., 2007). In this regard the Department of Biodiversity and Conservation Management at CPUT has been concerned for a few years by the poor performance of many first year students admitted to the National Diplomas offered by the Department, of whom the proportion completing the Diploma in the prescribed time (3 years) has averaged under 20% in recent years. Furthermore, less than 50% of the students eventually graduate and more than half of these losses occur at the end of the first year (Scott *et al*., 2007).

The bases for high drop-out levels at South African universities have been reviewed by several researchers (e.g. Jones *et al*., 2008; Lesteka *et al.*, 2001; Ravjee, *et al.*, 2010; Scott *et al*., 2007), and include the preparedness of new entrants for university study. In this regard, the predictive ability of matric scores and other admission tests for the success of undergraduate students have been reported on (e.g. de Klerk *et al*., 2006; van der Flier *et al*., 2003), and national benchmark tests (NBTs) have been developed to help assess school leavers' proficiency in mathematics and academic and quantitative literacy as they enter higher education[1]. The present analysis concerned the performance of all first-time entrants after the first semester and this was related to the students' matriculation ratings and performance in the national benchmark tests (NBT's) administered at the beginning of the year. We sought, through this process to identify the 'risk profiles' of first time-entrants, in order to inform the Department on the placing of students (e.g. into ECP), and also in designing the curricula so as to improve student success rate and throughput. This is particularly timely as the Department is in the process of re-curriculation to meet new HEQF (Higher Education Quality Framework) requirements. The present paper reports on a retrospective analysis on all first time entrants, MS and ECP students, after completion of their first semester programme for 2010.

METHODS

Only first time entrants (i.e. excluding repeats) were considered and only those students who sat for the exams at the end of the first semester were included in the study. In the first instance the MS and ECP student groups were analysed separately, the MS group consisting of 30 students and the ECP group of 17 students. All of these students obviously met the requirements of entry to CPUT based on their matriculation performance and with one or two minor exceptions all the MS students met the additional requirements of the Department. The ECP group were chosen from those applicants that did not meet the Departmental requirements. Matriculation performance and interviews were the basis for selection of this group.

The first analysis involved a simple comparison between the MS and ECP groups of the class performance in first semester subjects. Subsequent analyses were concerned with the overall performance of students, based on the average mark obtained for **all** their subjects and the **number** of subjects passed per student.

[1] http://nbt.ac.za/cms
Accessed October 2010.

This was used in preference to individual subject scores which would add considerable complexity to the analysis and also because the primary focus should be on the student's relative success in completing the whole of the curriculum. This level of achievement was then compared with that in the National Benchmark tests for academic literacy (AL) and quantitative literacy (QL). As not all students had written these tests the semester performance of those who had written the tests and those that had not, within both groups, was compared using the Mann-Whitney U- test to determine if there was any significant difference in performance. Since there was no significant difference in the Semester-1 performance of students who had written the NBTs and those who had not, the Semester performance was used to place all students in one of three benchmark equivalent levels; and these levels were analysed against the matriculation ratings obtained for the three main matriculation subjects that are a requirement for entering the National Diploma in Nature Conservation at CPUT. Finally, a 'risk profile' of first time entrants was produced.

RESULTS AND DISCUSSION

Semester Performance Analysis

It is worth noting that for the ECP, the Department of Biodiversity & Conservation Department uses the 'augmented' model, and therefore first-time entering ECP students take half the number of subjects that the MS students do, but both ECP and mainstream students sit for the same tests and exams. However, the ECP group gets additional support through more 'responsive' teaching of the subjects, and through linking the subject matter to additional courses in language and numeracy, and interventions such as conceptual development and scaffolded reading.

At the end of the semester studies here, the performance of MS and ECP students was very similar in the subjects done by both groups of students, both in terms of average marks obtained and the percentage pass rates (Table 1), despite the 2010 ECP students having been admitted with lower Matric grades than their mainstream counterparts. This performance is similar to the findings of Garraway (2009) for the 2007 cohort of first time entrants to this Department, and to other ECP programmes in other Universities (HELTASA, 2009).

Table 1: Summary outcomes for the various subjects taken by Mainstream (MS) and Extended Curriculum Programme (ECP) student groups in the first semester of 2010.

	Animal Studies 1		**Plant Studies I**		**Conservation Development**	**Conservation Ecology 1**
	MS	ECP	MS	ECP	MS only	MS only
Average final mark (%)	55%	50%	54%	54%	50%	61%
Percentage students passing	73%	71%	63%	71%	47%	90%

The reasons for the relative success of the ECP group are discussed later in this document. However, in order to get a deeper understanding of the performance, the performance of the students in the National Benchmark tests was analysed.

National Benchmark Test Analysis

In the first instance the students that wrote the National Benchmark tests were compared with those that did not write the tests using their semester performance to gauge if there was any significant difference. In both groups, MS and ECP, it was established that there was no significant difference between the semester results for those that wrote and those that did not sit for the National Benchmark tests (Mann-Whitney test at $p < 0.05$). Based on this finding students that had not written the test were placed in one of three **benchmark equivalents** (proficient, intermediate or basic) after consideration of their overall performance at the end of the first semester with reference to the scores obtained by those students that had sat for the benchmark tests. In essence, a proficient rating indicates that a student is adequately prepared for university study, an intermediate score indicates that a student should be on some sort of Foundation programme or

extended intervention such as the ECP in order to facilitate success, and the basic level essentially means the student is not ready for university study[2]. The following table is a summary of this analysis and includes information on performance of students at the end of the first semester. Students who fail in more than 50% of the subjects registered for are meant to be academically excluded and this level was used as the baseline for comparing relative performance.

Table 2: Performance indicators for Benchmark Test Equivalents for first time entrants in the MS and ECP groups after the first semester of 2010

	Proficient No. (%)		**Intermediate No. (%)**		**Basic No. (%)**		**Total No. (%)**	
MS	MS	ECP	MS	ECP	MS	ECP	MS	ECP
No. of students	19 (63%)	0 (0%)	9 (30%)	11 (65%)	2 (7%)	6 (35%)	30 (100%)	17 (100%)
Average final mark (%) for all subjects	60	-	46	54	45	48	(55)	(52)
No. (and %) of students passing >50% of subjects(%)	16 (84%)	-	2 (22%)	7 (64%)	0 (0%)	2 (33%)	18 (60%)	9 (53%)

The data in table 2 provides useful information to start building on the notion of a student risk profile. In the MS only 63% of students would have been sufficiently prepared for the University-level course, based on Benchmark test results. Thirty percent of the MS group should have been on an ECP-type programme, and 7% would have been considered too underprepared for admission even into an 'augmented' programme. As is to be expected, the ECP group had no student in the proficient category. This group had 11 students (65%) in the intermediate category, and six students (35%) in the ECP group should have been considered inadmissible based on the Benchmark test results.

Most of the students at the proficient level (all MS) passed the majority of their subjects and the average mark for all subjects was at an 'acceptable' 60%. However, only 2 MS students from the other two levels (Intermediate and Basic) managed to pass more than 50% of their subjects, indicating that the vast majority of this group should have been on an ECP type programme as they either needed additional assistance or could not cope with four subjects in their first semester. On the other hand, the majority of ECP students, who are in the intermediate category, passed more than 50% of their subjects. Also, while no MS student in the Basic category passed >50% of their subjects, two ECP students who were placed at the Basic level passed all their subjects.

The value of the ECP programme is illustrated by the performance of students who did not qualify for mainstream in the first place but managed to perform much better than their intermediate level counterparts in the mainstream group. A further analysis was undertaken by considering the combined Intermediate and Basic levels for each group (MS and ECP) and their relative performance in the two subjects that were taken by both groups. This focus on the finer detail of comparison is indicated in Table 3.

[2] National Benchmark Tests, http://nbt.ac.za/cms/
Accessed October 2010.

Table 3: Performance of students in the Intermediate/Basic levels, for subjects taken by both mainstream and extended curriculum programme students.

	Animal Studies 1		**Plant Studies 1**	
	MS (N = 11)	ECP (N = 17)	MS (N = 11)	ECP (N = 17)
Average final mark (%)	44.5%	50%	44%	54%
% pass rate for subject	45%	71%	36%	71%

Table 3 indicates that ECP students in the benchmarked intermediate and basic level equivalents perform better than the MS students by some 5% and 10% in Animal Studies 1 and Plant Studies 1, respectively. A consequence of this is that a much higher percentage of ECP students actually pass both subjects. The value of the ECP model is clear from the above and would suggest that some 37% of mainstream students (the proportion on MS students that was at Intermediate/ Basic levels) would benefit from being placed on such a programme.

Despite the value of the NBTs in providing an indication of the level of preparedness for students entering the South African HE system, these tests are not universally used for selection. Most Universities, including CPUT, use matriculation marks for this purpose. The next section therefore considers the matriculation marks in relation to performance the groups identified above.

Matriculation Rating Analysis

The average scores in the three matriculation subjects that are required for admission to the National Diploma in Nature Conservation are shown in Table 4. The three subjects are: English (NSC level 4 required), Life Sciences (NSC level 4 required) and Mathematics (NSC level 3 required). Maths literacy is not considered for admission, and for the very few students who took this subject the data was ignored. It is expected that students who passed greater than 50% of their subjects still have a reasonable chance of completing their diploma in the minimum time but for those that failed 50% or more this would be very unlikely. Such students would, essentially, now be on a four year programme. In calculating the average rating for matriculation subjects the percentage obtained for each subject was used and the rating awarded was based on a finer ten point scale within the general rating category. For example, a student who obtained a rating of 3(40-49%) for Life Sciences because they had a percentage of 46 for the subject was given a rating of 3.6. The average for students in each group was then calculated using this finer scale and the results are presented table 4.

Table 4: Average ratings for three required matriculation subjects for different success levels of first time entrants (2010) for the Nature Conservation Diploma in the MS and ECP groups and the Departmental prerequisite levels.

	PERCENTAGE OF SUBJECTS PASSED	MS/ ECP	**NSC achievement in required subject**			
NBT level			ENGLISH	LIFE SCIENCES	MATHEMATICS	AVERAGE
Proficient	75% or more	MS	5.3	5	4.5	5
		ECP	N/A	N/A	N/A	N/A
Intermediate and Basic	75% or more	MS	5	4.5	3.5	4
		ECP	4.6	3.9	2.5	3.75
Intermediate and Basic	50% or less	MS	5	4.5	3.5	4
Intermediate and Basic	50% or less	ECP	4	3.1	2.1	3.3
Requirements for the Diploma			4	4	3	

The data in table 4 indicates that there is a progressive improvement of matriculation scores, within each group, from the weakest category at the lower end of the table to the proficient level at the top, for all three subjects. Furthermore, all benchmarked equivalent levels on average met the required score for English, the two MS groups and the top ECP group either met or were marginally just below the requirements for Life Science, but both ECP groups scored, on average, below the requirement for mathematics.

The above information was used to place students in at risk categories and these are indicated in table 5. For a student to be categorised as a low risk student (proficient level) on the mainstream programme it is necessary to score at least **ONE** rating above that required by the Department of Nature Conservation for **EACH** of the three matriculation subjects. Students meeting this level should be able to complete the diploma in the minimal time (3 years). Furthermore, despite the fact that the MS students in the two at higher risk levels met the Departmental requirements, their poor performance suggests they would have a better chance of success if they had been placed in an ECP type intervention, to have a reasonable chance of completing the diploma in the extended curriculum programme minimal time (4 years). The ECP students who performed successfully in the intermediate and basic group also met or almost met the requirements for automatic entry and may be classified as at low risk while the bottom two levels in the ECP group would be categorised as at medium and high risk.

The data from all of the above analyses was used to place the present students in risk categories. The starting base was a class size of new entrants of 60 (the present scenario) of which 20 are on the ECP programme. Table 5 indicates the present scenario and the preferred scenario for placement of students based on their matriculation performance within at risk categories.

Table 5: Present and preferred placement of 2010 first time entrants (N = 60) based on at risk categories.

Risk profile based on Matric scores	Percentage of Students at Present		Student Numbers as at present		Preferred Placement of present students	
	MS	ECP	MS	ECP	MS	ECP
Low Risk	53%	41%	21	8	21	20
Medium Risk	40%	24%	16	5	3	16
High Risk	7%	35%	3	7	0	0
Total	100%	100%	40	20	24	36

The above table indicates that the majority (36 or 60%) of first time entrant students should be on an ECP type programme in order to have a reasonable chance of completing the diploma in the minimum time. This is almost the complete reverse of the present scenario where only 20 (33%) are allowed into ECP and 40 (66%) are in mainstream. It should also be noted that the above table does not include repeats and cancellations which at present, number on average about 15 and 10 respectively and they would mostly be in the MS group and would bring the class size to 85.

Conclusion and recommendations

Although the NBTs provide a useful tool for assessing student preparedness for university study, they are not used widely for admission, matric performance being used at CPUT. The situation outlined above, for the 'risk profile' of first-time entrants, is unlikely to change in the medium term and there is thus the need to arrange Departmental programmes such that they present a fair opportunity for entrants to complete their Diplomas in the minimum time. In the longer term this could involve placing the majority of students accepted into the Department on an extended curriculum type programme. Even if this could be adopted in the short term it cannot simply be a case of placing the majority of students (who are at least medium risk) on a four year programme (the reverse of that at present). One has to consider what the implications would be for this, and what the present interventions are that enable the present ECP group to perform better than MS groups with a similar NBT profile, particularly with the medium- and high-risk students in MS. In our

opinion the relative success of the ECP group is inter alia connected to small class size, reduced subject load (50% less), highly experienced lecturers and the opportunity presented by these three factors to adequately address the contexts of learning and teaching that are required at the tertiary level. These would include aspects of literacy such as understanding and interpreting conceptual language, making extrapolations and inferences about what they read, demonstrating familiarity with understandings of literacy such as interpreting graphs and flow-charts and coping with basic numeracy (Scott *et al*., 2007). Certainly, some interventions can be introduced for the medium and high risk students in MS to be assisted but this is dependent on resources such as personnel availability, space and time-table restrictions. A start has been made: in the first semester, ECP lecturers offered 'Academic Development' sessions (two periods a week) to all students (MS and ECP); and in the second semester (during which both groups register for the numeracy-intensive Resource Management 1 subject), the weaker MS students (medium or higher at risk students) are given the opportunity of attending special classes for three periods a week which follow the ECP approach and are under the tutelage of an ECP lecturer. However, as this is optional, less than 40% of those identified for assistance actually make use of the opportunity, indicating that the intervention must be formalised to have a chance of real success for the higher at risk students in MS.

In conclusion, we therefore suggest that, while the department adjusts as best as possible in the short term, serious consideration be given to the idea that an ECP-style intervention in the not too-distant future becomes the 'mainstream' intake and the smaller numbers in the MS low-risk profile becomes a targeted group for special attention (to enable them to complete the qualification in three years). This would require all staff to be committed to the ECP-type interventions, as the development staff cannot undertake this in isolation. This would require that all staff, and not just those teaching on the ECP, be committed to the necessary interventions.

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