

Helping Us Teach - Who do We Select for our Degree Programme?

Bruce Ferguson

The Waikato Polytechnic
Hamilton
New Zealand
itdbf@twp.ac.nz

ABSTRACT

The Waikato Polytechnic Bachelor of Information Technology degree attracts students from a wide range of backgrounds. This is partly because the admission requirements are reasonably wide (for instance, setting a lower Bursaries exam entry threshold for school leavers than the equivalent competitive Waikato University BCMS degree, and allowing over-20-year-olds to enter with no academic requirement). One disadvantage of these wider admission criteria is the potential for higher failure levels. Another is that the lower criteria may cause “high flyers” to think that this degree is not for them.

This paper analyses results for the 1999 intake of Year 1 students in order to see if any correlation can be found between their success or failure and previous academic achievement. The overall quality of the intake is also assessed. Further analyses are carried out based upon categories of age and gender and prior achievement in mathematics. These analyses are then used as guidelines for future enrolments and to assist in future marketing of the degree.



1. INTRODUCTION

This paper is motivated by the desire to gain a better understanding of the key indicators that can be identified in prospective students which will be the best predictors of future performance. It is the beginning part of an ongoing research project.

The catalyst for this work was an overall disappointing set of results for the 1999 Year 1 Bachelor of Information Technology students. A number of them have subsequently not returned for 2000.

No doubt a number of factors have contributed to these results. There will always be students who begin a course but do not finish it. The high number of students in this case with poor results suggests that for many, the work is too difficult. If this is so, we need to look carefully at our entry criteria to ensure that those we admit to the degree programme have a reasonable chance of success.

Specifically, this paper looks at student pass rates and compares them with prior academic achievement. It also attempts to discover if other factors have a bearing. These other factors include age at entry and gender. A further possibility is that success or failure in one particular module may correlate with success or failure on the degree as a whole, and this is examined briefly, along with the suitability of current entry criteria.

It must be remembered that the numbers used for this analysis are small (see Table 1. below) and so any conclusions must remain tentative until further data becomes available.

2. SELECTION ISSUES

The current climate at tertiary institutions is one of fierce competition in a dwindling market coupled with

steadily reducing government subsidies. Those who admit students onto programmes have to tread a fine line between the need to garner EFTS and the importance of selecting only those who have a reasonable chance of success.

The closest competing tertiary institution is the University of Waikato. They offer a Bachelor of Computing and Mathematical Sciences which “is centred on studies in computer science, mathematics and statistics and is oriented towards the many professions which require high levels of expertise in these subjects.” (BCMS Student Handbook). While it is not a direct match with our vocational IT qualification, the two degrees are often compared by school students in the Waikato region when deciding their future direction. There is certainly some overlap in the pools of applicants targeted by each degree.

2.1 Selection Criteria

Selection of students for The Waikato Polytechnic’s BInfoTech programme is based either upon academic qualifications (12 or less in 6th Form Certificate, or minimum Bursary passes of 3 “C” results or 4 “D” results) or, for those aged 20 and over, evidence of some relevant work experience and evidence of commitment.

Entry criteria for Waikato University’s BCMS are expressed differently: applicants need a minimum of 205 in their four best Bursary subjects. This will require at least four very good C passes. The BInfoTech requirement of four D passes could result in an applicant with as few as 136 marks (D being a range starting at 34%) so there is potentially a large difference in entry criteria.

2.2 Selection Processes

While the academic criteria are unambiguous, the criteria for admitting those over 20 years old give some

scope for discretion by the Programme Manager. Experience in previous years has shown that mature students have good records of achievement on the programme, so if there is any doubt about suitability then those applicants showing enthusiasm are admitted rather than not admitted. This is usually done after some counselling which spells out the risk and puts the onus back on to the applicant who, after all, is given credit for his or her maturity and regarded as fully able to make decisions for himself or herself.

2.3 Success Criteria

What constitutes success, and how do we define a successful student? Obviously, the ideal is to pass all papers attempted. Typically, students enrol in six papers over the year. Passing 5 out of 6 can be regarded as a second-best situation: it puts students behind, but they have passed enough to be able to carry on. One failed paper can also act as a powerful incentive to subsequent improvement.

Student success has been divided into three groups. The first group includes those who passed 100% of their courses. For the BInfoTech degree, one failure equates to an 83% pass rate but for the sake of simplicity, the line has been drawn at 80%, making the second group those who passed 80% - 99% of their courses. The third group includes all others.

3. ANALYSIS

3.1 Basis of Entry

Of the 27 students, 16 were selected on academic criteria, with 11 of those being school leavers and 5 being mature students. The remaining 11 were selected purely as mature students.

Table 1 below shows their results.

	Academic Entry		Non-academic Entry
	School Leavers	Mature	
Total Enrolled	11	5	11
Passed 100%	1	2	2
Passed 80%-99%	4	1	0
Passed less than 80%	6	2	9

Table 1. Numbers of students gaining degree entry in 1999

Only 18.5% (5 students) passed all papers. For school leavers, the figure was 9%. For mature students, the figure was 25%.

3.2 Relationship between Academic Entry Criteria and Subsequent Performance

3.2.1 School Leavers

The four students with the highest entry qualifications all had at least one B pass in the Bursary examination. Two entered with B/B/C passes and two with B/C/C passes.

Their pass rates were, respectively, 89%, 66%, 100% and 33%.

For these students at least, there is no correlation with qualifications at entry.

At the other end of the scale, one student qualified at the minimum entry level of 4 D Bursary passes and four others, falling just outside the criteria, were admitted under the Programme Manager's discretion.

Upon investigation of the four discretionary admissions, one was clearly able to do the work and her subsequent results showed that she was appropriately admitted. This student, aged 18, had recently moved to New Zealand and sat School Certificate rather than Bursary because of language difficulties. Notwithstanding this, her results in School Certificate clearly showed that she had good academic ability.

The second student had 1 "C" and 2 "D" Bursary passes, the third had 3 "D" Bursary passes only, and a fourth had a 6th Form Certificate score of 13.

Results for those four students were, respectively, 83%, 89%, 56% and 0%.

The fifth student who came with 4 D passes in Bursary passed 44% of his degree papers.

As with the top students, there is no direct correlation at the bottom end either although overall results are worse for the latter group.

The remaining two school leavers came in with C/C/C. One scored a reasonable 83%, the other 44%.

In summary, then, for school leavers, entry qualifications bear no necessary relationship with subsequent performance.

3.2.2 Mature Students With Academic Qualification

This was a small group of 5 students. With one exception, as a group they did well. Two passed 100%, one passed 94% and one 75%. The fifth one had severe personal difficulties and dropped out of the programme, largely due to events beyond her control.

The combination of maturity plus prior academic qualification in this case therefore did indicate a high chance of success at later study.

3.3 Performance of Mature Students Without Prior Academic Qualifications

There is no middle ground here. Either they did very well or did very poorly. Two passed 100% but the next best was 65%, trailing down to 22% plus two drop-outs showing 0%.

Both of the 100% students had completed 6th form at school but would not have qualified for academic admission.

All except 3 students in this group had completed 6th form in earlier years. The 3 that had not completed 6th form scored 40%, 33% and 0%. The 40% student had an overseas school qualification that appeared to be about School Certificate level, but the other two had not even achieved School Certificate.

The students in this sample showed that mature students without the qualifying academic criteria are more likely than not to fail.

3.4 Correlation by Gender

A second analysis can be made on the basis of gender. As would be expected, male and female students are represented in each of the three achievement categories.

On a percentage basis, females did better. Three (37.5%) out of eight female students passed all papers compared to two out of nineteen males (10.5%). At the bottom end, 50% of female students gained less than 80% pass rate compared to 68% of males.

Looking at this another way, the totally successful students were 60% female, even though females accounted for only 30% of the whole student group.

3.5 Correlation by Age

The data shows little correlation - there is a slight tendency towards greater success at younger ages but it is not significant as it simply matches the age distribution.

3.6 Subject Correlation

Success in year 1 courses is shown below in Table 2.

	TOPIC	PASS RATE
IT101	Communication Studies	77%
IT102	Fundamentals of IT	72%
IT103	Analysis and Design	65%
IT106	The IT Environment	47%
IT104	Programming	46%
IT105	Mathematics	23%

Table 2. Pass rates for BInfoTech Year 1 courses in 1999

The pass rate for Mathematics is very poor, being only half that of the next highest pass rate.

Mathematics is included in the degree because it is regarded as a “foundation” subject which is drawn upon by other more traditional IT papers especially Programming and Electronics.

Information on the mathematical background of students prior to enrolment is not available in all cases. However, on the face of things, because mathematics is so integral to the degree it may well be advisable to investigate further the need for some benchmark to be added to the entry criteria - perhaps a certain pass mark in Bursary or Sixth Form Certificate mathematics, or a not-for-credit mathematics foundation course.

Because of the way that the entry criteria are currently structured, it is quite possible to achieve three C passes in other subjects, qualifying for entry, while having received, say, a low D or an E for mathematics.

4. CONCLUSION

What can be made of this data? With such small numbers, any conclusion has to be tentative. In the meantime, however, some signals are coming through from the analysis to date.

4.1 Admitting School Leavers

We are getting, at best, “second tier” school leavers. None of the 1999 intake had any A Bursary passes at all. Either those A students who go on to tertiary study in IT are going to University or else IT is not attracting any A students. In fact, with only 1 out of 11 school leavers passing all courses, I am probably stretching things even to describe them as “second tier”.

The Waikato Polytechnic has a long history of offering good IT qualifications in the form of certificates and diplomas but the degree is a relative newcomer. One possibility is that we are continuing to get “typically Polytechnic” clientele for a programme that should be competing for “typically University” clientele.

In late 1999, a number of changes were made to the degree programme which will affect all intakes from this year on. The first is to remove the four D passes from the admission criteria so that the lowest entry point is three C passes.

If the new criteria had been strictly applied in 1999, we would have had 5 fewer students. Because, as we have seen, these students did not perform uniformly badly, it is not necessarily true to say that this is a good thing. Two of the students have not re-enrolled this year but the other three have returned and will hopefully complete their degrees albeit at a slower than optimal rate.

The figures presented in this paper indicate that we would be disadvantaging the latter students (as well as losing EFTS!). Is that fair on those students? At the same time, of course we would be excluding two students who were not going to succeed. Was it fair to them to create an unrealistic expectation by admitting them?

There is a solution: encourage those falling below the upgraded admission criteria to enrol in the Certificate in Business Computing which is offered concurrently. At the end of the first year, the students (and their programme managers) will be in a much better position to assess their chances of success on the degree. If they just scraped through, the degree is probably not for them. If they did very well, they can enrol in the Summer School and then enter the degree at year 2. Either way, the students are eventually guided to the right place for them and the EFTS are preserved.

Even tightening our entry criteria still leaves us a long way behind the criteria for BCMS students. For obvious reasons, we do not want an entry bar set too high but neither do we want one set too low. Not only do we have performance problems, as already seen, but also we risk an attitude of intellectual snobbery from potential students, similar to the famous dictum of Groucho Marx, who did not want to join any club that would admit him as a member.

Also, perhaps the time is now right to insist on evidence of some mathematical ability and to make this a condition of entry as well as the Bursary passes. At very least, counselling should clearly state the risks to those without mathematics who still wish to do the degree.

4.2 Admitting Mature Students

Mature students generally have a commitment to success in study. Perhaps this is because they have more to lose if they fail, perhaps it is simply a function of their maturity.

Those mature students in the sample who also qualified academically all did very well or reasonably well (with the one special case exception noted above). Across all categories, this is the group most likely to succeed.

The situation for those mature students without the supporting academic qualifications is more complex.

For those who had not reached sixth form, it is clear that they will struggle and they should probably be admitted to the degree only in exceptional circumstances, such as extensive prior practical experience in IT.

For those who had completed sixth form, many will still struggle. The two in this category from our sample who passed 100% of their courses both had reasonable sixth form Mathematics passes. The remainder, who all did poorly, had no or very little mathematics at all. (One exception: a student with an overseas BSc passed only 40% of his papers. One can only presume that other circumstances affected his results.)

In summary, then, for mature students: admit those who also qualify academically and those who at least reached sixth form with reasonable performance in mathematics. Others should probably follow the CBC route until their performance can be more accurately gauged.

4.3 Follow-up Work to be Done

Conclusions from this study should at least be kept in mind when selecting for 2001.

At the same time, the results for the 2000 and future Year 1 students should be similarly analysed. As each intake is assessed, the information which it provides can be used to further refine the selection processes and regulations to improve their accuracy, and therefore our retention and pass rates. Additionally, the information we get from the analyses should enable us to better market the degree.

