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An Exploratory Study of Factors Affecting Attrition within an ICT Degree

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Introduction

- High attrition in ICT-related degrees
  - attrition = loss of students from an ICT degree
- This paper examined some factors that could affect attrition:
  - gender, citizenship, age, and entry qualification
- This paper addresses the following research questions:
  - *What factors affect the likelihood a student in an ICT degree will pass all their first-semester subjects, pass all their first-year subjects, pass introductory programming or graduate?*
  - *What factors, in combination with a lack academic success, affect when a student is likely to withdraw from an ICT degree?*

Background

- The Bachelor of Information and Communication Technology was implemented in 2014 - 2018 at the University of Tasmania
  - Students completed 24 units over a period of three years
    - a unit is a subject
  - In the first year of the seven of the eight units are the same for all students
- Students can enter the BICT:
  - as a domestic student on the basis of their ATAR;
  - as an international student on the basis of GPA;
  - via an alternate pathway such as mature age with experience (25+ years), a Technical and Further Education (TAFE) qualification (such as Certificate III or IV, or a diploma).

Research Method

- There were 798 students eligible for the study
- The following data was collated:
  - gender, citizenship, age, and entry qualification;
  - current status (graduated, continuing, withdrawn);
  - first semester and first year pass/failure status; and
  - number of attempts and pass/failure status for KIT101 Programming Fundamentals
    - first programming unit that introduces programming skills using Java.
- A chi-squared test for a p-value < 0.05 was used to evaluate if there was a relationship

Findings: Gender

- Of the 798 students, only 92 were female (12%)
- Analysis indicated there was no significant relationship between:
  - gender and passing all their subjects in their first semester
  - gender and passing all their subjects in their first year
  - gender and continuing to second year
  - gender and whether they withdrew from the degree

Findings: Gender

- Analysis indicated there was a significant relationship between:
  - Gender and continuing to second semester
    - 47% of the female students that failed first semester continued to second semester (compared to 93% of those that passed);
    - 63% of the male students that failed first semester continued to second semester (compared to 96% of those that passed).
  - Gender and passing introductory programming
    - 38% of the female students that failed introductory programming continued to another semester and tried again;
    - 61% of male students that failed introductory programming continued to another semester and tried again.
- Female failing students are making the decision to abandon ICT faster than male failing students

Findings: Citizenship

- Of the 798 students:
  - 462 are domestic students (58%)
  - 325 are international students (41%)
- Analysis indicated these relationships were not significant:
  - Citizenship and continuing to second semester
  - Citizenship and passing all their subjects in their first year

Findings: Citizenship

- Analysis indicated these relationships were significant:
  - Citizenship and passing all their subjects in their first semester
    - domestic students are more likely to pass all their first semester units
  - Citizenship and withdrawing from the degree
    - domestic students are more likely to withdraw in the latter years
  - Citizenship and graduating on time (within 3.5 years)
    - international students are more likely to graduate around the standard timeframe of 3.5 years
  - Citizenship and passing introductory programming
    - domestic students are more likely to pass introductory programming on first attempt and eventually
      - international students that fail introductory programming are not making the decision to withdraw differently to domestic students that fail

Findings: Age

- Of the 798 students, 23% were mature age (over 25).
- Analysis indicated these relationships were not significant:
  - age and passing their first semester
  - age and whether they continued to second semester
  - age and whether they continued to second year
  - age and graduation
  - age and passing introductory programming
- Analysis indicated these relationships were significant:
  - age and passing their first year
    - mature age students were more likely to pass their first year
  - age and failing first year and continuing to second year
    - mature age students that failed were less likely to continue to second year than failing non-mature age students

Findings: ATAR v TAFE

- Analysis indicated these relationships were not significant:
  - entry qualification and failing and continuing to second semester
  - entry qualification and whether they passed their first year
  - entry qualification and graduation
- Analysis indicated these relationships were significant:
  - ATAR students are more likely to pass their first semester
  - ATAR students are more likely to continue to second semester
  - ATAR students are more likely to continue to second year
  - ATAR students are more likely to continue
  - ATAR students are more likely to pass introductory programming

How is this information broadly useful

- Information on where the different pre-tertiary factors have a significant relationship with passing and the decision to withdraw could be used for optimal implementation of intervention measures to reduce attrition.
- Relevant intervention measures are:
  - *academic assistance measures* provide extra academic support during a semester by academics (lecturers, tutors or senior peers) and include additional tutorials, extra content consultation, mentoring, extra online materials, or study advice sessions on such things as exam preparation, time management and study planning;
  - *welfare assistance measures* provide non-academic advice by professional staff such as disability officers, student counsellors, career advisors, international advisors, and housing/finance officers;
  - *progression assistance measures* provide whole-of-degree academic advice by degree coordinators to encourage persistence and discuss failures, slow progression, reduced enrolment or subject repetition.

Impact: Gender

- Female students who fail their first semester or fail introductory programming were making the decision to withdraw from an ICT degree after just one semester
- To influence the female retention rates:
  - Academic assistance intervention measures that improve pass rates need to be offered to all female students in their **first semester**.
    - [24] found the main reasons female students gave for withdrawing included not being able to get help when needed and that the pace of teaching was too fast.
    - Female students are more reactive when they receive lower marks than received previously, and as a result, female students tend to leave ICT degrees with higher marks than male students who do not leave [24].
    - These issues could be alleviated by academic assistance intervention measures applied during a female student's first semester rather than waiting until they have failed.
  - Progression assistance intervention measures held at the **end of first semester** could persuade female students to persist with their ICT degree at the time they are making the decision to leave

[24]Madeleine Roberts, Tanya McGill, and Peter Hyland. 2012. Attrition from Australian ICT degrees: why women leave. In *Proceedings of the Fourteenth Australasian Computing Education Conference* Vol. 123. Australian Computer Society, Inc., Darlinghurst, Australia, Australia, 15-24.

Impact: Citizenship

- Analysis indicated that international students were more likely to fail a first semester unit or introductory programming, but did not indicate that they were more likely to withdraw as a result.
- To influence the international student pass rates:
  - Academic assistance intervention measures should be directed at international students in their first semester to help them adjust to the learning style, and with programming.
  - Welfare assistance intervention measures should be directed at international students in their first semester to help them deal with the myriad of arrival issues to enable them to settle into study faster.
- International students were more likely to continue towards graduation and to graduate around the standard timeframe of three years.
- To influence the domestic student retention rates:
  - Progression assistance intervention measures that persuade domestic students to persist need to be held with students that have exceeded the standard timeframe of three years.

Impact: Age

- Mature age students were more likely to pass all their first-year units but mature age students that failed first year were less likely to continue to second year.
- To influence the mature age student retention rates:
  - Academic assistance intervention measures should be directed at mature age students who failed first semester during their second semester, as they would appreciate their value.
  - Mature age students who failed a unit in first year would benefit from progression assistance to influence their decision proceed.

Impact: Entry Qualification

- The analysis of entry qualification established that TAFE students were more likely to fail their first semester and introductory programming. TAFE entry students were also more likely to withdraw at any time; failing was not a significant influencing factor on their decision to withdraw.
- To influence the TAFE student retention rates:
  - Academic assistance intervention measures to improve pass rates need to be offered to TAFE entry students during their first semester, focusing on assistance with introductory programming.
  - Progression assistance intervention measures that persuade TAFE students to persist need to be held at the end of first semester, not at the end of the first year.
- To influence the ATAR student pass rates:
  - Academic assistance intervention measures should be provided to anyone with an ATAR less than 63 as they have a less than 50% probability of passing their first semester.

Conclusion and Future Work

- *What factors, in combination with a lack academic success, affect when a student is likely to withdraw from an ICT degree?*:
  - gender and entry qualification can be used to predict the probability that a student will continue to the second semester;
  - age and entry qualification can be used to predict the probability that a student will continue to the second year; and
  - citizenship and entry qualification can be used to predict the probability that a student will withdraw from the degree.
- Future work is to apply the intervention measures at these optimal times and analyse the impact on attrition.

	First Semester	Second Semester	At 3 years
Academic assistance during semester	All female, international, TAFE, ATAR<65 students	All failed students	
Welfare assistance early in semester	International students		
Progression assistance end of semester	TAFE, Failed female, international students	TAFE, Failed male, mature students	Domestic students

Questions

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