

## **The impact of student characteristics on academic achievement: Findings from an online undergraduate property program**

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This study provides an empirical investigation into the impact of individual student characteristics on academic achievement through an online undergraduate property program. Using a multi-year data set over 2007–2012, the results from our OLS regressions show that there is a significant positive association between university entry scores and academic achievement in an online undergraduate property program. In addition, student performance is significantly related to age and the grades that the students receive in two core knowledge subjects. Further property education implications are also highlighted.

**Keywords:** online; property program; student characteristics; academic achievement

### **Introduction**

Online or distance education is emerging as the new paradigm of modern education. Given the advancement of information and communication technology, online education has become a more viable method of learning (IBISWorld, 2013). Many higher education institutions have recognised the growing demand from individuals and businesses. These institutions have also increased the breadth of courses offered through online platforms (Kearsley, 2000). Massive Open Online Course (MOOC), which is a recent development in distance education, has further enhanced the growth of online education. Numerous leading universities have launched various MOOCs. For instance, Massachusetts Institute of Technology (MIT) and Harvard University have launched edX in recent years. In Australia, the online education industry is estimated to grow by an annualised rate of 14.4% over 2009–2014 to total of \$5.9 billion (IBISWorld, 2013).

Given the Australian government aims to widen participation in higher education for which a target has been set to increase the proportion of Australians aged between 25 and 34 with a bachelor degree and above to 40% by 2025 (Commonwealth of Australia, 2009), this suggests that a flexible online education delivery option will be an important part of meeting the goal. Currently, there are 14 Australian universities offer property programs. Importantly, 36% of these Australian universities offer online property education (API, 2014), reflecting that online property education is a popular method of learning. Online education has several advantages such as offering greater flexibility (Ward & Newlands, 1998), encouraging critical thinking (Ivancevich, Gilbert, & Konopaske, 2009) and enhancing virtual communication skills (Wan, Eang, & Haggerty, 2008). However, online education has many challenges. These include that students should initiate the learning process and have some computer literacy (Dutton,

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Dutton, & Perry, 2002; Howell, Williams, & Lindsay, 2003). These challenges are likely to have an adverse effect on student performance.

Extensive studies have been undertaken into property education. Nevertheless, little study has been undertaken to examine the factors involved in external student performance. The importance of a dedicated study of external students has also been highlighted by various studies such as Dutton et al. (2002). Although these studies have provided valuable insights, most have dealt with non-property education. Importantly, Arbaugh, Desai, Rau, and Sridhar (2010) highlighted the importance of discipline-based studies. Therefore, it is critical to identify the characteristics associated with successful online property students.

The aim of this study is to fill the gap of online property education by examining the impact of individual student characteristics on academic achievement. Specifically, this study explores the topical research issue of online learning. It identifies the factors related to student performance in an online property course offered in an Australian university. This paper contributes to property education in a number of ways. First, this is one of the limited studies of property education, particularly online property education. Given the growth of online education in recent years, a study of online property education is timely. Second, this probably is the first study to examine the factors associated with external property student overall performance. Unlike Yam and Rossini (2012), this study examines success factors in the property degree as a whole (overall performance) instead of a property unit or subject. The findings will offer further insights to course coordinators which may be used for course advising. An enhanced understanding the impact of student characteristics may enable course coordinators to improve their early identification of “students at risk,” thereby facilitating early intervention and support to be provided to these students.

The remainder of this paper is organised as follows. The following section provides a literature review on property education. The determinants of student performance are also discussed. The following section details the data used and the methodological framework adopted, then reports and discuss the empirical findings, whilst the final section provides concluding comments.

## Literature Review

In the business education literature, various potential determinants of academic success have been identified. These factors are university entrance examination results (Durden & Ellis, 1995; Newell & Mallik, 2011), prior experience (i.e., doing mathematics, English and economics in high schools) (Mallik & Lodewijks, 2010; Mitchell, 1988; Newell & Mallik, 2011), results in core business units (Allen & Carter, 2007), gender (Anderson & Benjamin, 1994), age (Didia & Hasnat, 1998), Language background (Andrade, 2006; Grebennikov & Skaines, 2009; Phakiti, Hirsh, & Woodrow, 2013).

Many property studies examined various issues on property education. Tu, Weinstein, Worzala, and Lukens (2009) and Ooi and Yu (2011) scrutinised the major elements related to improving graduate real estate programs in the USA and Singapore, respectively. Hefferan and Ross (2010) identified several recent changes occurring within the property profession and in the tertiary sector in Australia. Newell, Susilawati, and Yam (2010) investigated student perceptions of the quality of Australian property education. Blake and Susilawati (2009) found that Australian property students have the appropriate level of technical and “soft-skills” to enter the property industry. Recently, Yam (2012) and

Carter and Yam (2013) highlighted the effectiveness of tutorials and the role of tutors in enhancing the student learning experience.

The benefits of online property education have also been discussed by Wolverton and Wolverton (2003), Cornish, Reed, and Wilkinson (2009), Yam and Rossini (2012) and Poon (2012, 2013). Importantly, Yam and Rossini (2012) compared the performance levels of internal and external students in a first-year property unit or subject. They found that external students performed better than internal students. In addition, Yam and Rossini (2013) revealed that formative assessment would enhance student performance in a first-study property subject.

However, no study has been done in the area of determinants of students' overall academic success. There are only two exceptions. Allen and Carter (2007) found that performance in two required core knowledge courses serve as good predictors of overall academic success in the real estate degree. Newell and Mallik (2011) offered empirical evidence of mathematics background is an important determinant of success in the property degree. However, these studies do not examine the determinants of academic success in an online property program. Given that many universities are moving towards online property education delivery, it further highlights the need for an enhanced understanding of critical success factors in online property education.

## **Data and method**

### ***Data***

Data were collected on students who completed their property degrees at the University of Western Sydney (UWS) externally over 2007–2012. UWS is one of the few Australian universities offering property programs on-campus and externally. This offers an enriched data set and allows closer examination of online property education. The online undergraduate property program at UWS is a four-year or six-year distance program. This study mode offers greater flexibility in light of the program being delivered in a part-time study mode.

Data were also obtained on overall property degree-level performance (Grade Point Average), student age, gender, ATAR/UAI score, general maths at HSC, higher level maths at HSC, economics at HSC and language background from university records. Data on students' results in core business units were also collected from university records. UWS ethics committee approval was also granted to access these data. Unfortunately, the ethics approval does not allow us to access data regarding the socio-economic background on students, although the socio-economic data would offer further insights into the factors in determining success at university.

Table 1 presents the summary statistics. Overall, 126 external students were included in our analysis. The average GPA score was 4.5 out of 7. In addition, the average age of external students at admission is 25 years old. The average university entry score (UAI or ATAR) is 73.

### ***Method***

An Ordinary Least Squares (OLS) regression was employed to examine the role of specific factors influencing academic success in the overall performance of the external property degree. Regression fits a linear function to the data and allows us to test the effects of several variables together on academic performance. The equation to be estimated is as follows:

Table 1. Descriptive summary.

Variables	Mean	Standard Deviation
GPA	4.500	0.759
Entry Qualification (UAI or ATAR score)	72.634	9.855
Age (years)	24.572	1.451
Gender (dummy variable)	0.777	0.417
Language (dummy variable)	0.802	0.400

Source: Authors analysis of UWS student academic records.

$$GPA_i = \alpha + \beta_1 EntryQualification_i + \beta_2 Gender_i + \beta_3 Age_i + \beta_4 Language_i + \sum_{i=1}^4 HSCresults_i + \varepsilon_i \quad (1)$$

where:

*GPA* is the overall grade point average at graduation;

*EntryQualification* is the either UAI or ATAR score;

*Gender* is a dummy variable in which males are 0 and females are 1;

*Age* is the age of a student at admission;

*Language* is a dummy variable in which English-speaking background is 1, whereas non-English-speaking background is 0; and

*HSCresults* are results in general maths at HSC, higher level maths at HSC, English at HSC and economic at HSC.

## Results and discussion

### *Overall performance of external property students*

Table 2 exhibits the estimated coefficients from regression analyses for a number of models to identify the significance of specific factors influencing academic success at the overall property degree level based on the GPA of 126 external property graduates over 2007–2012.

A number of points are noted from Table 2. First, being consistent with the findings from previous studies (Durden & Ellis, 1995; Newell & Mallik, 2011), a positive and significant coefficient of entry qualification was evident in Models I–V, suggesting that university entrance scores (UAI/ATAR) have a significant positive relationship with academic achievement. The possible explanation for this finding could be that students with higher UAI or ATAR scores are more familiar with the academic setting and have better study skills (Anderson & Benjamin, 1994; Cheung & Kan, 2002).

Another important success factor is age. Interestingly, a negative and significant age effect was observed, indicating that younger students did better in the online property courses. Although the results contrast with the common belief that older students usually do better on a program, results here are comparable to the empirical findings from Peiperl and Trevelyan (1997) and Grebennikov and Skaines (2009). As discussed by Peiperl and Trevelyan (1997) that younger students had more recently used to an academic environment and were likely perform in that environment. Another possible explanation is the academic achievement of mature age students could be negatively affected by factors associated with family or work commitments. It should be noted that the online property program at UWS is a part-time study mode. Therefore, many external students are mature age students who have family and/or work commitments.

Table 2. Overall performance and external student characteristics.

Model	I	II	III	IV	V
Constant	5.663 (5.398)***	5.667 (5.395)***	5.636 (5.364)***	5.638 (5.381)***	5.656 (5.384)***
Entry	0.036	0.035	0.035	0.036	0.035
Qualification	(5.255)***	(5.187)***	(5.215)***	(5.302)***	(5.167)***
Age	-0.155 (-3.406)***	-0.153 (-3.336)***	-0.157 (-3.436)***	-0.157 (-3.459)***	-0.155 (-3.391)***
Gender	0.096 (0.642)	0.122 (0.796)	0.083 (0.549)	0.086 (0.571)	0.091 (0.602)
Language	0.004 (0.023)	0.008 (0.053)	0.036 (0.224)	0.040 (0.249)	0.040 (0.025)
General Maths		-0.106 (-0.811)			
Maths			0.152 (1.005)	0.171 (1.162)	
Econ			0.079 (0.568)		0.110 (0.809)
R <sup>2</sup>	0.204	0.209	0.215	0.213	0.209
F-statistic	7.768***	6.329***	5.442***	6.503***	6.328***

Source: Authors.

This also offers some indirect supports for the finding of Hunt, Lincoln, and Walker (2004) in which work commitments have a negative effect on academic achievement. Furthermore, Newell and Mallik (2011) also suggested that older property students are more focused on their property career goals.

On the other hand, we found that gender is not a critical factor in explaining academic success, reflecting in the insignificant regression coefficients for gender. Thus, this supports the findings of Peiperl and Trevelyan (1997) and Newell and Mallik (2011) in which no significant difference between males and females being evident. There is also evidence to suggest that English as a first language does not have a significant impact, indicating that those who do not speak English as a first language are not significantly disadvantaged. This also supports the findings of Halpern (2007) based on 127 students taking a business management module at London Metropolitan University. It should also be noted that the majority of UWS external property students are domestic students. Although some of them may not speak English at home, they have a high level of English language proficiency.

In addition, little evidence is available to support that HSC subjects are significant in explaining the academic success of external students. Although the results are broadly consistent with the findings of Newell and Mallik (2011), one difference was found. Interestingly, it was found that neither general mathematics nor higher level maths at HSC is an important factor in determining academic success in the distance property degree. The difference can be attributed to different samples. It should be noted that this study focuses on external students, while Newell and Mallik (2011) included both external and on-campus property students in their studies. Results reported here also reinforce the findings of Dutton et al. (2002) and Yam and Rossini (2012) in which there are clear differences between external and face-to-face students. This also recognises the importance of a dedicated study on online studies.

In addition, the coefficients of determination (R<sup>2</sup>) produced by the regression models are relatively low, although these results are comparable to the findings of Newell

and Mallik (2011). The results suggest that other important determinants have not been included into the models.

Overall, there is a significant positive association between academic achievement and university entry scores. In addition, age is also an important determinant. However, student characteristics such as gender, language and HSC subjects were not found to have a significant impact on academic success.

### *Core business units*

Given Allen and Carter (2007) found that performance in required core knowledge courses served as good predictors of overall academic success in the real estate degree, the baseline results were further controlled by various core knowledge units (i.e. Accounting Information for Managers, Principles of Economics, Statistics for Business, Marketing Principles, Business Academic Skills) that are typically completed in their first two years of business studies (junior years). The results are reported in Table 3.

After the additional controls for various core business knowledge units, strong evidence is still available to suggest that entry qualifications and age are critical factors in determining academic achievement for external property students. Specifically, a positive and statistically significant coefficient of entry qualification is evident in all models. Similarly a negative coefficient of age is found in all models. Furthermore, no evidence is available to support the notion of gender, language and HSC subjects

Table 3. Overall performance and external student characteristics: Core business units.

Model	I	II	III	IV	V	VI
Constant	3.575 (3.493)***	5.987 (4.403)***	6.663 (4.856)***	6.156 (4.405)***	3.120 (3.222)***	1.982 (2.105)**
Entry Qualification	0.023 (3.509)***	0.036 (5.249)***	0.036 (5.295)***	0.036 (5.262)***	0.026 (4.468)***	0.019 (3.197)***
Age	-0.112 (-2.687)***	-0.168 (-2.949)***	-0.192 (-3.435)***	-0.174 (-3.019)***	-0.102 (-2.572)**	-0.079 (-2.111)**
Gender	0.091 (0.670)	0.099 (0.656)	0.108 (0.717)	0.106 (0.699)	-0.003 (-0.012)	0.009 (0.075)
Language	-0.051 (-0.357)	-0.002 (-0.013)	-0.007 (-0.047)	0.008 (0.053)	0.010 (0.076)	-0.031 (-0.248)
Accounting Information for Managers	0.032 (5.355)***					0.024 (4.331)***
Business Academic Skills		-0.060 (-0.376)				
Marketing Principles			-0.185 (-1.128)			
Principles of Economics				-0.089 (-0.536)		
Statistics for Business					0.030 (6.826)***	0.026 (5.946)***
R <sup>2</sup>	0.358	0.205	0.213	0.206	0.427	0.505
F-statistic	13.371***	6.199***	6.483***	6.236***	17.874***	20.224***

Source: Authors.

having a significant impact on academic success in this online property program, reflecting that the baseline results are robust.

Interestingly, it was also found that Accounting Information for Managers and Statistics for Business are two core business units that are significantly and positively related to students' ultimate GPA. This also suggests that both units are good determinants of overall academic success. Hence, both units can serve as a screening mechanism that may identify students who are not adequately prepared for online property studies. However, no similar evidence is available for other core business units. This can be attributed to these units being less or non-quantitative subjects. As a result, these units might not serve as a good determinant of an external's student success in light of the property degree requirement for a high level of quantitative skills. As highlighted by Newell and Mallik (2011), professional accreditation requires students to have key competencies in specific core property and business areas. Importantly, many of these competencies require students with a strong understanding of financial mathematics concepts; thereby mathematics background is seen as an important success factor in the property degree. Therefore, top-performing students in both quantitative business units (Accounting Information for Managers and Statistics for Business) are more likely perform well in the overall property degree. In addition, the inclusion of both core business units also enhanced the coefficients of determination ( $R^2$ ) up to 51%, reflecting the importance of both business units in determining the academic achievement of property students.

To summarise, the baseline results are robust to core business knowledge courses. Entry requirements and age have a significant impact on the overall success in the online undergraduate property degree. In addition, Accounting Information for Managers and Statistics for Business, being typically quantitative business units taken in the earlier semesters of the property degree, are critical determinants of academic success.

### ***Comparative analysis of face-to-face students***

The enriched data set at UWS allows comparative analysis of external and on-campus students. To shed more light of the academic success determinants of external students, a comparative analysis of face-to-face students was also performed. Table 4 presents the estimated results for face-to-face students who graduated from 2007 to 2012. There were 269 on campus students graduated over this study period.

By simply comparing the estimated coefficients in Tables 3 and 4, it is evident that the academic success determinants of face-to-face students are broadly similar to external students. Specifically, entry qualification is an important academic success determinant in which students with higher entry scores are more likely perform well. The results are in line with the finding of external students, reflecting entry qualification (either UAI or ATAR) being the key determinant of academic success in a property degree. In addition, Accounting Information for Managers and Statistics for Business, two core business units with a strong quantitative focus, are also critical success factors.

Unlike the cohort of external students, the documented positive and significant coefficient for Marketing Principles in Model III suggests that this unit is another important success factor for on campus students. Nevertheless, the variable is not significant when the results of Statistics for Business and Accounting Information for Managers are controlled. Therefore, no robust evidence is available to support the significance of this variable. Moreover, insignificant coefficients are also observed for gender, confirming

Table 4. Overall performance and on campus student characteristics.

Model	I	II	III	IV	V	VI	VII
Constant	1.369 (1.616)	3.306 (2.804)***	1.269 (1.208)	2.636 (3.032)***	1.670 (2.200)**	1.282 (1.712)	0.453 (0.628)
EntryQualification	0.029 (4.069)***	0.029 (3.840)***	0.028 (3.828)***	0.028 (3.779)***	0.018 (2.595)***	0.022 (3.703)***	0.019 (2.864)***
Age	-0.032 (-0.979)	-0.064 (-1.414)	0.005 (0.120)	-0.039 (-1.142)	-0.109 (-0.624)	-0.034 (-1.252)	0.009 (0.261)
Gender	-0.051 (-0.371)	-0.017 (-0.116)	-0.013 (-0.087)	-0.027 (-0.185)	-0.123 (-0.956)	-0.057 (-0.476)	-0.114 (-0.892)
Language	0.374 (2.448)***	0.383 (2.365)**	0.356 (2.210)**	0.383 (2.360)**	0.416 (2.915)***	0.378 (2.849)***	0.388 (2.736)***
Accounting Information for Managers	0.020 (5.770)***					0.011 (3.465)***	0.008 (2.255)**
Business Academic Skills		-0.002 (-0.852)					
Marketing Principles			0.006 (2.257)**				0.004 (1.641)
Principles of Economics				0.001 (0.492)			
Statistics for Business					0.023 (8.712)***	0.020 (7.783)***	0.019 (6.607)***
R <sup>2</sup>	0.190	0.089	0.104	0.087	0.293	0.365	0.315
F-statistic	12.176***	5.049***	6.006***	4.944***	21.498***	27.929***	16.945***

Source: Authors.



that female students performed as well as male students. This further reinforces the view that the determinants for on campus students are comparable to external students.

However, some variations are evident. Age appears as an insignificant factor in determining the academic success for on campus property students, whilst no similar evidence has been found for external students. Given most face-to-face students entered the university via the same pathway (high school students), age variations among on campus students are very limited. Therefore, it is not surprising to find a weak link between age and the academic achievement of on campus students. In addition, unlike external students, language proficiency emerges as a critical success factor. Specifically, English-speaking background students performed better than non-English-speaking background students. The results are consistent with the finding of Andrade (2006) and Phakiti et al. (2013). This finding is in contrast to the documented finding for external students that language proficiency was not related to achievement of external students. This can be attributed to students' demographics. As discussed earlier, most external students at UWS are domestic students; thereby languages spoken at home are not that critical for this cohort as domestic students normally have a high level of English language proficiency. Hence, a weak link is evident between this variable and the academic achievement of external students. Conversely, international students normally conduct their degree on campus; thereby a stronger relationship between language background and academic achievement is evident. The finding also suggests that appropriate support services should be provided for international students to assist them to prepare for and succeed in their academic studies.

Overall, the academic success determinants for on campus students, in general, are very comparable to external students. However, some differences are identified by comparing the academic success determinants of face-to-face and external students (age, language spoken at home). This also highlights the importance of a specific study of external students.

### ***Robustness checks***

Given the coefficients of determination produced by the regression models are relatively low, a comparison of means test was also conducted to check the robustness of the regression results. First, the sample was decomposed into two groups based on the average entry qualification scores (i.e. low and high). Thereafter, a pair-wise t-test was conducted to provide a more straightforward analysis of the performance of these cohorts in the online property degree. Similar steps have also been taken for the variables of age, Accounting Information for Managers and Statistics for Business. The results are presented in Tables 5 and 6.

The results suggest that those external students with higher entry scores outperformed the cohort with lower entry scores. Importantly, the differences are statistically significant at 1% level. This suggests that entry qualifications appear to be an important success factor of GPA. Similarly, the results in Table 5 also show that younger students performed better than mature age students. The results are consistent with the regression results in Table 2, reflecting the robustness of the regression results.

Results in Table 6 also offer further evidence to support of the finding that Accounting Information for Managers and Statistics for Business are critical factors for overall academic success. Students, who did well in both units are more likely to outperform other groups significantly in the overall GPA. This further reinforced the robustness of the results in Table 3. Overall, the results suggest that academic achieve-

Table 5. Overall Performance (GPA) and T-tests: Entry qualification and age.

Model	Entry Qualification		Age	
	High	Low	Mature	Young
Mean	4.742	4.235	4.282	4.564
Difference(T-statistic)		0.507 (23.409)***		-0.282 (-2.314)**

Source: Authors.

Table 6. Overall Performance (GPA) and T-tests: Accounting information for managers and statistics for business.

Model	Accounting Information for Managers		Statistics for Business	
	High	Low	High	Low
Mean	4.860	4.045	4.864	4.028
Difference(T-statistic)		0.815 (18.578)***		0.836 (22.387)***

Source: Authors.

ment of external students is affected by university entry scores, age and results in Accounting Information for Managers and Statistics for Business.

### Conclusions and property education implications

This study investigated the impact of student characteristics on academic achievement in an online undergraduate property degree. The study was based on a sample of 126 external students who completed a taught undergraduate property degree at the University of Western Sydney between 2007 and 2012 via an online platform.

Results from this study indicated that entry qualifications and age have a significant impact on academic achievement. In addition, core business units (Accounting Information for Managers and Statistics for Business) are paramount academic success factors for external property students. The findings have some important property education implications. The findings may be used to influence admission policy in which entry qualification is a critical success factor. Given age is also a critical determinant of academic success in an online property program, the importance of having the necessary skills in balancing work, study and family commitments should be made clear to external students. Universities may also need to provide some work-life balance workshops to external students. In addition, the findings of this study suggest that the academic achievement in two core business units with a strong quantitative focus is likely to affect the overall performance of external students. Thus, universities could use both units as a screening mechanism to identify “students at risk.” Collectively, the findings of this study may enable course coordinators to improve their early identification of “students at risk.”

Some limitations of this study should be noted. First, socio-economic data on students have not been included in this study due to the restrictions of the human ethics approval for this project. Clearly, the socio-economic data on students should be considered in order to improve the models in a future study. Second, this study did not include personal factors such as self-regulation, self-efficacy, motivation and other

personal values in the analysis. These personal factors are critical factors in academic achievement (Phakiti et al., 2013). The coefficients of determination produced by the regression models could be significantly improved by capturing personal factors. Therefore, the importance of these factors in determining academic success in an online property degree warrants further research.

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