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Online Learning and blended learning: which is more effective?

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Abstract

One of the significant recent transformations in tertiary education is the trend to offer students the opportunity to offset internal classes with a greater online component in order to cope with competing demands from family and work commitments. Traditionally courses were offered internally with significant class room contact with a limited number of tertiary programmes being offered in external mode via "correspondence". With the growth of the world-wide web and e-learning some programs are now fully online but blended learning has also become popular, offering various combinations of internal classes and online content. This paper reports the results of delivering an introductory first-year property course using both online and blended learning. The paper considers the effectiveness of blended and online learning based on the thesis that blended learning is more effective as students have the advantages of both face-to-face learning and the online environment. A case study approach is adopted that involves two recent cohorts of students. Course statistics from the newly introduced Moodle software are used to analyse how these two groups of students use the online material and how these activities are correlated with their learning outcomes. The paper provides some insights into the use of the Moodle platform and how students react to the blended style of learning.

Keywords: *online learning, blended learning, face-to-face learning, property education*

Introduction

There have been considerable transformations in property education in Australia in recent years. These changes range from programme content, teaching and learning strategies, delivery modes and diverse student background to the increases in student numbers (Baxter 2007; Boyd 2010; Cornish, Reed and Wilkinson 2009; Hefferan and Ross 2010; Mak, Sher and Williams 2010; Newell and Eves 2000). The changing student profile such as the increasing number of mature-age students, part-time students, postgraduate enrolment and international students means that today's educators need to embrace flexible teaching strategies to better engage these groups of students (DEEWR 2008). As a result, besides meeting the growing expectation of learning experience; online learning is becoming popular in higher education to fulfil the connectivity demands of students (Garrison and Kanuka 2004). The literature reveals that the use of technology in property education is rewarding for both students and the academics (Cornish, Reed and Wilkinson 2009; Mak, Sher and Williams 2010; Wolverton and Wolverton 2003), therefore these should be refined through time to improve its efficiency and effectiveness.

In the property programme at University of South Australia, both internal and external courses cater for the distinct demands of these diversified groups of students. The internal students are provided with both face-to-face contact and online material whilst the external students study solely online. In January 2010 the University moved to a Moodle based online environment and this exploratory project is designed to examine how effective the new platform is for these two groups of students. The two cohorts are compared in term of their use of the online materials and how these activities correlate with summative learning outcomes.

The findings show that although blended learning provided more flexibility and support to students, those external students with only online learning performed better than their counterparts who had blended learning. This could be because the external students are generally more self-motivated as a greater proportion are part-time students; also they are self-selecting in that those less competent students tend to withdraw from the course early and only more motivated students remain at the end. It is also worth noting that the average mark of online quizzes had a strong correlation with final grades suggesting that those students who attempted the quizzes after studying the material diligently would do well in the course eventually. The regression models also revealed that the number of attempts for online quizzes did not transform into higher summative mark outcome suggesting that students do not develop an understanding of the material repeatedly taking quizzes and using short term rote learning. However, the results of this paper need to be taken with caution because it relates only to one course in one program and has a relatively small sample size. There is an ongoing need to expand the research area by having qualitative and quantitative feedback from the participating students.

This paper is structured as follows. First, the literature review will focus on the issues of online and blended learning to highlight the effectiveness of these two teaching mediums. Background information on the course, online facilities and the project is then followed by the research methodology. Discussion is presented with the results followed by a short conclusion.

Online Learning

Since 2000, online learning commonly known as 'web-based instruction', 'e-learning' or 'distance learning' has played an increasing role in higher education with the development of the internet and world-wide web. Web-based learning or online learning can be defined as 'hypermedia based instructional program, which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997, p. 6). Online learning is delivered via the internet which enables educators to have instant updating, distribution, and sharing of information (Rosenberg 2001). With the growing demand of the diverse student population, online learning has become popular as it provides the students with more flexible access to course contents and instructions at anytime and from anywhere with unlimited educational discourse (Centre for Technology in Learning 2009; Garrison and Kanuka 2004).

Also, there are other benefits associated with online learning as identified in the literature: media variety and unbounded web explorations, increasing the availability of learning experiences for learners who cannot or choose not to attend traditional face-to-face offerings; assembling and disseminating instructional content more cost-efficiently; enabling instructors to handle more students while maintaining learning outcome quality that is equivalent to that of comparable face-to-face instruction; and as a medium to encourage deeper processing as the students have more time for reflection (Arbaugh 2005; Centre for Technology in Learning 2009, p. 1; Spiro and Jehng 1990). The result of a meta-analysis on web-based and classroom instruction studies from 1996 to 2005 suggests that online learning is more effective than classroom instruction for teaching declarative knowledge; however, the two mediums are equally effective when the same instructional methods were used (Sitzmann et al. 2006).

Notwithstanding the myriad of advantages of online learning, the conclusions of the meta-analysis of the literature concerning online learning from 1996 to 2006 does not demonstrate that online learning is superior as a medium. (Centre for Technology in Learning 2009, p. xvii). Many of the studies that show an advantage from online learning could relate to online and class room conditions differed in terms of time spent, curriculum and pedagogy; it is the combination of elements that produced the observed advantage (ibid, p. xvii). Nevertheless, one should also note that online learning is much more conducive to the expansion of learning time than face-to-face instruction (ibib, p. xvii).

Although online education has been practised in some property programmes in Australia over the last decade, issues involving online learning in property education have not been well researched. At the international level, there have however been articles published relating internet and technology to property education. For example, Cannon (1997) and Redman (2001) have reviewed the use of internet in teaching property courses. With the introduction of online learning, research on a real estate principles course conducted by Wolverton and Wolverton (2003) reveald that there was a mixture of positive and negative feedback from students regarding online learning although it appears that the favourable comments outweigh the negative ones. The favourable comments include: more freedom with study schedule; being able to keep up with readings and concentrate on lectures, more effective use of time, and spending more time on study.

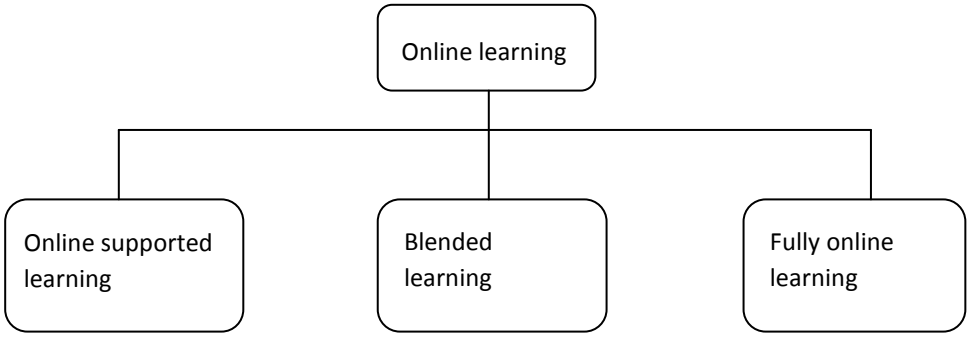
In the context of Australian higher education, a recent study on a property course at Deakin Univeristy shows that there has been positive feedback from the students on the use of technology in the course delivery which confirms the needs to continually evolve our delivery of education to enhance students' learning outcomes (Cornish, Reed and Wilkinson 2009). As well, a study on a postgraduate

programme at Univeristy of Newcastle indicates that majority of the students were satisfied with their experience of using Blackboard (online learning software) particularly in facilitating their learning process (Mak, Sher and Williams 2010). In short, online learning not only benefits the students and other stakeholders it also help to make property education delivery more efficient and available to today's diverse student populations (Cornish, Reed and Wilkinson 2009).

Blended learning

Blended learning or hybrid learning has become increasing important in higher education as it has the advantages of both online and traditional instructions (Horton 2000). Commonly, blended learning means those programmes that provide some combination of online and face-to-face learning (Owston 2008; Singh 2003; Voci and Young 2001; Wall, Ahmed and Smit 2006). However, to make it meaningful, blended learning should be the result of a thoughtful integration of classroom face-to-face learning and online learning experience (Garrison and Kanuka 2004). Therefore it is important to distinguish blended learning from online supported learning and online learning (see Figure 1).

Figure 1 - A continuum of online learning (adopted from Garrison and Kanuka 2004, p. 97).



As explained by Krause (2008):

> *Blended learning is realized in teaching and learning environments where there is an effective integration of different modes of delivery, models of teaching and styles of learning as a result of adopting a strategic and systematic approach to the use of technology combined with the best features of face to face interaction. (p.2)*

In other words, blended learning is the effective combination of face-to-face teaching and online technology in a learning program such that we are not just adding one onto the existing medium conveniently (Garrison and Kanuka 2004). To achieve this, academics have to decide which content will be transferred to the online environment and how it will be presented, and this certainly requires technical competence in creating these web documents (Gulbahar and Madran 2009, p.2). It has also been argued that learning outcomes will be enhanced when the rich dynamics of fast-paced communication technology are thoughtfully integrated with traditional classroom instruction (Garrison and Kanuka 2004).

As rightly argued by Steinberg (2004), online learning is not just a technological advancement in teaching delivery, but it is a new business model to be more competitive for higher education. In accommodating students' different learning requirements, more and more higher education institutions are incorporating web-sites in their programmes by providing study materials, having

podcasts for students who chose to listen at their own convenience, using emails and discussion board for in-depth communication, as well as using the internet for assignment submission and return of feedback (Cornish, Reed and Wilkinson 2009; Johnstone 2002; Mak, Sher and Williams 2010; Singh 2003).

From the literature, blended learning appears to be more effective than other forms of learning instruction as it incorporates the benefits of both personal face-to-face interactions and online settings (Kerres and deWitt 2003; Pratt 2002). This is in line with media richness theory, in which richer media (by providing the same material using multiple media) helps to enhance learning especially for complex and ambiguous tasks (Daft and Lengel 1986). The meta-analysis conducted by the US Centre for Technology in Learning (2009) found that on average blended learning had a larger advantage relative to pure face-to-face instruction; however, blended and pure online learning delivered similar students learning outcomes. To justify blended learning, Garrison and Kanuka (2004, p. 97) argued that the combination of face-to-face and online learning facilitates a simultaneous independent and collaborative learning experience, in other words the students can be independent of space and time, yet together. It is the face-to-face element of blended learning that maintains the students' high level of commitment and removes the sense of isolation that online students normally face (Wall, Ahmed and Smit 2006). Also, besides fostering the learning community, blended learning extends the total length of learning that resulted in greater reflection and better learning outcomes (Bonk, Kim and Zeng 2005).

In terms of effectiveness of a specific online element, Lewis (2002) suggests that in order to achieve effective learning, the online discussion activities must reach a certain level of activity to enhance student engagement. The author argues that higher frequency of participation in online discussion tends to lead to a 'deep learning' process and thus enhances student learning outcome. On the contrary, research conducted at the Univeristy of Newcastle found that the respondents did not find online discussion to be useful for their learning (Mak, Sher and Williams 2010).

It is worth noting that there are mixed findings on whether online quizzes are effective in improving learning outcomes. There was no significant difference found between the online group that had online quizzes and the other group that did not (Maag 2004). Also, there was no significant advantage found for students who took online quizzes compared to the group who did assignment (Stanley 2006). On the other hand, Lewis (2002) and Tselios et al. (2001) suggest that the effectiveness of online quizzes may depend on the influence of other variables. Lewis (2002) puts forward that online quizzes may enhance student learning outcome, however an active online discussion can be as effective as online quizzes in engaging student. Interestingly, Tselios et al. (2001) proposes that the software platform used for online quizzes may also affect student performance.

Based on the above literature review, it is hypothesized that blended learning is more effective than pure online learning due to better support through having the benefit of both face-to-face contact and the online environment. In this project, the effectiveness of online learning materials to internal and external students is examined. These include online textural and graphical resources, discussion forums and a variety of quizzes. Also, the frequency of access of study material such as the study guide and power-point slides is considered as well as how using different online items may be correlated to the students' summative mark outcomes.

Project Background

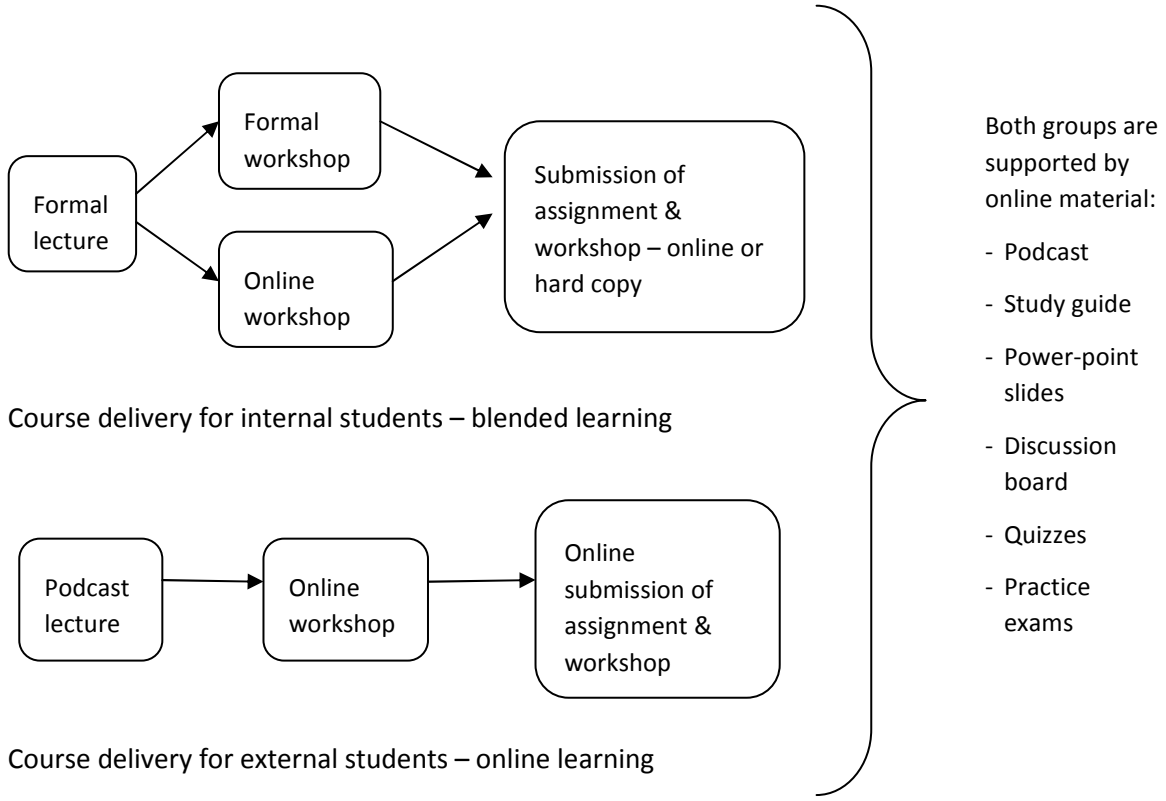
Moodle is an open source learning management system now widely used by higher institutions in Australia and overseas (UniSA, 2010). It is a highly sophisticated learning management system designed to help academics create online courses in a robust and flexible environment. Although the university has been offering online courses since 1995, Moodle was not adopted until January 2010, and the property programme was one of the first in the University to fully adopt the platform.

The case study uses a first semester first year property course, Introduction to Property and Valuation, and examines the pattern of usage of this new platform split by study mode and then examines how using internet items is correlated to examination marks and overall course marks. The two study modes considered are students who were exposed to blended learning and external students who were fully online.

The same set of instructional materials and assessment were used for both student groups but with variable methods of delivery. For internal students, a face-to-face lecture and workshop were held weekly while the external students were provided with podcasts and online workshops. Materials such as the study guide, power-point slides, workshop instructions and assignment details were available online so that students could access them from any location with internet access at anytime. All students were encouraged to participate in the online discussion forums and a variety of online quizzes and practice exams were provided to facilitate their learning. As well, Moodle was used for submission of assignments and return of feedback.

The course delivery of these two student groups is illustrated in Figure 2.

Figure 2 - Course Delivery of blended learning and online learning



Assessment Structure

Introduction to Property and Valuation has three assessment items within a project based learning environment.

1. A project (assignment) is submitted at the end of the study period and involves each student valuing a different residential property (usually the house they live in) involving all stages of primary and secondary research. This involves the application of nearly all the teaching material from the course.
2. Workshops are held on a weekly basis and are the primary mechanism used to scaffold the assignment. Internal students submit work from the workshops on a fortnightly basis in groups and have a short (five minute) test on an individual basis each week. External students submit individual workshop work on a fortnightly basis.
3. A final examination contributes 50% of the assessment and as required by professional standards students need to pass this examination. This is structured as three separately marked sections; multiple-choice questions, calculation-decision-making questions and an essay.

Research Methodology

This is an exploratory research study designed to compare the effectiveness of blended learning and online learning. There are two primary objectives in analysing data for this paper:

1. To examine how students interact with the Moodle based system by examining which resources and activities are most prevalent and at what stage in the study period these are accessed. 'Course statistics' in the form of hit counts were used in our analysis (Lowes, Lin and Wang 2007).
2. By looking for relationships between in the indicators of student utilisation of the Moodle based system and summative outcomes from the course.

In order to perform the analysis data is required to be matched across three different databases.

1. Logs of access to the Moodle based learnonline site. Each access to each activity on the Moodle site is logged against the student who uses it. Analysis of these logs shows what activities students used, who used them and when.
2. Results of online activities such as online quizzes. While the logs from learnonline will show how many times students access the quizzes and for what purpose, the results database shows what their performance was in each quiz.
3. Database of student names and characteristics together with marks from all assessment which is held as an Excel database.

This study is based only on students who attempted the examination in the main examination period. This excludes students who had decided to change programmes or courses and therefore withdrawn from the course or simply decided to "disappear". Also excluded were students who took (or will take) the examination at a later period due to study disruption at the time of the main examination. This meant that the final sample of data used to this study was based on 81 (of 109 starters) internal students and 17 (of 43 starters) external students. This resulted in 53,768 total Moodle logs and 3422 completed quiz results for students who completed the course. Student usage is shown through pie charts and time series plots of weekly usage. The relationship between online items and summative marks is explored using correlation and regression models.

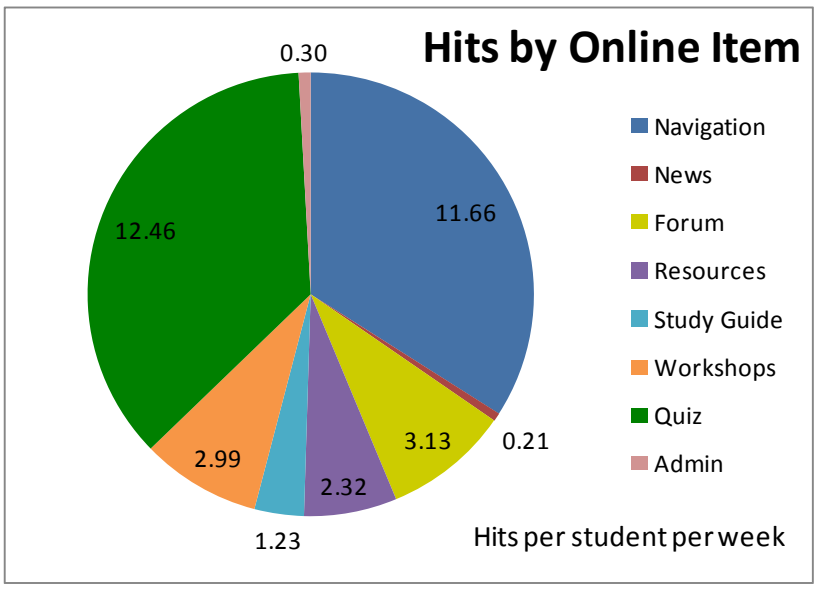
Results and Discussions

The results are discussed in three sections: student usage, correlations and regression modelling.

Student Usage

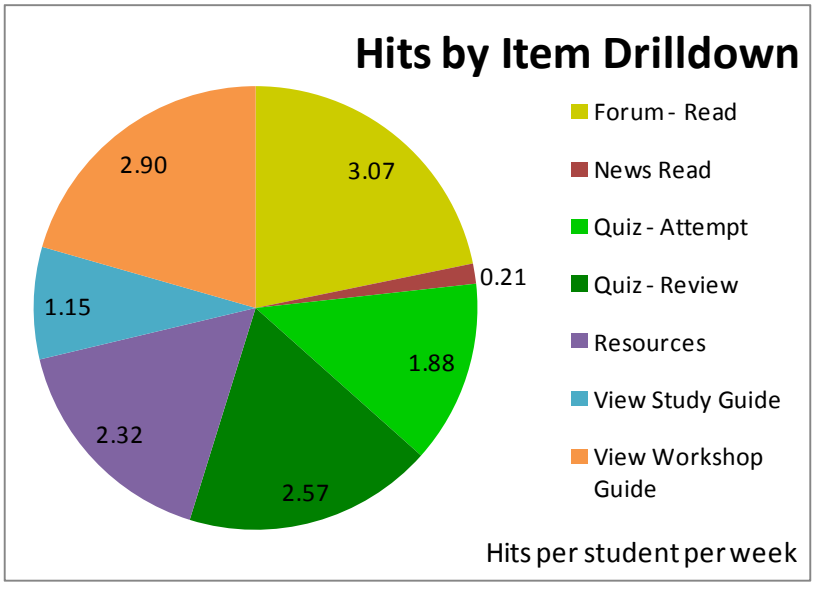
The total average hits per student per week are indicated in Figure 3.

Figure 3 - Average hits per student per week by primary item



On average each student hit the site just over 34 times each week however much of this activity is made up of navigation around the site (over 1/3rd) and activity on the quizzes (over one 1/3rd) and some of these involved navigation within the quiz system or continuing existing quizzes. To get a clear pattern of affective hits on the site further drill down is required to more discrete activities which are the major learning tools. On average, roughly 14 hits per student per week were made on these major tools (see Figure 4).

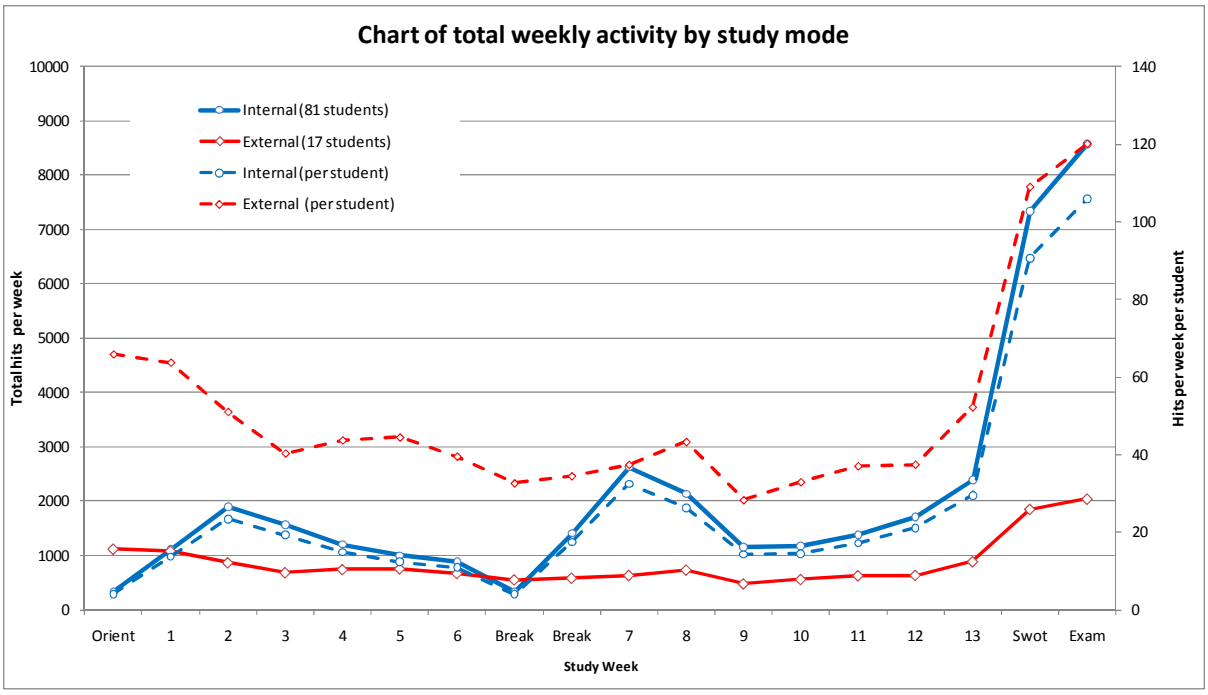
Figure 4 - Average hits per student per week for major learning tools



This shows a more balanced access to the major learning tools once navigation and administrative activities are removed. Material that might typically exist on a relatively "flat" website - without interactivity, makes up just under 50% of the activity including viewing study guides, workshop guides and resources as well as reading news posted by the course coordinator. Genuine student interaction is a little over 50% of total activity, particularly the use of the student forum and online quizzes. For most students, forum activity seems to be primarily reading other student posts (3.07 of the 3.13 average for all forum activity). The online quizzes make up the highest proportion of activity with each student attempting roughly 1.88 quizzes per week and reviewing around 2.57 quizzes. Reviewing a quiz is a normal part of taking the quiz so on this basis 1.88 is the expected minimum for reviews. This value of 2.57 indicates that most students review just less than 1 (.7 on average) previous quizzes each week.

The weekly usage of online resources and activities is indicated in Figure 5 and this is broken down between internal and external students and shows both overall hits and hits per student per week to allow for the smaller proportion of external students.

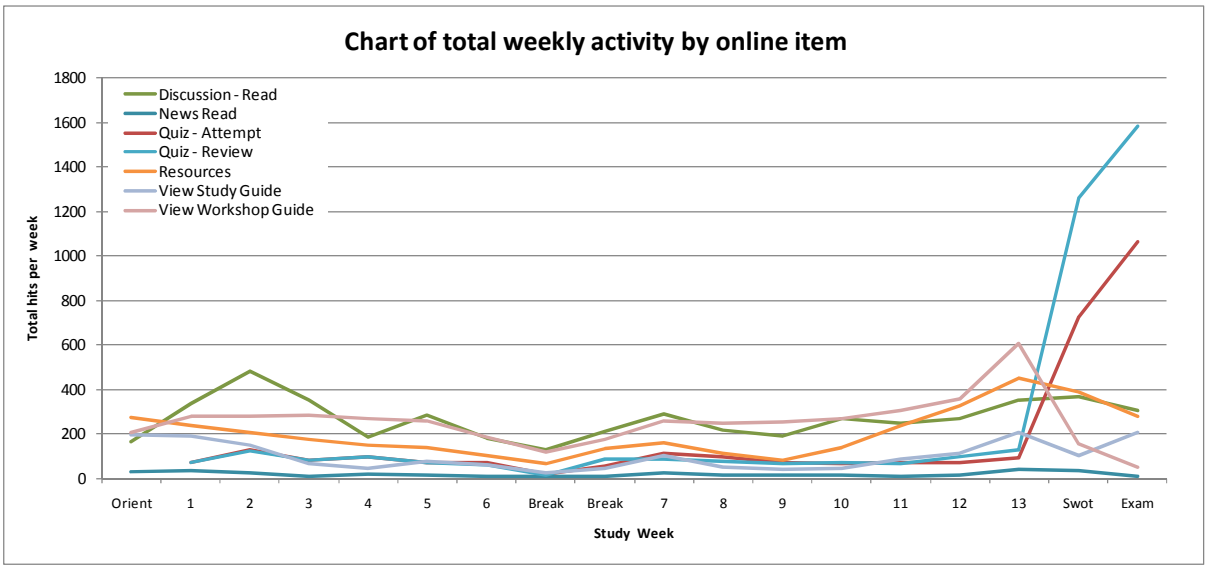
Figure 5 - Total weekly hits by mode of study



The chart highlights the difference in online activity between internal and external students. Internal students generally did not visit the online materials until after the first lecture in week one after which the activity slowly declined until the break in the middle of the study period. Their activity peaked again after the study period as they became anxious about the requirements to keep up to date with assignment work. Activity then declined around weeks 9 and 10 but with a marked peak leading into the examination period with hits per student per week averaging around 100 per student per week leading into the examination. External students use the website significantly during the orientation period and in week 1 as they investigate how to study the course. Their activity was reasonably regular throughout the study period but again with a marked peak moving into the pre-examination “swot vac” period and examination period. Typically with the exception of the swot vac and examination period hits per student per week for externals were usually at least twice that of internal students.

This weekly online usage pattern is then broken into specific activities in **Error! Reference source not found.**.

Figure 6 - Total weekly hits by online item



Investigating which items were hit in each week shows that primarily quiz attempts and quiz reviews lead to the significant peak around the swot vac and examination period. Noticeably just prior to the examination period in week 13 hits on resource areas such as lectures handouts, workshop guides and study guides reaches a peak in the week prior to students significantly hitting the site in terms of quizzes. This could suggest that students did their study first before testing their level of understanding. Also during this period the discussion forum was not heavily used with students preferring the self test mechanism of quizzes. During the study period students tended to only review their quizzes upon completion with quiz attempts and quiz review results being almost identical however during the examination preparation periods students actively review previous quiz attempts.

Correlations

Correlations are used as a simple preliminary method to examine the relationship between each online item and the various summative assessment pieces. These correlation coefficients together with their level of significance using a standard two-tailed T test are indicated in Table 1. The results show that every online item is significantly correlated with at least one assessment piece. Although students frequently use the online quiz system there is very little correlation between the number of times a student attempts quizzes and the assessment results. The primary exception seems to be that the calculations and decision-making section of the examination was weakly correlated with the number of attempts in quizzes. While the number of attempts at quizzes is not generally correlated with summative mark outcomes, average mark of quizzes taken is closely correlated. The average mark for all quizzes taken is a statistically significant correlation with all assessment items; all have a correlation above .4. The average of quizzes taken during the study period however has only an small impact on workshop marks (internal students included a short weekly test) however the average mark of tests taken during the pre-examination “swot vac” period shows significant but lower correlations with each assessment item. Almost no online item is related to the mark in the essay question in the examination except the average mark of all quizzes.

This essay question required students to bring together their learning across the entire course. It was found that students achieving a higher mark than average in the essay question, received a higher than average mark in aggregated quiz results. This suggests that the ability of students to synthesise the material and present it in a logical manner required for the essay question resulted from their involvement in more rigorous study throughout the course. Workshop marks are closely related to those items online which encourage interaction and deeper learning such as the formative quizzes and online forums. The record showed that most discussions were about the workshop topics and thus students who had participated actively in the forums did well in their workshops. This is in line with Lewis's (2002) suggestion that a higher frequency of participation in online discussion tend to engage in deep learning process and enhance learning outcomes.

The results suggest that each online item contributes to higher summative marks in at least one assessment piece so makes a worthwhile contribution to the package of learning tools. However it is also obvious that simple involvement in online activities such as taking quizzes and reading forums has little or no effect on exam marks. In practice such activity is still reasonably passive; students may simply read questions, comments or suggestions from other students and partake of quizzes without ever actively studying the material. Another issue discovered from by the records suggests that many students did not study the material before attempting the quizzes; they hope to get good marks by just rote-learning the questions with suggested solutions. Also, this conclusion is supported by the fact that higher average marks in quizzes and active involvement in the forums does lead to better outcomes. This suggests students who participate online having otherwise studied the material reap the benefits of online activities while students who ignore "old-fashioned" study and seek to use the online material as a way of shortcutting study are much less successful. In practice online quizzes are a useful tool for student self-assessment but are not a quick-fix learning mechanism and students need to be made aware of this fact.

Table 1 - correlation coefficients between online items and summative assessment pieces

Online Item	Workshops	Assignment	Exam MC	Exam Calcs	Exam Essay
Practice Exam Multi Choice - Number of Attempts	.188	.161	.131	.341**	.129
Practice Exam Calcs- Number of attempts	.152	.170	.047	.305**	.148
Formative Quizzes - Number of Attempts	.372**	.268**	.308**	.381**	.166
All Non-formative Quizzes - Number of Attempts	.337**	.175	.171	.288**	.144
Average mark quizzes taken during study period	.337**	.191	.169	.127	.190
Average mark quizzes taken during Swot Vac	.253*	.270**	.338**	.535**	.267**
Average mark ALL quizzes	.589**	.463**	.513**	.674**	.459**
Add Forum Topic	.328**	.154	.193	.133	.008
Add Forum Post	.365**	.244*	.223*	.224*	.153
View Forum	.424**	.294**	.270**	.292**	.160
View News Item	.376**	.166	.146	.138	.106

** Correlation is significant at the .01 level (2 tailed).

* Correlation is significant at the .05 level (2 tailed).

Regression Models

The difficulty with relying on correlation coefficients is that many indicators may be measuring much the same thing and may imply causation between the online facilities and study outcomes which is unwarranted. The advantage with regression modelling in this instance is that the authors seek to explain the relationship between each online activity and a summative mark outcome holding other

factors constant. Such issues might include the student's age, gender, mode of study and if they are an international student. Variables to control these issues have been included in the regression model together with a control for the number of workshops completed because while all students included in the sample completed the assignment and the examination, some students did not submit all workshops and this has a major effect on their overall course mark. It was also possible that those students who did not complete all workshops might not have developed a satisfactory understanding of the material.

It is also possible through the various tests to avoid the problem of multicollinearity - effectively double counting of assessment items which have the same effect. The presence of multicollinearity in the model leads to incorrect interpretation of the regression coefficients and this is avoided by careful selection of the independent variables. The first model uses the overall course mark as the dependent variable and the second adopts the total examination mark as the dependent variable. The second model is considered to be important because students are required to achieve a pass mark in the examination in order to complete the course.

Table 2 shows the regression model including statistics using the overall course mark as the dependent variable.

Table 2 - regression model - dependent variable = overall course mark

Dependent Variable: Overall Course Mark

R Square	0.667
Std. Error of the Estimate	8.7874
F	21.026

Parameter	B	Std. Error	t	Sig.	VIF
(Constant)	14.535**	5.111	2.844	0.006	
External	6.095*	3.044	2.003	0.048	1.589
International	2.675	2.488	1.075	0.285	1.114
Mature (over 25 years old)	1.217	2.635	0.462	0.645	1.556
Female	-0.177	1.996	-0.089	0.929	1.149
The Number of Workshops Completed	4.213**	0.996	4.232	0.000	1.339
Add Forum Post	0.418	0.512	0.818	0.416	1.501
Quizzes - # of Attempts	-0.017	0.044	-0.385	0.701	1.270
Quizzes - Average Mark	41.23**	5.732	7.195	0.000	1.600

** Regression Coefficient is significant at the .01 level (2 tailed).

* Regression Coefficient is significant at the .05 level (2 tailed).

The model shows that external students have a significantly higher overall mark (roughly 6 marks out of 100) compared to internal students. Student age and gender and being international have no significant effect on the overall mark. Number of workshops completed has a significant effect on overall course marks and its coefficient value of 4.2 is roughly equal to the contribution for each workshop (5%) to the final mark. The number of forum posts nor the number of quizzes attempted had a statistically significant effect, while the average mark for tests overall is the most significant contributing factor to the final overall mark, remembering that these tests are student self tests and do not contribute to the

final grade. The low VIF values for each variable indicate that multicollinearity is not a problem in this model. This would have existed by using most of the other variables.

Table 3 shows the equivalent regression model using the total examination mark as the dependent variable.

Table 3 - regression model - dependent variable = total examination mark

Dependent Variable: Total Examination Mark

R Square	0.531
Std. Error of the Estimate	11.7733
F	11.889

Parameter	B	Std. Error	t	Sig.	VIF
(Constant)	20.527**	6.848	2.997	0.004	
External	8.226*	4.078	2.017	0.047	1.589
International	8.358*	3.333	2.507	0.014	1.114
Mature (over 25 years old)	1.951	3.530	0.553	0.582	1.556
Female	-0.392	2.674	-0.147	0.884	1.149
Number WKs completed	1.020	1.334	0.764	0.447	1.339
Add Forum Post	-0.100	0.685	-0.146	0.884	1.501
Quizzes - # of Attempts	0.019	0.059	0.326	0.745	1.270
Quizzes - Average Mark	47.962**	7.679	6.245	0.000	1.600

** Regression Coefficient is significant at the .01 level (2 tailed).

* Regression Coefficient is significant at the .05 level (2 tailed).

This model shows that as with the overall marks the age and gender of students does not affect the total examination mark but that external students perform better on average achieving about 8/100 higher marks than internals and that international students have a statistically significantly better performance in the examination. This is in line with our experience that the international students tend to perform better in this numeric-rich exam.

Simply completing workshops, making forum posts or attempting quizzes did not affect the final overall mark however students with high average marks in quizzes showed statistically higher examination marks. This model supports the earlier suggestion that simply undertaking online activities such as posting questions onto the forum or attempting quizzes does not lead to better marks outcomes in terms of either the final examination or the overall mark. The statistically significant result for average quiz marks suggest that students who perform well must study the material independently before going online and using the quizzes as a self testing mechanism and that simply going online and repeatedly taking quizzes provides no significant benefit to students.

Although the literature suggests that blended learning is superior than other form of learning modes (Kerres and deWitt 2003; Pratt 2002), results from the above regression analyses negated the authors' earlier hypothesis that blended learning delivers better learning outcomes with both results indicating that learning outcomes from online learning was better than blended learning. This could be

due to the fact that external students were usually more self-motivated than internal students as many of them were mature working students who strived to enhance their qualification for better career prospect. As well, these external students were self-selecting in which those students who did not perform well withdrew from the course early. Although the external students had less access to academics they tend to be independent learners than the internal students, this was evident from the number of hits per student as illustrated in Figure 5. There could be many possible reasons why there were higher hits for external students: they might be double-checking the material, working on the online quizzes, participating on the online discussion, or even failed to print their material off the first time. We may infer from all these activities that these external students are working harder compared to their counterparts.

Conclusion

More and more property programmes in Australia have been delivering online courses in order to cater for the increasing demand from students of diverse backgrounds, this is particularly relevant to satisfy those part-time students as well as those who find it difficult to access the traditional face-to-face learning. Having the advantages of both face-to-face and online leaning, blended learning which offers more flexibilities and student support has been highly recommended to enhance student engagement thus improving student learning outcomes.

Contrary to the literature, findings from this research revealed that external students who were exposed to online learning performed better than students in blended learning mode. This suggests that external students may be more self-motivated as most of them were part-time students; also, they were self-selecting in that those less motivated students tend to withdraw from the course at an early stage leaving only the better students to complete the course. Even though the research finding did not find blended learning to be more effective than online learning, property academics should explore how best to incorporate blended learning into their programmes to enhance student engagement given that blended learning actually offers more students learning support and flexibilities (Boyd 2010).

In terms of effectiveness of individual online items, the average mark of online quizzes had a strong correlation with final grades suggesting that those students who attempted the quizzes after studying the material diligently did well in course. Noticeably from the data students who did not do their study before attempting the quizzes did poorly in their first attempts. This reaffirms the needs to understand the material in order to excel. Also, the regression analysis revealed that the frequency of attempts for online quizzes did not affect the learning outcome as students simply could not do well by just rote-learning the answers. While online quizzes are a useful tool to engage students, they can lead student into a false “sense of security” if they keep repeating quizzes until they get a high mark. Students should be advised that quizzes are only effective if they use them to self-test their competency after studying the course material comprehensively.

Lastly, it is important that the results of this paper be taken with caution because of the small sample size of students across only one course; therefore there is a need to expand the research by collecting qualitative and quantitative feedback from students, particularly in terms of their perceptions, satisfaction level and suggestions to improve online interaction.

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