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Reasons Why Some University Students Avoid the Online Learning Environment in Blended Courses

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Integrating an online component into a university course is typically done to improve the student experience. However the intent of the teacher's blended design may not always align to the students' experience of it. Their experience may be mediated by a number of factors including student perceptions of the online environment and their approach to engaging in the experience. In this study, an investigation into student learning experience of 201 engineering students found that the extent of their engagement and academic success was related to how integrated they perceived the online environment to be with the whole course design, the perceived amount of workload and benefits they found when engaging online and their preference for which mode of learning they chose. The outcomes of the associations amongst their perceptions, preferences and levels of engagement have important implications for university course design and teaching.

INTRODUCTION

Student experiences of learning in universities involving online learning as a constituent part of courses is increasingly ubiquitous (Demming et al., 2015). However, simply including online learning in university courses does not ensure relatively better experiences of learning and outcomes (Ellis &

Goodyear, 2013). There are a number of reasons why student learning may be impoverished when they are expected to learn in courses with a significant online part of the experience.

Previous research has identified that student perceptions of their learning experience may result in positive associations with learning outcomes. Studies have shown that positive student perceptions of learning in on-line courses are related to increased measures of engagement (Rovai & Barnum, 2007), and that positive perceptions of cognitive presence online, that is the extent to which students are able to construct meaning through sustained online communication, are related to higher outcomes (Shea & Bidjerano, 2010). In contrast, some studies reported not finding any positive correlations between student perceptions of elements of the experience such as online learning tools and academic performance (Lane & Porch, 2002) while others have identified that negative perceptions of the online part of university courses and learning outcomes are associated with relatively lower learning outcomes (Ellis, 2016).

Other related research has investigated student preference for mode of learning and its association with the learning experience. Foci of research have included student preferences for mode of learning at the level of courses (Jaggars, 2014), suggesting perceptions of the level of difficulty of the course was related to their preference. Other studies have focused on student preference for mode of particular activities such as discussions for example (Meyer, 2003). Such studies suggest that the different modes offer different affordances, with asynchronous discussions offering additional time for reflection while face-to-face discussions offered immediacy of feedback.

A relatively newer area of research, learning analytics, is providing evidence about many aspects of the university student experience of learning (for summaries see Pam, Morgan, O'Keefe, & Yanosky, 2016; Sclater et al., 2016). Learning analytics in higher education is used for a number of purposes such as student support and retention, measuring student engagement in learning and investigating patterns of learning strategies across large population samples. Within this research, some studies (for example, Shum & Ferguson, 2012) emphasize the interpretation of online data within socially orientated frameworks to improve our understanding of the links between measures of analytics and the intent and experience of the students underpinning them.

In this study, we examine how differences in student perceptions, preferences for mode of learning and engagement with the online learning environment in a blended university course may account for variation in the

quality of their experiences and academic performance. This study adds to the previous research by investigating the relational nature of perceptions of the learning environment, mode of learning and use of the online learning environment in the blended course to identify why some groups of students are more successful than others. In doing so, it reveals evidence why some students group tends to avoid the online environment and provides ideas for how to address this behaviour.

Relational Perspectives on Student Learning

A relational perspective of student learning looks for how the interrelatedness of key aspects of the learning experience is related to qualitatively different learning outcomes. Sometimes referred to as Student Approaches to Learning [SAL] (Pintrich, 2004), studies in this area have systematically investigated variation in the quality of student learning in higher education for the last four decades. This line of research suggests that student perceptions of learning, their engagement with the course elements including the online environment, and the choices they make in their approach to learning are logically and positively related to qualitatively different outcomes (e.g., Biggs, 1999; Ellis & Goodyear, 2013; Marton & Säljö, 1976; Prosser & Trigwell, 1999; Ramsden, 2002).

SAL studies into student perceptions of the learning have identified a number of key aspects of the learning environment that are related to outcomes. These aspects include student perceptions of teaching quality, clear goals and objectives, workload and generic skills (Ramsden, 1991; Richardson & Turner, 2000). For those concerned about the quality of learning, these studies have provided evidence of statistically significant associations amongst positive and negative perceptions which are logically related to higher and lower learning outcomes (Entwistle et al., 1991; Ramsden, 2002).

The relational nature of learning is not typically emphasised in learning analytic studies, yet these are an important source of evidence about the student experience in blended courses. Learning analytic studies in blended contexts have investigated social networks amongst learners (De Liddo et al., 2011; Ferguson, Coulson, & Barnett 2011), latent semantic analysis to investigate how evidence from natural language processing can provide insight into the learning experience (Landauer, Foltz, & Laham, 1998) and how computers can support argumentation in learning (Thomason & Rider, 2008). The studies have also investigated how analytic evidence can pro-

vide guidance for automated methods of examination and support advice to learners on which resources to use (Drachsler et al, 2010; Verbert et al., 2011). Defined as *the use of data, statistical analysis, and explanatory and predictive models to gain insight and act on complex issues* (Pam et al., 2016), we use available data in this study from students' use of the online environment to look for relations with the perceptions and preferences they held in their experience. More precisely, this study investigates the associations amongst the students' perceptions of, and engagement with, the online learning environment in their course, the students' choice of learning mode (whether they prefer to work only face-to-face or both face-to-face and online), and their academic outcomes. The main research question is:

What aspects of the student experience in a blended course inhibit or encourage them to engage successfully with the online environment?

The supporting research questions are:

a) *To what extent is students' choice of learning mode related to their perceptions of, and engagement with, the blended learning environment and their academic performance?*
b) *To what extent are students' perceptions of the blended learning environment related to their engagement with it and their academic performance?*

METHOD

Participants and the Learning Context

The participants were 201 first year undergraduate engineering students enrolled in a course – Fundamentals of Electrical and Electronic Engineering – in the Faculty of Engineering and Information Technologies at a large metropolitan Australian research intensive university. The course is a core requirement for Electrical, Computer, Telecommunications, Bioelectronic, and Power Engineering students. The main objective of the course was to familiarize students with the basic concepts of fundamental electrical circuit analysis, including topics such as circuit variables, circuit elements, simple resistive circuits, and techniques for circuit analysis. The course ran one semester long, and was designed to be a blended learning course which involved both a face-to-face component and an online component. The face-to-face component was structured as a two-hour lecture, a two-hour tutorial, and a three-hour laboratory for every week. The online component was sup-

ported by a bespoke learning management system. Student learning online in the course took place in the students' own time.

Instruments and Data

Three instruments were used to investigate the student experience: a questionnaire to capture student perceptions about key aspects of the blended environment and their preference of mode of learning, the digital footprint left by students' engagement in the online environment (primarily frequency of tool use), and students' academic performance as measured by formative and summative marks.

To examine students' perceptions of the blended learning environment and their choice of learning mode, a questionnaire with three subscales and a closed-ended question was developed and based on previous literature from Student Learning Research (e.g., Biggs, 1987; Crawford, Gordon, Nicholas, & Prosser, 1998; Ellis & Goodyear, 2013). Students completed the questionnaire using a 5-point Likert scale. The items examine students' perceptions of the extent of integration they perceived between the online learning environment and the course; their perceptions of the online workload; and perceptions of the usefulness of classmates' online contributions. To identify the students' choice of mode of learning, a close-ended question interrogated whether their preferred to work with peers mainly face-to-face or both face-to-face and on-line. The design of the course did not allow them to work *only* online with peers.

To examine the students' engagement with the online learning environment, frequencies of tool use by each student captured by the learning management system were used. The online tools supported student learning in three main areas: assessment, which consisted of formative exam questions, weekly quizzes, sample final exam papers, and other assessment-related content (assessment tools); critical disciplinary course content, such as video recordings, links to scientific research papers, electric circuit databases, and other types of multi-media resources (content tools); and key learning resources including the course outline, weekly compulsory readings and weekly lecture notes (course tools). A summary of the frequencies of tool use is shown in Table 1.

Table 1
Frequencies, Means and Standard Deviations of Tool Use in the Engineering Course

Online Tool	*Purpose*	*Total frequency of use*	*M*	*SD*
Assessment tools	Assessment tasks, quizzes and exam questions	147,447	718.29	339.01
Content tools	Video recordings, research papers, databases	97,583	476.54	191.01
Course tools	Course outline, readings, lecture notes	2,125	10.49	6.98

Two kinds of academic performance measures were captured and used in the analyses: one was a summative outcome – results of students' final exam of the course (60%), and the other was a formative outcome, which was made up of laboratory exercises involving building circuits (15%), marks for lecture conceptual review (5%), marks for the weekly homework (15%), and marks of the progress exams (5%). The summative outcome had 60 as the maximum score (M = 31.62, SD = 6.95) and the formative outcome had 40 as the maximum score (M = 33.95, SD = 11.65). From the SDs we could see that outcomes were more widespread for the summative outcome.

Data Collection and Analyses

The data collection followed the procedures stipulated by the ethics committee of the researchers' university. Student participation was voluntary and anonymity of the participants' identity was ensured. The questionnaire was administered towards the end of the semester so that students could reflect on the whole course. Students were also asked to give permission to access to the digital footprint of their engagement with online learning environment and their academic performance as measured by their course marks.

Data analyses were carried out in three steps. The first step aimed at exploring the reliability and validity of the scales of perceptions of blended learning environment. An Exploratory Factor Analysis (EFA) using Principal Component procedure followed by Varimax rotation was conducted. We used the following criteria to determine the number of scales and cor-

responding items: (1) the scree plot; (2) deletion of items with coefficients being < .45 within a factor and with high multiple coefficients loaded across factors; (3) factor solution with parsimony and the interpretability of the resulting solution (Field, 2014; Preacher & MacCallum, 2003); and (4) reliability of Cronbach's alpha's being appropriate. Before the EFA, we reversed negatively-worded items, so that for all the items, a higher score means more positive perceptions.

The second step was to identify sub-groups within the population sample which reported similar types of experiences using two kinds of criteria: the first criterion was students' choice of learning mode and the second criterion was students' positive or negative perceptions of their blended learning environments. To group students according to their choice of learning mode, we used their answers to group them into those that preferred a face-to-face mode, and those that preferred a blended mode (both face-to-face and online).To group them according to their perceptions, we conducted a hierarchical cluster analysis with Ward's method (Seifert, 1995) using the resulting scales from step 1.

The last step was to examine associations of students' perceptions of blended learning environment and choice of learning mode with a range of independent variables using a two-way MANOVA. The two independent variables were two grouping variables resulted from step 2: a) choice of learning mode (i.e., face-to-face vs. online); b) perceptions of blended learning environment (positive vs. negative perceptions). The dependent variables included: a) their engagement with the online environment - frequencies of tool use when participating in learning activities about key disciplinary concepts that were relevant to the whole course (the content tool), assessment activities (the assessment tool), and the main course resources such as the course outline, weekly compulsory readings and weekly lecture notes (the course tool); and b) their academic performance – summative and formative assessment results.

RESULTS

Exploratory Factor Analysis and Descriptive Statistics

The results of the exploratory factor analysis for the perception subscales are presented in Table 2. Three subscales were identified: perceptions of course workload, perceptions of online student contributions, and perceptions of integrated learning environment. The Eigen-values of the subscales

were 4.91, 3.50, and 3.18 respectively, explaining 24.57%, 17.50%, and 15.90% of the total variance respectively. The values of the Cronbach's alpha for the three subscales were .83, .83, .and .82, indicating all were reliable.

Table 2
Perception Subscales and Example Items

Subscale	*Description*	*Example item*
perceptions of course workload (6 items, $\alpha = .83$)	assesses students' perceptions of course workload in relation to the online activities	"The online activities in this course made the workload too heavy."
perceptions of online contributions (6 items, $\alpha = .85$)	assesses students' perceived value of online contributions by other students in the course	"Other students' online contributions helped me understand my ideas from a new perspective."
perceptions of integrated learning environment (6 items, $\alpha = .82$)	assesses students' view of the level of integration of the online component with the whole course	"The online activities seem to be well integrated with the assessment."

Correlation Analysis

To examine the nature of associations amongst the perceptions of the blended learning environment, bivariate associations amongst the perceptions subscales were examined using correlation analysis. Table 3 shows that the integrated learning environment variable is positively correlated with the online contributions variable ($r = .30$, $p < .01$) and it did not relate to the course workload variable ($r = .12$, $p = .08$). The course workload variable was negatively associated with the online contributions variable ($r = -.21$, $p < .01$), indicating that a negative perception towards reviewing the online contributions of students was related to a heavy course workload.

Table 3
Correlation Analysis of Perception Subscales

	Integrated environment	Online contributions	Course workload
Integrated environment	---		
Online contributions	.30**	---	
Course workload	.12	-.21**	---

Notes: ** $p < .01$.

Associations with Choice of Learning Mode and Perceptions of Learning Environment

Using students' answers about choice of learning mode, we found that 68 students preferred working mainly face-to-face in this course and 133 students preferred using a combination of working face-to-face and online (known as blended mode group hereafter). Using a cluster analysis based on students' perceptions of learning environment, based on the increasing value of the squared Euclidean distance between clusters, a two-cluster solution was produced with 136 students in cluster 1 and 65 students in cluster 2.

Overall, the results of a MANOVA showed that the main effects of both choice of learning mode F (8, 190) = 3.12, $p < .05$, $\eta^2 = .12$ and perceptions of blended learning environment F (8, 190) = 29.83, $p < .01$, $\eta^2 = .56$, were significant. The interaction effect between choice of learning mode and perceptions of learning environment is also significant F (8, 190) = 2.18, $p < .05$, $\eta^2 = .08$. We then conducted three separate univariate analyses for the choice of learning mode, perceptions of blended learning environment, and the interaction of both. Table 4 shows the results of univariate analysis for the main effect of choice of learning mode (face-to-face vs. blended), and the significant effects were bolded.

Table 4
Univariate Effects by Choice Of Learning Mode

Dependent variables	*df*	*df error*	*F*	*p*	η^2	*groups*	*M*
			perceptions				
Integrated environment	1	197	0.49	.48	.00	blended	3.39
						face-to-face	3.34
Online contributions	1	197	0.25	.62	.00	blended	2.97
						face-to-face	2.92
Course workload	1	197	4.38	**.04**	**.02**	**blended**	**2.53**
						face-to-face	**2.26**
			engagement with online tools				
Assessment tool use	1	197	5.59	**.02**	**.03**	**blended**	**737.08**
						face-to-face	**610.12**
Content tool use	1	197	5.24	**.02**	**.03**	**blended**	**484.91**
						face-to-face	**415.50**
Course tool use	1	197	0.07	.79	.00	blended	10.32
						face-to-face	10.62
			academic performance				
Summative assessment	1	197	4.70	**.03**	**.02**	**blended**	**34.88**
						face-to-face	**30.81**
Formative assessment	1	197	1.04	.31	.01	blended	30.60
						face-to-face	31.74

Table 4 shows that there are significant differences on perceptions of course workload F (1, 197) = 4.38, $p < .05$, $\eta^2 = .02$; frequencies of assessment tool use F (1, 197) = 5.59, $p < .05$, $\eta^2 = .03$ and content tool use F (1, 197) = 5.24, $p < .05$, $\eta^2 = .03$ and the summative outcome F (1, 197) = 4.70, $p < .05$, $\eta^2 = .03$. We found that the blended mode group tended to perceive a higher course workload ($M = 2.53$), and to use the online environment significantly more (assessment tool: $M = 737.08$ and content tool: $M = 484.91$) than face-to-face mode group did (assessment tool: $M = 610.12$; and content tool: $M = 415.50$). The blended mode group also performed significantly higher on the summative task ($M = 34.88$) than face-to-face mode group did ($M = 30.81$).

Table 5 presents the univaraite analysis for the main effect of perceptions of blended learning environment. The results show that there are significant differences on perceptions of integrated learning environment F (1, 197) = 157.09, $p < .01$, $\eta^2 = .44$; perceptions of online contributions F (1, 197) = 51.96, $p < .01$, $\eta^2 = .21$; frequencies of assessment tool use F (1, 197) = 6.17, $p < .05$, $\eta^2 = .03$; content tool use F (1, 197) = 8.14, $p < .05$, $\eta^2 = .04$; and also the formative assessment outcome F (1, 197) = 7.52, $p < .05$, $\hat{\eta} = .04$.

To be more specific, the descriptive statistics in Table 4 showed that cluster 1 students had higher ratings (hence, more positive perceptions) on integrated learning environment ($M = 3.86$) and online contributions ($M = 3.35$) than cluster 2 students ($M = 2.88$ and $M = 2.56$ respectively). Students in cluster 1 also tended to engaged more with the online learning environment, as measured by assessment tool use ($M = 740.28$) and content tool use ($M = 493.46$), than students in cluster 2 (assessment tool: $M = 606.92$ and content tool: $M = 406.95$). At the same time, students in cluster 1 also scored higher on the formative assessment ($M = 32.70$) compared to students in cluster 2 ($M = 29.64$).

The univariate analysis showed that the interaction effect between choice of learning mode and perceptions of blended learning environment is not significant on most of dependent variables. However, the interaction had a significant effect on perceptions of course workload F (1, 197) = 6.94, $p < .05$, $\eta^2 = .03$. To be more specific, it showed that students who favoured blended learning mode with less positive perceptions of environment felt that online workload was most appropriate ($M = 2.63$), followed by students who favored working mainly face-to-face with more of positive perceptions ($M = 2.51$), and students with a preference of blended learning mode with positive perceptions ($M = 2.44$). Students who preferred mainly face-to-face mode with negative perceptions of learning environment perceived the online workload was most inappropriate ($M = 2.02$)..

Table 5
Univariate Effects by Perceptions of Blended Learning Environment

Dependent variables	*df*	*df error*	*F*	*p*	η^2	*groups*	*M*
			perceptions				
Integrated environment	1	197	157.09	**.00**	**.44**	**cluster 1**	**3.86**
						cluster 2	**2.88**
Online contributions	1	197	51.96	**.00**	**.21**	**cluster 1**	**3.35**
						cluster 2	**2.56**
Course workload	1	197	1.43	.23	.01	cluster 1	2.48
						cluster 2	2.34
			engagement with online tools				
Assessment tool use	1	197	6.17	**.01**	**.03**	**cluster 1**	**740.28**
						cluster 2	**606.92**
Content tool use	1	197	8.14	**.01**	**.04**	**cluster 1**	**493.46**
						cluster 2	**406.95**
Course tool use	1	197	0.01	.98	.00	cluster 1	10.49
						cluster 2	10.46
			academic performance				
Summative assessment	1	197	51.24	.54	.00	cluster 1	33.43
						cluster 2	32.26
Formative assessment	1	197	352.22	**.01**	**.04**	**cluster 1**	**32.70**
						cluster 2	**29.64**

DISCUSSION

The aim of this study is to identify which aspects of the student experience of learning in a blended university course may inhibit or encourage them in engaging with the online environment successfully so that they succeed in the course as a whole. Its purpose was to provide some evidence why, despite being a key part of university courses, some students tended to avoid using the online environment in their studies. To pursue this aim, we used student responses to a closed-ended questionnaire about their per-

ceptions of the learning environment and preference of mode of learning, the frequency of tool use by students in the course as they engaged in their learning activities and their academic performance as indicated by formative and summative assessment marks.

Before considering the results and implications, it is worthwhile noting the limitations of the study. The research site is one course in the discipline of engineering. To investigate the transferability of the results, many similar studies in other disciplines are warranted. In addition, the methodology is predominantly quantitative. To ensure that the focus of research continues to be well-scoped, the research program in which this study sits should continue to conduct qualitative investigations that investigate breadth of the phenomena researched to understand the wider context in which the findings are situated.

In a blended course design, there is often a choice to engage with others and with resources either in class and/or online. If a student chooses to avoid the online environment for any reason, then they lose the learning opportunities provided by that part of their experience as well as the opportunity to develop learning skills that they will need to support their learning after graduation. In this study we found that there are a number of reasons why a student might avoid the online learning environment. These included:

- *having a preference to only work face-to-face with others rather than routinely incorporating the online environment in their learning strategy;*
- *perceiving the online part of their experience to be unrelated to, and unintegrated with, their course;*
- *not perceiving the learning value in reviewing the online contributions made by other students*
- *perceiving that the online part of their experience creates overall too much workload in their course*

The results of this study reveal that these outcomes held true for the perceptions and preferences reported by the students and their use of the online learning environment in the engineering course. Answering research question a), Table 4 shows that students who held a preference for a face-to-face mode of learning, tended to perceive the course workload to be less, tended to use the online environment less and performed at a relatively lower level academically as measured by the course summative outcome. Answering research question b), Table 5 shows that students who held negative perceptions towards how integrated the online environment was with the

course, who viewed the contributions of other students negatively tended to perform at a relatively lower level as measured by the summative outcomes. Significantly, the interaction of perceptions of blended learning environment and choice of learning mode were logically and significantly related to students' perceptions of online workload.

Implications for Course Design and Teaching

A key outcome from all the results in this study is the relational nature of the parts of the university student experience of learning (Ellis & Goodyear, 2013; Prosser & Trigwell, 1999). In general, relatively higher and lower academic performance was logically related to choices of learning mode (blended or face-to-face), perceptions of the learning environment (positive and negative) and use of the online environment (higher and lower frequency). The interrelated and individual nature of these aspects offers some insight into course design and teaching.

The results suggest that in blended university course designs, helping students to understand the significance and importance of including the online environment in their learning approach is important for their overall academic performance. While it seems obvious that in a blended course design, avoiding use of the online environment is likely to negatively impact outcomes, it was clear that in this study, about a third of students held this preference which in turn was related to negative perceptions of the experience and relatively lower academic performance.

To address negative perceptions of the online environment not being integrated in the course, teachers can design curriculum elements (course outline, assessment schedule, weekly activities and objectives) to make it clear to the students that the online environment is an essential and embedded part of their experience. The course outline could describe how engaging in activities across face-to-face and online contexts will help the students to develop the graduate attributes of problem-solving and teamwork in a digital context. The assessment schedule could attribute a proportion of the assessment to engaging meaningfully online through responding to other student submissions on learning tasks. The design of the learning activities could explicitly model how students are expected to engage successfully online in order to complete the activities; and the objectives of the course could make it clear to the students that the generic skills of learning through combinations of face-to-face and online interactions is as an important outcome for their course as is the development of a deep understanding of their disciplinary content.

To address a negative perception of the value of reviewing the online contributions of other students, teachers could teach in ways that use the submissions of other students as a key stage of each student clarifying their own response to tasks. This can be achieved for example, in task designs which are project based or on discussion topics which offer a variety of perspectives and positions that can be adopted. By modelling interesting and well-structured student responses to tasks in class, the contributions of others provide examples of responses to task which can stimulate ideas and function as a type of peer learning.

By addressing the negative perceptions held by students of the online environment such as the extent of its integration with course design, the learning value of the contributions of other students, and the overall workload, the results in this study suggest that students would have a better understanding of why the online part of their experience was important, and that it was necessary for them to develop ways of including it in their overall learning strategy. The results suggest that learning activity design and teaching in blended courses need to address not just the disciplinary content of the activities, but also reveal to students the importance how to adjust poor perceptions about the online environment and preferences for mode of learning. Only then will they be able to extract the most educational benefit from blended experiences of learning.

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