

# Interactivity and learning: connecting multimodal student experiences in first year undergraduate courses

**Beverley Webster**

RMIT University Vietnam, Ho Chi Minh, Vietnam  
beverley.webster@rmit.edu.vn

**Catherine Peck**

RMIT University Vietnam, Ho Chi Minh, Vietnam  
catherine.peck@rmit.edu.vn

**Le Thi Viet Ha**

RMIT University Vietnam, Ho Chi Minh, Vietnam  
ha.lethiviet@rmit.edu.vn

**Do Quoc Tuan**

RMIT University Vietnam, Ho Chi Minh, Vietnam  
tuan.doquoc@rmit.edu.vn

New learning design models and technologies offer powerful solutions to the problem of interactivity in higher education. While increasing innovative use of interactive digital technologies has been a hallmark of recent changes to higher education practice, the thoughtful/careful/well-considered integration of traditional delivery modes and innovative digital techniques in learning and teaching design and practice remains a crucial issue for university educators. There has been a tendency for new technologies to be added to existing curriculum design and learning and teaching practice in an ad hoc, isolated manner, rather than as part of an overarching learning design which incorporates new technologies, traditional techniques and understanding of pedagogic principles and practice. The need to integrate these elements is evident at RMIT University Vietnam which has a 100% campus-based experience for all undergraduate programs yet has a strategic goal to graduate students with digital capabilities. A learning pathway was designed and implemented in eight core first year courses in a Bachelor of Commerce program and included moving away from a single textbook to digitally rich resources, establishing expectations around students engaging outside of class in online learning activities, and in class experiences aimed to draw connections between in and out of class activities. Pre and post surveys were administered to students and data collected using the Student Engagement and Learning Inventory. This part of the study focuses on the constructs of Facilitating, Experience and Connectivity which are part of the Technology Enhancing Learning Experiences. Results indicate positive effects of the implementation of the learning pathways initiative.

**Keywords:** Interactivity, student engagement, student outcomes

## Introduction

A growing body of evidence has shown that interactivity is the key to human learning and intelligence, rather than abstract symbol manipulation or internal representation (Churchill, King, Webster, & Fox, 2013). Interactivity implies two-way interactions between learner and

instructor rather than just one-way interactions from teacher to student. Wagner (1994) elaborated the simple definition, asserting that the actions of involving parties need to encourage learning and guide the learners' knowledge towards consistency with the instructional goal. Interactivity has been one of the main drivers for the increasing use of technology in higher education. Incorporating Information and Communications Technology (ICT) into learning and teaching is a substantive shift that has been made in the field toward incorporating ICT into learning and teaching in higher education. It is widely accepted in educational research that when well used, contemporary technology boosts learning outcomes and digital proficiency (Cao, Li, & Csete, 2010). In addition, the use of web 2.0 technology also holds tremendous potential. It can not only be used to distribute lecture notes and homework but also to help students participate in collaborative tasks that have no predetermined answers and allow students to come up with creative 'think out-of-the-box' solutions (Schneckenberg, Ehlers, & Adelsberger, 2011).

Universities, especially ones in under-developed and developing countries, are generally just starting to use new and advanced technologies, so usage is expected to keep expanding in the future (Carnoy & Rhoten, 2002). However, as yet both common and cutting-edge technologies are poorly integrated into course and program delivery in higher education, often 'tacked on' rather than selected to enable a specific learning design. Technology provides us with tools intended to enable/enhance pedagogy but does not, on its own, guarantee improved student performance. So while it is true that with the aid of technology we can engage students in more interactive ways, expand beyond the confines of classroom and reduce dependence of students on their teachers, it is pertinent to remember that learning is fostered by a well matched combination of the technology, the learner and the learning environment, with the last element having particular importance (Peeraer & Van Petegem, 2010). Teachers therefore face a multilayered challenge in making effective use of modern technology to support teaching, student learning and the building of a curriculum and learning environment that enhances interactivity.

The purpose of this study is to explore how to better improve the use of technology and online learning to help students, especially first year undergraduates, to maximize online experiences, particularly those out of class that are designed to support offline or in class learning. The remainder of this paper is organized in the following way: First, we review key literature regarding first-year students, blended learning (online and face-to-face) and its impact on student engagement and interaction. Second, the research methods and results of this experiment are presented. Last, we discuss the results and draw conclusions about how the use of technology can enhance student learning.

## **Literature review**

Research on the first-year experience has been given prominence because freshman students who drop out, defer, fail or change programs have a direct impact on university's reputations and finances (Wilcox, Winn, & Fyvie-Gauld, 2005). During this period, students go through a massive transition from high school to university with many types of change that fall into several categories including, transition to university, academic engagement as a first year and understanding expectations about goals (Webster & Yang 2012). They have to adjust to various teaching styles, be more independent and proactive in learning, and adapt to the workload and schedule of higher education (Asmar, Brew, McCulloch, Peseta, & Barrie, 2000). Besides academic difficulties, first year undergraduates also face various social challenges. One of the most common and crucial challenges is the feeling of not belonging.

Students who have financial difficulties, weak academic performance or difficulty in making new friends could easily feel they do not belong in university life. An Early Attrition Analysis (2011) at the University of Sydney found that more than 550 undergraduate freshmen left the university before the fourth week of the semester (as cited in Barnes, Macalpine, & Munro, 2015). The majority were students who were the first-in-family to attend university, students from remote areas, students with disability and students with low socioeconomic backgrounds. According to Bourdieu (1984), and Bourdieu and Passeron (1990), these are individuals who have low cultural capital, thus are less likely to fit in and succeed in the university. Recognizing this phenomenon, almost all universities have some programs and events to support new students, make them feel included and increase the retention rate during this transitional period (Auburn, 2007; Gardner 2001; Lovitts, 2005; Schnell, Louis, & Doetkott, 2003; Skyrme, 2007). Examples include orientation days, induction days, learning skills workshops and other first-year seminars (Skyrme, 2007; Steltenpohl & Shipton, 1986; Wilcox, Winn, & Fyvie-Gauld, 2005). Kuh (2009) claims that teachers need to be welcoming and supportive of collaborative learning, and respect all students regardless of their backgrounds. Institutions can also help to engage new students by building a culture that emphasizes student success, establishes high expectations, strives for continuous improvement, stresses the importance of diversity and helps student get ready for higher learning (Kuh, Kinzie, Schuh, & Whitt, 2005).

Blended learning, the combination of online and face-to-face learning, is a promising teaching methodology. There have been conflicting findings regarding the effectiveness of online learning experiences versus traditional face-to-face learning experiences. Hughes, McLeod, Brown, Maeda, and Choi (2007) and Maki, Maki, Patterson, and Whittaker (2000) reported that students who attended an online class outperformed those who went to the traditional face to face class. By contrast, Mottarella, Fritzsche and Parrish (2005) stated that web-based students scored lower than ones who enrolled in the face-to-face class. Therefore, the mix of those two learning and teaching methods could be considered an optimal learning scenario. Online learning provides much greater flexibility for learners in terms of time and locations compared to other types of learning (Allen & Seaman, 2006). Web-based interfaces also promote interactivity as instructors and students can communicate and interact more easily and conveniently (Li, 2007). Combining online and offline learning would allow students to apply those experiences and skills into classroom settings, where there is closer and more natural contact between teachers and students and among students themselves, promoting students' experience and learning outcomes.

The effective and appropriate use of teaching and learning instruments, such as blended learning, can directly impact the level of student engagement and participation. For a long time, insufficient student engagement has been a challenging problem for higher education institutions (Churchill et al., 2013). The problem has become more serious recently due to the increase in size and diversity of entering cohorts of students to universities. Research has showed that the reasons for such insufficiency include class size, instructor's authority, age, gender, or faculty-student interaction (Weaver & Qi, 2005). While large class size and too much teacher authority might reduce participation, lecturer-student interaction both inside and outside the classroom might have a positive effect on student engagement (Auster & MacRone, 1994; Astin, 1993; Endo & Harpel, 1982; Tinto, 1997). For example, visiting lecturers' offices after class or exchanging emails with professors gives students an opportunity to personally communicate with their teachers and ask any questions. Engaging students in teaching and research opportunities and in other extracurricular activities alongside the professor can reduce the distance between faculty and students and enhance

their confidence to take part in in-class participation. Making effective use of digital technologies is also a solution for the lack-of-student-engagement problem as they can facilitate communication between teachers and students (Gleason & Daws, 2011).

This paper reports a section of a larger First Year Experience study. Project funds were awarded for this study which included the redevelopment of the core eight courses of a Bachelor of Commerce at a privately owned Australian University in South East Asia. The newly developed courses included learning pathways for students, orientation modules and greater use of learning activities outside of the classroom with the aim of better engaging students in learning activities in the classroom. This paper reports on the effectiveness of the project in relation to student perceptions of their engagement in learning and how online experiences facilitated better engagement in class. The following objectives are addressed:

1. To determine the validity and reliability of the Student Engagement and Learning Inventory.
2. To explore the differences in student perception of Technology Enhancing Learning Experiences pre and post the learning pathways intervention.

## Methods and results

Over 2015, each of the eight core courses in the Bachelor of Commerce was re-developed and implemented. A significant part of this initiative was the introduction of learning pathways to facilitate student engagement with the use of technology, in this case being the Blackboard learning management system. The redevelopment included the learning pathway that students were able to access and provided them a series of expectations to engage in out of classroom activities that better prepared them to participate when in class in a subsequent lesson. The learning pathway was a coherent set of standards and engaged students in a variety of online learning experiences available through the learning management system. The learning pathways included activities that prepare students to come to class and fully participate, it involved videos, quizzes, reading and other forms of activities (see Figure 1).

The screenshot displays two learning pathway examples in Blackboard. The top example, titled "Comparing the Size of Economies", includes a bubble chart of 2010 GDP in U.S. Dollars for various countries. The bottom example, titled "Comparative Analysis - % Sales: % Profit Contribution", features a bar chart comparing sales and profit percentages across four categories.

**2010 GDP in U.S. Dollars**

Country	GDP (in billions of U.S. Dollars)
USA	14.89
China	10.51
Germany	3.50
France	2.50
Italy	2.00
Spain	1.41
UK	2.00
Canada	1.38
Mexico	1.08
India	1.00
Japan	5.40
South Korea	1.01
Russia	1.00
Brazil	1.00
South Africa	1.00

**Comparative Analysis - % Sales: % Profit Contribution**

Category	Sum of % Sales Per Product	Sum of % Profit
Category 1	~30%	~40%
Category 2	~20%	~20%
Category 3	~10%	~10%
Category 4	~45%	~35%

**Topic 4: Global Perspectives**

**TUTORIAL 1 PREPARATION**

What will we learn?

- Explain how the global economy cr
- Explain different attitudes towards
- Discuss regional trading alliances
- Understand international business s

**Core Concepts and terms yo**

**Globalization:** "is the closer integration o breaking down of artificial barriers to the fi

**Globalization**

**WissensWerte**

**Topic 3: Segmentation, Targeting, Differentiation an**

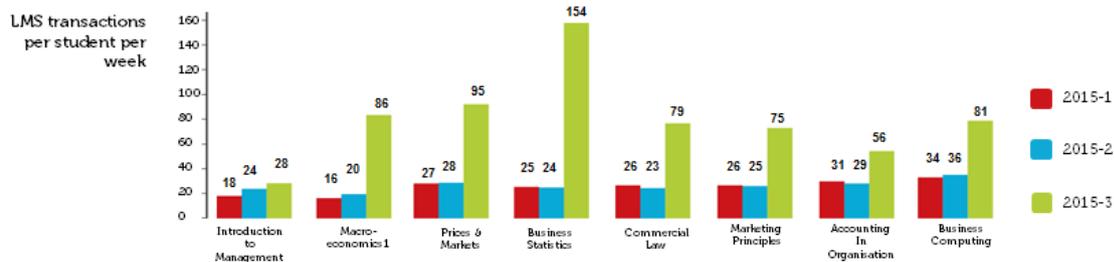
This week we will discuss **Chapter 7 Customer Driven ?**

**Objectives for this week are:**

- Define the four steps in designing customer driven market
- List, discuss and apply the major bases for segmenting c iPhone customer?

Figure 1: Learning pathways examples in Blackboard

The results in relation to accessing Blackboard and completing the activities were incredible. Prior to the intervention, students rarely went to their course Blackboard shells. An audit of these blackboard shells showed that for the most part, course outlines were uploaded, class power point slides and assessment details. There was very little by way of engagement in activities to both support learning and prepare for class. Data were collected on student activity in the Blackboard shells of the core eight courses that were included in this study. The results indicate significant increase in student engagement from the first two semesters of 2015 to the last one (see Figure 2), in particular those courses which had implemented the new pathways for over one semester.



**Figure 2: Blackboard activity post learning pathways intervention**

Students also made comments in relation to what was expected of them in this newly developed curriculum and pedagogy of learning and teaching. The comments were positive and indicated that students felt the activities that there were asked to engage in, facilitated their learning and their better involvement in class (see Figure 3 for examples of what students said).



**Figure 3: Student comments on learning pathways in Blackboard**

Data collection in this study also involved an online survey administered to all of the first year students enrolled in the eight core courses (Macroeconomics, Business Statistics, Introduction to Management, Accounting in Society, Commercial Law, Principles of Marketing, Business Computing and Prices and Markets). The survey was administered pre and post implementation of the newly developed courses. The survey included 48 items within eight broad areas of interest (see Table 1 below). The overall aim of these three constructs in the survey (the Student Engagement and Learning Inventory - SELI) was to collect data in relation to students' experiences in and out of class, experiences with assessment and feedback, perceptions of skill development and experiences with and without the use of technology that enhanced their engagement in learning. These constructs are part of a larger survey which included other areas of the student learning experience.

**Table 1: Constructs of the Student Engagement and Learning Inventory**

Constructs	Number of items	Example item
Softskills development	7	My experiences in this course sharpened my analytical skills
Clarity of expectations	5	I usually had a clear idea of where  I was going in this course and what was expected of me
Assessment for learning	4	My teacher seemed more interested in testing what I had memorized than what I had understood
Feedback for learning	3	The feedback in this course helped me improve my learning
Engagement	5	It was expected that students work collaboratively in this course
Connecting in class and online learning	7	I used what I learned in Blackboard during the in-class sessions
Learning using technology	7	My online experiences helped me engage actively in my learning
Use of Blackboard	6	I was able to find all my course materials in Blackboard

Whilst the survey included eight broad constructs, this paper is reporting on only three of those. The reason for this is that the focus of this paper is the use of technology to enhance learning experiences. The other constructs in the survey relate to assessment and feedback and clarity of expectations. These are discussed in a full paper which is in preparation on the validity and reliability of the full instrument. The constructs reported here are in relation to Technology Enhancing Experiences (Connecting in class and online learning, Learning using technology and Use of Blackboard). Factor analysis was conducted with the 20 items from the SELI to confirm the structure of these constructs. A clear three factor structure was identified with these 20 items and together they explained 59.048 percentage of the variance of 'Technology Enhancing Learning Experiences'. Reliability analysis was conducted on the three constructs and the results indicate that each construct has acceptable estimates (Table 2).

**Table 2: Factor Analysis of Technology Enhancing Learning Experiences**

Dimension	Item	Factor loadings			
		I	II	III	
I	Learning using technology (LUT)	LUT29	.692		
		LUT30	.718		
		LUT31	.672		
		LUT32	.581		
		LUT33	.563		
		LUT34	.623		
		LUT35	.622		
II	Use of Blackboard (UB)	UB36		.543	
		UB37		.602	
		UB38		.594	
		UB39		.428	
		UB40		.629	
III	Connection in class and online learning (CIOL)	UB41		.607	
		CIOL42	.721		
		CIOL43	.749		
		CIOL44	.761		
		CIOL45	.757		
		CIOL46	.719		
		CIOL47	.645		
		CIOL48	.525		
Eigenvalue		9.077	1.612	1.121	
% Variance		26.226	19.355	13.467	
$\alpha$		0.854	0.826	0.897	

To determine if the intervention improved student perception of their learning experiences and engagement in their learning, t-tests were conducted with the semester of course offering as the independent variable (pre intervention and post intervention). In all of the courses the post offering scores received higher and more positive feedback than the pre course offering. Whilst these were not all statistically significant (see Table 3), they do demonstrate that with the introduction of the newly developed learning experiences, students engagement in these experiences and learning activities were considered more satisfactory and their perception of the usefulness to learning of these improved.

**Table 3: Mean differences in student perception of learning experiences**

Course		Online experiences	Blackboard	Connecting
Introduction to Management	Pre	2.80	2.91	3.03
	Post	3.01	2.96	3.06
	<i>t-value</i>	<i>-2.44</i>	<i>-1.09</i>	<i>-2.67</i>
Marketing Principals	Pre	2.87	3.06	3.14
	Post	3.08	3.19	3.26
	<i>t-value</i>	<i>-1.82</i>	<i>-1.20</i>	<i>-1.15</i>
Commercial Law	Pre	2.71	2.89	2.94
	Post	2.91	2.91	3.10
	<i>t-value</i>	<i>-1.33</i>	<i>-.135</i>	<i>-1.44</i>
Business Statistics	Pre	2.81	2.91	3.03
	Post	3.01	2.96	3.63
	<i>t-value</i>	<i>-1.63</i>	<i>-.323</i>	<i>-.233</i>

*Note:* t-values greater than 2.00 are statistically significant to 0.05

## Conclusion

It is very clear that the introduction of a newly developed curriculum for which a large part was a learning pathway in the Blackboard course shells, increased and improved student engagement and student participate in class. A common concern for teachers in higher education is how I, as a teacher in higher education, can better motivate students to come to class prepared to participate in a meaningful way. This is not an easy objective to achieve. Students need to feel that any activity that they engage in is worthwhile, that it does contribute to their learning and that they will benefit from engaging in the activity. If we are able to succeed in providing these types of activities that meet student expectations, then we can expect students to come to class better prepared to engage and to have a better learning experience. This initiative has achieved some outstanding results in relation to student activity on Blackboard, student participation in learning experiences that are available in their course shells in Blackboard and student perception of the usefulness of these for their learning. In addition to this very substantive outcome, this project has included the development of an instrument that can be used to measure student perceptions of the use of technology to enhance their learning experiences and their learning. The validation and reliability of this instrument is supported by the estimates presented in this paper. Further work will be done to confirm the use of this instrument cross culturally.

## References

- Allen, I. E., & Seaman, J. (2006). Growing by degrees: Online education in the United States, 2005. *Sloan Consortium (NJ)*.
- Asmar, C., Brew, A., McCulloch, M., Peseta, T., & Barrie, S. (2000). The first year experience project report. *Institute for Teaching and Learning: University of Sydney*.
- Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco, CA: Jossey-Bass Inc.

- Auburn, T. (2007). Identity and placement learning: student accounts of the transition back to university following a placement year. *Studies in Higher Education*, 32(1), 117-133.
- Auster, C. J., & MacRone, M. (1994). The classroom as a negotiated social setting: An empirical study of the effects of faculty members' behavior on students' participation. *Teaching sociology*, 289-300.
- Barnes, S., Macalpine, G., & Munro, A. (2015). Track and Connect: Enhancing student retention and success at the University of Sydney. A Practice Report. *The International Journal of the First Year in Higher Education*, 6(1), 195.
- Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*: Cambridge, MA: Harvard University Press.
- Bourdieu, P., & Passeron, J.-C. (1990). *Reproduction in education, society and culture* (Vol. 4): Sage.
- Cao, M.-L., Li, Y., & Csete, J. (2010). *A Pedagogical Study of an E-learning Case Computer Simulation for Enhancing Students' Learning Outcomes in Clothing Functional Design*.
- Carnoy, M., & Rhoten, D. (2002). What does globalization mean for educational change? A comparative approach. *Comparative education review*, 46(1), 1-9.
- Churchill, D., King, M. E., Webster, B. J., & Fox, B. (2013). *Integrating Learning Design, Interactivity, and Technology*. Paper presented at the Ascilite, Sydney.
- Endo, J. J., & Harpel, R. L. (1982). The effect of student-faculty interaction on students' educational outcomes. *Research in Higher Education*, 16(2), 115-138. Retrieved from <http://dx.doi.org/10.1007/BF00973505>
- Gardner, J. N. (2001). Focusing on the First-Year Student. *Priorities*.
- Gleason, J. P., & Daws, L. B. (2011). Interactivity and Its Effect on Student Learning Outcomes. *Teaching, Learning and the Net Generation: Concepts and Tools for Reaching Digital Learners: Concepts and Tools for Reaching Digital Learners*, 129.
- Hughes, J. E., McLeod, S., Brown, R., Maeda, Y., & Choi, J. (2007). Academic achievement and perceptions of the learning environment in virtual and traditional secondary mathematics classrooms. *The American Journal of Distance Education*, 21(4), 199-214.
- Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New Directions for Institutional Research*, 2009(141), 5-20.
- Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2005). *Student success in college: Creating conditions that matter*. San Francisco, California: Jossey-Bass.
- Li, M.-H. (2007). Lessons learned from web-enhanced teaching in landscape architecture studios. *International Journal on E-Learning*, 6(2), 205-212.
- Lovitts, B. E. (2005). Being a good course-taker is not enough: a theoretical perspective on the transition to independent research. *Studies in Higher Education*, 30(2), 137-154.
- Maki, R. H., Maki, W. S., Patterson, M., & Whittaker, P. D. (2000). Evaluation of a Web-based introductory psychology course: I. Learning and satisfaction in on-line versus lecture courses. *Behavior research methods, instruments, & computers*, 32(2), 230-239.
- Mottarella, K., Fritzsche, B., & Parrish, T. (2005). Who learns more? Achievement scores following web-based versus classroom instruction in psychology courses. *Psychology Learning & Teaching*, 4(1), 51-54.
- Peeraer, J., & Van Petegem, P. (2010). *Factors influencing integration of ICT in higher education in Vietnam*. Paper presented at the Global Learn.
- Schneckenberg, D., Ehlers, U., & Adelsberger, H. (2011). Web 2.0 and competence-oriented design of learning—Potentials and implications for higher education. *British Journal of Educational Technology*, 42(5), 747-762.
- Schnell, C., Louis, K., & Doetkott, C. (2003). The first-year seminar as a means of improving college graduation rates. *Journal of The First-Year Experience & Students in Transition*, 15(1), 53-76.
- Skyrme, G. (2007). Entering the university: The differentiated experience of two Chinese international students in a New Zealand university. *Studies in Higher Education*, 32(3), 357-372.
- Steltenpohl, E., & Shipton, J. (1986). Facilitating a successful transition to college for adults. *The Journal of Higher Education*, 637-658.
- Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *The Journal of Higher Education*, 68(6), 599-623. Retrieved from <http://www.jstor.org/stable/2959965>
- Wagner, E. D. (1994). In support of a functional definition of interaction. *American Journal of Distance Education*, 8(2), 6-29.
- Weaver, R. R., & Qi, J. (2005). Classroom organization and participation: College students' perceptions. *The Journal of Higher Education*, 76(5), 570-601.
- Wilcox, P., Winn, S., & Fyvie-Gauld, M. (2005). 'It was nothing to do with the university, it was just the people': The role of social support in the first-year experience of higher education. *Studies in Higher Education*, 30, 707-722. doi:10.1080/03075070500340036

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