The positive relationship between flipped and blended learning and student engagement, performance and satisfaction

Rosemary Fisher, Aron Perenyi and Naomi Birdthistle

Biographical/contact details of author(s)

Rosemary Fisher. Department of Business Technology and Entrepreneurship, Swinburne Business School, Swinburne University of Technology, John Street, Hawthorn, Hawthorn Victoria 3122, Australia. Email: rlfisher@swin.edu.au

Áron Perényi. Department of Business Technology and Entrepreneurship, Swinburne Business School, Swinburne University of Technology, John Street, Hawthorn, Hawthorn Victoria 3122, Australia. Email: aperenyi@swin.edu.au

Naomi Birdthistle. Department of Business Technology and Entrepreneurship, Swinburne Business School, Swinburne University of Technology, John Street, Hawthorn, Hawthorn Victoria 3122, Australia. Email: nbirdthistle@swin.edu.au

Rosemary Fisher, lecturers and researches in entrepreneurship and innovation, and has a particular interest in teaching and learning for non-traditional students and the potential value of new pedagogies.

Áron Perényi, lecturer in international business, conducts research in international business and entrepreneurship. His teaching portfolio includes preparing students to meet the challenges of the 21st century workplace, focusing on application of technology in teaching material design.

Naomi Birdthistle, an Associate Professor of Entrepreneurship, has been an academic for over 20 years. For her research, her PhD has won a worldwide award given by the Family Firm Institute and has published extensively on the area of entrepreneurship education; high growth firms and family business management issues and is recognised as a Government of Ireland Scholar.

Abstract

Flipped and blended learning pedagogies are increasingly adopted and institutions that see in these novel pedagogies mechanisms that might contribute to improved student outcomes and, in the case of the institutions, student retention. However, the as yet limited research does not definitively demonstrate the empirical link between flipped and blended learning pedagogies and desirable student outcomes of engagement, performance, and satisfaction. Over four semesters, 348 responses were collected and analysed. Findings are that flipped and blended learning do positively influence perceptions of engagement, performance, and satisfaction, but that flipped learning mediates the effects of blended learning, underscoring that blended learning pedagogies are delivery mechanisms that do not influence learning. Furthermore, the engagement stimulated by flipped learning pedagogy is inherently satisfying to students independent of their perceptions of performance. These findings contribute to closing the gap between what we believe and what we confirm with respect to flipped learning pedagogies, and provide additional evidence that the financial, cultural and individual investment by education institutions in flipped learning pedagogies will lead to the outcomes sought.

Keywords

Flipped learning, blended learning, student satisfaction, student performance, student engagement.

Flipped and blended learning

Students today need an education that equips them for the unknown, yet increasingly digitally focused jobs of the near future (World Economic Forum, 2016). The universities that prepare them for this near future face increasing pressures to stay competitive by delivering higher quality learning experiences and outcomes to students (Garrison and Kanuka, 2004; O'Flaherty and Phillips, 2015) which are frequently measured through student engagement, performance and satisfaction. However, traditional learning pedagogies sit uncomfortably with the connected and digital world of our students and are increasingly criticised for failing to: i) engage students, ii) contribute to good learning outcomes, and iii) contribute to student satisfaction (Garrison and Kanuka, 2004; Monash University, 2016; O'Flaherty and Phillips, 2015; Pye et al., 2015). To address the challenges faced by both universities and students flipped and blended learning are increasingly implemented (O'Flaherty and Phillips, 2015; Yarbro et al., 2014). It is the perceived relationship between the pedagogies that characterise flipped and blended learning, and the desired outcomes of improved student engagement and satisfaction, that is thought to positively influence retention and new enrolments (Burke and Fedorek, 2017; Garrison and Kanuka, 2004; O'Flaherty and Phillips 2015).

In part seen as a panacea for the disengaged learner, as a student centred pedagogy the well flipped classroom is thought to contribute to deeper, richer learning leading in turn to the development of lifelong learning skills (O'Flaherty and Phillips, 2015). Flipped learning splits the achievement of learning objectives between those that are lower order (such as remembering and understanding) and can be achieved through at-home preparation, and those that are higher order (such as analysing and evaluating) which are better achieved through in-class interaction with others including the teacher. Blended learning refers to the combination of learning methods (Yuping et al., 2015) through the incorporation of digital technology into teaching practice and lies on a continuum between fully online and fully face to face courses (Allen and Seaman, 2006; Garrison and Kanuka, 2004). Increasingly scholars see flipped learning as a form of blended learning because it combines teaching modalities including digital technologies (Garrison and Kanuka, 2004) to transfer direct instruction of students from the group into the individual learning space (Yarbro et al., 2014).

Blended learning

Blended learning is a contentious catchall term for a heterogeneous and developing area of design and inquiry (Halverson et al., 2014) which focuses on the relationships between learning modalities (Bliuc et al., 2007). Often accepted as the "...the thoughtful integration of classroom face-to-face learning experiences with online learning experiences..." (Garrison and Kanuka, 2004, pg 96), blended learning is a form of pedagogy rather than of learning (see Bliuc et al., 2007 for a review) in which pedagogy not technology should drive the educator's decision making (JISC 2009). Following Yuping et al. (2015) we accept blended learning to be an adaptive, dynamic, self-organising, co-evolving complex system that seamlessly fuses face to face with technology-mediated learning.

Blended learning is attractive to institutions and has untapped potential (Yuping et al., 2015), but some students have expressed concerns with the design of courses that blend online with in-class delivery (Bruff et al., 2013). Furthermore, the adoption by students of the technology that delivers blended learning, typically the Learning Management System (LMS), is variable (Henderson et al., 2015), and there is evidence that it is student achievement levels that influence satisfaction with blended learning (Owston et al., 2013). Blended learning is said to be an important predictor of academic success, satisfaction and retention rates (Pye et al., 2015). These conflicting research results about the value of blended learning to students underscore the importance of continued research into this.

Flipped learning

Flipped learning is a "pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive

learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (Yarbro et al., 2014 pg 5). Thus, prior to attending class, students individually engage with content materials often via pre-recorded lectures, prescribed readings, study guides, interactive videos, simulations and cases, and in class pedagogies such as interactive engagement, just-in-time teaching, and peer instruction (Berrett, 2012). They then build on the prepared learning to construct knowledge using (for example) presentations, discussions, roles plays, and debates (Abeysekera and Dawson, 2015; O'Flaherty and Phillips, 2015; Sohrabi and Iraj, 2016).

The use of digital technology, both inside and outside the classroom, is a common feature of the flipped class (O'Flaherty and Phillips, 2015). Used to deliver content, technology can increase the class time available for in-class discussions and other active learning (Garrison and Kanuka, 2004). However, completion of the preparatory work is critical for the flipped class to succeed and the challenge of encouraging student preparation is an acknowledged problem (Masika and Jones, 2016; Pye et al., 2015; Yearwood et al., 2016). As educators we see, and the literature supports, our observations, that many students will not engage with the preparatory work necessary for a subsequent class (Michaelson, 2008; Yearwood et al., 2016) making the use of external motivators common practice in flipped learning (Bowen, 2006).

Research into flipped learning generates mixed results. It is understood to contribute to increased student engagement, satisfaction and learning outcomes (Hung, 2015; Mason et al., 2013; O'Flaherty and Phillips, 2015; Schultz et al., 2014), and to positive feelings about, or preference for, flipped learning (Brooks, 2014; Sohrabi and Iraj, 2016). Flipped learning's reliance on and development of autonomy, relatedness and competence is believed to provide students with increased motivation (Abeysekera and Dawson, 2015) and self-efficacy (Enfield, 2013). In combination with other learning strategies, flipped learning contributes to the instillation of deep content knowledge and critical thinking skills (Capaldi, 2015; Kong, 2014), and improved attendance and study effort (Chen et al., 2014). However, there is limited understanding of which type of learning activity benefits students or why they benefit from flipped learning (Chen et al., 2014; Nouri, 2016; Wasserman et al., 2015). Some studies report student resistance to the uptake of flipped learning (Burke and Fedorek, 2017; Herreid and Schiller, 2013) and lack of satisfaction with the pedagogy (Missildine et al., 2013) despite evidence of reduced cognitive load and higher achievement levels for students taught using the flipped classroom model (Turan and Goktas, 2016).

The rise in flipped learning in higher education institutions is driven by the interest in adopting and utilising effective and efficient pedagogies in the classroom. The potential of flipped and blended learning to drive positive student experiences and therefore ultimately student satisfaction, retention and enrolment numbers (Chong and Ahmed, 2015; Garrison and Kanuka, 2004; Pye et al., 2015) represents a holy grail worth pursuing in this era of fierce and potentially disruptive competition in the tertiary sector. However, scoping reviews of both the blended and flipped learning literature highlight the relative newness of these concepts with research demonstrating diverse definitions and models, and limited empirical evidence in support of the efficacy of these pedagogies (Abeysekera and Dawson, 2015; DeSantis, et al., 2015; Halverson et al., 2014; O'Flaherty and Phillips, 2015; Yuping, et al., 2015). Performance and satisfaction drive desirable consequences for both students and universities (Chong and Ahmed, 2015). Students satisfied with their performance and experience of university are likely to be more self-determined, recommend that university to others, remain with their studies and engage in additional higher education study (Chong and Ahmed, 2015; Douglas et al., 2014). However, flipped learning is associated with challenges to and mixed responses from students (Fisher et al., 2017) in contrast to the seeming acceptance of blended learning (Yuping et al., 2015). Therefore, demonstrating the link between flipped and blended learning and good learning outcomes is important as it will add to our knowledge about the effectiveness of nascent pedagogies.

Thus, a gap exists between what we believe, and what we know, of the contribution of flipped and blended learning to desirable student outcomes. Our research asks the question: does the combination of flipped and blended learning positively influence student engagement, performance and satisfaction? It is important to confirm if these benefits exist as the implementation of both flipped and blended learning represent significant shifts in pedagogy and technology platforms with consequent implications for financial, cultural and individual investment.

The relationship between engagement, performance, satisfaction, and flipped and blended learning

Engagement. Student engagement is a multidimensional construct influenced by the interplay of a complex array of influences and factors (Hagel et al., 2012; Kahu, 2013). Student engagement appears to be a cornerstone construct for delivering quality higher education and related to academic success (Kahu, 2013), favourable educational outcomes (Yearwood et al., 2016) and student satisfaction (Pye et al., 2015). Whichever delivery mode is used (face-to-face, blended or virtual) student engagement is characterised or nurtured by: enthusiasm, interest, belonging (Cramp and Lamond, 2016; Kahu, 2013; Masika and Jones, 2016), deep learning (Kahu, 2013; O'Flaherty and Phillips, 2015), self-regulation, time and effort invested in studying, interaction and participation (Cavanagh, 2011; Kahu, 2013; Pye et al., 2015; Zepke and Leach, 2010), feelings of autonomy, and choice and control (Hagel et al., 2012; Kahu, 2013; Zepke and Leach, 2010). Thus, we accept student engagement to be a multidimensional construct that comprises these characteristics.

Intensive and strategic engagement with LMS materials prior to class is characteristic of students who perform well in a flipped class (Jovanovich et al., 2017). Therefore, the benefits that blended activities within the class provide students, should be of importance to them and influence their perceptions of engagement with the subject. However, there is little direct research into the relationship between learner engagement and blended learning (Halverson et al., 2014). Thus,

H1. Student perceptions of the benefits of blended learning activities positively influence their engagement with flipped learning.

Performance. The performance of students in a subject indicates the extent to which they gained and applied the knowledge and skills to achieve the subject's learning outcomes as indicated by their grades. There is evidence across several studies that students perform better on average in blended learning contexts (see Means et al., 2010) and a strong relationship has been found between positive perceptions of blended learning and grades (Owston et al., 2013). Therefore:

H2. Student perceptions of the benefits of blended learning positively influence perceptions of their performance.

Equally, flipped learning contexts have demonstrated some students experience better results than traditional classroom learning contexts (O'Flaherty and Phillips, 2015; Wasserman et al., 2015); whilst Jovanovich et al. (2017) find better results depend on the learning strategy adopted by the student. Therefore,

H3. Student perceptions of their engagement with flipped learning positively influence perceptions of their performance.

Satisfaction. Satisfaction is generally understood to be the extent to which students have enjoyed their studies (Bedggood and Donovan, 2012) and is the product of factors including engagement and skills development. Satisfaction with their learning is used to evaluate and assess the effectiveness of that learning, including for both blended (Arbaugh, 2014; Rahman et al., 2015) and flipped learning modalities (see O'Flaherty and Phillips, 2015 for a review). Students who feel good about their academic results perceive satisfaction with their academic experience, and key satisfiers for university students include experiencing a sense of achievement with what they have learned (Douglas et al., 2012). As performance in a subject is judged by the marks gained on assessment items measuring achievement of learning outcomes, a student's perception of their achievement of learning outcomes will influence their satisfaction. Thus:

H4. Students' perceptions of their performance positively influence their overall satisfaction.

Furthermore, as above, student engagement with the blended delivery method has been found to enhance satisfaction. Thus:

H5. Student perceptions of their engagement with flipped learning positively influence their overall satisfaction with flipped and blended classes.

And lastly, evidence has been presented that student perception of the benefits of the blended learning environment also influences their overall satisfaction. Thus:

H6. Student perceptions of the benefits of blended learning positively influence their overall satisfaction with flipped and blended classes.

We present a conceptual model in which blended learning partially mediates performance through engagement in flipped learning, and how students perceive their performance in a subject influences their perceptions of overall satisfaction with a subject (see Figure 1).

<<Insert figure 1 here>>

Methods

The study uses a questionnaire to seek student perceptions of their engagement, performance and satisfaction as a consequence of participating in the flipped and blended activities of this subject.

Context

Over four semesters, 714 students from Swinburne University of Technology, Melbourne Australia, were invited to participate in a quantitative survey probing student perceptions of engagement, satisfaction and learning outcomes arising from their experience of this 3rd year flipped and blended subject. The subject used digital technologies to blend asynchronous online materials and tasks with face to face workshops designed to build upon that knowledge. Direct submission of group work during class time was captured using the LMS; feedback to students was delivered via rubrics viewed in the LMS and the My Grades function. This 36-hour class was conducted as seven 3-hour face to face workshops (assessment value 35%) and seven online tutorial modules (assessment value 40%). Fifteen of the 36 hours were allocated to students to complete the online tutorial modules, in addition to students' own private study time. Feedback indicates tutorial modules took between four to eight hours to complete. Tutorial module tasks included several of the following: journal article or video and response; quiz; reflection; student-sourced media article and response. Workshop tasks built on the theme of the tutorial modules and used group work to complete quizzes, discussions, and written responses.

As the preparatory tutorial modules (40%) and in-class activities (25% of 35% workshops assessment) were submitted and assessed on a continuous basis, at the time of completing the survey instrument students had access to the majority of their grades for these components giving them a strong indicator of their objective performance to date.

Participants

Sixteen participants volunteered for the pilot study and a further 364 participated in the research providing 348 usable responses (49% response rate). Data was collected on the last day of classes held in semester 2, 2014, Semester 1 and 2, 2015, and Semester 1 and 2, 2016.

Of the respondents the majority were: male (53.5%); aged between 18-23 years of age (72.3%); third year students (66%); majored in accounting, followed by business, marketing, human resources management, international business, and other areas of specialisation. At the time of completing the survey, 51.7% perceived their marks to date at 70/100 or higher.

Survey instrument and measures

Overall satisfaction. A global indicator to capture the student's perception of their satisfaction with the subject ("Overall, CLASS X was a satisfying learning experience for me"), measured on a 5 point scale (M=3.55, SD = 1.46).

Control variables. Age, gender, current year of study, and perception of marks to date were included. Gender was collected as a dichotomous variable, and the remaining as interval scales that were dichotomised around the median as the cut-off point.

New constructs. Three constructs are proposed that require the development of scales to operationalise them. These constructs capture the student's perception of: 1) the benefits of the blended learning activities; 2) their engagement with flipped learning; and 3) their performance against learning objectives. These constructs are necessary in order to capture and measure the perceived experience of participants with respect to underlying assumptions about the effectiveness of flipped and blended learning. The scale development process included the identification and development of constructs, unambiguous selection and identification of items that capture the nature of the construct, separation of construct items within the instrument, pilot testing and administration of the measure (Kline, 1993; Saunders et al., 2007; Spector, 1992). All scale items were reviewed by academics involved in this project (n=6), and subsequently tested in a pilot study (n=16). Minor revisions were made to layout, grammar, and removal of one redundant item.

Factor analysis

Exploratory factor analysis (EFA) was used to identify dimensionality and alignment of survey items, and confirmatory factor analysis (CFA) to validate the scales. The sample was randomly split with 63 observations capturing 20% of the sample for EFA, and the remaining 285 observations for CFA (Hair et al., 2006). Reliability is confirmed where Cronbach's $\alpha > 0.70$.

Engagement with flipped learning scale (EFL). Scale items were derived from literature articulating the components of student engagement (see Table 1).

<<Insert Table 1 here>>

A seven-item factor emerged from EFA explaining 48.24% of the total variance, and sufficient loadings to suggest the underlying factors (see Table 2a).

<<Insert Table 2a here>>

After CFA analysis and evaluation of modification indices, two items (Q4 and Q6) were removed to improve convergent validity. The remaining five items demonstrated a good model fit: $\chi 2(5) = 9.90$, p = .08, Bollen-Stine p = .13, SRMR = .02, RMSEA = .06 [.00, .11], TLI = .99, CFI = .99. Factor loadings are significant at $p < 0.001$, Cronbach's $\alpha = 0.88$. Items removed from the final CFA (Table 2b) address individual student conduct; whilst retained items measure students' learning experience in terms of engagement, experience, motivation, effectiveness and efficiency.

<<Insert Table 2b here>>

Perceived performance scale (PPERF). The learning outcomes for this subject were adapted to become indicators for the PPERF scale (see Table 3). EFA resulted in one factor explaining 60.25% of the variance, and CFA confirmed the measurement model. Factor loadings are significant at $p < 0.001$, Cronbach's $\alpha = 0.83$ (see Table 4).

<<Insert Table 3 & 4here>>

<<Insert Table 4 here>>

Blended learning benefits scale (BLB). Twelve scale items (see Table 5) were developed to test student perceptions of the benefit to them of activities that make tangible the blended learning system of this subject. One indicator (Q5) was eliminated during EFA, due to insufficient loading to any factor, resulting in a two-factor solution explaining 45.65% of the variance (see Table 6). Factor 1 relates to the personal convenience of the on-line method to deliver materials and submit responses, and factor 2 the efficient use of time in the context of on-line learning and on-campus presence.

<<Insert Table 5 here>>

<<Insert Table 6a here>>

CFA resulted in removal of indicators demonstrating low factor loadings (Q2, Q6, Q9), improving model fit: $\chi 2(16) = 32.20$, $p = .00$, Bollen-Stine $p = .06$, SRMR = .04, RMSEA = .06, TLI = .96, CFI = .97. Factor loadings are significant at $p < 0.001$, Cronbach's $\alpha = 0.78$ (personal convenience), 0.70 (time efficiency).

<<Insert Table 6b here>>

Path model analysis

To test the hypotheses proposed, a path model was constructed, reflecting the conceptual model displayed in Figure 1. Scale scores were calculated as simple means of the indicator values (Hair et al., 2006), and average indicator scores used for evaluation of the path model.

First, a full path model including overall satisfaction (OSAT) and all control variables was examined. The results provided poor fit, and none of the control variables were significant. The model was re-estimated excluding control variables resulting in a good fit: $\chi 2(2) = 6.96$, $p=.03$, Bollen-Stine $p = .12$, SRMR = .02, RMSEA = .09, TLI = .97, CFI = .99) (see Figure 2).

<<Insert Figure 2 here>>

Results

Hypothesis 1 predicts the benefits of blended learning would positively influence student engagement with flipped learning. Thus, this hypothesis is supported (.84, $p<.001$).

Hypothesis 2 predicts that the benefits of blended learning will positively influence the students' perception of their performance. However, this hypothesis is not supported (.09, not significant) and we discuss this finding below.

Hypothesis 3 predicts that engagement with flipped learning would positively influence perceptions of performance, and this is supported (.57, $p<.001$).

Hypothesis 4 predicts that students' perception of their performance will positively influence their overall satisfaction. In this subject the positive, not negative, sign for this result suggests students believed themselves to be doing well in the subject (.22, $p<.001$). This is consistent with the control variable that asked students to indicate their understanding of their grade at time of completing the survey. 51.7% students across the 4 semesters believed their marks to be 70/100 or higher.

Hypothesis 5 predicts that perceptions of engagement with flipped learning will positively influence overall satisfaction, and this is supported (.40, $p<.001$).

Hypothesis 6 is supported (.29, p<.01). That is, student perceptions of the benefits of blended learning will positively influence their overall satisfaction.

<<Insert Table 7 here>>

There are significant and positive direct relationships between blended learning benefits (BLB), engagement with flipped learning (EFL), perceived performance (PPERF) and overall satisfaction (OSAT). Furthermore, the results suggest the presence of mediation effects, demonstrating the importance of recognising the joint impact of the independent variables (BLB, EFL, PPERF) on the dependent (OSAT) variable.

It can be established that the non significant result between blended learning benefits and perceived performance indicates there is no explanatory relationship between blended learning and overall satisfaction. Blended learning benefits do not contribute to perceptions of performance (ie achieving learning outcomes), and thus the impact of the blended system on overall satisfaction is *not* through perceptions of performance. Whilst blended learning benefits (personal convenience and time efficiency) explain 70% of variance in student perceptions of engagement with flipped learning, engagement with flipped learning explains only 42% of the variance in perceived performance. The lack of significant direct relationship between student perceptions of the benefits of a blended learning system and attainment of learning outcomes (perceived performance) implies that students only perceive they achieve the learning outcomes for the subject because they are engaged in flipped learning and not because of the benefits of the blended system. This result is contrary to our expectations and is further elaborated upon below.

The path model analysed (see Figure 2) displays a strong model fit thus demonstrating that a) blended learning benefits, b) engagement with flipped learning and c) perceived performance explain 67% of variance in the overall satisfaction experienced by students in this flipped and blended class. That is, 33% of the overall satisfaction is due to other variables not specified in this research. This is a strong result. For comparison prior studies seeking to explore factors driving student satisfaction explain 42-56% of the variance (Diep, Zhu, Struyven and Blieck, 2017; Ke and Kwak, 2013), demonstrating the contribution of this model to the body of knowledge, further elaborated on, in the following section.

Discussion and conclusion

The potential of flipped and blended learning strategies to deliver cost effective education for both the student and institution makes them of considerable interest. Consistent with the results of other research, we find that blended and flipped learning contribute to perceptions of student engagement, performance and satisfaction.

However, in this research it is flipped learning that mediates the effects of blended learning on performance (ie the achievement of learning outcomes). The lack of a significant relationship between blended learning and perceived performance underscores that the term blended *learning* maybe a misnomer. Learning refers to the acquisition of knowledge which is indicated by the achievement of learning outcomes or performance. At the core of our accepted definition of blended learning (see Yuping et al., 2015) is a system, a complex whole that includes seamlessly fused face to face and technology-mediated elements. The system necessarily organises or delivers the presentation or receipt of its elements for the purposes of learning, but does not necessarily influence the acquisition of knowledge on the part of the learner. In this research, the factors that emerged as conceputalsing blended learning suggest to us that, from the perspective of students in this class, blended learning is associated with time efficiency and personal convience. Therefore we suggest blended learning is akin to a hygiene factor (Herzberg, 2008); something that can be problematic if not appropriately designed and utilised, but when appropriately designed and utilised does not necessarily lead to the desired state (ie acquisition of knowledge or learning). Thus, time efficiency and personal convenience influence perceptions of satisfaction, but not perceptions that learning objectives have been achieved.

Being engaged emerges as important in explaining the performance and satisfaction of students. Thus, our results support the literature that finds a well flipped class is engaging and can improve learning

(performance) which in turn leads to satisfaction (Fritz, 2013; Hung, 2015; Mason et al., 2013; O'Flaherty and Phillips 2015; Schultz et al., 2014).

Additionally, it emerged that engagement with flipped learning is directly linked to student satisfaction independent of performance, suggesting that the characteristics of flipped learning are appreciated by students as a form of teaching and learning *independent* of how it impacts their performance. This direct relationship between flipped learning and satisfaction is likely due to the active learning environment of the flipped class (Burke and Fedorek, 2017). The indicators in the scale developed to capture the flipped learning construct articulate *how* flipped learning engages students (by engaging and motivating them, providing an enjoyable learning experience, helping them achieve a good understanding of materials, and putting them in control of their learning). These indicators also suggest *why* it is that students perceive themselves as having acquired the knowledge and skills of a subject as articulated by the learning outcomes. That is, the good feelings and affect engendered by the experience of the flipped class contribute to their students feelings of self-efficacy. Thus, students believe in their ability to achieve the complex learning outcomes that comprised the performance indicators, even whilst the achievement of these can really only be tested by the passage of time.

The limitations to this research offer further avenues for research. The scales developed should be verified by correlation with similar scales, and practical validity established through further empirical studies. The participants in this study were from only one discipline (business and management), from only one university, in only one country. Accordingly, the results should be read with caution and may not be generalisable. As results from any study are always context dependent, future work is needed to look at flipped and blended learning in other disciplines, with students at different/other levels (for example, postgraduates or those in their first year of undergraduate studies) and those from other cultures/countries. Additionally, studies that incorporate objective measures of performance could shed interesting insights as student perceptions of their own performance can be flawed. These results offer opportunities for further research, particularly to examine if flipped and blended learning positively impact good student outcomes only in conjunction with one another, or if they do so independent of each other. Additionally, further research could test if or how the individual flipped activities influence student performance.

Overall, the results statistically demonstrate that blended and flipped learning do contribute to student perceptions of engagement, performance and satisfaction, and that being engaged with flipped learning contributes directly to feelings of satisfaction even without perceptions of improved performance. Given the implied relationship between performance, satisfaction and student retention, these positive results and can be used by university decision makers and government funding agencies to defend investment in up-skilling the academic workforce in blended and flipped learning philosophy and pedagogies. Furthermore, whilst designing and implementing such pedagogies requires a large investment on the part of educators, these results clearly underscore the value of so doing for our students.

References

Abeysekera L and Dawson P (2015) Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. *Higher Education Research and Development* 34(1):1-14.

Allen IE and Seaman J (2006) *Making the Grade: Online Education in the United States*. Needham, MA: Sloan Consortium.

Arbaugh JB (2014) System, scholar or students? Which most influences online MBA course effectiveness? *Journal of Computer Assisted Learning* 30(4):349-362.

Bedggood R and Donovan J (2012) University performance evaluations: What are we really measuring? *Studies in Higher Education* 37(7):825-842.

Berrett D (2012) How "flipping" the classroom can improve the traditional lecture. *The Chronicle of Higher Education*, 24 February 2012. Available at: http://chronicle.com/article/How-Flipping-the-Classroom/130857.

Bersin J (2004) *The Blended Learning Book: Best Practices, Proven Methodologies and Lessons Learned*. New York: Wiley and Sons.

Bliuc, A-M, Goodyear P and Ellis RA (2007) Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *Internet and Higher Education* 10(4): 231-244.
Bowen J (2006) Teaching naked: Why removing technology from your classroom will improve student learning. *The National Teaching and Learning Forum* 16(1): 1-15.
Brooks AW (2014) Information literacy and the flipped classroom: Examining the impact of a one-shot flipped class on student learning and perceptions. *Communications in Information Literacy* 8(2): 225-235.
Bruff DO, Fisher DH, McEwen KE and Smith BE (2013) Wrapping a MOOC: Student perceptions of an experiment in blended learning. *Journal of Online Learning and Teaching* 9(2): 187-199.
Burke AS and Fedorek B (2017) Does "flipping" promote engagement? A comparison of a traditional, online and flipped class. *Active Learning in Higher Education* 18(1):11-24.
Capaldi M (2015) Including inquiry-based learning in a flipped class. *PRIMUS* 25(8): 736-744.
Cavanagh M (2011) Students' experiences of active engagement through cooperative learning activities in lectures. *Active Learning in Higher Education* 12(1): 23-33.
Chen Y, Wang Y, Kinshuk and Chen NS (2014) Is FLIP enough? Or should we use the FLIPPED model instead? *Computers and Education* 79: 16-27.
Chong YS and Ahmed PK (2015) Student motivation and the 'feel good' factor: An empirical examination of motivational predictors of university service quality evaluation. *Studies in Higher Education* 40(1): 158-177.
Cramp A and Lamond C (2016) Engagement and kindness in digitally mediated learning with teachers. *Teaching in Higher Education* 21(1): 1-12.
DeLozier SJ and Rhodes MG (2017) Flipped classrooms: A review of key ideas and recommendations for practice. *Educational Psychology Review* 29(1): 141-151.
DeSantis J, Van Curen R, Putsch J and Metzger J (2015) Do students learn more from a flip? An exploration of the efficacy of flipped and traditional lessons. *Journal of Interactive Learning Research* 26(1): 39-63.
Diep A-N, Zhu C, Struyven K and Blieck Y (2017) Who or what contributes to student satisfaction in different blended learning modalities? *British Journal of Educational Technology* 48 (2): 473-489.
Douglas JA, Douglas A, McClelland RJ and Davies J (2014) Understanding student satisfaction and dissatisfaction: An interpretive study in the UK higher education context. *Studies in Higher Education* 40(2): 329-349.
Douglas JA, Thomson G and Zhao CM (2012) The learning outcomes race: The value of self-reported gains in large research universities. *Higher Education* 64(3): 317-335.
Enfield J (2013) Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN. *TechTrends* 57(6): 14-27.
Fisher R, Ross B, Laferriere R, and Maritz A (2017) Flipped learning, flipped satisfaction, getting the balance right. *Teaching and Learning Inquiry* 5(2): 114-127.
Fritz J (2013) Using analytics at UMBC: Encouraging student responsibility and identifying effective course designs. *EDUCASE Research Bulletin*. Maryland: University of Maryland.
Fritz, J (2016) LMS course design as learning analytics variable. *6th International Conference on Learning Analytics and Knowledge*, Edinburgh, UK, 25-29 April 2016.
Garrison DR and Kanuka H (2004) Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education* 7(2): 95-105.
Hagel P, Carr R and Devlin M (2012) Conceptualising and measuring student engagement through the Australasian survey of student engagement (AUSSE). *Assessment and Evaluation in Higher Education* 37(4): 475-486.
Hair JF, Black WC, Babin BJ, Anderson RE and Tatham RL (2006) *Multivariate Data Analysis*, 6th ed. New Jersey: Pearson Education International.
Halverson L R, Graham CR, Spring KA, Drysdale JS and Henrie CR (2014) A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *The Internet and Higher Education* 20: 20-34.
Henderson M, Selwyn N, and Aston R (2017) What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education* 42(8): 1567-1579.
Herreid C F and Schiller NA (2013) Case studies and the flipped classroom. *Journal of College Science Teaching* 42(5): 62-67.

Herzberg F (2008) *One More Time: How Do You Motivate Employees?* Boston, Harvard Business Press.
Hung HT (2015) Flipping the classroom for English language learners to foster active learning. *Computer Assisted Language Learning* 28(1): 81-96.
Jovanovic J, Gasevic D, Dawson S, Pardo A and Mirriahi N (2017) Learning analytics to unveil learning strategies in a flipped classroom. *Internet and Higher Education* 33: 74-85.
JISC (2009) *Effective Practice in a Digital Age: A Guide to Technology Enhanced Learning and Teaching*. Bristol, UK, University of Bristol.
Jordan P (2015) Time to digitalise. *Teaching Business and Economics* 19(2): 21-24.
Kahu E (2013) Framing student engagement in higher education. *Studies in Higher Education* 38(5): 758-773.
Ke F and Kwak D (2013) Constructs of student-centered online learning on learning satisfaction of a diverse online student body: A structural equation modeling approach. J*ournal of Educational Computing Research* 48 (1): 97-122.
Kline P (1993) *The Handbook of Psychological Testing*. London, Routledge.
Kong SC (2014) Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Computers and Education* 78 (September): 160-173.
Masika R and Jones J (2016) Building student belonging and engagement: Insights into higher education students' experiences of participating and learning together. *Teaching in Higher Education* 21(2): 138-150.
Mason G, Shuman T and Cook K (2013) Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course. *IEEE Transactions on Education* 56(4): 430-435.
Michaelson L (2008) First-day questions for the learner-centred classroom. *The National Teaching and Learning Forum* 17(5): 1-2.
Missildine K, Fountain R, Summers L and Gosselin K (2013) Flipping the classroom to improve student performance and satisfaction. *Journal of Nursing Education* 52(10): 597-599.
Monash University (2016) An inside look at how Monash university's blended learning transformation is improving student outcomes. *Blended Learning 2016*, 20-21 October 2016, Sydney.
Nouri J (2016) The flipped classroom: For active, effective and increased learning – especially for low achievers. *International Journal of Educational Technology in Higher Education* 13(1): 1-10.
O'Flaherty J and Phillips C (2015) The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education* 25 (April): 85-95.
Oliver M and Trigwell K (2005) Can 'blended learning' be redeemed? *E-Learning* 2(1): 17-26.
Owston R, York D and Murtha S (2013) Student perceptions and achievement in a university blended learning strategic initiative. *Internet and Higher Education* 18(July): 38-46.
Pye G, Holt D, Salzman S, Buellucci E and Lombardi L (2015) Engaging diverse student audiences in contemporary blended learning environments in Australian higher business education: Implications for design and practice. *Australasian Journal of Information Systems* 19:1-20.
Rahman, NAA, Hussein N and Aluwi AH (2015) Satisfaction on blended learning in a public higher education institution: What factors matter? *Procedia - Social and Behavioral Sciences* 211: 768-775.
Saunders M, Lewis P and Thornhill A (2007) *Research Methods for Business Students*. England: Pearson Education Limited.
Schultz D, Duffield S, Rasmussen SC and Wageman J (2014) Effects of the flipped classroom model on student performance for advanced placement high school chemistry students. *Journal of Chemical Education* 91(9): 1334-1339.
Slomanson WR (2014) Blended learning: A flipped classroom experiment. *Journal of Legal Education* 64(1): 93-102.
Sohrabi B and Iraj H (2016) Implementing flipped classroom using digital media: A comparison of two demographically different groups perceptions. *Computers in Human Behavior* 60(July): 514-524.
Spector P (1992) *Summated Rating Scale Construction: An Introduction.* Newbury Park, Sage Publications.
Turan Z and Goktas Y (2016) The flipped classroom: Instructional efficiency and impact of achievement and cognitive load levels. *Journal of e-Learning and Knowledge Society* 12(4): 51-62.
Wasserman NH, Quint C, Norris SA and Carr T (2015) Exploring flipped classroom instruction in calculus III. *International Journal of Science and Mathematics Education* 15(3): 1-24.

Yarbro J, Arfstrom KM, McKnight K and McKnight P (2014) *Extension of a Review of Flipped Learning*. Flipped Learning Network. Available at: https://flippedlearning.org/wp-content/uploads/2016/07/Extension-of-FLipped-Learning-LIt-Review-June-2014.pdf (accessed 12 February 2016).

Yearwood D, Cox R and Cassidy A (2016) Connection-engagement-empowerment: A course design model. *Transformative Dialogues: Teaching & Learning Journal* 8(3): 1-15.

Yuping W, Xibin H and Juan Y (2015) Revisiting the blended learning literature: Using a complex adaptive systems framework. *Journal of Educational Technology & Society* 18(2): 380-393.

Zahidi S, Ratcheva V and Leopold T (2016) *The Future of Jobs; Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Switzerland, Challenge Global Insight Report.

Zepke N and Leach L (2010) Improving student engagement: Ten proposals for action. *Active Learning in Higher Education* 11(3): 167-177.

Table 1: Engagement with flipped learning items

	Looking back over this semester the structure of CLASS X (online tutorial modules followed by a workshop) enabled me to:
Q1	Achieve a good understanding of course materials (O'Flaherty and Phillips 2015, Kahu 2013)
Q2	Be motivated to do the work (Kahu 2013, Salamonson, Andrew, and Everett 2009, Pye et al. 2015, Zepke and Leach 2010)
Q3	Be engaged with the subject (Salamonson, Andrew, and Everett 2009, Kahu 2013, Pye et al. 2015, Zepke and Leach 2010)
Q4	Get to know more students than I otherwise might in a subject (Kahu 2013, Masika and Jones 2016, Cramp and Lamond 2016)
Q5	Have an enjoyable learning experience (Kahu 2013, Masika and Jones 2016, Cramp and Lamond 2016)
Q6	Make better use of my study/learning time (Hagel, Carr, and Devlin 2012, Kahu 2013, Zepke and Leach 2010)
Q7	Put me in control of my learning (Hagel, Carr, and Devlin 2012, Kahu 2013, Zepke and Leach 2010)

Table 2a: Engagement with flipped learning EFA (n=63)

Item description	*Loading*
Q3 be engaged with the subject	0.86
Q5 have an enjoyable learning experience	0.78
Q2 be motivated to do the work of the unit	0.72
Q7 put me in control of my learning	0.69
Q6 make better use of my study/learning time	0.66
Q4 get to know more students than I otherwise might in a subject	0.56
Q1 achieve a good understanding of course materials	0.52

Table 2b: Engagement with flipped learning CFA (n=285)

Item description	*Loading*
Q3 be engaged with the subject	0.84*
Q2 be motivated to do the work of the unit	0.83*
Q5 have an enjoyable learning experience	0.76*
Q1 achieve a good understanding of course materials	0.74*
Q7 put me in control of my learning	0.72*

** significant at p<0.001*

Table 3: Perceived performance indicators

Learning Outcome: Students who successfully complete this Unit should be able to:	**Matched survey Question**: Having completed CLASS x I believe:
Define and integrate theoretical principles applicable to entrepreneurship and innovation and apply these to problems and opportunities that might arise in the business and/or social context.	Q3 I understand how entrepreneurship and innovation could be used to solve a range of problems that might arise in the business context
Systematically review and critically evaluate research from a range of sources in order to make informed judgements on options for using entrepreneurship and innovation in the business context to address problems, opportunities and/or commercialise solutions.	Q1 I could use entrepreneurship and innovation tools to generate commercialisation opportunities
Build on and continuously develop the intellectual independence to be critical and reflective learners, who are cognisant of the relevance of entrepreneurship and innovation to their business discipline.	Q2 I can see the relevance of entrepreneurship and innovation to my business discipline

Table 4: Perceived performance EFA (n=63) and CFA (n=285)

Item description	*EFA (n=63) Loading*	*CFA (n=285)*
Q1 I could use entrepreneurship and innovation tools to generate commercialisation opportunities	0.85	0.78*
Q2 I can see the relevance of entrepreneurship and innovation to my business discipline	0.74	0.82*
Q3 I understand how entrepreneurship and innovation could be used to solve a range of problems that might arise in the business context	0.73	0.79*

** significant at p<0.001*

Table 5: Blended Learning Benefits items

The self-paced, online tutorial modules:	
Q1	Were easy to use
Q2	Enabled me to make better use of my study/learning time
Q3	Put me in control of my learning
Q4	Enabled me to work at times that I found convenient
Q5	Prepared me to participate in the workshops
Having completed CLASS X I believe:	
Q6	Completing online self-paced tutorial modules is preferable to attending weekly face to face tutorials
Q7	A 3 hour workshop 6 times a semester is preferable to attending weekly lectures

In general:	
Q8	I regularly monitored the marks I received for Tutorial Modules to see how I was going with this assessment item
Q9	I liked using electronic devices (eg computers, laptops, tablets, mobile phones) to carry out the work of this subject
Q10	Reducing my environmental footprint is important to me
Q11	Reducing the time I spend travelling to and from university is important to me
Q12	Reducing the time I spend on campus is important to me

Table 6a: Blended Learning Benefits EFA (n=63)

Item description	*PCON*	*TIMEFF*
Q1 Were easy to use	0.881	
Q3 Put me in control of my learning	0.841	
Q2 Enabled me to make better use of my study/learning time	0.751	
Q8 I regularly monitored the marks I received for TM to see how I was going with this assessment item	0.696	
Q4 Enabled me to work at times that I found convenient	0.547	
Q9 I liked using electronic devices (eg computers, laptops, tables, mobiles phones) to carry out the work of this subject	0.511	
Q10 Reducing my environment footprint is important to me	0.452	
Q12 Reducing the time I spend on campus is important to me	0.439	
Q6 Completing online self-paced tutorials modules is preferable to attending weekly face to face tutorials		0.764
Q7 A 3 hour workshop 6 times a semester is preferable to attending weekly lectures		0.617
Q11 Reducing the time I spend travelling to and from university is important to me		0.492

PCON: Personal Convenience; TIMEFF: Time Efficiency

Table 6b: Blended Learning Benefits EFA (n=285)

Item description	*PCON*	*TIMEFF*
Q1 Were easy to use	0.65	
Q3 Put me in control of my learning	0.65	
Q8 I regularly monitored the marks I received for TM to see how I was going with this assessment item	0.47	
Q10 Reducing my environment footprint is important to me	0.72	
Q12 Reducing the time I spend on campus is important to me	0.60	
Q6 Completing online self-paced tutorials modules is preferable to attending weekly face to face tutorials		0.78
Q7 A 3 hour workshop 6 times a semester is preferable to attending weekly lectures		0.73
Q11 Reducing the time I spend travelling to and from university is important to me		0.47

PCON: Personal Convenience; TIMEFF: Time Efficiency

Table 7. Hypothesis testing results

Hypothesis	Standardised Model Path	Estimate	P	Result
H1	BLB --->FLE	0.835	***	Supported
H2	BLB --->PPERF	0.092	0.418	Rejected
H3	FLE --->PPERF	0.570	***	Supported
H4	PPERF --->OSAT	0.219	***	Supported
H5	FLE --->OSAT	0.397	***	Supported
H6	BLB --->OSAT	0.295	**	Supported

*n=285. ** p<0.01; *** p<0.001*

Figure 1 Conceptual Framework

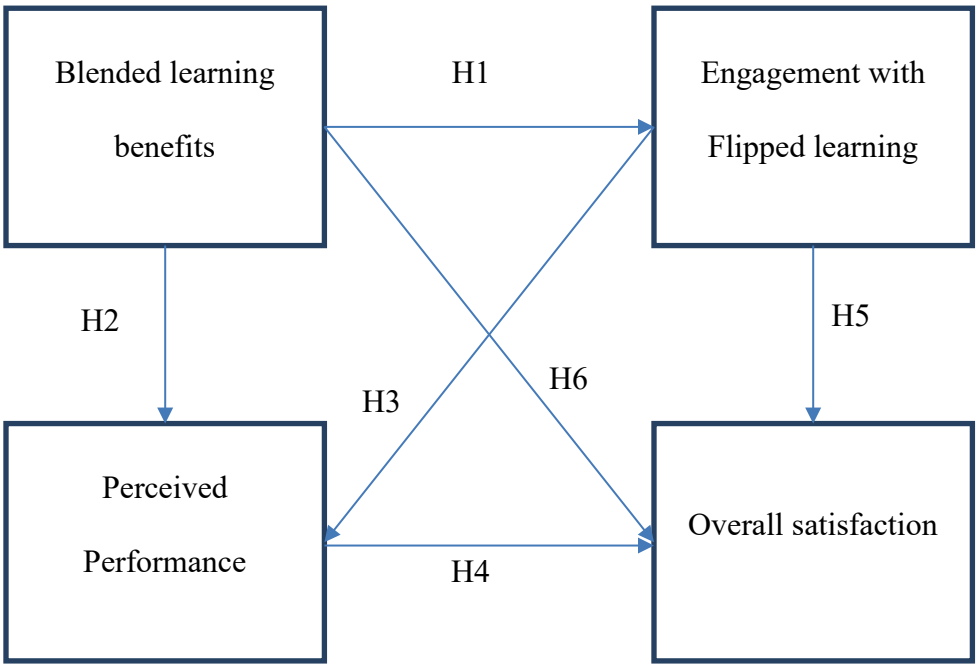
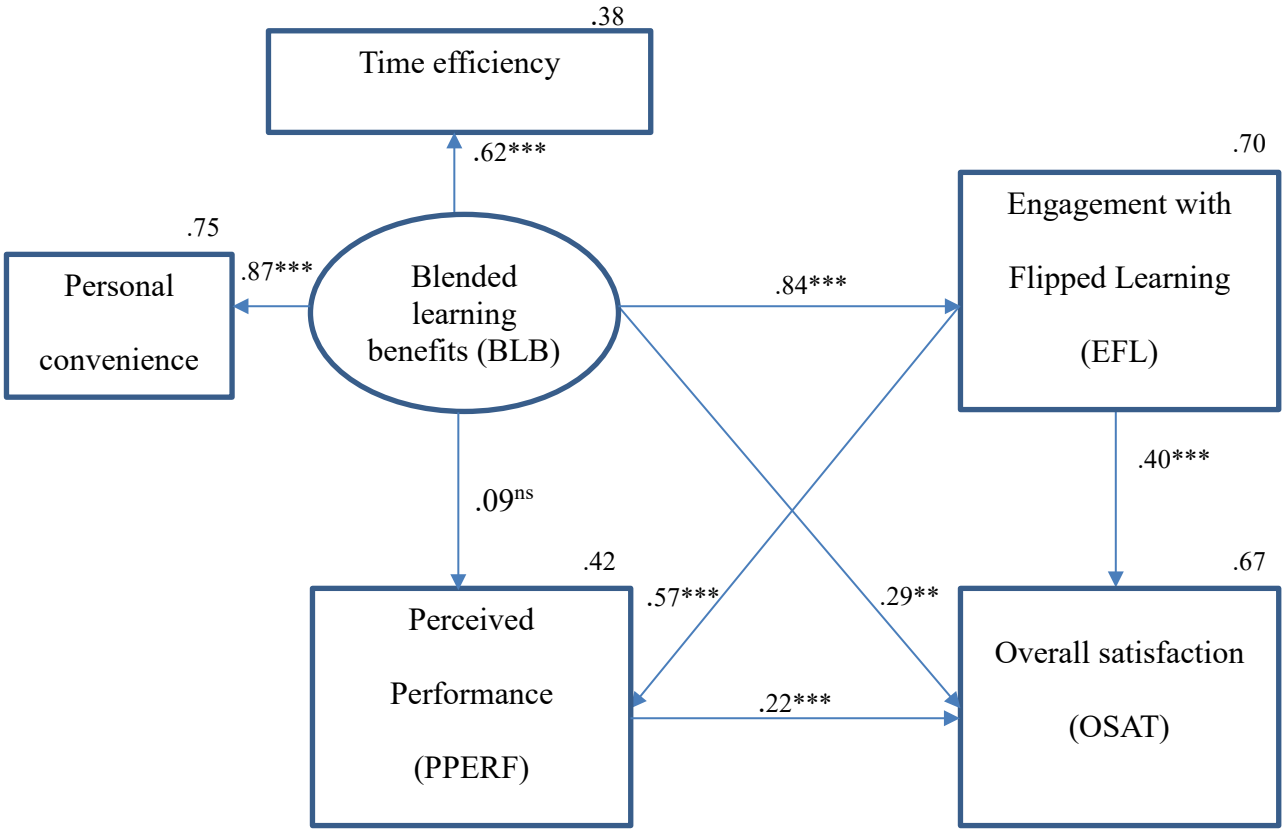


Figure 2: Path Model Results



** significant at p < 0.01
*** significant at p < 0.001
ns - not significant