Student perceptions and achievement in a university blended learning strategic initiative ☆

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ABSTRACT

Examined in this study is the relationship between student perceptions in blended learning courses and their in-course achievement. The research was conducted at a large urban university that embarked on a major initiative to scale-up blended learning across its campus. Student perceptions ($N = 577$) were assessed in four areas deemed important to the university: overall satisfaction with blended learning, convenience afforded by blended learning, sense of engagement in their blended course, and views on learning outcomes. Final course grade was the dependent variable and cumulative grade point average was the covariate in an ANCOVA design. A remarkably strong relationship was found between perceptions and grades. Compared with low achieving students, high achievers were the most satisfied with their blended course, would take one again, and preferred the blended format more over fully face-to-face or online. High achievers also found blended courses more convenient, more engaging, and they felt that they learn key course concepts better than in other traditional face-to-face courses they have taken. An implication of the study is that low achievers may not be able to cope with the blended environment as well their high achieving peers. Therefore, when scaling up blended learning institutions may want to consider offering students a choice of whether to enroll in blended or fully face-to-face course sections where feasible, especially in subject areas that students find difficult.

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1. Introduction

Blended learning is an instructional approach that substitutes online learning for a portion of the traditional face-to-face instructional time. With few drawbacks it offers many advantages to institutions, faculty, and students. For example, institutions see it as a model that makes efficient use of classroom space; faculty benefit from increased flexibility in their teaching schedules; and students appear to be more satisfied and achieve higher grades than in either fully face-to-face or fully online classes (Cavanagh, 2011; Dziuban, Hartman, Juge, Moskal, & Sorg, 2006). Features such as these spurred a large urban university in Canada to embark on a strategic initiative to promote the adoption of blended learning across its campus. Described in this paper is a study undertaken during the first year of implementation of this initiative that examined the relationship between student perceptions of blended learning and course achievement.

2. Theoretical framework

The study is situated in the literature on student satisfaction studying in blended learning environments, their preferences for particular aspects of blended learning, and their achievement in blended courses. With regard to student satisfaction, there is an overwhelming body of research that demonstrates that students have greater satisfaction with blended courses, compared with both traditional face-to-face and fully online modes of education (Castle & McGuire, 2010; Collopy & Arnold, 2009; Farley, Jain, & Thomson, 2011; Martinez-Caro & Campuzano-Bolarin, 2011; Owston, Garrison, & Cook, 2006; Schuhmann & Skopek, 2009; Woltering, Herrler, Spitzer, & Spreckelsen, 2009). There are several key reasons why this is the case. First, because the delivery of blended learning relies on the mixture of face-to-face and online learning environments, students can benefit from increased time and spatial flexibility for their study, wider and easier access to learning resources, and a higher level of autonomy in regulating their learning (Ashton & Elliott, 2007; Battye & Carter, 2009; Collopy & Arnold, 2009; Poon, 2012; Reiss & Steffens, 2010). Given considerable latitude in managing their blended courses, students are able to fit their study around multiple commitments they are faced with in their real lives (e.g., commuting, juggling work with family obligations, and financial challenges) to achieve their educational goals. For instance, students report that they appreciate the opportunity to regulate their own study, such as work with course materials and pace their participation in online discussions

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(Lin & Wang, 2012; Mitchell & Honore, 2007; Poon, 2012; Smyth, Houghton, Cooney, & Casey, 2012).

The inclusion of face-to-face sessions within blended courses also provides students with an opportunity to communicate directly with faculty and, in case they need it, to receive immediate support and guidance (Castle & McGuire, 2010; Poon, 2012; Schuhmann & Skopek, 2009). Equally important, students feel that participation in face-to-face interactive activities helps them to engage with other students in the class and to develop close associations with each other (such as friendships) that are predicted to promote the development of a strong learning community outside of the classroom (Collopy & Arnold, 2009; Harris, Connolly, & Feeney, 2009; McCarthy, 2010; Smyth et al., 2012; Vaughan, 2007). Having continuous access to the instructor is perceived as an important factor in students' satisfaction with blended learning (Martinez-Caro & Campuzano-Bolarin, 2011). Some students report that they receive instructor feedback and their grades faster than in traditional courses (Korr, Derwin, Greene, & Sokoloff, 2012). Compared with fully online learning, students in blended courses are more satisfied with faculty interaction and feel better supported with instructional guidance during their study which results in the lower level of perceived instructional difficulty and a more manageable workload for their study (Lim, Morris, & Kupritz, 2006; Schuhmann & Skopek, 2009). In addition, the quality of teaching assistants was rated significantly better by the students in blended courses compared with the traditional face-to-face learning environment (Woltering et al., 2009).

Additionally, students believe that having a connection between face-to-face and online learning environments in the blended courses enables them to receive knowledge and feedback from multiple sources, to relate to the subject matter of the course, and to gain confidence in applying acquired knowledge into practice (Bliuc, Ellis, Goodyear, & Piggott, 2011; Collopy & Arnold, 2009; Hsu, 2011; McCarthy, 2010; Smyth et al., 2012). When comparing the quality of students' discussions in face-to-face and online environments, Bliuc et al. (2011) found that online discussions are not as high quality as face-to-face discussions. In face-to-face discussions students tend to elaborate more and develop more cohesive and critical reflections. In online discussions, on the contrary, the researchers suggest that students tend to be more concerned about just making postings that often lack in deep thinking. In addition, Bliuc et al. (2011) report that online discussions are more likely to be perceived by students as just a formal requirement to complete the course rather than a valued component, although other researchers (e.g., Garrison & Vaughan, 2008) would argue that this will not occur if online discussions need to be properly structured and facilitated.

Student preferences vary with regard to the mix between face-to-face classes and online classes. Some students prefer a higher proportion of face-to-face learning, while others prefer occasional or compressed face-to-face classes (Castle & McGuire, 2010; Farley et al., 2011; Fleck, 2012; Korr et al., 2012). Students generally prefer attending tutorials in a face-to-face rather than in an online format (Battye & Carter, 2009). Face-to-face tutorials are believed to strengthen peer learning and help address student concerns and clarify their positions on issues (Farley et al., 2011; Moore & Gilmartin, 2010; Smyth et al., 2012). In relation to a face-to-face lecture component, Farley et al. (2011) suggest that students' interpretations of the learning value of lecture formats are contingent on their level of academic study at university. For example, first-year students believe that lectures, along with tutorials, should be held in the face-to-face format rather than over the Internet. The most common reason behind students' interpretation might be their lack of learning skills to take advantage of the lecture in the online format.

As students progress through their studies at university, they become more independent and sophisticated in their deliberations and thus less attached to face-to-face lectures as the major source of knowledge that is expected to cover all the aspects of the course. Indeed, some senior level students believe that face-to-face lectures

prevent them from active engagement with the course material and collaboration with other students. Stacey and Gerbic (2008) suggest that students' maturity might contribute to a positive thinking about blended learning, along with a high degree of self-regulation and motivation for learning (Tabor, 2007; Vaughan, 2007; Woltering et al., 2009). In this regard, graduate and mature part-time students happen to be more convinced of the appropriateness of the blended modality to meet their educational needs and expectations than traditional undergraduate students (Castle & McGuire, 2010; Fleck, 2012; Smyth et al., 2012).

Whether students achieve higher in blended learning environments compared with either fully face-to-face or fully online courses is not clear. The University of Central Florida's extensive experience with blended learning suggests that on average, blended courses have higher success rates and lower withdrawal rates than their comparable face-to-face courses and fully online courses (Dziuban et al., 2006). An often-cited U.S. Department of Education (2010) meta-analysis of empirical studies comparing learning in face-to-face and online courses supports Dziuban et al.'s finding by concluding that "students who took all or part [e.g., blended] of their class online performed better, on average, than those taking the same course through traditional face-to-face instruction" (p. xiv). Students also frequently report increased subjective learning gains and improved understanding of subject matter in blended courses, while instructors observe no significant difference in the impact of the blended course on test results when compared with traditional face-to-face or fully online course delivery (Alonso, Manrique, Martinez, & Vines, 2011; Collopy & Arnold, 2009; Lim et al., 2006; Moore & Gilmartin, 2010; Poon, 2012; Woltering et al., 2009).

Research suggests that achievement in blended courses is influenced to a greater extent by students' conceptions of learning, their ability to accept responsibility for their learning, and the degree of interactivity outside of the classroom (Bliuc et al., 2011; Chou & Chou, 2011; Mitchell & Honore, 2007; Moore & Gilmartin, 2010; Smyth et al., 2012). Bliuc et al. (2011) found that students are more likely to receive higher grades when they apply a deep approach to their learning and elaborate cohesive intellectual concepts. Some studies (Chou & Chou, 2011; Moeller, Spitzer, & Spreckelsen, 2010; Reiss & Steffens, 2010) found a positive correlation between the quality of interaction within a course management system and students' final grade. Mitchell and Honore (2007) put a stress on the role of teamwork in achieving better learning outcomes. In addition, Lopez-Perez, Perez-Lopez, and Rodriguez-Ariza (2011) suggest a link between achievement and students' maturity, background, and the level of class attendance in the blended course.

Students believe that using interactive technologies helps them to increase learning productivity, encourage a deeper approach to learning, promote the development of communication skills, and improve their understanding of course content (Kember, McNaught, Chong, Lam, & Cheng, 2010; McCarthy, 2010; Reiss & Steffens, 2010). The feelings of safety, anonymity, and connectivity inherent in online interaction allow students to voice different, maybe controversial viewpoints and to harness the potential of an online learning community for collaborative participation in co-production of knowledge of the subject matter and negotiation of its meaning (Ashton & Elliott, 2007).

The relationship between student perceptions of blended learning and achievement, which is the focus of this study, is unexplored in the literature. An understanding of this relationship will be beneficial as institutions of higher education begin to scale up blended learning across their campuses. For example, academic policymakers will be better able to understand whether there are differential effects between high and low achievers in blended courses on factors such as satisfaction, convenience, engagement, and learning in the blended mode. This will help them in planning and providing supports for blended courses that typically have students with various levels of abilities, such as honors courses or compulsory non-major courses.

In this study, four research questions are investigated that address this relationship: (1) how do perceptions and satisfaction with blended courses relate to achievement? (2) how do perceptions of the convenience afforded by blended learning relate to achievement? (3) how do perceptions of engagement in blended learning courses relate to achievement? and (4) how do perceptions of learning in blended courses relate to achievement?

3. The setting

The above research questions were investigated at York University, a comprehensive urban university in Toronto, Canada. The university has some 55,000 students with diverse ethnic and racial backgrounds, almost half of whom are the first generation in their family to attend an institution of higher learning. Because the university is located in an urban center, the vast majority of students commute to the campus. The university has large enrolments in arts, humanities, social sciences, and non-medical professional programs and more limited enrolments in several specialized engineering and science programs. For over 15 years the university has had a fairly static enrolment of 7000 students in fully online courses run by a division with a mandate for continuing education.

In 2009, a newly appointed provost and academic vice-president created a task force on student engagement. The task force published a white paper the following year that, among other recommendations, included a recommendation that the university "improve accessibility for students by significantly expanding online delivery of courses and programs as part of its efforts to enhance learning through the use of technology" (Monahan, 2010a, p. 14). Thus the paper set up a two-part goal for the university. The first part of the goal was to significantly expand online delivery; later the paper says that this may be accomplished either through fully online or blended courses.[1] The paper's author urged that the expansion of online delivery be "planned, deliberate, coordinated institutional manner" (Monahan, 2010a, p. 41), so that rather than simply responding to isolated faculty interests, efforts should be made to identify strategic programs where there will likely be significant demand for online offerings. The rationale offered for the online expansion was largely to make learning more accessible to the university's large body of commuting students and to respond to the needs of part-time mature working students. Online delivery was also seen as a way to respond to enrolment pressures the university faces without having to build significantly more physical classroom space. The second part of the goal calls on the university to step up its efforts to enhance the teaching and learning environment through technology. The author viewed technology as having the potential to improve student engagement and learning and to respond to the changing expectations of today's net savvy generation of students. Additionally, they noted that the university had made "modest progress towards systematically incorporating new technologies in the learning process, particularly as compared to our competitors" (Monahan, 2010b, p. 13) and enjoined the university to bolster its efforts and take a leadership role in the use of technology in teaching and learning.

As a consequence of the white paper, the university further indicated its commitment to e-learning in its academic plan adopted by its senate (York University, 2010). The plan called for increased commitment to academic quality, student success and engagement, and outreach in relation to teaching and learning by "supporting innovative and flexible curriculum delivery through online and hybrid [blended] courses, as well as other elements of technology enhanced learning" (York University, 2010, p. 8). Thus the stage was set for the university to embark on a new e-learning initiative.

In order to move forward, a working group was formed to develop the business case for a major expansion of e-learning at the university. The group, which consisted of senior faculty and staff, was given four criteria by the provost that the business case should address. They were that e-learning should:

1 enable the university to respond to pressure to increase enrolment;
2 provide a better experience for commuter students;
3 increase student engagement;
4 improve student learning.

Within several months the working group produced its report (e-Learning Working Group, 2010) after surveying the literature, examining the university's competitive environment and its own strengths and limitations, assessing its technological and support infrastructures, and analyzing the financial implications of a significant expansion of e-learning. The working group developed a rationale as to why they believed blended learning would best meet the above four criteria better than fully face-to-face or fully online courses. Consequently, they strongly recommended that the university distinguishes itself from other institutions in Canada by focusing its efforts on blended learning.[2] Indeed, the recommendation was that blended learning could be the university's "signature pedagogy." At the same time, however, the group did not rule out expansion of fully online course offerings where there are competitive or practical reasons to do so.

Shortly after the working group presented its report the provost established in fall 2010 the Academic Innovation Fund (Monahan, 2010c). The fund offered $2.5 million in grants to advance the priorities of the white paper including the "enhancement of online teaching and learning opportunities." Two major projects received funding to significantly expand blended learning offerings over a three year period (Monahan, 2011). One of these projects spanned two faculties, the Faculty of Health and the Faculty of Liberal Arts and Professional Studies; the other project was in the Faculty of Fine Arts. The research questions stated at the end of the previous section were investigated in these faculties.

4. Methodology

The study encompassed 11 courses in the above three faculties. Total student enrolment in these courses was 1147. A student questionnaire was developed and administered by the researchers towards the end of the courses. The questionnaire was based on items drawn from: the *Classroom Survey of Student Engagement* (CLASSE, n.d.), which is an adaptation of the National Survey of Student Engagement; the student survey questionnaire in the appendix of Garrison and Vaughan's (2008) book *Blended Learning In Higher Education* (pp. 189–193); the *Blended Course Student Survey* from the Blended Learning Toolkit (2011); and student surveys from Cook, Owston, and Garrison (2004) COHERE study. Questions were adapted from existing survey questions or developed by the researchers so that the four criteria (respond to enrollment pressure, better experience for commuter student, increased engagement, improve learning) were addressed. Added to these were several other questions specific to the local university context. The resulting questionnaire (see Appendix A) contained 31 items, of which 25 were on a 5-point Likert-style scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, with 1 representing Strongly Disagree and 5 representing Strongly Agree) and 6 were multiple-choice questions. Even though participation in the study was voluntary, all students in attendance on the days the questionnaire was administered replied resulting in a total of 577 respondents (50% of students enrolled in the 11 courses were present). Cronbach's alpha coefficient calculated subsequent

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[1] Earlier drafts of the paper called on the university to offer 10% of its courses online, which would have amounted to over 500 courses; however, this target was removed as it was not considered achievable in the near future.

[2] Currently, no university in Canada claims to be a leader in blended learning, although many offer blended courses.

to administration of the questionnaire was .908 for the 25 Likert items which suggests high reliability.

Student's final course grades and cumulative grade point averages (CGPA) were obtained from the university's official records. Grades in courses were based on a 10-point scale, with 9 representing an A+ and 0 representing an F. Typically, when calculating final course grades, instructors took into account multiple choice exam scores, mid-term tests, and assignments. In this study, we use the term student grades, achievement, and academic performance as interchangeable terms.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) in an analysis of covariance model (ANCOVA). Final grade was the dependent variable, questionnaire response was the independent variable, and CGPA was the covariate. Partial eta-squared was calculated to determine effect size. According to Richardson (2011), partial eta-squared values of approximately .01, .06, and .14 indicate small, medium, and large effects, respectively.

5. Results

Overall, 25 of the 31 items on the questionnaire were significantly related to achievement. The ANCOVA results grouped by research question are presented next.

5.1. Research question 1: How do perceptions and satisfaction with blended courses relate to achievement?

University officials were concerned about their ability to respond to pressures to increase enrolment. Their reasoning was that if blended learning frees up classroom space by moving some course activities online, they will be able to utilize that space to accommodate additional courses and students. A pre-condition for increasing enrolment via the blended model was that students needed to be at least as satisfied, if not more satisfied, with their blended course compared with traditional lecture only courses that they have taken. Hence five questions were asked that related to the university's ability to respond to enrolment pressures. Three items dealt with student preferences and satisfaction with their blended course, one was about support and the other dealt with cost. All three items relating to preferences and satisfaction were significantly related to achievement, while the other two were not. Shown in Table 1 for two of the significant relationships are the frequency response means, the estimated marginal means for course grades (after adjustment for CGPA) for the highest and lowest Likert scale response categories, F statistic with degrees of freedom, probability, and partial eta-squared (η^2) as a measure of effect size. From the table it can be seen that partial eta-squared was of medium size for both questions ($\eta^2 = .102, .066$).

The third questionnaire item where a significant relationship was found asked participants to choose their preferred course format. Responses were 35.2%, 48.6%, and 16.3% for fully face-to-face, blended, and fully online formats respectively (N = 449). The highest mean grade (6.28) was for the blended format, while the lowest (5.30) was

for face-to-face [F (2, 443 = 17.52, p = .000, $\eta^2 = .073$)]. Again the effect size was medium.

In sum, for research question 1, the results suggest that the highest achievers were most satisfied with their blended course, would take one again, and preferred the blended format over fully face-to-face or online. The lowest achievers were the least satisfied, were least likely to want to take another blended course, and preferred face-to-face instruction.

5.2. Research question 2: How do perceptions of the convenience afforded by blended learning relate to achievement?

Because the university has a large student commuter population and that a sizable proportion of full-time students are employed, the university sought to make learning more convenient and flexible to accommodate students' personal schedules. The university believed that blended learning offers the advantage of increased flexibility to students via the online portion of a course while at the same time maintaining face-to-face contact with faculty and other students, an attribute of courses that many students desire. The questionnaire contained seven items related to commuter students' university experience, of which five were significantly related to grades as shown in Table 2. In general, mean grades were highest for students who strongly agreed that blended courses were convenient, improved accessibility, reduced travel time/expenses, and that they felt connected to other students. The fifth item about isolation had the highest mean grade for students who disagreed and lowest mean grade for those who strongly agreed. Partial eta-squared for the item that asked students directly if their course offered convenience was the only effect size that was medium ($\eta^2 = .067$), although the item on reduced travel time and expenses was borderline medium ($\eta^2 = .059$). The remaining three items had a small effect size that ranged from .041 to .056. Therefore, the results suggest that high achieving students found that blended learning offered convenience and reduced travel time and expenses, while the low achieving students did not.

5.3. Research question 3: How do perceptions of engagement in blended learning courses relate to achievement?

The university has a broad notion of engagement that encompasses not only engagement of students in courses, but also engagement with the community and "bringing knowledge to bear on social and economic problems" (Monahan, 2010a, p. 3). The focus of the student survey, however, was only on student engagement in their courses. A total of 15 questions focused on this topic, 12 of which were Likert items and 3 were multiple choice. A significant relationship was found between student responses and grades on all but one of the Likert items. Table 3 shows that a large effect ($\eta^2 = .153$) was found for the item asking students directly if they were engaged more in their current blended course than other face-to-face courses they had taken. For this item the highest achievers rated themselves as more engaged, while the opposite was true for the lowest achievers. Four items dealing with

Table 1
Relationship between student preferences, course satisfaction, and grades.

Item	Response mean[a]	Estimated marginal mean grade[b]		F (df)	p	η^2
		Strongly disagree/disagree	Strongly agree			
I am satisfied with this course	3.47	4.67[c]	6.51	12.69 (4, 448)	.000	.102
I would take another blended course	3.48	5.21[d]	6.41	6.30 (5, 447)	.000	.066

[a] Based on a 5 category Likert scale where 1 = strongly disagree and 5 = strongly agree.
[b] Based on a 9-point grade scale where, for example, a grade of C+ = 5.00, B = 6.00, B+ = 7.00.
[c] The lowest mean grade for this item was for Strongly Disagree.
[d] The lowest mean grade for this item was for Disagree.

Table 2
Relationship between student perceptions of convenience and grades.

Item	Response mean	Estimated marginal mean grade		F (df)	p	η^2
		Strongly disagree	Strongly agree			
Course offered convenience	3.59	4.53	6.13	6.37 (5, 445)	.000	.067
Improved my opportunity to access and use class content	3.43	5.09	6.28	5.36 (5, 448)	.000	.056
Course allowed me to reduce my travel time and related expenses	3.28	4.78	6.20	5.56 (5, 443)	.000	.059
I feel connected with other students	2.58	5.26	6.32[a]	3.80 (5, 447)	.002	.041
I feel isolated during this course	2.81	6.14[b]	5.17	4.24 (5, 445)	.001	.046

[a] The highest mean grade for this item was for Agree, not Strongly Agree.
[b] The lowest mean grade for this item was for Disagree, not Strongly Disagree.

interaction during the course had medium effects: course online and face-to-face components enhancing each other ($\eta^2 = .083$), likelihood to ask questions ($\eta^2 = .065$), quality of interaction with other students ($\eta^2 = .077$), and increased interaction with the instructor ($\eta^2 = .082$). The remaining six items had only small effect sizes. In all instances of medium and small effects the highest achievers rated these items most favorably.

The remaining three questions that were significantly related to achievement were multiple-choice items which asked students their preferred mode for participating in lectures, discussions, and tutorial classes. Their choices for each mode were fully face-to-face, fully online, or a combination of both (i.e., blended). For all three modes, students with the highest grades preferred a combination of both and students with lowest grades preferred face-to-face. The relevant statistics were the following: lecture mode F (3, 443) = 3.92, p = .009, $\eta^2 = .026$, face-to-face M = 5.57, combination of both M = 6.08; tutorial mode F (3, 444) = 5.27, p = .001, $\eta^2 = .034$, face-to-face M = 5.54, combination of both M = 6.25; and discussion mode F (3, 440) = 6.25, p = .000, $\eta^2 = .041$, face-to-face M = 5.46, combination of both M = 6.24. Effect size in all three cases was medium.

Overall, the results for this research question suggest a strong relationship (large effect) between engagement and grades with high achievers stating that they strongly agreed that they were more engaged in their blended course than other courses they had taken. Seven other items had a medium relationship and six had a weak (small effect) relationship. Only one item was not significantly related to grades, a question that asked students if they felt anxious in the course.

5.4. Research question 4: How do perceptions of learning in blended courses relate to achievement?

Improved learning is the ultimate goal of blended learning. Unless students are able to learn as well in blended courses as traditional face-to-face classes, the university would be loath to embark on a blended initiative. There were no other sections of the courses running at the same time as the blended courses from which to obtain comparative achievement data, so as a proxy students were asked about how well they learned in the blended environment compared with other courses they had taken. Specifically, students were asked the extent to which their course improved their understanding of key concepts. A significant relationship was found between responses to this question and grades [F (5, 446) = 6.38, p = .000, Strongly Disagree M = 4.95, Agree M = 6.31]. Partial eta squared was .067, which indicated a medium effect. A second question asked the extent to which students were motivated to succeed. Again, a significant relationship was found, although the effect size was small with partial eta squared equal to .056 [F (5, 441) = 5.20, p = .000, Disagree M = 4.71, Strongly Agree M = 6.18].

6. Discussion and conclusions

Examined in this study is the relationship between student perceptions and achievement at a university that is implementing a major blended learning initiative. The university chose blended learning as a way to increase enrolment by more efficiently utilizing existing classroom space, to provide greater convenience to its commuter students, to engage students more in their courses, and to improve student learning. Four research questions related to these goals were formulated and a questionnaire was developed to assess student perceptions in each of the question areas. The questionnaire was administered to students enrolled in blended courses at the university and student final course grades and cumulative grade point averages were obtained. A surprisingly strong relationship was found between perceptions and course grades. Fully 25 of the 31 items on the questionnaire were significantly related to final grades even when the students' cumulative grade

Table 3
Relationship between student engagement and grades.

Item	Response mean	Estimated marginal mean grade		F (df)	p	η^2
		Strongly disagree	Strongly agree			
I am more engaged in this course	2.83	5.04	6.85	15.99 (5, 444)	.000	.153
Online and face-to-face components enhanced each other	3.16	5.15	6.54	8.07 (5, 446)	.000	.083
Moodle is well organized and easy to navigate	3.70	5.11[a]	6.16	4.09 (5, 448)	.003	.035
Web resources are helpful	3.55	4.94	6.13	2.69 (5, 446)	.021	.029
I am likely to ask questions in this course	2.89	5.07	6.29	6.13 (5, 441)	.000	.065
Amount of my interaction with other students increased	2.66	5.28	6.29	4.53 (5, 446)	.000	.048
Quality of my interaction with other students better	2.69	5.17	6.52[b]	7.35 (5, 442)	.000	.077
Amount of my interaction with the instructor increased	2.70	4.99	6.46[b]	7.95 (5, 447)	.000	.082
Quality of my interaction with the instructor was better	2.86	5.08	6.32	5.50 (5, 444)	.000	.058
I am overwhelmed with information and resources	2.79	6.50	5.24	3.81 (5, 447)	.002	.041
I feel more anxious in this course	2.64	6.23	5.31	4.37 (5, 445)	.001	.047

[a] The lowest mean grade for this item was for Disagree, not Strongly Disagree.
[b] The highest mean grade for this item was for Agree, not Strongly Agree.

point average was covaried in the analysis. The effect size for one of these relationships was strong, 13 items had medium effect sizes, and the remaining 11 had small effect sizes. The medium and strong relationships will be discussed next for each research question as they are of most interest for implementation reasons.

With respect to the first research question dealing with the relationship between satisfaction with the blended course format and achievement, our results are in alignment with the literature reporting that students show greater satisfaction in blended courses than in traditional lectures (e.g., Castle & McGuire, 2010). However, the results of this study suggest that it is the highest achievers who are most satisfied with their blended course, would take one again, and preferred the blended format over fully face-to-face or online. On the other hand, the lowest achievers were the least satisfied, were least likely to want to take another blended course, and preferred face-to-face instruction. The results are also particularly consistent with the findings in a study by Svanum and Aigner (2011), where the researchers found that students who were motivated and invested their effort in the course were more likely to succeed and to express higher satisfaction with the course: "students who did well were prone to view the course more positively; those who do less well or poorly attribute the failure to external factors including the instructor and course" (p. 676). Recent studies found that successful students are more likely to attribute their satisfaction with the course to the amount and quality of faculty's interaction and support they receive during the course (Delaney, 2008; Lo, 2010; Melton, Graf, & Chopak-Foss, 2009; Paechter, Maier, & Macher, 2010). Moreover, Lo (2010) found that students in the blended courses who were motivated and gratified with the instructor's support and course policies tended to perceive their learning outcomes higher.

Overall, results for this research question raise the issue of whether blended courses are as suitable for low achieving students as for high achievers. It may be that low achievers need the structure that comes from regular (e.g., weekly) face-to-face classes as they may not have the independent study skills that blended learning demands. At the same time one must ask the general question of whether academic subjects that are traditionally difficult for students to master are suitable for teaching using the blended format or if there are ways of organizing and designing blended courses in ways that will better scaffold these students.

The second research question pertains to the relationship between student perceptions of convenience and achievement. The results suggest that higher achieving students found that blended learning offered more convenience and reduced travel time and expenses than low achieving students. This finding is somewhat puzzling to interpret. There is some research evidence to suggest that students often enjoy flexibility in time and place and a higher degree of self-regulation. These advantages, which are usually inherent in blended or online course formats, allow students a greater ability to work around job and family responsibilities and retain their employment (Ashton & Elliott, 2007; Fleck, 2012; Poon, 2012; Smyth et al., 2012) or enable them to accelerate their learning process towards the completion of their degree (Reiss & Steffens, 2010). It could be that the convenience and flexibility of blended courses are appealing to high achieving students because the format allows them to make more efficient use of their time by engaging in academic work when they are not attending on-campus classes. On the other hand, low achievers may consider the time when they do not meet in class as simply free time and act as though the class was simply canceled.

The third research question deals with the relationship between engagement and achievement. A strong relationship was found on the question that asked students if they felt more engaged in their blended course than other traditional face-to-face courses that they had taken, with high achieving students responding that they felt more engaged than low achieving students. Other questions related to engagement showed a similar pattern; however, the effect size was medium. High achievers also favored the blended mode for lectures, tutorials, and discussions. A possible reason why high achievers felt more engaged with blended learning is that they participated fully in online activities as well as face-to-face classes, whereas low achievers may not have. While there is no direct evidence of this, anecdotally the researchers were told by instructors that some students did not participate in online activities even though a percentage of their final grade was based on their online work. Furthermore, the literature suggests that students taking blended courses tend to perceive a significantly higher quality of learning, compared with a face-to-face format (Melton et al., 2009). Possible factors contributing to such perceptions could be increased participation in discussions, particularly in small groups, and intense interaction with the instructor and their peers (Melton et al., 2009; Pollock, Hamann, & Wilson, 2011). Artino and Stephens (2009) found that students who were highly engaged in course activities and showed interest in the subject matter tended to achieve higher grades, compared with students who were frustrated with the course (e.g., felt bored or overwhelmed).

Results for the final research question investigating perceptions of learning and achievement suggested that high achievers believed that they improved their understanding of course key concepts better in their blended course than in other traditional face-to-face courses they have taken. The literature comparing achievement in blended learning courses versus traditional courses suggests that overall students achieve modestly higher in blended courses (e.g., Dziuban et al., 2006; U.S. Department of Education, 2010). It may be that some of the higher overall achievement in blended course may be accounted for by the higher achieving students thriving in this environment. Further research is needed to analyze the findings of comparative studies by including cumulative grade point average as a mediator variable. Again, as suggested above in research question one, this finding raises the question of whether low achieving students are able to succeed as well in blended courses as in traditional face-to-face courses.

The overall conclusion of this study is that high achievers are very satisfied with the blended format, find blended learning to be convenient and flexible, are very engaged in their studies, and appear to learn key concepts better. Thus the evidence suggests that the university will be able to meet its four-pronged goal of scaling up blended learning with this cohort of students. What is problematic – and raises a caveat – is that lower achievers may not be able to function in this learning environment as well. An implication of this for university implementation planers is that, as they scale up blended learning, they may want to consider offering students a choice of whether to enroll in blended or fully face-to-face course sections where feasible, especially in subject areas that students find difficult. Another option may be to provide instructors with assistance in designing blended courses in ways that will better address the needs of low achievers.

This conclusion, however, is tempered by several limitations of this study. The data on student perception, achievement, and cumulative grade point average were collapsed across a variety of subject areas. These included courses in business, health, humanities, and fine arts. Grading standards and expectations are undoubtedly different across the departments offering these courses as were the teaching styles of the instructors. Class sizes also varied significantly from a low of 21 students to a high of 304 students. Furthermore, it was not clear whether students were fully aware of their instructors' expectations for course interaction and participation which may have affected responses to some questionnaire items. Any or all of these factors may have influenced students' perceptions of their blended learning experience.

Appendix A. Blended learning survey for students

Table A1

How much do you agree or disagree with the following statements:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
1. Overall, I am satisfied with this course.	A	B	C	D	E	F
2. Given the opportunity I would take another course in the future that has both online and face-to-face components.	A	B	C	D	E	F
3. This course experience has improved my opportunity to access and use the class content.	A	B	C	D	E	F
4. The online and face-to-face course components of this course enhanced each other.	A	B	C	D	E	F
5. The course Moodlesite is well organized and easy to navigate.	A	B	C	D	E	F
6. The web resources in this course are helpful.	A	B	C	D	E	F
7. When I encounter a problem with the use of the technologies in this course, the York technical support service helped me with my problem in a timely and effective manner.	A	B	C	D	E	F

Compared to typical face-to-face courses I have taken…	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
8. this course offered the convenience of not having to come to campus as often.	A	B	C	D	E	F
9. …this course allowed me to reduce my total travel time each week and related expenses.	A	B	C	D	E	F
10. …Iam more engaged in this course.	A	B	C	D	E	F
11. …I am likely to ask questions in this course.	A	B	C	D	E	F
12. …I feel thatthe amountof my interaction with other studentsin this courseincreased.	A	B	C	D	E	F
13. …I feel that the qualityof my interaction with other studentsin this course was better.	A	B	C	D	E	F
14. …I feel connected with other students in this course.	A	B	C	D	E	F
15. …I feel isolated during this course.	A	B	C	D	E	F
16. …I feel that the amountof my interaction with the instructorin this courseincreased.	A	B	C	D	E	F
17. …I feel that the qualityof my interaction with the instructorin this course was better.	A	B	C	D	E	F
18. …I am overwhelmed with information and resources in this course.	A	B	C	D	E	F
19. …I have trouble using the technologies in this course.	A	B	C	D	E	F
20. …I feel more anxious in this course.	A	B	C	D	E	F
21. …this course required more time and effort.	A	B	C	D	E	F
22. …this course has improved my understanding of key concepts.	A	B	C	D	E	F

Table A1 (*continued*)

Course Format Preferences

23. If the same course is being offered in different formats, which course format would you prefer?

    A. Entirely face-to-face course format
    B. Blended course format (meaning some face-to-face activities are replaced with online activities)
    C. Entirely online course format (with no face-to-face class time)

24. If you had a choice between attending lectures face-to-face or accessing lectures online which would you choose?
    A. Attending lectures face-to-face
    B. Accessing online downloadable videos of lectures
    C. A combination of both

25. If you had a choice between attending tutorials face-to-face or participating in tutorials online which would you choose?
    A. Attending tutorials face-to-face
    B. Participating in tutorials online
    C. A combination of both

26. If you had a choice between participation in classroom discussion or online discussion which would you choose?
    A. Class discussion
    B. Online discussion
    C. A combination of both

How much you agree or disagree with the following statements:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
27. Video recordings of the course lectures that I could download for my personal use would be worth an extra $15 course fee to me.	A	B	C	D	E	F
28. I have strong time management skills.	A	B	C	D	E	F
29. I am motivated to succeed.	A	B	C	D	E	F

Additional Information

30. How many hours a week on average are you employed?
    A. I'm not working
    B. 1-9 hours
    C. 10-19
    D. 20-29
    E. 30-39
    F. 40+

31. What is your current overall GPA?
    A. A/A+ (8.0-9.0)
    B. B/B+ (6.0-7.9)
    C. C/C+ (4.0-5.9)
    D. D+ and less (less than 3.9)

Please share any additional comments or suggestions about this course.

_____
_____
_____ _____
_____
_____   _____

Thank You!

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