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Using a Blended versus Online Course Design for Teaching Intermediate Accounting - An Empirical Study of the Teaching/Learning Environments

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Abstract

This study examines the effect of delivering an intermediate accounting course in a fully online format as compared with the effect of delivering the same course in a blended, face-to-face format. Initial data collection in fall 2012 suggests the importance of student computer skills and grade point average to performance. No difference in student performance between the two delivery approaches is noted, probably due to small sample size. The study was extended in the spring 2013. Extended analysis shows students in online mode obtained more accounting knowledge than the blended mode. Students aged younger than 29 perceive the technology application more favorably enhanced their learning than others. Students enrolled in the blended setting indicate they are more willing to use the technology than the online setting. Students with different learning styles perform differently and perceive differently about the amount of computer skills enhanced by taking the blended vs. online courses.

Keywords: net gen students, blended instruction, online instruction, learning style, pre-pandemic era, technology course delivery.

I. INTRODUCTION

Among the important change agents affecting accounting education in recent years are the increasing application of technology in instructional design and the growth in demand for online courses. The growth in demand for online offerings brings with it the need for research on student performance and course delivery alternatives. A corollary consideration has emerged as well regarding whether and how the use of media technology in popular culture may affect current and the next (net) generation of students' learning preferences. As accounting is a technology-intensive profession, there is an increasing demand by the profession to incorporate use of current technology into the accounting teaching/learning experience.

Among the important questions facing accounting educators and administrators are:

1. What is the role of information technology in accounting course delivery?
2. Do course delivery methods that employ extensive information technology applications appeal mainly (or only) to next (net) generation students?
3. Can techniques be developed to enable analogous delivery of accounting technical detail and technology applications within the context of traditional, blended, and online teaching/learning experiences?

At the same time, there is an "aging" population of accounting educators who may or may not have a predisposition to adapt new technologies in existing courses. Similarly,

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uncertainties have been raised by educators and administrators regarding the skills or abilities of faculty members to teach blended and online courses when their previous work has been solely in the traditional face-to-face blended environment.

The rapid growth in demand for online education affects educators in general, as do imperatives regarding the role of technology in course delivery models overall. In addition, a better understanding of the characteristics of "net generation" students will benefit educators in general, not simply those who teach accounting. Technical diversity of students is an important issue to be considered in designing online and hybrid courses (Gloria & Uttal, 2020). Also, there are overlapping issues pertaining to faculty development, course and program implementation strategies (including blended versus online offerings) that are common to academic institutions in general.

This underscores the importance of the need for additional insights on these issues for accounting educators and administrators. That is, educators in most or all disciplines cannot ignore the value and promise of applying technology both in a blended and online setting. Because this seems to be true across disciplines, it is probable that lessons learned from the present study can be valuable to educators in other disciplines who face the same issues. At the same time, our failure as accounting educators to examine and learn from empirical works may well cause our programs to lose ground to those of other disciplines when planning and policy decisions are made by university administrators.

As will be discussed below, it is not uncommon for discussions of "blended" and "online" delivery to be put in "either/or" terms. A major premise of the approach for course design and delivery as described below is that analogous methods can be used commonly and effectively in both contexts, with the use of technology. The design of this study allows for monitoring and evaluation of results that can provide valuable insights for educators who wish to expand their competence with technology in course design and delivery. In addition, results should inform program administrators regarding their ability to make more effective/efficient use of faculty resources (talents). In turn, the study should be helpful in demonstrating methods for faculty and administrators to better serve the needs of current and future students both "in-house" and online.

Much attention has been placed on the efficacy of technology applications in course delivery, both to emulate practice requirements and to serve the needs of an emerging student demographic that has "disrupted" college. On a basic level, our efforts to analyze the data underscore both the importance of the issues being raised and the complexity of seeking "answers" to the questions surrounding those issues.

At present, the data support a view that suggests the applicability of techniques developed initially in a blended setting to a course delivered online. Findings related to the data collection in fall quarter 2012 and spring quarter 2013 support this view with additional textural variables for student motivation and aptitude. Online students outperform blended students in accounting knowledge acquisition. This provides educators and students with hope that the same or even better level of learning effectiveness can be achieved when the online course is designed well using technology.

There is also some evidence that students in the blended classroom setting actually value the use of technology more favorably than do those taking the course online. The potential importance of a student's age and time spent on course tasks in each delivery setting is noteworthy and will be examined more fully moving forward.

VARK data will be explored more fully as well. A core concept of learning style theory is that individuals differ in how they learn. Critics of learning style theory argue that no evidence exists to support the idea that identifying a student's learning style can improve learning outcomes. Previous research has suggested that learning outcomes may

be improved when a student's learning style (i.e., learning preferences) is matched with appropriate instructional methods (Marcy, 2001).

This study shows promise of adding to our awareness of how technology-based instructional design and delivery, like that employed in this study, can produce comparable learning outcomes for both a blended face-to-face and a fully online teaching-learning experience. Ongoing analysis is underway in this regard.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In recent decades, a clear signal from the accounting profession has been the need for educators to address student skill needs in course delivery. A motivating force is the platform of the Accounting Education Change Commission (AECC, 1990) which includes a prominent policy statement calling for skills infusion in course delivery. At the same time, the importance of the role of technology has grown, both in practice and in coursework (Güneya, 2014).

The importance of technology in coursework may be traced to at least two major forces. One is the fact that recognizing and applying elements of rapidly-changing technology is a core business driver in accounting practice. Thus, if our students are to be viable when they enter the profession, they must be well-versed in their coursework with technology that they will be required to use on the job. While there is a growing literature that addresses the importance of this issue, only two such works need be cited here to fully illustrate the point. Vasarhelyi et al. (2010), for example, argue that accounting practice reflects a "real time economy" (RTE) that requires a multitude of information technology skills and applications. Addressing specifically many of the technology-related changes in audit practice, Vasarhelyi et al. (2010, p. 420) assert "the arrival of the RTE represents a major tipping point for the auditing profession, one that cannot be ignored. Audit education must catch up with the progress being made in the rest of the business world in order to maintain relevance." The imperatives of leveraging technology are further underscored in an ongoing basis by their prominence in the AICPA (1999) core competency framework.

Another major force that ties technology to course delivery pertains to characteristics associated with the young people of today, sometimes referred to as "millennials" or "net generation" students. The "net" is shorthand for internet. Again, an extensive literature has emerged (Prensky, 2001; Heppel et al., 2004; Morineau et al., 2005; Newland et al., 2006; Walton, 2006; Ball et al., 2007; Brabazon, 2007; and Beard & Ball, 2008). A common theme in these works relates to societal changes in recent decades that reflect rapid changes in everyday uses of information technology. Students born in the recent past have become accustomed to a variety of technology tools in their everyday lives. As Oblinger and Oblinger (2005), assert these students know how to navigate the web but expect a much fuller and interactive learning platform in their courses. In this sense, net gen students are said to be bored by using technology tools solely for searching for sources (such as they have practiced from the fourth grade or earlier) and expect (and value) a learning experience where the instructor has designed coursework around interactive applications. This is expressed well by Windham (2005): "just as we want to learn about the web by clicking our own way through cyberspace, we want to learn about our subjects through exploration." A recurring observation regarding this new generation of students is that they prefer online courses over traditional blended lectures. Because younger students will likely be a growing part of the future enrollment mix, it is imperative that educators seek to develop course delivery techniques that are both appealing to them

and effective. This statement is applicable equally (in our view) to a blended or an online setting.

As noted above, there has been a rapid growth in demand for online offerings. One of the major business and accounting program accrediting agencies, AACSB International (2007), published a policy paper on emerging quality issues facing educators and administrators. The AACSB International (2007, p. 3) notes the potential for educators to employ "technology-delivered education" in either an blended or distance learning setting and asserts "many of the [quality] issues are relevant for technology-delivered education of all sorts, whether or not it is distance learning."

Among the key quality issues identified in the report is the need for faculty and administrators to be committed to distance learning if a program chooses this platform and for faculty members to pay serious attention to stakeholder needs in course design and assessment. Regarding faculty composition and qualifications (AACSB International, 2007, p. 8), the report asserts that the "faculty composition and qualifications are essential components to creating high-quality distance learning programs. The school's faculty should understand and embrace the change from a teaching-centered to a learning-centered environment: with learners, rather than students and with facilitators and designers of learning experiences, rather than teachers."

This perception of an apparent dichotomy in teacher-student roles in a blended versus an online setting may be a major barrier to entry into the online environment for faculty members who have taught only in the more traditional setting previously. As will be discussed below, the current study will involve an extension of delivery techniques developed originally by the faculty member for blended use, but employing a learner-centered approach. The study will monitor student experiences and performance in each setting using analogous delivery methods.

A measure of the growing importance of online education may be found in the work of Zawacki-Richter et al. (2009). These authors reviewed, profiled and evaluated 695 journal articles that had been published world-wide in the area of distance learning from 2000 to 2008. While noting that the number of published works has increased in recent years, they point as well to issue areas requiring more study regarding implications that mobile devices and synchronous tools afford for teaching, learning, and assessment."

2.1. Statement of the Research Hypotheses

This study uses a quasi-experiment strategy to examine student learning outcomes resulting from use of technology-mediated instructional design and delivery methods and techniques. The experimental design aims at testing whether the use of common materials and instructional methods in both blended/face-to-face and online teaching environments result in comparable learning outcomes. We are interested in providing evidence pertaining to important questions such as: Does online delivery lead to inferior learning outcomes, relative to blended/face-to-face delivery? Does online delivery lead to lower student satisfaction relative to blended/face-to-face delivery? In particular, we empirically test the following hypotheses, stated in the null form.

H_1: students in the blended/face-to-face blended and online settings will perform equally well on course performance measures.

H_2: younger students will perceive technology applications to be equally favorable to perceptions of older students.

H_3: blended/face-to-face blended and online students will use interactive delivery features equally as much.

H_4: students with different learning preferences (as measured with VARK) will perform equally well on course performance measures.

H_5: students with different learning preferences (as measured with VARK) will perceive the blended and online deliveries to be equally favorable in improving their computer skills.

III. RESEARCH METHODOLOGY

This quasi-experimental study incorporates common course materials, delivery platform, and instructor to teach an upper-level financial accounting course, commonly called "intermediate accounting III." Course materials and delivery techniques employed by the instructor (one of the co-authors) have evolved in recent years to make extensive use of information technology tools in a blended setting. More recently, similar applications have been employed to link students to the professor between classes, using a "virtual office hours" approach. Course design reflects a "learner-centered" approach with much time, thought and effort directed to course design. A specific focus presently is the development of a delivery approach that will be used in both a blended (face-to-face plus online materials) and an online setting. Results of this experiment and ongoing assessment insights will influence the design of future course delivery in either or both settings.

During fall quarter 2012, two sections of the intermediate accounting course were taught to students using identical course materials and supporting technology methods. One section was delivered in a blended/face-to-face format. The other was delivered in a fully online format. Both courses were taught by the same instructor. The "blended" section was taught at the university where the instructor (co-researcher) is employed full-time. The online section was taught through the auspices of another university where the same instructor maintains "adjunct" status.

Course materials were identical in terms of textbook used, assignments, tests, media presentations, concept maps and the like. A major difference, of course, is that students in the blended/face-to-face blended section were able to meet and interact with the professor on a twice-weekly basis. Otherwise, everything was identical – including the use of virtual office hours in both sections.

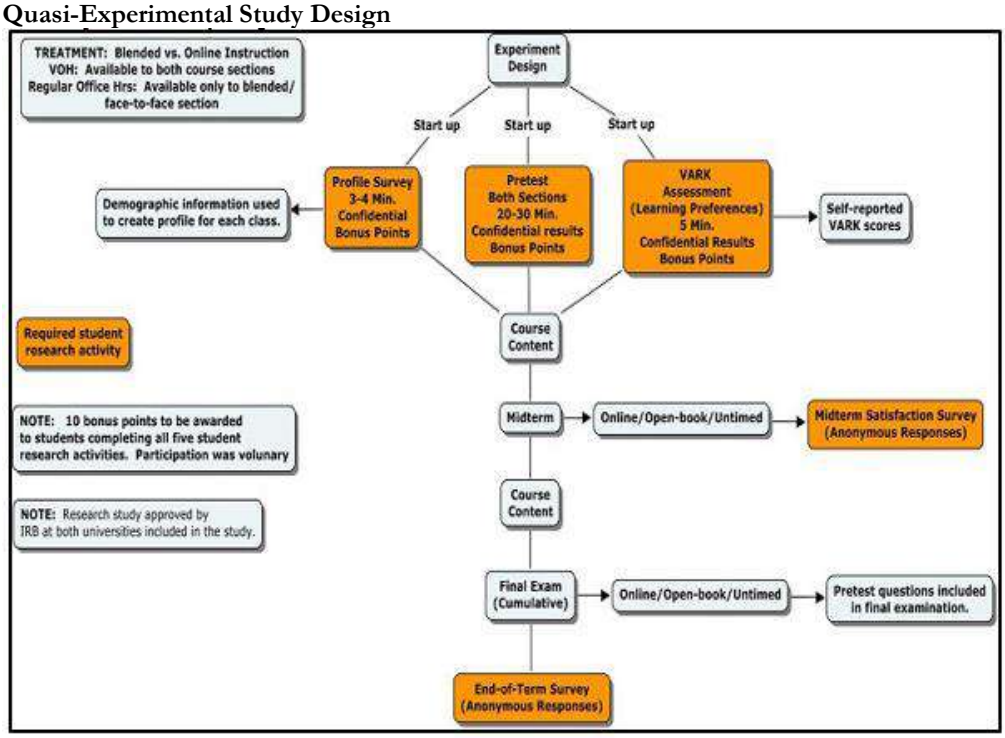
Data was collected in both sections pertaining to student demographics and performance measures on course requirements. In addition, extensive use of surveys enabled collection and analysis of student feedback on their perceptions of course delivery techniques. Furthermore, additional survey data was collected on student learning and technology preferences as identified more fully below.

To assure symmetry across each group and setting, a website was created and common access granted for students in each location. An introductory video by the instructor identified the fact that student participation was voluntary and suggested in general terms the nature of the study. Each of the 5 "research activities" to be completed during the quarter were housed within the website. The first 3 such activities were part of early term procedures. These included an introductory survey, a pretest and completion of the VARK learning preference survey. A mid-term and end-of-term survey comprised the remaining research activity tasks that included a post-test of performance items completed in the first week of the quarter. Students were informed that they would not be penalized if they did not participate. Those who did participate would be awarded 10 bonus points for the course upon completion of all research activities. Anonymity of responses was assured and an "informed consent" form was provided in the initial research activity task. For each setting, 100% participation was achieved.

The study design is intended to provide empirical data that can lead to an improved awareness and understanding of the ability to employ common delivery techniques to teach in both a blended/face-to-face blended and an online setting. Analysis of student demographics, survey results, and course performance data should add to our understanding of the role and place of information technology in instructional design and delivery. This analysis can be enlightening regarding student preferences, perceptions and performance in each setting. In addition, the [historical] composition of students in each setting suggests the promise of a comparative analysis of a "net-gen" and more traditional student pool. Figure 1 below illustrates the quasi-experimental design of the study.

Figure 1

Quasi-Experimental Study Design



As the two courses were delivered to students at two universities during fall quarter 2012, the research design was approved by the respective IRB at each university. As indicated in Figure 1, we used a pre-post experimental design. Students in each section were given an entrance examination, midterm, and final examination. We used incremental test grades to measure learning outcomes. We also controlled for factors that may either hinder or improve student learning outcomes (e.g., work experience, age, GPA, prior experience with blended and online course formats, and attitude toward use of technology features in course design).

The introductory survey (research activity 1) provided for information on age, gender, full/part-time status, grade point average, grades on pre-requisite courses, and current/previous work experience. In addition, students were provided with descriptions of "traditional", "blended" and "online" delivery modes of delivery and asked to identify whether they had taken one or more such courses previously. A follow-up question asked them "on the average, how satisfied were you with courses presented in each of the formats?"

Given the potential importance of a student's computer skills to course success in either a blended or online setting, we asked: "how would you rate your overall computer

skills (i.e., "0" equals "what skills" to "10" equals "outstanding skills")? We provided a sliding scale below the question for students to adjust manually to their perceived level of computer skills (0 to 10).

Another question sought a response to the following: "use the scale below to indicate your willingness to use technology in this class (i.e., "0" equals "unwilling" to "10" equals "very willing). Again, students were provided with a dial to adjust manually to indicate their individual willingness to use technology. (Our informed intuition suggested that online students would on the whole be more willing to use technology, but see below).

A final question in the first research activity asked: "what final course letter grade do you expect to earn in this course"? A scale was provided initially calibrated to "A+" but allowed each student to indicate individual expectations.

Students completed research activity #2 (pre-test) and #3 (VARK survey) during the first week of the quarter (as noted above, items included in the pre-test were embedded in the end-of-quarter examination to provide for a post-test comparison). Research activity #4 is a mid-term satisfaction survey completed by students via the webpage. One question asked students to indicate their satisfaction with the course at the mid-way point using a Likert 7-point scale (very dissatisfied to very satisfied). Another question asked: "how would you rate the professor's contribution to your overall learning experience in the course to date?" again using a 7-point Likert scale. A similar question asked: "how would you rate your contribution to your overall learning experience thus far in the course?" Another question asked students to indicate their satisfaction with each of 7 types of technology-based techniques used in the course (e.g. introductory instructor videos, voice thread modules, simulations, online homework). Students were enabled to indicate their satisfaction/dissatisfaction (as above) and were given another possible choice "never used this course feature." It should be noted that these questions were deemed to be informative to our analysis and at the same time have been an ongoing element of the instructor's interim assessment strategy for a number of years. Similarly, an open-ended question gave students the opportunity to comment and make suggestions to improve the course. Student anonymity of response was assured. Completion of a separate page was required for each student to track the number of overall responses.

Three questions were included in the mid-term assessment survey for purposes of the study that had not been posed routinely in the past. These sought feedback on the frequency of student usage of blended or virtual office hour mechanisms and their perceptions of the role of technology in their learning. The questions pertaining to technology are: "do you feel that technology features used during the course have enhanced your overall learning experience?" and "Do you feel the technology features used in the course have helped you to improve your computer and technology-use skills?"

Research activity #5 consists of the end-of-quarter satisfaction survey. Students completed this survey on the course webpage during the final week of the quarter. The survey followed the same format and asked the same questions as were on the mid-term link but with reference to the course and quarter as a whole.

In the appendix, we describe the instructional design model for face-to-face, blended and online in diagram. Figure 2 of appendix shows the component composition of instructional activities employed in the intermediate accounting courses. Figure 3 of appendix compares the different features of face-to-face, blended and online delivery modes. According to Lillie and Wygal (2011), the warmth continuum extends from the online to the face-to-face via the blended (Figure 4 of appendix). The online delivery is

perceived to be cold due to its asynchronous, text heavy and less touch with instructor nature. The face-to-face delivery on the other hand is perceived to be synchronous, visual/aural and with abundant touch between instructor and students. They argue that using appropriate technology applications such as videos, pictures and virtue office hours can create the warmth that is needed in online setting. Figure 5 of appendix shows that technology features in our course delivery. The weekly module on Blackboard starts with a recorded video commentary by the instructor that highlights the learning objectives and important issues. Mindmap provides a visual roadmap that aligns these important issues. Articles links about accounting practice is provided. Wileyplus Homework online platform is used for simulation-based problem solving. Additional activities such as research project based on FASB codification system is assigned. Self-study and practice problems are also provided. Figure 6 of appendix gives an example of how the visual/aural/text content is displayed by the Mindmap software in the course.

3.1. Initial Data Collection

We conducted the experiments in two rounds, i.e. in fall 2012 and spring 2013. Findings from the fall 2012 data collection with regard to student performance are highlighted below in Table 1. Student performance is measured as the incremental number of questions that were answered correctly in the pre-test and post-test based on the same 8 questions. Table 1 suggests preliminary signals of the importance of both GPA and computer skills to student performance in the two settings. In addition, there is no difference in student performance between the two settings.

Table 1
Student Performance and Delivery Mode in Fall Quarter 2012

	Fall data	
Source	**Coefficient**	**P-value**
Intercept	4.012	.232
GPA	.716	.106
Online Exp.	-1.195	.521
AGE	.201	.501
Gender	.087	.893
Computer Skills	-.492	.104
Technology Willingness	.302	.220
Online Rating	-.006	.989
Full Time	.374	.585
Campus[a]	-.765	.339
N	37	
R Squared	.251	

A total of 20 students in the blended setting and 14 in the online course are included in the data set. The number of initial participants in the online setting was reduced from the initial number (18) due to incomplete data from 3 students and a fourth dropped the course. Thus, as we commenced initial data analysis, we came to conclude that our efforts for fall 2012 likely provided major value in terms of providing preliminary signals to address issues we have raised. That is, we recognized that the relatively small sample size hinders the ability to generalize from the findings, particularly with regard to the number of variables employed in the model. For example, by definition, covariates have to be continuous variables. However, many of the ones employed in our model are categorical (such as age, full time/part-time student, online experience). Such variables were manually defined to make them numeric and included as covariates in the model and analysis. GPA data truncated the sample size somewhat as well.

With these caveats in mind, we note that Table 1 findings can be viewed only to suggest that there is no difference in performance between students in the blended (campus= 1) versus online setting (campus= 0) while computer skills and GPA are shown to be significant at the .093 level. Thus, on a basic level, the finding of no difference in performance between the two settings can be seen to affirm a view that a "blended" classroom delivery can be employed identically and effectively in an online setting as well. However, in our view the results could not/should not be interpreted in a more general fashion to suggest that "our questions have been answered."

As noted, such a conclusion must be considered in the light of potentially major issues with the variance analysis as presently performed due to the small sample size. Stated differently (and in our view), a univariate test as shown in Table 1 would only show significant differences with such a small size if the underlying causes were truly extreme. Thus, the null hypothesis of no difference is supported by the results above using a test that likely is not sufficiently powerful to give any real general assurances.

We made the decision to learn as much as possible from the data collected to date to inform a (hoped-for) ability to extend the study in a future quarter. As a means of seeking to enable additional explanatory power with the existing data, an additional statistical technique was employed. This test follows a model that allows for a tripling of the observations (60 and 42) while holding all else unchanged. Results of this test indicate that with such an expanded sample size (and with parallel results) a difference does exist in terms of performance at the .09 level. Interestingly, the coefficient estimate for the blended setting is negative .681. Thus, the test indicates that students in the online course actually performed better than those in the blended setting. Such a "pro-forma" finding suggested to us that any extension of our data collection efforts should seek not only further observations but also additional information with regard to what might drive lead to such a finding (as discussed below).

An additional analysis was performed on fall 2012 data using a step-wise regression approach. Step 1 involved entry of the data with all variables without regard to online or blended setting. Step 2 involved a second regression with the addition of the campus setting, allowing a focus then on an analysis and explanation of the difference in the variance between steps 1 and 2. Table 2 reports the results of step 1 using this approach. Table 3 shows the step 2 results.

Table 2

Tests of Between-Subjects Effects (Step 1 Regression) in Fall Quarter 2012

Dependent Variable: Performance					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	17.336[a]	8	2.167	.931	.509
Intercept	6.711	1	6.711	2.883	.102
Fulltime	.793	1	.793	.341	.565
OnlineExperience	.842	1	.842	.362	.553
OnlineRating	.047	1	.047	.020	.888
ComputerSkills	7.095	1	7.095	3.048	.093
GPA	5.395	1	5.395	2.318	.140
Willingness	3.124	1	3.124	1.342	.258
Age	1.458	1	1.458	.627	.436
Gender	.280	1	.280	.120	.731
Error	58.194	25	2.328		
Total	588.000	34			
Corrected Total	75.529	33			

Notes: [a] R squared= .230 (adjusted R squared= -.017)

Table 3
Tests of Between-Subjects Effects (Step 2 Regression) in Fall Quarter 2012

Dependent Variable: Performance					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	19.903[a]	9	2.211	.954	.499
Intercept	5.136	1	5.136	2.216	.150
Fulltime	.001	1	.001	.000	.988
OnlineExperience	1.607	1	1.607	.693	.413
OnlineRating	.142	1	.142	.061	.807
ComputerSkills	7.091	1	7.091	3.059	.093
GPA	7.099	1	7.099	3.063	.093
Willingness	4.266	1	4.266	1.841	.188
Age	.312	1	.312	.135	.717
Gender	1.145E-5	1	1.145E-5	.000	.998
Campus	2.568	1	2.568	1.108	.303
Error	55.626	24	2.318		
Total	588.000	34			
Corrected Total	75.529	33			

Notes: [a] R squared= .264 (adjusted R squared= -.013)

As shown in Table 3, both computer skills and GPA are shown to be significant at the.093 level. In addition, results suggest that the campus variable does provide incremental explanatory power with regard to student performance as model R Squared increases from .230 to .264.

3.2 Expanded Data Collection

Given the limitations of sample size in the fall quarter 2012 data, we continued to include additional data collection at the next available opportunity when both courses would be offered again in the same quarter and by the same instructor (co-researcher). We conducted the experiments in spring 2013 for a second round. We also collected data on additional control variable such as Aptitude and Motivation. Aptitude is measured by the self-reported SAT score of students. Motivation is measured as how much time students spend on average each week in doing course related work.

In addition, the preliminary signals with regard to the possibility that the online students may actually perform better than students in a campus setting provided much food for thought for the authors to consider. For example, the instructor who delivers both sections may "know" from experience that the same technology-driven delivery method should work as well for each setting. However, there is little to inform our collective intuition with regard to the possibility that online students would outperform those in the blended setting when controlling for the many other variables already employed in the model (age, gender, GPA, computer skills, prior online experience and willingness to use technology).

Thus, plans were put into place to seek new oversight approvals from each institution for collection of additional data when the two sections were delivered as in fall quarter 2012. The design called for collection of the same information as before plus the ability to address additional signals arising from the fall quarter data analysis. For example, ongoing dialogue among the authors and an examination of the education literature suggested the possibility that student "motivation" and "aptitude" may have explanatory power.

We determined that "time spent" on course requirements could serve as a proxy for student motivation. We had not sought such information in the initial data collection.

Moving forward, a question was added that prompted students to identify how much time they had spent in addressing course needs.

Another consideration with regard to the possibility that differences in the two settings may result pertains to the aptitude evidenced in each group. As to "aptitude", our initial design employed the GPA descriptor as an imperfect surrogate. We have continued to seek such information in the second data collection but recognize that "grading" at each institution may make GPA per se an even less adequate comparative descriptor. Our review of relevant literature suggested also that SAT scores can provide explanatory power (but mainly in studies of students at the introductory level). We were informed by administrators of one of the institutions that SAT score information was not required of students in the admissions process. Thus, we moved forward with the ability to identify SAT scores only on a self-reported basis.

Because the two courses were not to be offered in the term immediately following initial data collection, plans were put into place to extend the study in the next available time frame. Approvals were received from each institution and data collection was completed for the quarter just ended in early summer. For spring 2013, 21 students participated in the blended setting and 15 students were in the online section pool.

IV. RESULTS AND DISCUSSIONS

H_1: students in the blended/face-to-face blended and online settings will perform equally well on course performance measures (stated in null).

Extended information with regard to hypothesis H_1 is shown in Table 4 below. This analysis maintains a parallel analytical approach for data collection for each time frame (and thus, without regard to additional spring term results pertaining to SAT scores and time spent on course work which is shown in Table 8). Table 4 suggests that differences in performance between students in the blended or online settings are not statistically significant. (Note that no values are shown in Table 4 for "SAT" or "TimeSpent" as these two variables were not considered in the initial design).

Table 4
Analysis of Performance Variance in Fall/Spring and Combined

	All Data (GPA only)		Fall Data (GPA only)		Spring Data (GPA only)	
Variables	**Coeff.**	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-value**
Intercept	5.107	.015	4.012	.232	8.510	.017
GPA	-.306	.459	.716	.106	-1.513	.020
SAT						
TimeSpent						
OnlineExp	-.321	.728	-1.195	.521	-9.311	.002
AGE	-.111	.625	.201	.501	-.268	.435
Gender	-.091	.867	.087	.893	-1.730	.046
ComputerSkills	-.397	.106	-.492	.104	-.071	.846
TechWillingness	.420*	.069	.302	.220	.122	.740
OnlineRating	.266	.213	-.006	.989	2.162	.001
FullTime	.268	.540	.374	.585	.306	.606
Quarter	-1.535					
Campus	-1.024	.111	-.765	.339	-1.455	.130
N	73		37		36	
R Squared	.211		.251		.515	

Notes: * Represents the coefficients that are significant at 10% level of two-tailed t-test.

Because the spring 2013 design provided for information on SAT scores and motivation (time spent on course work), related results including information on those variables are shown in Table 5.

In spring data sample, we used SAT score instead of GPA to proxy for student aptitude according to literature. We also added TimeSpent as a control variable for student motivation. Table 8 suggests that SAT scores and time spent (motivation) add to the explanatory power of the model. Both are significant control variables in the model. Student's prior experience taking online courses and their favorable perceptions about online courses are also significant. Campus variable is negative and significant, suggesting that blended students underperform the online students in improving the number of correct questions on the same pre-test and post-test questions. These findings are consistent with prior literature that student's motivation, aptitude, experience taking online courses, and their perceptions toward online courses determine their learning effectiveness in both blended and online settings. After controlling for these factors, we continue to find that online delivery offers better learning effect than the classroom delivery using the same technologies. The finding casts light on the promise of online education which can be used as an even better substitution for classroom delivery.

Table 5
Analysis of Performance Variance in Spring Quarter 2013
Including SAT and TimeSpent Variables

	Spring Data (SAT and TimeSpent)		Spring Data (SAT only)	
Variables	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Intercept	9.055**	.019	5.470	.113
GPA				
SAT	-.176	.427	-.220	.346
TimeSpent	-.999**	.052		
OnlineExp	-9.447***	.003	-9.224***	.005
AGE	-.499	.170	-.386	.305
Gender	-1.443	.102	-1.446	.120
ComputerSkills	.189	.623	.134	.741
TechWillingness	-.095	.813	.174	.666
OnlineRating	2.216***	.001	1.966***	.004
FullTime	.648	.294	.505	.435
Campus	-2.373**	.020	-2.368**	.016
N	36		36	
R Squared	.421		.421	

Notes: *** Represents the coefficients that are significant at 1% level of two-tailed t-test, ** Represents the coefficients that are significant at 5% level of two-tailed t-test, and * Represents the coefficients that are significant at 10% level of two-tailed t-test.

H_2: younger students will perceive technology applications to be equally favorable to perceptions of older students (stated in null).

With regard to H_2 that younger students will perceive technology applications to be equally favorable to perceptions of older students, our analysis suggests that differences are observable with regard to younger/older student perceptions of technology applications. In an end of term survey, students were asked to respond to the following question: "do you feel that technology features used during the course have enhanced your overall learning experience?" The learning enhancement variable is coded as "definitely yes= 1, probably yes= 2, maybe= 3, probably not= 4, definitely not= 5". Our survey on age of respondents included 5 range categories. Using spring quarter data,

we find that after controlling for relevant covariates, age is a significant factor in shaping students' perception toward the technology applications (untabulated). A further contrast analysis indicates diverging perception between students aged under and over 29. Further analysis of responses was performed on reported perceptions using all responses from those "29 and under" as one group and "over 29" as another. In table 6, the age variable is a dummy coded to be 1 if the student is under age 29. A negative coefficient of .672 (significant at the .075 level) was found. Thus, our findings suggest that younger students do indeed perceive the benefits of technology more favorably than do older students.

Table 6

Analysis of Variance on Student Perception toward Technology Application in Spring Quarter 2013

Dependent Variable: LearningEnhanced						
Parameter	**B**	**Std. Error**	**t**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Intercept	4.122	1.405	2.933	.007	1.233	7.011
Gender	-.060	.322	-.186	.854	-.721	.601
Fulltime	-.101	.219	-.459	.650	-.552	.350
OnlineEXP	-1.246	1.094	-1.139	.265	-3.495	1.003
ComputerSkills	-.178	.144	-1.234	.228	-.475	.119
Willingness	.147	.154	.953	.349	-.170	.464
OnlineRating	.187	.230	.813	.423	-.286	.661
SAT	-.074	.087	-.850	.403	-.253	.105
TimeSpent	.504	.189	2.663	.013	.115	.893
[AgeUnder29= 1]	-.672	.362	-1.856	.075	-1.417	.072
[AgeOver29= 0]	0[a]	.	.	.	.	.

Notes: [a] This parameter is set to zero because it is redundant.

H_3: blended/face-to-face blended and online students will use interactive delivery features equally as much (stated in null).

With regard to comparable data collected for both fall 2012 and spring 2013 combined (and, therefore, without regard to added variables identified only in spring 2013 delivery), students in the on-campus setting are found to use interactive delivery techniques more fully than those who take the course online (see Table 7). We collect data from students in the opening survey by asking them to "indicate your willingness to use interactive delivery features in the course". The coefficient estimate of campus variable is .764 which is significant at a .025 level. This positive coefficient means that on-campus students are more willing to use the technological features than the online students, after controlling for student age which may be a confounding factor. This seemingly counter-intuitive result is supported by observations (to end of quarter surveys) provided by students in the online setting indicating that such students in general have a less favorable perception of the value of technology to their educational needs. There is an apparent irony in this observation given that these students have enrolled in an online course. Intuition suggests that students would understand the "need" to apply technology in an online format. Our preliminary analysis indicates, nonetheless, that they do not necessarily prefer to do so.

Insert Table 7 here.

H_4: students with different learning preferences (as measured with VARK) will perform equally well on course performance measures (stated in null).

Table 7
Analysis of Variance on students' willingness to use technology in Fall/Spring Combined

Dependent Variable: Willingness					
Variables	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	103.579[a]	8	12.947	8.009	**.000**
Intercept	10.430	1	10.430	6.452	**.014**
AgeGroup	2.792	1	2.792	1.727	**.193**
Gender	.030	1	.030	.019	**.891**
Fulltime	.358	1	.358	.222	**.639**
OnlineEXP	1.018	1	1.018	.630	**.430**
OnlineRating	.313	1	.313	.193	**.662**
GPA	.357	1	.357	.221	**.640**
ComputerSkills	61.928	1	61.928	38.308	**.000**
Campus	8.275	1	8.275	5.119	**.027**
Error	103.462	64	1.617		
Total	5818.000	73			
Corrected Total	207.041	72			

Notes: [a] R squared= .500 (adjusted R squared= .438)

Dependent Variable: Willingness				
Campus	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
0	8.332[a]	.243	7.846	8.818
1	9.107[a]	.211	8.684	9.529

Notes: a. Covariates appearing in the model are evaluated at the following values: AgeGroup= 2.59, Gender= 1.41, Fulltime= 2.01, OnlineEXP= .88, OnlineRating= 2.55, GPA= 1.74, and ComputerSkills= 7.48.

Students were asked first to note their preferences using VARK questionnaire. Students in both blended and online courses completed the VARK online survey and self-reported their VARK learning preferences information to us as noted above. VARK= 1 for visual, = 2 for aural, = 3 for read-write, = 4 for kinesthetic and = 5 for multimodal. Brief explanations of the three VARK preferences are described below.

1. Visual: these learners best internalize and synthesize information when it is presented to them in a graphic depiction of meaningful symbols. They may respond to arrows, charts, diagrams and other visualizations of information hierarchy, but not necessarily to photographs or videos.[1]
2. Aural: these learners are most successful when they are given the opportunity to hear information presented to them vocally.[2]
3. Read-Write: these learners prefer information to be displayed as words. This preference emphasizes text-based input and output.
4. Kinesthetic: these learners prefer hands-on learning experience and practice (i.e., simulations or real-world experience).
5. Multimodal: these learners adapt to the teaching/learning experience being used by the instructor. Multimodal learners tend to use all VARK learning preferences as needed.

[1] Retrieved on July 1, 2019, from vark-learn.com/introduction-to-vark/the-vark-modalities/.
[2] Retrieved on July 1, 2019, from medium.com/@homespunandhandson/vark-learning-styles-the-auditory-learner-90ce0fd434ed.

Table 8 summarizes VARK preference data self-reported by students for fall quarter 2012. The columns to the right note their subsequent response with regard to whether they agreed with the profile generated for them. Table 9 shows the distribution of different learning styles measured by VARK in the blended and online courses for spring quarter 2013. For both rounds of data collection, we observe majority of students enrolled in both type of course delivery is multimodal learners. This is consistent with the fact that multimodal learners are the most popular population-wise.

Table 8
VARK Preferences Self-Reported by Students in Fall Quarter 2012

	VARK Preferences					Self-Perception of VARK Results		
Course	**Visual**	**Aural**	**Read-Write**	**Kinesthetic**	**Multimodal**	**Like Me**	**Not Me**	**Not Sure**
Campus	0%	5%	21%	16%	58%	69%	5%	26%
Online	5%	0%	15%	10%	70%	55%	5%	40%

Table 9
VARK Preferences Self-Reported by Students in Spring Quarter 2013

	VARK Preferences					Self-Perception of VARK Results		
Course	**Visual**	**Aural**	**Read-Write**	**Kinesthetic**	**Multimodal**	**Like Me**	**Not Me**	**Not Sure**
Campus	10%	15%	10%	20%	45%	75%	0%	25%
Online	7%	0%	27%	13%	53%	73%	0%	27%

Intuitively, we understand that all students do not perceive and process information in the same ways. VARK supports this understanding. Therefore, we would not expect course performance measures to be identical across all VARK preferences.

In testing for H_4, we use spring 2013 data sample, controlling for SAT and TimeSpent, Table 10 shows that the interaction between campus and VARK is significant with p-value= .018. This means that different learning style perform differently in different delivery mode. To understand how students with different learning style perform in each delivery mode, we compared the mean value of performance by VARK and by delivery mode. Table 11 shows that in the blended setting, Visual and Aural students learn better than other types, while in the online setting, the read-write, kinesthetic and multimodal students equally outperform other types. We observe two diverging groups of learning style dynamics. The first group includes Visual and Aural students who performed way better in the blended course than in the online course. The second group includes read-write, kinesthetic and multimodal students. They seem to learn much better in the online format than in the blended format. The online course delivery is text heavy and is lacking human interaction which explains why Visual and Aural students perform poorly in that environment. Read-write and multimodal students are better at handling texts which make them successful for online learnings. In addition, the online learnings format involves interactive problem solving features that may be to the liking of those kinesthetic students. The findings are insightful for future course design and education administration. Knowing the demand of different learning formats before enrolling in the course allow students to optimize their learning effect.

Insert Table 10 here.

H_5: students with different learning preferences (as measured with VARK) will perceive the blended and online deliveries to be equally favorable in improving their computer skills (stated in null).

Table 10
VARK Preferences, Delivery Mode and Performance in Spring Quarter 2013

Dependent Variable: Performance					
Variables	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	192.793[a]	16	12.050	3.297	.008
Intercept	2.556	1	2.556	.699	.414
AgeGroup	25.887	1	25.887	7.084	.016
Gender	.873	1	.873	.239	.631
Fulltime	29.697	1	29.697	8.127	.011
OnlineEXP	61.202	1	61.202	16.748	.001
OnlineRating	78.526	1	78.526	21.488	.000
TimeSpent	35.563	1	35.563	9.732	.006
SAT	.225	1	.225	.061	.807
Willingness	5.375	1	5.375	1.471	.241
Campus	.522	1	.522	.143	.710
VarK	20.962	4	5.240	1.434	.263
Campus*VarK	47.995	3	15.998	4.378	.018
Error	65.778	18	3.654		
Total	490.000	35			
Corrected Total	258.571	34			

Notes: [a] R squared= .746 (adjusted R squared= .519)

Table 11
VARK Preferences, Delivery Mode and Performance in Spring Quarter 2013

Dependent Variable: Performance					
Campus	**VarK**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	**Upper Bound**
0	1	5.200[a]	1.639	1.756	8.644
	2	4.097[a]	1.315	1.335	6.860
	3	.828[a]	1.210	-1.714	3.370
	4	-.817[a]	1.033	-2.987	1.354
	5	1.793[a]	.832	.045	3.541
1	1	-2.622[a]	2.116	-7.068	1.823
	2	.[a,b]	.	.	.
	3	3.333[a]	1.361	.473	6.193
	4	3.459[a]	1.745	-.208	7.126
	5	4.384[a]	.827	2.645	6.122

Notes:

a. Covariates appearing in the model are evaluated at the following values: AgeGroup= 2.91, Gender= 1.49, Fulltime= 2.51, OnlineEXP= .91, OnlineRating= 3.80, TimeSpent= 2.83, SAT= 5.17, and Willingness= 8.80.

b. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.

The end-of-course satisfaction survey asks students to what extent they felt the technology features used in the course help enhance their computer skills on a scale between 0 and 100. Combined sample data of both fall 2012 and spring 2013 are used to examine the relationship between VARK learning style and student's perception about the course in improving their computer skills. Table 12 part 1 reports a significant p-value= .056 interactions between campus and VARK, suggesting that different learning styles perceive differently about their amount of computer skills improvement in different delivery modes. Campus variable is not significant (P-value= .356) meaning that

students in both setting have perceived equally favorable about the improvement in their computer skills, with the mean perception of 3.416 for online and 3.916 for blended. Specifically, Table 12 part 2 shows that in the blended setting (campus= 1), kinesthetic students had a mean perception score of 3.11, which is significantly less than the other four types of students. In the online setting (campus= 0), visual (mean perception of computer skill enhanced= 4.016) and kinesthetic (mean perception of computer skill enhanced= 4.124) students both perceive computer skill enhancement more favorably than the other three types. In comparing the same learning style across the two delivery modes, we find that kinesthetic and multimodal students think they have acquired more computer skills in the blended delivery than in the online delivery. It is not surprising that multimodal students have enhanced use of technology in online setting due to their balanced and versatile ability to thrive in new learning environment. We argue that the hand-on characteristic of the kinesthetic allow them to restlessly explore the technology application in an online setting. Particularly when there is no human guidance, their hand-on ability makes them to try and figure out how to use the technology feature without the guidance of human instruction. This finding support the idea that kinesthetic and multimodal students may be the fastest master of technology in an online setting. Table 12 part 4 reports that overall across both settings, Visual and Aural students perceive the enhancement of their computer skills more positively than the other three type of learning styles while Read-Write students perceive the enhancement to be the least positive. Kinesthetic and multimodal students are in the middle. It is consistent with the fact that the design of the course that incorporates heavily new technologies which appeal to Visual and Aural learners.

Table 12

VARK Preferences, Delivery Mode and Computer Skills Enhanced in Fall/Spring Quarters Combined

Part 1					
Dependent Variable: ComSkillEnhanced					
Variables	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	45.997[a]	14	3.286	2.609	.006
Intercept	8.274	1	8.274	6.569	.013
AgeGroup	.120	1	.120	.095	.759
Gender	3.342	1	3.342	2.653	.109
Fulltime	1.439	1	1.439	1.142	.290
OnlineEXP	.014	1	.014	.011	.918
OnlineRating	6.024	1	6.024	4.783	.033
GPA	2.077	1	2.077	1.649	.205
Campus	1.091	1	1.091	.866	.356
VarK	1.971	4	.493	.391	.814
Campus*VarK	10.091	3	3.364	2.671	.056
Error	69.274	55	1.260		
Total	1001.000	70			
Corrected Total	115.271	69			

Notes: [a] R squared= .399 (adjusted R squared= .246)

To be continued Table 12.

Part 2

Dependent Variable: ComSkillEnhanced

Campus	VarK	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
	1	4.016[a]	1.169	1.674	6.358
	2	.[a,b]	.	.	.
0	3	2.615[a]	.525	1.563	3.667
	4	4.124[a]	.586	2.949	5.298
	5	2.909[a]	.259	2.389	3.429
	1	4.003[a]	.696	2.607	5.399
	2	4.299[a]	.577	3.142	5.456
1	3	4.063[a]	.436	3.189	4.938
	4	3.110[a]	.486	2.136	4.085
	5	4.105[a]	.269	3.566	4.645

Notes:

a. Covariates appearing in the model are evaluated at the following values: AgeGroup= 2.53, Gender= 1.43, Fulltime= 2.01, OnlineEXP= .89, OnlineRating= 2.50, and GPA= 1.74.

b. This level combination of factors is not observed, thus the corresponding population marginal mean is not estimable.

Part 3

Dependent Variable: ComSkillEnhanced

Campus	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
0	3.416[a,b]	.354	2.708	4.125
1	3.916[a]	.222	3.471	4.362

Notes:

a. Covariates appearing in the model are evaluated at the following values: AgeGroup= 2.53, Gender= 1.43, GPA= 1.74, Fulltime= 2.01, OnlineEXP= .89, and OnlineRating= 2.50.

b. Based on modified population marginal mean.

Part 4

Dependent Variable: ComSkillEnhanced

VarK	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4.010[a]	.662	2.683	5.336
2	4.299[a,b]	.577	3.142	5.456
3	3.339[a]	.337	2.664	4.014
4	3.617[a]	.366	2.883	4.351
5	3.507[a]	.179	3.149	3.866

Notes:

a. Covariates appearing in the model are evaluated at the following values: AgeGroup= 2.53, Gender= 1.43, GPA= 1.74, Fulltime= 2.01, OnlineEXP= .89, and OnlineRating= 2.50.

b. Based on modified population marginal mean.

V. CONCLUSION

In summary, we find that students taking an online course perform better than students taking a blended face-to-face course after controlling for age, gender, their previous experience and perception with online learning, aptitude and motivation. In particular, we find that the driving factors for better performance in addition to delivery mode, student's prior experience with online learning, their positive perceptions about online learning and the amount of time they spent in the coursework to be the driving

factors to student success. These are consistent to findings in prior literature. The results of the quasi-experiment provide evidence that a well-designed and well-delivered course that is built upon technology applications is able to achieve at least the same or even better learning outcome to university students. This gives guidance to education policy makers who advocate for online education. The key success factors for online education is to provide trainings to students on technology application, help them be familiar and comfortable with the online learning environment. Since the time spent on coursework is an important driving factor for success, instructors should design the course to best engage students in online activities.

We also find that younger students perceive the technological application features to be more favorable in enhancing their learning than do older students. In particular students younger than 29 years value the contribution of technology to their learning more than other age groups. This finding supports the current trend of increasing online delivery for higher education in that college-aged students are suitable target for online learning.

Another finding is students in blended class are more willing to use the technology features than students in the online class. We conjecture that students in the traditional program have less opportunity to play the new online stuff and are less bored by the technology than the students who enrolled in a straight online program. Thus students in the blended class would be more willing to use technology.

Finally we find the students' learning styles play a role for their success in different delivery mode. Students' performance diverges between the Visual/Aural and Read-Write/Kinesthetic/Multimodal groups. Visual/Aural students perform better in the blended format that provides more human interaction. Read-Write/Kinesthetic/Multimodal students perform better in the online format that is text-heavy. These findings shed light for students and higher education administers. Administers can better assist students in choosing their course format by asking them to take a learning style assessment. Students will have a better guidance in planning course work knowing their learning style and what types of courses are more attractive to them.

We also report that students with different learning styles perceive the technology features enhance their computer skills to different degrees. Some learning styles gain more computer skills than others do. For example, Kinesthetic and Multimodal students think they have acquired more computer skills in the blended delivery than in the online delivery. In the blended setting kinesthetic students perceive their computer skill enhancement to be significantly less than the other four types of students. In the online setting, Visual and Kinesthetic students both perceive computer skill enhancement more favorably than the other three types. We argue that the hand-on characteristic of the Kinesthetic allow them to restlessly explore the technology application in an online setting. Particularly when there is no human guidance, their hand-on ability makes them try and figure out how to use the technology feature without the guidance of human instruction. This finding support the idea that Kinesthetic and Multimodal students may be the fastest master of technology in an online setting.

Our "conclusions" can be only tentative at this point. Nonetheless, the real promise here is to provide additional evidence that should prove to be relevant to a wide range of stakeholders in the teaching/learning process. Such stakeholders include fellow educators who are concerned about the ability of faculty members to develop analogous delivery approaches that can be used effectively in both blended/face-to-face blended and online settings. The findings in this research are insightful and relevant for the COVID-19 pandemic era when many courses are forced to be straightly online due to

lockdowns. The course design that incorporates warmth continuum using technologies allow instructors and students achieve maximum learning effectiveness in online courses. Future research may focus on investigating whether students' perceptions regarding online learning change after the COVID-19 intensive online experience. When students are not be able to choose the learning mode based on their learning preference, what kind of students are successful adapting to online environment and what kind of students are having big challenges?

Results can be helpful also in guiding faculty members who seek to further their abilities to employ technology more fully as well as to administrators and policy makers with regard to many important issues. These include accreditation quality standards for course delivery, scheduling faculty assignments for blended and online settings, and for future course or program development planning purposes.

REFERENCES

AACSB International. (2007). *Quality issues in distance learning*. Retrieved April 2, 2021, from http://www.aacsb.edu/publications/whitepapers/quality-issues-distance-learning.pdf.

Accounting Education Change Commission (AECC). (1990, August). *Issues statement no. 1: AECC urges priority for teaching in higher education*. Torrance, CA: AECC.

American Institute of Certified Public Accountants (AICPA). (1999). *AICPA core competency framework for entry into the accounting profession*. New York, NY: AICPA.

Ball, D., Beard, J., & Newland, B. (2007). E-books and virtual learning environments: Responses to transformational technology. *The Acquisitions Librarian*, *19*(3-4), 165-82.

Beard, J., & Ball, D. (2008). Reshaping the future. *Liber Quarterly*, *18*(2), 199-208.

Bonk, C. J., & Graham, C. R. (2006). *Handbook of blended learning: Global Perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Brabazon, T. (2007). *The university of google: Education in the (post) information age*. Guildford: Ashgate.

Gloria, A. M., & Uttal, L. (2020). Conceptual considerations in moving from face-to-face to online teaching. *International Journal on E-Learning*, *19*(2), 139-159. Waynesville, NC USA: Association for the Advancement of Computing in Education (AACE). Retrieved May 4, 2021 from https://www.learntechlib.org/primary/p/184150/.

Güneya, A. (2014). Role of technology in accounting and e-accounting. *Procedia - Social & Behavioral Sciences*, 152, 852-855. Https://doi.org/10.1016/j.sbspro.2014.09.333.

Heppel, S., Chapman, C., Millwood, R., Constable, M., & Furness, J. (2004). *Building learning futures. A research project at Ultralab within the CABE/RIBA "building futures" programme* (pp. 1-46). Retrieved July 24, 2021 from http://rubble.heppell.net/cabe/final_report.pdf.

Lillie, R. E., & Wygal, D. (2011, March). Virtual office hours (VOH) in accounting coursework: Leveraging technology to enhance an integrative learning environment. *Journal of Accounting Education*. 29(1), 1-13. Https://doi.org/10.1016/j.jaccedu.2011.10.002.

Marcy, V. (2001). Adult learning styles: How the VARK© learning style inventory can be used to improve student learning. *The Journal of Physician Assistant Education*, *12*(2), 117-120. Http://dx.doi.org/10.1097/01367895-200107000-00007 and https://vark-learn.com/wp-content/uploads/2014/08/VanessaMarcy.pdf.

Morineau, T., Blanche, C., Tobin, L., & Guéguen, N. (2005). The emergence of the contextual role of the e-book in cognitive processes through an ecological and functional analysis. *International Journal of Human–Computer Studies*, *61*(3), 329-348. Https://doi.org/10.1016/j.ijhcs.2004.10.002 and https://www.sciencedirect.com/science/article/abs/pii/S1071581904001089.

Newland, B., Jenkins, M., & Ringan, N. (2006). Academic experiences of using VLEs: Overarching lessons for preparing and supporting staff (pp. 34-50). In John O'Donoghue (Ed.), *Technology supported learning and teaching: A staff perspective,* John. Hershey, Pennsylvania, USA: Information Science Publishing. Retrieved on October 19, 2023 from https://www.igi-global.com/chapter/academic-experiences-using-vles/30229.

Oblinger, D., & Oblinger, J. (2005). Is it age or IT: First steps toward understanding the net generation? In D. G. Oblinger & J. L. Oblinger (Ed.), *Educating the net generation. Educause.* Retrieved October 19, 2023, from http://www.educause.edu/educatingthenetgen/.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, *9*(5), 1-6. Https://doi.org/10.1108/10748120110424816.

Vasarhelyi, M. K., Teeter, R. A., & Krahel, J. P. (2010). Audit education and the real time economy. *Issues in Accounting Education*, *25*(3), 405-423. Https://doi.org/10.2308/iace.2010.25.3.405 and https://publications.aaahq.org/iae/article-abstract/25/3/405/7770/Audit-Education-and-the-Real-Time-Economy?redirectedFrom=fulltext.

Walton, G. (2006). Learners' demands and expectations for space in a university library: Outcomes from a survey at Loughborough university. *New Review of Academic Librarianship*, *12*(2), 133-49. Https://doi.org/10.1080/13614530701330430 and https://www.tandfonline.com/doi/abs/10.1080/13614530701330430.

Windham, C. (2005). Father google and mother IM: Confessions of a net gen learner. *Educause Review, 40*(5), 43-44. Https://www.learntechlib.org/p/99185/.

Zawacki-Richter, O., Bäcker, E. M., & Vogt, S. (2009). Review of distance education research (2000-2008): Analysis of research areas, methods, and authorship patterns. *The International Review of Research in Open & Distance Learning (IRRODL)*, *10*(6), 21-50. Http://www.irrodl.org/index.php/irrodl/article/view/741/1461.

Appendix

The instructional design and the type of technology applications used in the course is explained in the below appendix.

Practical Approach to Instructional Design

This section of the paper shares highlights of the instructor's approach to instructional design for accounting courses.

Blended learning is defined by Bonk and Graham as the combination of face-to-face instruction with computer-mediated instruction (Bonk & Graham, 2006).

Overall Course Design

The instructor had already developed and successfully taught several undergraduate accounting courses at both campuses. Since this research project focuses on teaching intermediate accounting 3, the third course in the intermediate accounting sequence, this course is used for illustration purposes in this discussion.

The instructor's challenge was to modify course design to simultaneously fit learning needs of two diverse groups of undergraduate accounting students (i.e., traditional and fully online). Once designed and tested, the instructor applied the modified course design to other courses taught at both campuses.

Figure 2 depicts the general design of the instructor's intermediate accounting 3 course. The diagram includes both content and activity areas. To understand the flow of the teaching-learning experience, move left-to-right across the area titles (e.g. set the tone, guidance, etc.). Titles identify the learning objective of the area. The information box below the area title briefly describes the learning activity that takes place at the step in the overall teaching-learning experience.

Figure 2

Overall Organization/Design of Intermaediate Accounting 3

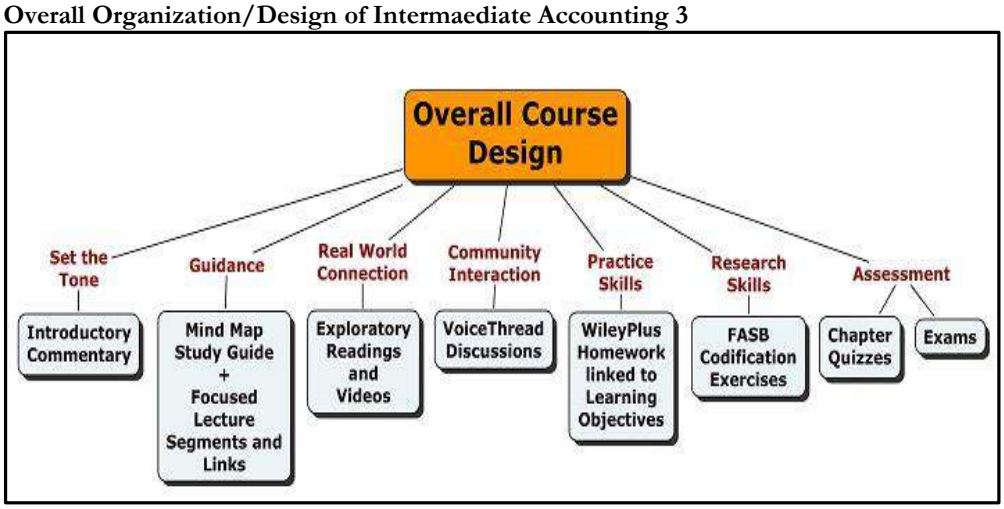


Figure 3

A Comparison between Face-to-Face, Blended and Online Delivery Modes

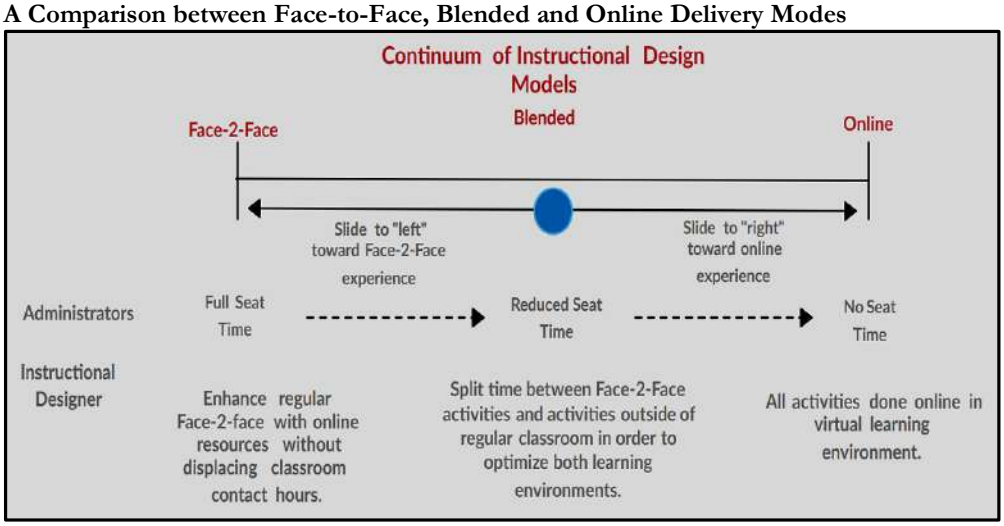


Figure 4
Moving along the Warmth Continuum and the use of Technology Tools

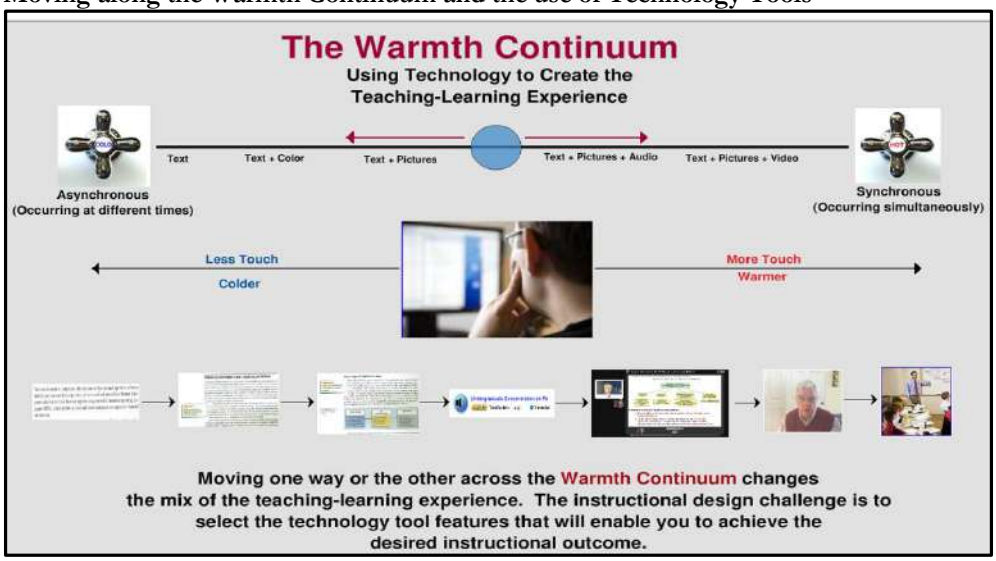


Figure 5
Course Delivery Components of Intermediate Accounting 3 Course

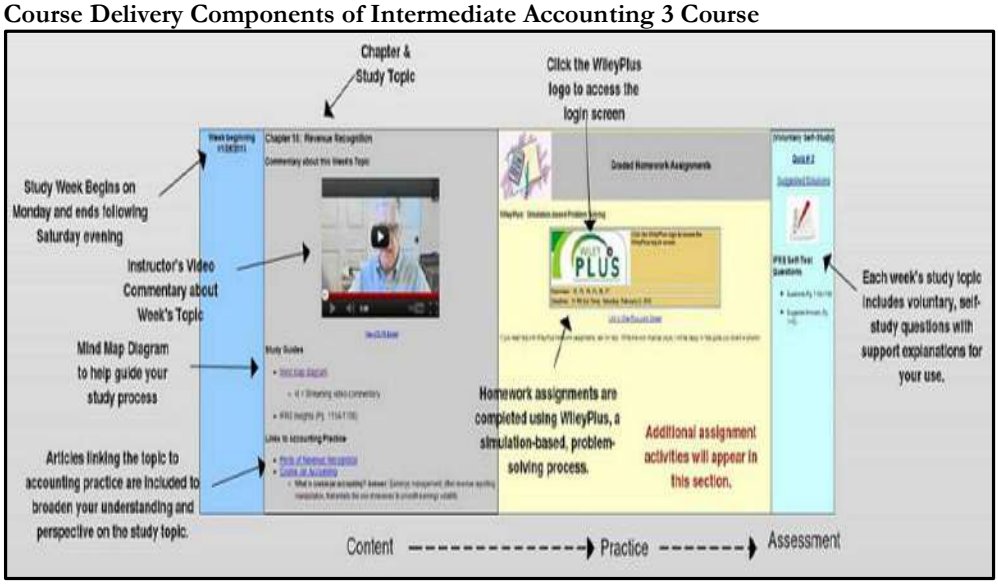


Figure 6
An Example of Mindmap Display