

## **ADAPTABILITY AND REPLICABILITY OF WEB-FACILITATED, HYBRID, AND ONLINE LEARNING IN AN UNDERGRADUATE EXERCISE PSYCHOLOGY COURSE**

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### **ABSTRACT**

The study aims to examine the effectiveness of web-facilitated, hybrid, and online learning modalities among undergraduate students in a public institution so as to determine the adaptability and replicability of these three learning modalities. This is a quasi-experimental study. A total of 103 undergraduate exercise science majors participated in the study. Students' learning outcomes were measured by mid-term exams, final exams, online journal entries, final course grades, and other in-class and online assignments, and compared among the web-facilitated, hybrid, and online course sections. The differences of the means of the three sections of the final exam, final course grade, and final letter grade were statistically significant. The mean scores of the final exam of the web-facilitated section were significantly higher than the means of both the hybrid and online sections. The means of the final course grade and final letter grade of the web-facilitated section were significantly higher than the means of the online section. Approximately 82.1% of the students in the web-facilitated section earned extra credits compared to about 37.5% of the students in the online section. Web-facilitated learning proved more desirable among undergraduate students than the other two modalities; hybrid learning, however, can serve as a viable alternative.

**Keywords:** Web-facilitated, Hybrid, Online Learning, Undergraduate, Exercise Psychology

### **INTRODUCTION**

According to the report, "Trends in Global Distance Learning," given the current growing demands in globalization in higher education and the revival of a global economy, the market for distance learning has been continuously prosperous and expanding (Hanover Research, 2011). Institutions of higher education are using various content delivery methods, including traditional face-to-face courses, hybrid or web-facilitated courses, and entirely online courses to address the needs of their students. By definition, a traditional course is typically taught face to face without using any online technology; web-facilitated courses use web-based technology, such as web-based learning management systems or electronic student response systems, up to 29% of the time to enhance classroom experiences and interactions; hybrid course formats typically utilize online or virtual capabilities 30-74% of the time, with a substantial portion of course content delivered through web-based software; and at least 75% of the coursework of an online course is delivered via web-based learning, and typically requires few to no face-to-face meetings (Allen & Seaman, 2004; Collopy & Arnold, 2009; Southern Illinois University Edwardsville, 2014).

Compared to the United Kingdom, distance learning has been more commonly applied to undergraduate education in the United States. But, trends indicate that the majority of fully online programs still target graduate or professional degree-seeking students. During the 2006-2007 academic year, among all fully online programs offered in the U.S., 41% were undergraduate degree programs, and 22% were undergraduate certificate programs. Larger-sized and/or 2- or 4-year public institutions were more likely to offer online/hybrid programs than smaller-sized and/or private institutions. Approximately 87% of 600 4-year public institutions and 93% of 500 institutions with enrollments of 10,000 or more students in the U.S. offered online, hybrid, or other format of distance learning courses (Hanover Research, 2011; National Center for Education Statistics, 2008). Though health professions and related science programs demonstrated the lowest enrollments of distance learning overall in 2009-2010, they also had the lowest decline in enrollment, when compared with other programs, including liberal arts and sciences, social sciences, psychology, business, education, computer, and engineering during that

same period (Hanover Research; National Center for Education Statistics). A 2012 study of over 210,000 undergraduates from the U.S and 13 countries, found that the students overall favored the use of information technology to facilitate learning (Dahlstrom, Walker, & Dziuban, 2013). They believed that information technology provided them with more opportunities to succeed and increased their likelihood of achieving success in the future. Further, the findings indicated that students appreciated that technology could provide availability and accessibility of various communication methods to meet the needs of a diverse learning population. (Dahlstrom, 2012; Dahlstrom, Walker, & Dziuban, 2013).

Over the past two decades, research regarding the effectiveness of web-based learning in diverse disciplines has increased dramatically. A majority of these studies have compared the effectiveness of traditional learning with either hybrid or online learning. One example is a six-semester long study at a large urban university, wherein the researcher compared exam and final grades of over 300 students enrolled in a traditional face-to-face exercise physiology lecture-style class with those who enrolled in its comparable hybrid online format (McFarlin, 2008). The results of this study found that the students enrolled in the hybrid class sections had significantly higher final grades than those enrolled in the traditional class. Similar results were found in two experimental studies conducted by Vernadakis, et al. (2011) with 172 freshmen in a computer science course and Melton, Graf, and Chopak-Foss (2009) with 251 undergraduates in a general health course. The students enrolled in the hybrid classes achieved higher grades than the students enrolled in the traditional classes. Moreover, several studies examined undergraduate student satisfaction in comparison to course delivery format. In general, these data indicate higher or equal overall student satisfaction with course quality and/or instructor-student interactions in either online or in a hybrid format in comparison to a traditional delivery format (Callaway, 2012; Campbell, Floyd, & Sheridan, 2002; Melton, Graf, & Chopak-Foss, 2009). Hybrid or online course delivery formats can appeal to students who are seeking some flexibility in their class schedule, or new ways of engaging in a class. In an attempt to increase attendance in large introductory natural resources and life sciences classes, Riffell and Sibley (2004) developed a hybrid introductory environmental science undergraduate course, which integrated the strengths of both traditional and online teaching. In this hybrid format, they replaced typical lectures, which were routine in the traditional format class, with online assignments. Using an experimental study design, they found that the students enrolled in their hybrid sections were more engaged, as measured by having a higher completion rate of online assignments than the class attendance rate of passive lectures among the students enrolled in their traditional sections.

Evidence concerning the effectiveness of online/hybrid learning, however, has been controversial. The debate regarding the assessment of outcomes of the formats is ongoing. Grades and academic performance are standard measurements that can be readily compared across platforms, while instructional effectiveness must also be examined. However, given the current emphasis on enrollment and retention among many institutions, student satisfaction cannot be ignored. Interestingly though, when compared with graduate students, undergraduates are more likely to prefer a traditional or hybrid learning format, rather than a fully online mode of delivery (Castle & McGuire, 2010). Scherrer (2011) compared traditional, hybrid, and online deliveries of an undergraduate introductory statistics course in the areas of the students' academic performance, assignment completion, and overall course satisfaction. The participants were overwhelmingly juniors and seniors majoring in industrial engineering, management, and information technology/computer science. Grades from mid-term exams, final exams, homework assignments, and instructors' course evaluations were used as measures. Results suggested that the students in the traditional section outperformed the students in both hybrid and online sections, and that the students were more likely to complete homework assignments. Instructors' course evaluations for the online section were the least favorable, while "responses for the traditional and hybrid sections were almost identical" (p.109). O'Brien, et al. (2011) studied how course delivery methods determined students' performance, as well as their perceptions of instructional effectiveness, and preparation for being future special education teachers. At this large public institution, 159 undergraduate education majors enrolled in a large traditional lecture section of an *Introduction to Students with Special Needs* class, while 69 students enrolled in a hybrid section, and 69 students in a fully online section. Results of this study found that students in the traditional section demonstrated a higher comfort-level in working with students with disabilities than the students in both the hybrid and online sections. Further, students in both the traditional and hybrid sections demonstrated greater confidence of success as future special education professionals. There was no significant difference suggested regarding the students' perceptions of effectiveness and usefulness of the three instructional strategies. These findings were consistent with several other studies among other disciplines (Castle & McGuire, 2010; Lovern, 2010; Mottarella, Fritzsche, & Parrish, 2004).

Given the inconsistency of current literature, and the paucity of research to demonstrate the value of hybrid or online learning among undergraduate students at public institutions (e.g., Collopy & Arnold, 2009; Scherrer, 2011), the proposed study aims to further examine the effectiveness of three learning modalities: web-facilitated,

hybrid, and online, for an undergraduate upper-level exercise psychology course in order to determine the adaptability and replicability of the course format.

**THE STUDY**

**Study Design**

The current quasi-experimental study evaluated and compared the effectiveness of three learning models (e.g., web-facilitated, hybrid, and online) of an upper-level undergraduate exercise psychology course taught at a 4-year public university located in the mid-west. Approximately 90% of the total 11,759 undergraduate population at the institution are residents of Illinois (Southern Illinois University Edwardsville, 2014). The course was designed to provide an overview of the major psychological determinants and consequences of exercise, as well as its impact on public health. Three sections of this class, which is required for all exercise science majors, were taught by the same instructor over the course of three semesters; the spring 2013 section was web-facilitated, the summer 2013 section was offered as a hybrid course, and the spring 2014 section was taught as an online class. The web facilitated section met face to face in class three hours each week, and used Blackboard Learning Management System (Blackboard 9.0 version) as an enhancement to the class; assignments, additional readings and other materials were provided to students through Blackboard to supplement traditional, in-class instruction. The hybrid section included 65% of coursework spent in a traditional face-to-face class setting, while additional web-facilitated lectures, assignments and activities were conducted using Blackboard. No face-to-face interactions were conducted for the online class, and all assignments, lectures and activities were presented via Blackboard.

All students self-enrolled into one of the three sections. All three class sections aimed to achieve the four common course objectives using the same textbook and the same or equivalent assignments and class activities. The overall objectives of the classes were: (1) understand the theories of the epidemiology of exercise behavior and their application for successful behavior modification; (2) compare and understand the various models of behavioral management strategies and techniques involved in exercise maintenance; (3) explain the role of exercise psychology in the adoption and adherence of physical activity; and (4) identify the numerous psychosocial antecedents and consequences of exercise behavior.

**Subjects**

A total of 103 undergraduate students, majoring in exercise science, at Southern Illinois University Edwardsville enrolled in one of the three sections and participated in this study. Sixty-two students were females, and 41 were males. About 66.7% of the students were seniors, and 25.6% were juniors. About 76.9% of the participants were White. The students’ overall average cumulative Grade Point Average (GPA) was 3.22 on a 4.0 scale. There was no statistically significant difference among GPAs of students enrolled in each of the three sections ( $p = .65$ ). Thirty-nine students enrolled in the web-facilitated section, 24 in the hybrid section, and 40 in the online section. Table 1 indicates the breakdown of the students’ characteristics for each section.

Table 1 Students’ Characteristics (Percentage in the Parentheses)

Characteristics	Web-facilitated (n=39)	Hybrid (n=24)	Online (n=40)
Gender			
Male	13 (33.3)	9 (37.5)	19 (47.5)
Female	26 (66.7)	15 (62.5)	21 (52.5)
Race			
White	30 (76.9)	18 (75.0)	32 (80.0)
Black	4 (10.3)	2 (8.3)	5 (12.5)
Hispanic/Latino	4 (10.3)	1 (4.2)	1 (2.5)
Multiethnic	0	2 (8.3)	2 (5.0)
Unreported	1 (2.6)	1 (4.2)	0
Year in school			
Freshmen	0	0	0
Sophomore	3 (7.7)	3 (12.5)	2 (5.0)
Junior	10 (25.6)	9 (37.5)	8 (20.0)
Senior	26 (66.7)	12 (50.0)	30 (75.0)
Average GPA	3.26	3.21	3.19

**Measures**

The effectiveness of the three learning models was evaluated by both the students’ academic achievement and their motivation for learning. Students’ academic achievement was measured using grades from mid-term exams, final exams, a total of four online journal entry assignments, a combined total of mid-term and final exams plus

four journal entry assignments, the final course grades, and the final letter grade earned for all three sections. Table 2 describes these six common measures and the instructor’s instructions for the students. Table 3 describes the measures for the activities that are common for either web-facilitated and hybrid sections or hybrid and online sections. In addition, assignment completion and rates of submission of extra credit assignments were determinants used to measure students’ level of motivation.

Table 2 Measures and Instructions for All Three Sections (Maximum Points in the Parentheses)

Measures	Web-facilitated	Hybrid	Online
Mid-term exam	There will be one mid-term examination. The exam will include multiple-choice, fill in the blank responses, short answer and essay questions. You will be responsible for all material covered in the readings, lectures, discussions and class activities for the exam. (50 points)	There will be one mid-term examination. The exam will include multiple-choice, fill in the blank responses, short answer and essay questions. You will be responsible for all material covered in the readings, lectures, discussions and class activities for the exam. This will be taken online and is open book/open notes, however you are strictly prohibited from consulting other students, faculty, friends, family, colleagues, or any other human being regarding questions on the exam. The mid-term exam will be given via Blackboard on Friday, July 12. You must log in between midnight Thursday night, July 11 and midnight Friday night, July 12 to complete the mid-term exam. The exam will be timed, and you will have one hour to complete it. (50 points)	There will be one mid-term examination (administered on Blackboard). The exam will include multiple-choice, fill in the blank responses, short answer and one essay question. Students will be responsible for all material covered in the readings, lectures, discussions and activities for the exam. The exam will be administered online, and students will have one hour to complete the exam. (50 points)
Final exam	There will be a final comprehensive examination. The exam will include multiple-choice, fill in the blank responses, short answer and essay questions. It will largely cover material from chapters 8-15; but there will be one comprehensive final essay. You will be responsible for all material covered in the readings, lectures, discussions and class activities for the exam. (75 points)	There will be a final examination. The exam will include multiple-choice, fill in the blank responses, short answer and essay questions. It will largely cover material from chapters 8-15; but there will be one comprehensive final essay. You will be responsible for all material covered in the readings, lectures, discussions and class activities for the exam. This will be taken online and is open book/open notes, however you are strictly prohibited from consulting other students, faculty, friends, family, colleagues, or any other human being regarding questions on the exam. The final exam will be given via Blackboard. You must log in between midnight Wednesday, July 24 and 12:00 pm Friday,	There will be a final exam. The final exam will include multiple-choice, fill in the blank responses, short answer and one essay question. It will be administered on Blackboard and cover material from chapters 8-15, but there will be one comprehensive essay. The exam will be administered online, and students will have one hour and 15 minutes to complete the exam. (65 points)

Measures	Web-facilitated	Hybrid	Online
<p>Total of four online journal entries</p>	<p><b>Journal entry 1:</b> As you read chapter 1, reflect upon your career or future path ahead. In the profession that you hope to pursue, how will your knowledge of exercise psychology help you in your career? (10 points)  <b>Journal entry 2:</b> Read and reflect upon the theories described in your textbook in chapters 3 and 4. Describe how you might be able to utilize the Transtheoretical Model (TTM) in your future career. Provide an example of either recommendations that you could make to a patient/client at each of the five stages, or behavioral/attitude clues that would lead you to know which stage that a patient/client was moving through. (10 points)  <b>Journal entry 3:</b> Choose one of the following groups to target for increasing physical activity:            -College age students at SIUE            -Rural schoolchildren aged 6-10 for an after-school program            -New mothers            -Group of retired, and relatively healthy, men for a community center based program            -Diverse group of teenagers for a month long summer camp            -Hospital outpatient outreach program for those who have recently been diagnosed with Type 2 diabetes            Your task is to develop an intervention program for one of the above groups to increase physical activity. Use what you have learned in Chapter 6 to create a plan that will incorporate specific behavioral and social approaches to increase the group's physical activity. Include at least five specific intervention techniques, including both</p>	<p>July 26 to complete the final exam. The exam will be timed, and you will have one hour to complete it. (65 points)  <b>Journal entry 1:</b> As you read chapter 1, reflect upon your career or future path ahead. In the profession that you hope to pursue, how will your knowledge of exercise psychology help you in your career? (15 points)  <b>Journal entry 2:</b> Read and reflect upon the theories described in your textbook in chapters 3 and 4. Describe how you might be able to utilize TTM in your future career. Provide an example of either recommendations that you could make to a patient/client at each of the five stages, or behavioral/attitude clues that would lead you to know which stage that a patient/client was moving through. (15 points)  <b>Journal entry 3:</b> Choose one of the following groups to target for increasing physical activity:            -College age students at SIUE            -Rural schoolchildren aged 6-10 for an after-school program            -New mothers            -Group of retired, and relatively healthy, men for a community center based program            -Diverse group of teenagers for a month long summer camp            -Hospital outpatient outreach program for those who have recently been diagnosed with Type 2 diabetes            Your task is to develop an intervention program for one of the above groups to increase physical activity. Use what you have learned in Chapter 6 to create a plan that will incorporate specific behavioral and social approaches to increase the group's physical activity. Include at least five specific intervention techniques, including both behavioral and social</p>	<p><b>Journal entry 1:</b> As you read chapter 1, reflect upon your career or future path ahead. In the profession that you hope to pursue, how will your knowledge of exercise psychology help you in your career? (10 points)  <b>Journal entry 2:</b> Read and reflect upon the theories described in your textbook in chapters 3 and 4. Describe how you might be able to utilize TTM in your future career. Provide an example of either recommendations that you could make to a patient/client at each of the five stages, or behavioral/attitude clues that would lead you to know which stage that a patient/client was moving through. (10 points)  <b>Journal entry 3:</b> Choose one of the following groups to target for increasing physical activity:            -College age students at SIUE            -Rural schoolchildren aged 6-10 for an after-school program            -New mothers            -Group of retired, and relatively healthy, men for a community center based program            -Diverse group of teenagers for a month long summer camp            -Hospital outpatient outreach program for those who have recently been diagnosed with Type 2 diabetes            Your task is to develop an intervention program for one of the above groups to increase physical activity. Use what you have learned in Chapter 6 to create a plan that will incorporate specific behavioral and social approaches to increase the group's physical activity. Include at least five specific intervention techniques, including both behavioral and social</p>

Measures	Web-facilitated	Hybrid	Online
<p>behavioral and social approaches, to specifically target the group that you choose. Remember that these should be personally meaningful to the group members to be the most effective. You may use bullet points or number each intervention technique throughout your journal entry. (10 points)</p> <p><b>Journal entry 4:</b> Based on the information presented in Chapter 9, choose one of the scenarios listed below to design a program in which the individuals will feel comfortable and will lead to optimum adherence. What methods will you employ and why?</p> <p>1. You are a manager at a health club and wish to design a new "Get Fit, Get Moving" program that targets obese individuals who have little experience with working out.</p> <p>2. You are the coordinator of a community center sports program for middle school aged boys and girls. One of the goals of the program is to enhance body image through sport.</p> <p>3. You are working at a hospital as a community coordinator of health and wellness. The hospital administrator has asked you to create a 12 week exercise program aimed at women who have admitted to having low body image.</p> <p>4. As a university mental health counselor, your department has placed you in charge of implementing a program that addresses poor body image, including body dysmorphic disorder and health damaging behaviors. One facet of the program is a fitness program -- describe the program. (10 points)</p> <p>Total of mid-term, final, and</p>	<p>approaches, to specifically target the group that you choose. Remember that these should be personally meaningful to the group members to be the most effective. You may use bullet points or number each intervention technique throughout your journal entry. (15 points)</p> <p><b>Journal entry 4:</b> Based on the information presented in Chapter 9, choose one of the scenarios listed below to design a program in which the individuals will feel comfortable and will lead to optimum adherence. What methods will you employ and why?</p> <p>1. You are a manager at a health club and wish to design a new "Get Fit, Get Moving" program that targets obese individuals who have little experience with working out.</p> <p>2. You are the coordinator of a community center sports program for middle school aged boys and girls. One of the goals of the program is to enhance body image through sport.</p> <p>3. You are working at a hospital as a community coordinator of health and wellness. The hospital administrator has asked you to create a 12 week exercise program aimed at women who have admitted to having low body image.</p> <p>4. As a university mental health counselor, your department has placed you in charge of implementing a program that addresses poor body image, including body dysmorphic disorder and health damaging behaviors. One facet of the program is a fitness program -- describe the program. (15 points)</p> <p>A total grade of mid-term and final exams and four online journal entries (165 points)</p>	<p>approaches, to specifically target the group that you choose. Remember that these should be personally meaningful to the group members to be the most effective. You may use bullet points or number each intervention technique throughout your journal entry. (10 points)</p> <p><b>Journal entry 4:</b> Based on the information presented in Chapter 9, choose one of the scenarios listed below to design a program in which the individuals will feel comfortable and will lead to optimum adherence. What methods will you employ and why?</p> <p>1. You are a manager at a health club and wish to design a new "Get Fit, Get Moving" program that targets obese individuals who have little experience with working out.</p> <p>2. You are the coordinator of a community center sports program for middle school aged boys and girls. One of the goals of the program is to enhance body image through sport.</p> <p>3. You are working at a hospital as a community coordinator of health and wellness. The hospital administrator has asked you to create a 12 week exercise program aimed at women who have admitted to having low body image.</p> <p>4. As a university mental health counselor, your department has placed you in charge of implementing a program that addresses poor body image, including body dysmorphic disorder and health damaging behaviors. One facet of the program is a fitness program -- describe the program. (10 points)</p> <p>A total grade of mid-term and final exams and four online journal entries (155 points)</p>	

	Web-facilitated	Hybrid	Online
Measures			
online journal entries			
Final course grade	A total grade of all assignments, class activities, and exams. (300 points)	A total grade of all assignments, class activities, and exams. (300 points)	A total grade of all assignments, class activities, and exams. (285 points)
Final letter grade	A = 100-90% (300-269) B = 89-80% (268-239) C = 79-70% (238-209) D = 69-60% (208-179) F = 59% (178-0)	A = 100-90% (300-269) B = 89-80% (268-239) C = 79-70% (238-209) D = 69-60% (208-179) F = 59% (178-0)	A = 100-90% (285-256) B = 89-80% (255-227) C = 79-70% (226-199) D = 69-60% (198-170) F = 59% (169-0)

Table 3 Measures for Either Web-Facilitated and Hybrid Sections or Hybrid and Online Sections

	Web-facilitated	Hybrid	Online
Measures			
Total of two online activities	Not applicable	Physical activity epidemiology online activity (15 points) Personality and Exercise online activity (15 points)	Physical activity epidemiology online activity (10 points) Personality and Exercise online activity (10 points)
Total of two in-class activities	Transtheoretical Model in-class activity (10 points) Cognitive function in-class case study (10 points)	Transtheoretical Model in-class activity (10 points) Cognitive function in-class case study (10 points)	Not Applicable

### Procedures

All three class sections were taught by one instructor, who is a trained professional in both teaching pedagogy and exercise psychology. Blackboard 9.0 served as the intermediary platform for three learning models. Regardless of the learning models, all students completed the mid-term and final exams and four online journal entry assignments, which were almost identical for all three sections. Several other in-class assignments completed by the students enrolled in the web-facilitated section were also assigned to the students in the hybrid or online sections with modifications. In addition, the students enrolled in the online section participated in five Blackboard discussion postings during the semester. All students' grades were recorded via the student accessible grade book in Blackboard. The study was approved by the Institutional Review Board at Southern Illinois University Edwardsville.

### Analysis

SPSS statistics 19.0 software (IBM) was utilized for data analysis. Because of the slight variations of the grading scales used for some of the assignments/exams among web-facilitated, hybrid, and online sections, except for the mid-term exam scores, all other raw scores were converted into percentile scores to maintain consistency across all formats. Means and standard deviations were calculated for all the measures, including the GPA, the mid-term grade, the final exam grades, the total of four online journal entry assignment grades, the combined total of the mid-term, final exam, and four online journal entries, and the final course grade. One-way Analysis of Variance (ANOVA) was used to compare the means of the measures among all three sections, and then Tukey HSD post hoc tests were used to compare the means between sections. An independent-sample t-test was also used to compare the means for the assignments only common among the web-facilitated and hybrid sections or the hybrid and online sections. The statistical significance level of the *p* value is lower than 0.05 (one-tailed).

### FINDINGS

Table 4 presents the means and standard deviations for the measures applied to all three sections. Students in the web-facilitated section demonstrated higher grades, on average, on their final exams, total of four online journal entries, the combined total of the mid-term, final exams and four online journal entries, and the final course grade than those enrolled in the online section (.93 vs. .88, .93 vs. .91, .91 vs. .88, .95 vs. .89). The students enrolled in the hybrid section performed either the same as, or better than the students in the online section in all five measures (44.33 vs. 43.43, .88 vs. .88, .95 vs. .91, .90 vs. .88, .91 vs. .89). Compared to the other students in the study, those enrolled in the hybrid section achieved the highest average scores for both the mid-term exam and total of four online journal entries (44.33 and .95). However, overall, students in the web-facilitated section earned higher scores than the students in the hybrid section on their final exam, the combined total of mid-term,

final exams, and four online journal entries, and the final course grade (.93 vs. .88, .91 vs. .90, .95 vs. .91). In addition, more than 92.3% of the students in the web-facilitated section earned an overall grade of A, while 83.3% of the students in the hybrid section earned a grade of A, and only 62.5% in the online section earned a grade of A for the semester.

Table 4 Means and Standard Deviations of Measures for the Three Sections

	N	Mean	Standard Deviation
<b>Measures</b>			
<b>Mid-term exam</b>			
Web-facilitated	39	43.28	5.53
Hybrid	24	44.33	4.04
Online	40	43.43	4.60
<b>Final exam</b>			
Web-facilitated	39	.93	.05
Hybrid	24	.88	.08
Online	40	.88	.07
<b>Total of four online journal entries</b>			
Web-facilitated	39	.93	.12
Hybrid	24	.95	.15
Online	40	.91	.13
<b>Total of mid-term, final, and online entries</b>			
Web-facilitated	39	.91	.06
Hybrid	24	.90	.06
Online	40	.88	.06
<b>Final course grade</b>			
Web-facilitated	39	.95	.05
Hybrid	24	.91	.08
Online	40	.89	.08

Tables 5 and 6 present the results of the One-way ANOVA and multiple post hoc comparisons between means. Results suggest that there were statistically significant differences among the means of the three sections for the final exam, final course grade, and final letter grade ( $F(2,100) = 7.06, p < .05$ ,  $F(2, 100) = 7.32, p < .05$ ,  $F(2, 100) = 3.93, p < .05$ ). The mean of the final exam of the web-facilitated section was significantly higher than the means of both hybrid and online sections (mean difference = .05,  $p < .05$ , mean difference = .05,  $p < .05$ ). The means of the final course grade and final letter grade of the web-facilitated section were also significantly higher than the means of the online section (mean difference = .06,  $p < .05$ , mean difference = .42,  $p < .05$ ). The statistically significant differences among the means of three sections or between the means of any two of the three sections for the mid-term exam, the total of four online journal entries, and the combined total of the mid-term, final exams, and four journal entries were not revealed. Moreover, comparisons were also made between the means of the common activities applied to the web-facilitated and hybrid sections or hybrid and online sections only. No statistically significant differences were indicated.

Table 5 One-way ANOVA Comparing Means of Measures among the three sections

Measures	Sum of squares	df	Mean square	F	p value
<b>Mid-term exam</b>					
Between groups	18.04	2	9.02	.38	.68
<b>Final exam</b>					
Between groups	.06	2	.03	7.06*	.00
<b>Total of four online journal entries</b>					
Between groups	.02	2	.01	.62	.54
<b>Total of mid-term, final, and online entries</b>					
Between groups	.02	2	.01	2.22	.11
<b>Final course grade</b>					
Between groups	.08	2	.04	7.32*	.00
<b>Final letter grade</b>					
Between groups	3.53	2	1.77	3.93*	.02

\* indicates the statistical significance.



Table 6 Tukey HSD Post Hoc Multiple Comparisons of Means between Any Two of the Three Sections

Measures	Web-facilitated	Hybrid	Online
<b>Mid-term exam</b>			
Web-facilitated		-1.05	-.14
Hybrid	1.05		.91
Online	.14	-.91	
<b>Final exam</b>			
Web-facilitated		.05*	.05*
Hybrid	-.05*		.00
Online	-.05*	-.00	
<b>Total of four online journal entries</b>			
Web-facilitated		-.01	.02
Hybrid	.01		.04
Online	-.02	-.04	
<b>Total of mid-term, final, and online journal entries</b>			
Web-facilitated		.01	.03
Hybrid	-.01		.02
Online	-.03	-.02	
<b>Final course grade</b>			
Web-facilitated		.04	.06*
Hybrid	-.04		.02
Online	-.06*	-.02	
<b>Final letter grade</b>			
Web-facilitated		.23	.42*
Hybrid	-.23		.19
Online	-.42*	-.19	

Numbers indicate mean differences.

\* indicates statistical significance.

Table 7 presents the data of the completion rates for each of the assignments that were adopted by all three sections or any two of the three sections. None of these three sections consistently maintained a higher completion rate than any of the other two sections. However, students in the hybrid section had the highest completion rates for three of their four online journal entries, but they had lower completion rates of their in-class assignments than the web-facilitated students. Overall, for only half of the time, the students enrolled in the hybrid section were more compliant with completion of their online assignments than the online students were. Additionally, approximately 82.1% of the students in the web-facilitated section made the effort to complete an extra credit assignment to earn extra points compared to about 37.5% of the students in the online section.

Table 7 Completion of Class Assignments among the Three Sections

Measures	Web-facilitated	Hybrid	Online
Journal entry 1	94.9	95.8	90.0
Journal entry 2	94.9	95.8	95.0
Journal entry 3	97.4	91.7	97.5
Journal entry 4	92.3	100	85.0
Transtheoretical model in-class activity	92.3	83.3	---
Cognitive function in-class case study	92.3	91.7	---
Physical activity epidemiology online activity	---	91.5	97.5
Personality and exercise online activity	---	91.7	100

Numbers are percentages.

## DISCUSSION

In general, our study findings support that undergraduate students' academic performance and levels of motivation were higher in the web-facilitated class that mimics more traditional classroom style teaching formats. However, the data also show that hybrid learning, in many cases, can be an excellent alternative for undergraduates. These results are in alignment with a number of previous findings (e.g. Castle & McGuire, 2010; Collopy & Arnold, 2009; Lovern 2010; Mottarella, Fritzsche, & Parrish, 2004; O'Brien et al., 2011; Scherrer, 2011). Compared to the students in both the hybrid and online sections, students in the web-facilitated section were more likely to outperform in the majority of the measures included in this study, such as the final exam, final course grade, and final letter grade. Especially compared to the students enrolled in the online section, the

students in the web-facilitated section significantly increased their overall performance by the end of the semester, which was reflected on both their final course grade and final letter grade. Although on average, the students in the hybrid section achieved the highest scores on their mid-term exam and total of four online journal entries, the differences of the achievement among the three sections were not significantly significant.

For this design study, student motivation was measured by comparing the percent of students who submitted an extra credit assignment, and the percent of students who submitted the required journal entries and assignments. Although other extenuating factors might have an influential effect on these aspects of student behavior, it is believed that assignment completion and completing an additional assignment for extra credit are representative of student motivation for these sections. The students in the web-facilitated section were much more likely to complete the extra credit assignment than the students in the online section. Further, the number of students who did not submit journal entries was higher in the online sections, as demonstrated by the lower average scores for the assignment, since students who did not submit a journal entry received a grade of zero for the assignment.

El Mansour and Mupinga (2007) discussed the students' experiences in hybrid and online courses that may potentially lead to the ineffectiveness of these two teaching modalities for undergraduate students. In their study, 41 undergraduate students who were enrolled in either a hybrid or an online class from a mid-western 4-year college were surveyed. The main concerns raised by these students were: (1) lack of flexibility of schedule in a hybrid format, (2) technical difficulties for both hybrid and online deliveries, (3) lack of interactions with other students and instructors in an online format (Glanz, 2012; El Mansour & Mupinga, 2007), (4) lack of possibilities of receiving immediate feedback in an online format, (5) lack of a sense of belonging to a learning community in an online format, and (6) lack of learning efficiency due to complicated communication processes (El Mansour & Mupinga, 2007). Students' motivation may also compromise their online learning outcomes. Branoff and Wiebe (2009) surveyed 68 undergraduate engineering students enrolled in a hybrid *Foundations of Graphics* course. The results revealed that a number of students were unwilling to view the online instructional videos.

Some developmental abilities or learned skills are helpful for students to achieve success in an online class. Online learning environments require that students are able to successfully work independently, with little to no prompting from an instructor, which they would receive in a traditional face-to-face course format. Additionally, students must be able to effectively use time management skills to judge deadlines and foresee upcoming exams and assignments. Undergraduate students may still be honing these skills, which can affect their overall performance in an online learning environment (Keramidas, 2012). Undergraduate students are less likely to have developed the maturity, confidence, and motivation that are more well-developed among graduate students, who have increased self-efficacy as a result of their prior successes in a collegiate academic environment; this can result in undergraduates' perceptions that online classes are less effective than traditional classes, simply because they have not developed the skills and attributes that lead to success in an online class format (Watters & Robertson, 2009).

In order to address undergraduate students' concerns and help their transition from a traditional learning format to a hybrid/online learning environment, an experiment was carried out with a group of senior undergraduate nurses enrolled in a hybrid leadership/management course. Throughout the course of the semester, the students were encouraged to provide questions and comments regarding the hybrid learning format, so that these issues could be addressed in a timely manner, rather than gathering feedback at the end of the semester. For instance, students expressed concerns that they might overlook assignments in the hybrid course format. To address this issue, the students were assured that they would be given consistent reminders of upcoming assignments, and were also provided their instructor's and teaching assistant's cell phone numbers for communication, to ease their worries of missing an assignment. Further, to address expressed anxiety involving technical issues, students were allowed to complete their first online quizzes twice to lessen the likelihood of encountering submission problems. A majority of the students in this experiment commented in the end of the semester evaluations that they had a positive experience with the hybrid learning model (Mueggenburg, 2003). Both Sapp and Simon's study (2005), and Letterman's study (2008) further emphasized the importance of frequent reminders to students regarding deadlines and ease of access to instructors for timely feedback, so as to improve students' online learning experiences. Others recommend that students voluntarily complete an online readiness assessment, to determine whether online learning is an appropriate choice for their course delivery, or provide them with adequate online course management training and round-the-clock technical support (Chenoweth, Ushida, & Murday, 2006; Xu & Jaggars, 2011).

Certainly, some student fears and anxiety can be lessened with appropriate support and training, but instilling motivation among undergraduates may prove more challenging. Bernardo, et al. (2004) suggested that

motivation can be linked to effective online teaching methods; they noted that utilizing innovative video quizzes can help increase students' attention and increase their interest in the class. To incorporate some of the positive aspects of a traditional face-to-face learning environment in an online format, Cameron (2003) introduced an interactive simulation software package for an online networking course, which allowed the instructor to offer immediate feedback to students; he further enhanced the class experience by using different problem-solving techniques which could potentially improve students' motivation in an online learning environment. Babb and her colleagues (2014) offered seven principles for successfully enhancing undergraduate education by blending positive aspects of all three learning environments. These strategies include: increasing faculty and student interaction; encouraging students' collaborative learning; engaging students in active learning activities; giving prompt feedback; emphasizing the importance of time management skills; clearly communicating with students their responsibilities and the proposed learning outcomes; respecting students' opinions and providing them with alternative assignment options.

### LIMITATIONS

Due to the dynamic nature of the varied course delivery methods, the three sections of the exercise psychology course did not implement the exact assignments. For example, a couple of the assignments were applied only to one of the sections or were shared by two of the sections, such as the in-class assignments, which were not utilized in the online course. Therefore, assessment tools among the three sections were not entirely comparable. It is likely that the students' overall learning outcomes were influenced by the differences of these assignments to some degree. Also, different point values were attributed to assignments, the mid-term and final exams; however, to lessen the implications of these variations, raw scores were converted to percentile scores for comparison. But, due to these differences between sections, data could be potentially statistically biased. Further, our current sample is somewhat uniform, and lacking in diversity. About 67% of the students were seniors, and 77% were Caucasian, with an average GPA of 3.22; given these factors, these results may exclude the population of students who are not represented among this sample. The results may not represent the adaptability of lowerclassmen and other ethnic groups with a lower GPA to a hybrid or online learning modality. Moreover, we were not able to collect feedback directly from the students concerning their hybrid or online learning experiences; this information could have held value in providing information about the students' motivation or their own perceptions regarding academic success.

### CONCLUSIONS

In sum, both web-facilitated and hybrid learning modalities demonstrated higher adaptability among undergraduate students than the online learning modality as reflected by their grades and the assignment completion rates. Hybrid learning can serve as a valuable alternative for web-facilitated learning, and it can be a viable alternative to achieving the balance between web-facilitated and online learning. By addressing the concerns in the areas of motivation, communication, interaction, technology, and time management, both effectiveness and efficiency of hybrid learning among undergraduate students will continuously be advanced.

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