

The Effect of Adopting Blended Learning Approach on Students' Achievement and Satisfaction with Learning in a Post Graduate Course in Educational Statistics

Alajab Mohammed Alajab Ismail

*Department of Distance Learning, College of Graduate Studies, Arabian Gulf University,
Kingdom of Bahrain.*

*E-mail:alagabm@agu.edu.bh

Abstract

Many postgraduate students face difficulties in learning the educational statistics topics because of their mathematical nature. Adopting innovative learning technologies has opened up a wide range of options to extend the learning strategies in higher education and support students' learning outcomes. The current study aimed to assess the effectiveness of a blended learning BL approach with 18 Master's Degree students enrolled in two postgraduate courses in statistics i.e. (introduction to educational statistics and quantitative research data analysis courses) taught at the Arabian Gulf University Distance Teaching & Training Master Program in Bahrain. The courses were enrolled as Blended Learning with the College of Graduate Studies-CGS Moodle Learning Management System during the second semester of the academic year 2018/2019. The students were assessed using online quizzes, 2 written tests, two assignments: one in descriptive and the other in inferential statistics, one open book exam and a final examination. Data analysis revealed that the blended learning approach helped the students to learn the course content i.e. (students' grades ranged from B+ to A). The learning satisfaction survey administered at the end of the course revealed a high degree of satisfaction with the course material and the teaching approach used. In conclusion, blended learning is viewed as feasible for teaching statistics courses and is beneficial to both students and instructors.

Keywords: Blended learning, descriptive statistics, inferential statistics, satisfaction with learning and innovative learning technologies.

Received: 28 / 06 / 2020

Revised: 01 /09/ 2020

Accepted: 13 /09/ 2020

Introduction

Statistics is often said to be the science of variation, data, and uncertainty. In these days of big data and analytics, a comfortable explanation might be that Statistics is the science of variation, data, uncertainty, questioning of models, assumptions, and interpretations. The critical importance of Statistics lies in its pervasiveness, universality of concepts and thinking, as well as its power in specific contexts- across disciplines like business, industry, government, and society. Statistics can be a driver, partner or servant, but from the most theoretical to the most applied, its roots always lie in real problems. Ozgur, Adrienne, and Susan (2012) examined the challenge of teaching statistical research methods in three master's degree programs at a private university based in Washington, DC. They discussed the way they employed innovative approaches to deal with this challenge. They grounded their discussion within the theoretical framework of problem-based learning and adult learning principles. They provided brief descriptions of their research methods courses to demonstrate how an instructor can facilitate the learning of new knowledge and applications in a content area often considered



intimidating by students. They also highlighted similarities across the three different courses they taught and posed several key questions that might help guide instructors inspired to engage students in the vital practice of using research in professional practice.

Despite holding assumptions of uncontrolled statistics anxiety among students, sociologists had conducted a few empirical studies of this issue. Condrón, Becker, and Bzhetaj (2018) extend the literature by analyzing data from a survey of sociology, social work, and criminal justice students enrolled in seven sections of Social Statistics with a Computer Applications course in the 2018 winter semester. The results of the study revealed that two-thirds of the participants were anxious or very anxious about taking the course. Moreover, the participants experience statistics anxiety mainly due to their lack of self-confidence in their ability to succeed in the course and their more general test-taking anxiety.

Many researchers use the quantitative approach to explore undergraduate students' anxiety regarding statistics. However, few studies of adults' statistics anxiety use the qualitative method or a modest focus on graduate students. Huang (2018) incorporated a mixed research method to explore social sciences graduate students' statistics learning processes. Findings suggested that the social sciences graduate students' anxiety levels tend to diminish after the introductory statistics course, even though these also experience severe statistics anxiety at the very beginning. Findings found to be essential for institutions, higher education instructors, and social sciences statistics learners to consider.

Learning statistics requires learning the language of statistics. Statistics draws upon words from general English, mathematical English, discipline-specific English and words used primarily in statistics. This leads to many linguistic challenges in teaching statistics and the way the language is used in statistics creates an extra layer of challenge. Dunn, Carey, Richardson, and McDonald (2016) reported on a research paper that identified several challenges in teaching statistics related to language. They highlighted some implications for the effective learning and teaching of statistics and discussed methods to help students overcome these linguistic challenges.

Hijazi and Zoubeidi (2017) investigated the state of undergraduate business statistics education in the Middle East and North Africa (MENA) while assessing its alignment with the best practices in equipping business graduates with the knowledge and skills demanded by the labor market. A survey of 108 instructors from 80 business schools in 17 MENA countries was conducted to gauge information on the delivery of business statistics courses. The survey results were benchmarked to a proposed framework for best practices in business statistics education. The gap analysis identified deficiencies in the delivery of business statistics education in the region as compared to international best practices. The study revealed a need to revise statistics education as part of a comprehensive reform of business education to meet international quality standards in business education. Blended learning is considered to be equivalent to or better than face-to-face instruction in a broad variety of contexts. Goode, et al. (2018) randomly assigned students to either 50/50 blended learning or 100% face-to-face versions of research methods and statistics in a psychology course. Students who took the blended learning version of the course scored significantly

lower on measures of quantitative mastery of statistical concepts than those who took the face-to-face version; however, the size of this effect was quite small. The study revealed no significant difference between blended learning and face-to-face in the expression of critical thinking through writing or writing mechanics.

The present study is aimed at investigating how blended learning approach affects teaching educational statistics outcomes at the Arabian Gulf University distance teaching and training graduate program.

Background

Teaching Educational Statistics at Arabian Gulf University Distance Teaching and Training Program

The Department of Distance Learning is one of the graduate programs affiliated with the College of Graduate Studies at the Arabian Gulf University. The Arabian Gulf University is a Regional Governmental Gulf University, located in Manama, the capital of the Kingdom of Bahrain. It is an accredited institution by the ministries of higher education in the Gulf Cooperation Council States and managed by the GCC States. Two graduate programs are available in the department of distance learning including a postgraduate diploma in distance teaching and training and a master's degree in distance teaching and training, in addition to running King Hamad e-Learning Chair, which supports scientific research activities in the field of e-learning and training. It is worth mentioning that the activities of this academic chair go in line with the requirements of innovation in education, technology-based scientific research and community services. There are two basic types of statistics: descriptive and inferential statistics. (1) Descriptive Statistics tackles the reduction of large masses of raw educational data to a manageable form- e.g. graphs, tables, measures of central tendency and measures of dispersion. (2) Inferential or Predictive Statistics deals with the data that the educator/ researcher collects which is almost always a sample of all the data that one could have collected and wants to use to draw conclusions about the whole population. The ability to make such generalized conclusions, inferring characteristics of the whole from characteristics of the sample lies within the realm of inferential or predictive statistics. In Predictive Statistics, statistical analysis is usually conducted on the sampled evidence or data from which conclusions about the population is drawn. The statistical analysis usually starts with a hypothesis and based on the evidence in the data, the probability of a certain outcome of the hypothesis is determined.

The Study

1. Population and Sample of the Study

The sample of the study was the same as the population which consisted of all second and first-year distance learning master students enrolled in educational statistics courses at AGU in the second semester of the academic year 2018/2019. The sample was composed of 18 Kuwaiti (9 females and 9 male), postgraduate students. They were registered in two Educational Statistics courses (modules) offered by the distance teaching and learning program. Ten (10) students were registered for the introduction to educational statistics (4 females and 6 males), and eight (8) students were registered for Quantitative Research Data Analysis (5 females and 3 males). Table 1 shows sample distribution according to the course and student gender.

Table 1: *Sample destitution according to the course and student gender*

Course	Female	Male	Total
Introduction to educational statistics	4	6	10
Quantitative Research Data Analysis	5	3	8
Total	9	9	19
Percentage	50%	50%	100%

2. Method and Procedures

The study used a developmental research methodology which mainly depends on BL as a method of instructional delivery. In general, BL can occur at one of the following four levels: activity level, course level, program level, or institutional level. As blended learning will take place at the activity level in this study, brief description of this level will be provided.

Blending at the activity level took place when a learning activity enclosed both face-to-face and CM elements. In higher education, many strategies based on using technological tools make learning activities more authentic; many of these technologies were used to bring experts at a distance into the classroom, creating a simultaneous face-to-face and CM experience.

In the present study, the activity level blending was used in which some learning activities were delivered inside the classroom and most of the mastery learning activities were delivered online through the use of AGU learning management system (CGS Moodle).

3. Questions of the Study

The main question of the present study was what is the effect of the blended learning strategy used for teaching Educational Statistics on Arabian Gulf University distance learning students' learning outcomes?

The following sub-questions emerged from the main question:

1. What were the content and topics of the educational statistics courses taught for the AGU distance learning students?
2. What was the blended learning strategy used for teaching educational statistics at the AGU distance teaching and training program like?
3. What was the effect of the used blended learning strategy on the students learning academic achievement in educational statistics?
4. Were there any statistical differences in students' academic achievement related to student gender and the course of the study?
5. How do distance learning students are satisfied with the proposed blended learning strategy used for teaching the educational statistical courses?

4. Objectives of the Study

The researcher of the present study aimed to achieve the following objectives:

1. Describe the content and the topics of the educational statistics courses taught for the distance teaching and training program master's degree students.
2. Explore the proposed blended learning strategy used for teaching educational statistics at the distance teaching and training program.
3. Investigate the effect of the blended learning strategy on distance teaching and train

ing program students' learning outcomes (academic achievement and satisfaction with learning).

4. Investigate the differences in students' academic achievement related to student gender and the course of the study.

Instrumentation

The following instruments were used in the study: mastery tests administrated at the end of each course unit, closed-book written exams administrated at the end of the course, an open-book take-home exam, and satisfaction with learning questionnaire administrated at the end of each course.

1. Mastery tests

Mastery learning is a method of instruction where the focus is on the role of feedback in learning. Furthermore, mastery learning refers to a category of instructional methods which establishes a level of performance that all students must master before moving on to the next unit (Slavin, 1987). In this research after completing each learning unit, an online mastery test was administrated; these tests were developed by Probert R. Pagan, the author of *Understanding Statistics in the Behavioural Sciences Reference Book* used for teaching the two courses.

2. Midterm take-home open book exams

Take-home exams or open-book exams are a type of exams students do at home. Items and question(s) are handed out; answers on these questions are attempted without help from others, and the exam is returned within a specified period. In this study, the student is required to return the take-home exam after one academic week (5 days). The students are allowed to make use of their lecture notes, texts, and e-learning resource materials to answer the exam situation. The purpose is to test the student's ability to find and apply information and knowledge covered in the course/units.

The study makes use of take-home exams for testing the upper-division course competencies where the goal is to demonstrate critical thinking skills and the ability to synthesize information. In the two courses of statistics, after 2 weeks on theory construction, the participants were given a take-home midterm exam providing them with a set of concepts that they must turn into a viable statistics and data analysis theory (one that could be tested). For the introduction to the educational statistics course, the student is required to assess a descriptive statistics section from a master's thesis and answer questions related to this matter.

3. Closed book final exams

Closed book exam is the traditional mode of assessment whereby the students are allowed to take no notes, books or other reference material into the examination room; they rely entirely on their memory to answer the questions set. In this research, two closed book exams with similar formats were set out, one for introduction to educational statistics course and the second for quantitative research data analysis course. The format composed of four sections.

- Section one includes definitions and short answers to assess the students' understanding of the basic knowledge and understanding (low cognitive levels) of a topic before a more in-depth assessment and questions are asked on the course topics (10 marks).
- Section two comprises multiple-choice questions (MCQ), composed of two parts: a stem that identifies the question or problem, and a set of alternatives or possible answers that contain a key that is the best answer to the question, and several distracters that are plausible but incorrect answers to the question. The purpose of a multiple-choice item is to measure candidate ability about a specific content area.
- Section three offers true & false questions. They are a type of questions in the form of a statement that students can answer with true or false. Teachers use multiple choice questions to make their assessment more reliable, make marking far less labor-intensive, and make student understanding more visible to teachers; they make assessment more reliable.
- Section four offers problem-solving and short answers questions.

4. Satisfaction with learning questionnaire

The satisfaction with the learning experience scale was prepared and administrated by the Arabian Gulf University Quality and Excellence Center. The first version of the questionnaire was developed and validated by the National Commission for Academic Accreditation and Assessment - Saudi Arabia. The questionnaire was composed of three parts. Part one was used to collect information about the course (title, code, program/department information and the academic year, in addition to instructions on how to respond to the questions)_ part two aimed to assess student's level of satisfaction with the course and its contents. This part consisted of 26 items (questions) which formed students' satisfaction with the course. These questions were distributed among 4 dimensions: the study plan of the course, the teaching activities, judging the course value and the overall evaluation of the course. Table 2 below shows the scale of satisfaction with learning dimensions and the number of items in each dimension.

Table 2: *Scale of satisfaction with learning dimensions and number of items in each dimension*

#	Dimension	Number of Items	Distribution of items
1	The course study plan	3	1,2,3
2	The teaching activities	17	4,5,6,...,20
3	The scientific value of the course.	5	21,22,23,24,25
4	Judging the course value	1	21
	The overall evaluation of the course	26	1,2,3,...,26

The third part of the scale comprises open-ended questions (questions 27, 28 and 29) which enabled the student to report on her/his observations related to her/his satisfaction with the course as well as the learning experience and included the following questions:

1. What was the best part of the course you liked most?
2. What was the part of the course that you did not like?
3. What suggestions did you have for improving the course?

Results

To answer the study questions, the study used mixed research methods integrating qualitative and quantitative research methods.

1. Results related to question 1:

Question 1: What were the content and topics of the educational statistics courses taught for the AGU distance learning students?

The AGU distance teaching and training program used to teach two courses (modules) in educational statistics; this includes introduction to educational statistics and quantitative research data analysis. The following paragraphs will show the course description, learning units and learning objectives for each of the two courses.

- **Introduction to Educational Statistics Module (DE0510), 3 Cr. hours**

Prerequisites: no prerequisites

This module aims to provide the students with the knowledge and skills of quantitative basics for measuring and assessing and statistical tests that should enable them for understanding the results of the educational research. The students should be able to conduct the necessary analysis of their research. The module will cover the following topics: Statistic role in educational research; Educational data and how to describe them; Validity and Reliability; Probability concepts; Probability distributions; Sampling distributions; Correlations; Application on educational research.

The module covers topics related to descriptive statistics and divided into 9 units. The titles of the units are stated as follows:

Unit 1: Statistics and Scientific Method

Unit 2: Descriptive Statistics

Unit 3: Frequency Distributions

Unit 4: Measures of Central Tendency and Variability

Unit 5: The Normal Curve and Standard Scores

Unit 6: Correlation

Unit 7: Linear Regression

Unit 8: Random Sampling and Probability

Unit 9: Binomial Distribution

- **Quantitative Research Data Analysis(DE0603), 3 Cr. hours**

Prerequisites: DE0512

The module (course) aims to help the student to acquire the quantitative skills required for conducting the master's thesis research. The mathematical basis of statistics and computational procedures are not emphasized. Rather, they are taught to the extent that they help the student in understanding statistical concepts and methods. Complex statistical derivations are avoided by using, among other things, Monte Carlo methods via such software as Re-sampling Stats.

The module covers the following topics: Statistics and the scientific method; Basic mathematical and measurement concepts; Frequency distributions; Measures of Central Tendency and Variability; Descriptive statistics procedures; The normal curve and standard scores; Correction; Computing Correction Coefficient; Linear Regression; Random sampling and Probability; Binomial Distribution; Introduction to hypothesis testing using the Sign test; Sampling Distributions; Sampling Distribution of the Mean; The normal deviate (z) test; T-test for single samples; One-sample t-test; Confidence Interval for the population mean; Testing the significance of the Correlation Coefficient; Student's t-test for Correlated and Independent groups; Paired-sample t-test; Independent samples t-test;

Introduction to the Analysis of Variance; One-way ANOVA procedure; Using SPSS in entering, editing and transforming data and performing different statistical tests.

The module covers topics related to inferential statistics and is divided into 9 units. The titles of the units are stated as follows:

Unit 10: Introductions to Hypothesis Testing Using the Sign Test

Unit 11: Power

Unit 12: Sampling Distributions, Sampling Distribution of the Mean, the Normal Deviate (z) test

Unit 13: Student's t-Test for Single Samples

Unit 14: Student's t-Test for Correlated and Independent Groups

Unit 15: Introduction to the Analysis of Variance

Unit 16: Introduction to Two-Way Analysis of Variance

Unit 17: Chi-Square and Other Nonparametric Tests

Unit 18: Review of Inferential Statistics

2. Results Related to Question 2:

Question 2: What was the blended learning strategy used for teaching educational statistics at the AGU distance teaching and training program like?

The proposed blended learning strategy was developed based on the ASSURE ID model. The ASSURE model is a natural fit for blended learning environments, as it allows corporate instructors to integrate technology into their Instructor-Led Teaching (ILT) classrooms. The first version of the ASSURE model was proposed and constructed and authored by Heinich, Molenda, and Russell (1982) in their *Instructional Media and the New Technologies of Instruction*. It is a classroom focused-procedural instructional model for planning a lesson and is intended to assure the effective use of media and technology in instruction. The ASSURE model contains six steps in an acronym (Figure 1).

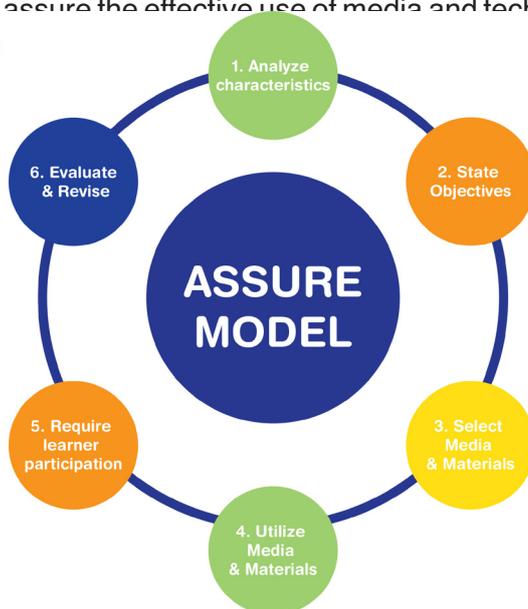


Figure 1: ASSURE ID model flowchart

A: Analyze learners characteristics

ASSURE ID model starts with looking at the learner in detail. Nothing that teachers/trainers plan or design is effective unless they have taken the time to look at the learners. To teach the Educational Statistics courses for the distance teaching and training program students at the Arabian Gulf University, it is now stated that the students must be

assessed and the program academic committee, as well as the registration unit, should make sure that the students passed their previous courses and instructors study the requirements for the course.

For the Introduction to Educational Statistics, the course material is prepared for first-year students in the second semester of their first academic year in the master's program. There are a total of 10 students in a class composed of 6 males and 4 females. Students presented a high level of motivation to participate in this module. Majority of the students know how to use scientific calculators can read and know the basics of using a computer, and Microsoft Excel program. They also enjoy learning Statistics and the majority of the class maintains an average above within this subject area; they have experience with Statistics in their college education.

For quantitative research data analysis, the course material was prepared for students in the second semester of the academic year 2018/2019 who are engaged in studying for their fourth semester in the master's program. There are a total of 8 students in a class composed of 5 females and 3 males. Students presented a high level of motivation to participate in this module; they passed introduction to educational statistics, and read on how to use statistics in educational research, registered their master's thesis projects, engaged in educational research and were motivated to develop their research instrumentation and data analysis strategies. All the students know how to use scientific calculators and can read and know the basics of using a computer, SPSS and Microsoft Excel program. They also enjoy learning inferential Statistics and have experience with descriptive Statistics in their introduction to educational statistics course (module).

S: State Learning Objectives

Good instructional design requires goals or objectives. Stating the goals gives the instructor guidance as to what the learners need to accomplish after the learning occurs. Concerning this study, for each learning unit of the two courses, the learning objectives are well stated to cover the instructional competencies of the course (knowledge, skills, and behaviors). In section 5.1 the objectives for each topic are stated for guiding the students' learning.

S: Select Media & Materials

After stating the instructional goals, the instructor needs to select the materials and media as well as the method of delivery that they will use for their instruction. The method of delivery in this study is the blended learning approach that combined face-to-face and online learning based on the Arabian Gulf University CGS Moodle LMS and Understanding Statistics in the Behavioural Sciences(9th ed.) by Probert R. Pagano Book Companion Site(2012), Pangno videos and PowerPoint presentations for each chapter of the course syllabus.

The course material included the instructor's presentations covering each unit, learning activities prepared by the course instructor and practice exercises to help the mastery of the course.

U: Utilize Media and Materials

The next step is using the material and the media with the learners. In this step, the above-mentioned learning material, as well as the media is used for actual instruction. Before starting the course, it was determined how the media will be used to enhance the instruction and help the students to learn the content.

Students will log into AGU Moodle LMS and will begin by navigating the course material, doing online activities, online mastery tests, downloading learning material and engaging in an online discussion with their classmates or course instructor. To facilitate interactions a WhatsApp group was created for each Module (course).

R: Require learner participation

Learner participation is an important aspect of student learning. When students speak up in class, they learn to express their ideas in a way that others can understand. When they ask questions, they learn how to obtain information to enhance their understanding of a topic. ASSURE model calls for the instructor to require the learners participation and practice of the learning expertise to accomplish the goals set. If they do not practice themselves, the chances of them retaining the information are much less.

In this study, students were allowed to work as individually and in groups. In-class activities sometimes require that the students come in front of the class to share presenting an idea or project work or participate in a discussion with the class. The course instructor will be monitoring his student understanding by asking each individual/group to explain their answers and arguments. Students also evaluate each other by sharing their presentations and course projects with the class.

E: Evaluate & Revise

The final step in the ASSURE model is to Evaluate. The instructor will evaluate the learners to see if they have achieved the instructional goals or not. The learners also need to have the opportunity to give feedback on the instruction (at the end of the course). After looking over evaluations, the instructor will revise or edit the instruction based on feedback.

Concerning this study, the evaluation covered the following: mastery tests administrated at the end of each learning unit, closed-book written exams administrated at the end of the course, open-book, take-home exam, and a questionnaire to evaluate the students' satisfaction with the learning material, the method of delivery and the course instructor. According to the evaluation results, the course will be revised to meet students' needs after all the evaluations are completed and reported to the Arabian Gulf University (AGU) quality assurance center.

3. Results Related Question 3:

Question 3: What was the effect of the used blended learning strategy on the students' learning academic achievement in educational statistics?

To test the impact of the proposed blended learning strategy on distance learning students' academic achievement in educational statistics one-sample t-test was conducted. Table 3, presents one-sample descriptive Statistics results on the final exam in an educational statistics course, while Table 4 shows the one-sample t-test results for the same group of students in the final exam of the same course/courses.

Table 3: One-Sample Descriptive Statistics

Exam	N	Mean	Std. Deviation	Std. Error Mean
Final Exam	18	35.7222	1.88041	0.44322

To test whether there are significant differences in means compared to the estimated mean of mastery level of 85% (estimated as 34 out of 40), one sample t-test was carried out. Table 3, shows one-sample t-test results based on a test value of $m=34$).

Table 4: One-Sample Test Results

Exam	t	df	Test Value = 34			
			Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
Final Exam	3.886	17	0.001	1.72222	Lower	Upper
					0.7871	2.6573

Data analysis results in Table 4 above revealed that the students' mean in educational statistics is significantly different compared to the estimated mean of 34 (mastery level of 85% which equates to 34) at the level of $p \geq 0.05$.

In general, these results lead to saying that distance learning students at the Arabian Gulf University are benefited from the blended learning approach. They made use of the utilized learning strategy to reach a level of mastery above 85%.

4. Results related to question 4:

Question 4: Were there any statistical differences in students' academic achievement related to student gender and the course of the study?

- **Results related to the effect of blended learning on students' achievement according to gender**

To test the impact of the proposed blended strategy used for teaching the two courses related to the gender of the student (male, female) independent sample t-test was performed. Table 5 and Table 6 tests results are related to students' gender (male, female).

Table 5: Group Statistics related to the students' gender (male, female).

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Final Exam	Male	9	35.5556	2.40370	0.80123
	Female	9	35.8889	1.29368	0.43123

Table 6: Independent Samples Test results related to students' gender (male, female).

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Final Exam	Equal variances assumed	5.944	0.027	-0.366	16	0.719	-0.33333	0.90991	-2.26225	1.59558
	Equal variances not assumed			-0.366	12.276	0.720	-0.33333	0.90991	-2.31092	1.64426

To assess the variation in students' achievement in educational statistics according to the students' gender independent samples t-test was administrated. Table 6 shows the result of this test. An independent-samples t-test results revealed no significant differences in the participants scores related to student gender; for male ($M=35.5556$, $SD=2.40370$) and female ($M=35.8889$, $SD=1.29368$) conditions; $t(16) = .3661$, $p = 0.719$. These results suggest that there are no significant differences in students' means in educational statistics due to their gender.

- **Results related to the impact of blended learning on participant achievement based on the course of the study**

As in testing the impact of the course on students' achievement related to student gender, independent samples t-test was carried out to test which course outcomes related to academic achievement are more affected by the blended learning strategy. Table 7 and

Table 8 show t-tests results related to the course of study (introduction to educational statistics, quantitative research data analysis).

Table 7: *Group Statistics related to course of study (introduction to educational statistics, quantitative research data analysis).*

Exam	Group	N	Mean	Std. Deviation	Std. Error Mean
Final Exam	Introduction to Educational Statistics	10	35.3000	2.17562	.68799
	Quantitative Research Data Analysis	8	36.2500	1.38873	.49099

Results presented in Table 7 above showed that students' mean in quantitative research data analysis ($m=36.2500$) is exceeding the students' mean in the introduction to educational statistics course ($m=35.3000$). To assess the variation in students' achievement in educational statistics according to the course of the study (introduction to educational statistics, quantitative research data analysis) independent samples t-test was administered. Table 8 below shows the results of this test.

Table 8: *Independent Samples Test results related to the course of study (introduction to educational statistics, quantitative research data analysis).*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Final Exam	Equal variances assumed	1.921	0.185	-1.070	16	0.301	-0.95000	-0.95000	-2.83291	0.93291
	Equal variances not assumed			-1.124	15.375	0.278	-0.95000	-0.95000	-2.74774	0.84774

An independent-samples t-test results revealed no significant differences in the students' means, for the introduction to educational statistics male ($M=35.300$, $SD=2.17562$) and for quantitative research data analysis ($M=35.250$, $SD=1.38873$) conditions; $t(16) = -1.070$, $p = 0.301$. These results suggest that there are no significant differences in students' means in educational statistics due to their course of study.

5. Resulted related to Question 5:

Question 5: How do distance learning students are satisfied with the proposed blended learning strategy used for teaching the educational statistics courses?

For the introduction to the educational statistics course, all the students (10) who participated in the study answered the satisfaction with the learning scale. Data analysis showed a very high degree of satisfaction with the course (i.e. overall satisfaction is 92%) as revealed in Figure 2 below.

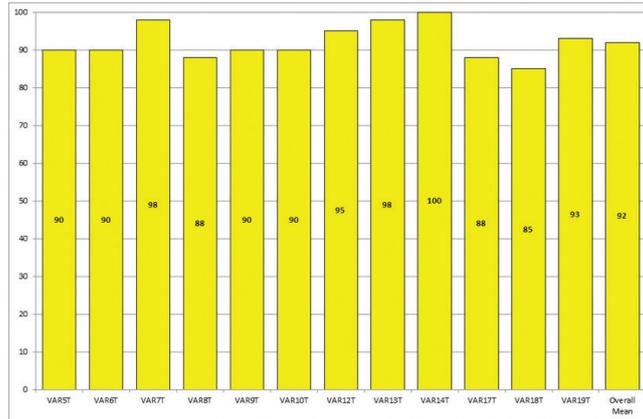


Figure 2: Students' satisfaction with the introduction to educational statistics course

With regards to the open-ended questions of the satisfaction with learning scale, Table 9 below summarizes the comments made by the students.

Table 9: Comments of the students on the open-ended questions of the scale of satisfaction with learning

Question	What is the best part of the course you liked most?	What is the worst part of the course that you did not like?	What suggestions do you have for improving the course?
Subjects answer	<ul style="list-style-type: none"> The course content is realistic, clear and useful and links theory with applications. Develop useful and applicable knowledge, skills and competencies for graduate learners. Help to deal with how to carry out your thesis descriptive statistics section. The activities and assignments of the course were found to be powerful and go with learning the course objectives. The course instructor is like a father, very nice and keen, a type of professor who likes his students and considers their needs. 	<ul style="list-style-type: none"> Some parts of the content are difficult and heavy compared to other courses. The mathematical components of the course are difficult and need clarification. 	<ul style="list-style-type: none"> Adding more learning activities. Mathematics problems applications should be done step by step. Taking into account all students' learning background. Giving more time for teaching the course

For the quantitative research data analysis course, the eight students who participated in the course and answered the satisfaction with the learning scale. Data analysis showed an outstanding level of satisfaction with the course (i.e. overall satisfaction is 96%) as presented in Figure 3 below.



Figure 3: Students' satisfaction with quantitative research data analysis course

With regards to the open-ended questions of the scale of satisfaction with learning, Table 10 below summarizes comments made by the students.

Table 10: Comments of the students on the open-ended questions of the scale of satisfaction with learning

Question	What is the best part of the course you liked most?	What is the worst part of the course that you did not like?	What suggestions do you have for improving the course?
Subjects answer	<ul style="list-style-type: none"> The course instructor has great abilities in statistics, he delivered the course in a useful manner that helps us to analyze data and interpret results. The course content is clear and useful and links data analysis theory with real applications. Help us understand how to make use of inferential statistics in educational research. The method used for teaching the course was understandable and easy. The course is relevant to our current and future needs, as other research was clarified The course is very nice but it may need to be taught by a professor who specialized in statistics and measurement. 	<ul style="list-style-type: none"> There a need for additional short quantizes and practical tests at the same time. The mathematical components of the course are difficult and need clarification. 	<ul style="list-style-type: none"> References and books should be available for purchase at the University bookshop instead of searching abroad Hiring a professor who specialized in statistics instead of putting more load in one professor.

Discussion and Conclusion

This research outlined the broad areas in which the Educational Statistics takes part in the Arabian Gulf University Distance Teaching and Training Graduate Program. The research explored blended learning as an effective teaching strategy that helps the students to understand statistics and make use of it in their master's research. The activity-based blended learning approach was explored as a proposed method of delivery for teaching statistics at the Arabian Gulf University distance teaching and training postgraduate program. In activity-based blended learning, some of the learning activities were carried out face-to-face inside the class, while other activities took place through online and electronic delivery. In this study, CGS Moodle LMS is used as a learning environment for facilitating learning material delivery and learning interactions among the students and the remaining components of the learning resources.

Eighteen (18) female and male master's students have participated in this study, 10 students registered for the introduction to educational statistics and 8 were registered for the quantitative research data analysis course during the second semester of the academic year 2018/2019. Both groups of students used Understanding Statistics in the Behavioral Sciences (10th ed.) by Robert R. Pagano as well as its accompanied electronic course campus with its e-tivities, exercises, and tests. The students benefitted from the blended learning experience and showed high interest in learning and studying statistics. Data analysis revealed that blended learning helped the students to master the stated learning objectives and be highly satisfied with the learning material and the strategy used to deliver the course material. Results show no statistical differences related to students' gender or course of the study (Introduction to Educational Statistics and Quantitative Research Data Analysis).

Based on these results the researcher recommended the following:

1. Using blended learning for teaching educational statistics at the postgraduate level to help the students apply statistics' competencies in their research.
2. Training instructors, who teach postgraduate students how to design, develop and manage a blended learning environment and course materia.
3. Assessing the impact of blended learning approach on large groups of students and other graduate courses.
4. Using the blended learning approach with the graduate students for enhancing the learning outcomes and getting the students more engaged in the learning process.

Acknowledgment: The author would like to thank the distance teaching training master's students who participated in this study; thanks also due to the Arabian Gulf University for funding the research publication.

References

- About the College of Graduate Studies (2013). Arabian Gulf University. Archived from the original on 10 January 2013. Retrieved 7 February 2019.
- Admissions; Arabian Gulf University (2013). Archived from the original on 12 February 2013. Retrieved 7 February 2019.
- Condrón, Dennis J.; Becker, Jacob H. and Bzhetaj, Linda (2018). Sources of Students' Anxiety in a Multidisciplinary Social Statistics Course. *Teaching Sociology*, 46 n (4), 346-355.

- Davies O L ed. (1961) *Statistical Methods in Research and Production*. 3rd ed., Oliver & Boyd, London.
- Dunn, Karee (2014). Why Wait? The Influence of Academic Self-Regulation, Intrinsic Motivation, and Statistics Anxiety on Procrastination in Online Statistics. *Innovative Higher Education*, 39 n (1), 33-44.
- Dunn, Peter K.; Carey, Michael D.; Richardson, Alice M.; and McDonald, Christine (2016). Learning the Language of Statistics: Challenges and Teaching Approaches. *Statistics Education Research Journal*, 15 n (1), 8-27.
- Goode, Christopher T.; Lamoreaux, Marika; Atchison, Kristin J.; Jeffress, Elizabeth C.; Lynch, Heather L.; and Sheehan, Elizabeth (2018). Quantitative Skills, Critical Thinking, and Writing Mechanics in Blended versus Face-to-Face Versions of a Research Methods and Statistics Course. *Teaching of Psychology*, 45 n (2), 124-131.
- Heinich, Molenda, and Russell (1982). *Instructional media and the new technologies of instruction*. John Wiley.
- Hijazi, Rafiq, and Zoubeidi, Taoufik (2017). State of Business Statistics Education in MENA Region: A Comparative Study with Best Practices. *Journal of International Education in Business*, 10 n (1), 68-88.
- Huang, Liuli (2018). A Mixed-Method Investigation of Social Science Graduate Students' Statistics Anxiety Conditions before and after the Introductory Statistics Course. *International Journal of Higher Education*, 7 n (3), 156-162.
- Kendall M G, Stuart A (1943). *The Advanced Theory of Statistics: Volume 1, Distribution Theory*. Charles Griffin & Company, London. First published in 1943, revised in 1958 with Stuart.
- Michael J de Smith (2018). *Statistical Analysis Handbook: A Comprehensive Handbook of Statistical Concepts, Techniques and Software Tools* (4th ed.). Published by: The Winchelsea Press, Drumlin Security Ltd, Edinburgh.
- Ozgun Ekmekci, Adrienne B. Hancock, and Susan Swayze (2012). Teaching Statistical Research Methods to Graduate Students: Lessons Learned from Three Different Degree Programs. *International Journal of Teaching and Learning in Higher Education*, Volume 24, Number 2, 272-279 <http://www.isetl.org/ijtlhe/ISSN1812-9129>.
- Robert R. Pagano (2012). *Understanding Statistics in the Behavioral Sciences (9th Ed.) Book Companion Site*. Available online at: http://www.cengage.com/cgi-wadsworth/courseproductswp.pl?fid= M20b&product_isbn_issn=9780495596578&token=
- Robert R. Pagano (2013). *Understanding Statistics in the Behavioral Sciences (10th Ed.)*. WADSWORTH CENGAGE Learning. Australia, Canada.
- Slavin, Robert E. (1987). Mastery Learning Reconsidered. *Review of Educational Research*, Vol. 57, No. 2 (Summer, 1987), 175-213.

Wu, Yazhou; Zhang, Ling; Liu, Ling; Zhang, Yanqi; Liu, Xiaoyu and Yi, Dong (2015). Attitudes of Medical Graduate and Undergraduate Students toward the Learning and Application of Medical Statistics. *Journal of Biological Education*, 49 n(3), 220-231.

Yang, Dazhi (2017). Instructional Strategies and Course Design for Teaching Statistics Online: Perspectives from Online Students. *International Journal of STEM Education*, 4 A (34).

أثر تبني أسلوب التعلم المدمج في تحصيل طلبة مقر الإحصاء التربوي للدراسات العليا ورضاهم عن التعلم

العجب محمد العجب إسماعيل

قسم التعلم عن بعد، كلية الدراسات العليا، جامعة الخليج العربي، مملكة البحرين.

*بريد الكتروني: alagabm@agu.edu.b

المُستَخَص

تاريخ استلام البحث: 28 / 06 / 2020

تاريخ تعديل البحث: 01 / 09 / 2020

تاريخ قبول البحث: 13 / 09 / 2020

يواجه العديد من طلبة الدراسات العليا صعوبات في تعلم موضوعات الإحصاء التربوي بسبب طبيعتها الرياضية. ولقد أدى تبني تقنيات التعلم المبتكرة إلى توفير عدد كبير من الخيارات التي تسهم في تنوع استراتيجيات التعلم في التعليم العالي وتعزيز المخرجات التعليمية. وهدفت هذه الدراسة إلى تقييم فعالية أسلوب التعلم المدمج (-Blended Learning) لدى مجموعة مكونة من (18) طالب ماجستير مسجلين في مقر إحصاء تربوي للدراسات العليا (مقدمة في الإحصاء التربوي، وتحليل بيانات البحث الكمي) يتم تدريسها في برنامج الماجستير في التعليم والتدريب عن بعد بجامعة الخليج العربي في مملكة البحرين. وقد تم تدريس المقررين باستخدام التعلم المدمج من خلال رفع محتوياتهما على نظام إدارة التعلم الخاص بكلية الدراسات العليا-CGS Moodle في الفصل الدراسي الثاني من العام 2019/2018. وتم تقييم الطلبة باستخدام اختبارات قصيرة عبر الإنترنت واختبارين كتابيين وواجبين؛ أحدهما في الإحصاء الوصفي والآخر في الإحصاء الاستدلالي، وامتحان الكتاب المفتوح لكل مقرر إضافة لاختبار نهائي لكل منهما. وقد كشفت نتائج تحليل البيانات أن أسلوب التعلم المدمج ساعد الطلبة على تعلم محتوى المقررات، حيث تراوحت درجاتهم بين +B و A. وكشفت نتائج الرضا عن التعلم في نهاية كل مقرر عن مستويات رضا مرتفعة فيما يتعلق بمادة المقرر الدراسي وأسلوب التدريس المستخدم. وفي الختام، يمكن القول إن التعلم المدمج يعد أسلوباً فعالاً لتدريس مقررات الإحصاء التربوي لما يحققه من فوائد لكل من الطلبة ومدرسيهم.

