Management Strategies for Active Learning in AACSB Accredited STEM discipline of CIS: Evidence from Traditional and Novel Didactic Methods in Higher Education

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Abstract

The positive influence of active learning methods for Higher Education is widely studied and is well documented in the research literature. However, there is very little research on active learning impact on Association to Advance Collegiate Schools of Business (AACSB) accredited business programs which include a Science, Technology, Engineering, Mathematics (STEM) discipline such as Computer Information Systems (CIS) with very diverse student population demographics. For this study, the researchers focus on campus-level data particularly how active learning influences student learning in introductory College of Business computer information systems courses focused on information technology for management. In this study, the researchers investigate whether a relationship exists between the method of learning and the student reactions to instruction and courses. The survey instrument of choice for eliciting student feedback is the Individual Development and Educational Assessment (IDEA) and the time period that the surveys have been collected and analyzed is more than a decade about 12 academic years, 35 academic courses for traditional learning, and 37 academic courses for active learning. The results of the statistical analysis indicate that there is a significant positive impact for the student feedback reported with active learning methods compared to significantly lower results reported with traditional learning. The results provide important information to practitioners, researchers and educators on the positive impact of active learning methods on AACSB accredited business programs which include a STEM discipline such as computer information systems with very diverse student population demographics.

Keywords: active learning

Introduction

In this study, the researchers focus on the influence of active learning in comparison to traditional learning on the student learning outcomes of Association to Advance Collegiate Schools of Business

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(AACSB) accredited business higher education Science, Technology, Engineering, Mathematics, Medicine *(STEMM)* courses. For this study, the focus on campus-level data, particularly how active learning influences student learning in introductory College of Business computer information systems courses focused on information technology for management. In this study, the researchers investigate whether a relationship exists between the method of learning and the student reactions to instruction and courses. Data of *IDEA* evaluations are drawn from over a decade, about 12 academic years, 35 academic semesters for traditional learning and 37 academic semesters for active learning. All these *IDEA* evaluations are analyzed with statistical methods such as t-tests and bootstraps. Results indicate a higher student satisfaction and higher student evaluations from the *IDEA* instrument are statistically significant when active learning teaching methods are employed. The influence of active learning on student engagement and learning indicators is well documented in the research literature, but there is very little evidence on long-term, about 12 academic years, information technology enhanced active learning methods and their effects on learning outcomes for business higher education level courses. The *STEMM* course Introduction to Computer Information Systems for which the students provided their feedback is part of the College of Business curriculum at California State University Stanislaus which is *AACSB* accredited.

Literature Review

In the available research literature, there are many studies which cover the traditional teaching and learning methods and their effects on the achievement of course learning objectives in traditional learning settings (Brockliss, 1996). Traditional learning is the lecture style delivery of information, which enforces a one way communication where the students passively receive information from the instructor (Piaget, 1926; Vygotsky, 1978). Also, traditional learning relies primarily on the teacher lecturing from a podium down to the crowd, a scenario which may cause—after the first 10-15 minutes—student attention decline and may lead to complete absence of student concentration (Bligh, 2000). Freeman et al. (2014) report research results that active learning increases student performance in science, technology, engineering and mathematics STEM. In contrast to traditional learning, in active learning a two-way communication is necessary between the teacher and the students to engage in the learning process (Pintrich, McKeachie, & Lin, 1987). The teacher facilitates the learning process by providing real world scenarios whereby the students learn by example and construct their own knowledge utilizing scientific evidence (Handelsman et al., 2004).

In the research literature, numerous studies provide scientific evidence which indicate information retention and student learning satisfaction is increased during interactive learning sessions compared to traditional 50 minutes' lectures (Hake 1998; Springer, Stanne, & Donovan, 1999; Knight & Wood 2005). Large class sizes (greater than 40 students) may inhibit and constrain the deployment of active learning strategies. In business schools where professors often utilize the Harvard business case study approach to engage the students in the learning discussion the most effective way to learn in larger classes is to create small groups of up to five students and engage in the class discussion activities one group at a time (Heppner, 2007; Stanley & Porter, 2002; Weimer, 1987). Higher education is dominated by

traditional learning and it is no wonder that students perceive some disciplines (for example science, technology, engineering, math, medicine, *STEMM*) as difficult, hard to understand, unapproachable and prefer to shy away from studying these fields. Unfortunately, the same facts are verified by the very high failure, attrition rates and low degree graduation rates in STEMM disciplines of Higher Education (Chen, 2013). Jensen, Kummer, and Godoy (2015) report that when an active-learning, constructivist approach is utilized in flipped and non-flipped classrooms higher learning gains or better attitudes are most likely a result of the active-learning style of instruction rather than the order in which the instructor participated in the learning process. Baepler, Walker and Driessen (2014) report that using an active learning classroom, seat time can be cut by two-thirds and achieve the same outcomes, original findings are confirmed with a second follow-up study, both studies use a standardized exam to measure learning outcomes and student perceptions of the active learning classroom are more favorable. Ruest, Svoboda, and Opperman (2017) report from their dental education research study that the students indicate that active learning activities like crossword puzzles could be an effective adjunct to a flipped classroom self-learning model.

Active teaching and learning methods

In order for active learning to be effective, some preparation (material and psychological) is required from the teacher facilitator. Instead of the teacher lecturing the students, the role is to facilitate, interact with learners and guide them step-by-step through the learning process. In this active teaching and learning paradigm a facilitating approach is for the teacher to consider the class as a group of junior colleagues with whom to collaborate and mentors them with great respect. Based on this strategy the teacher-facilitator is enabled to form a bond enhanced by the learning interaction with the students. This approach also allows the teacher-facilitator to build mutual trust and respect with learners. Active learning also enables the teacher to be a facilitator rather than a supervisor and allows the ability to approach students as a learning resource instead of their superior. This approach allows student-to-teacher and peer-to-peer interaction engaging students in the learning process with open communication so that they feel comfortable coming to the teacher for questions and educational guidance. Active learning approach also provides an open learning environment with mutual respect and satisfaction for the facilitator as well as for the students. The facilitator is able to achieve fulfilment in teaching by helping the students learn new knowledge, or a novel skill that will be useful to them in their higher education and ultimately their careers and the students feel satisfaction with their new knowledge and reflect it in their *IDEA* survey responses. For a teacher facilitator, the leading purpose is to coach the students and facilitate them throughout the learning process by receiving their feedback and adjusting the teaching approach to achieve their learning objectives. Student engagement in the learning process is achieved by motivating them to actively participate and get involved in their daily learning activities utilizing novel technologies such as information technology enhanced training, computing simulations, hands on IT labs, creating and practicing interactive computing models and collaborating on modern business case studies. For example, for the STEM course Introduction to

Computer Information Systems as part of their active teaching and learning students engage with interactive computing labs using Cengage's Skills Assessment Management software learning platform.

Next is an example of Microsoft Access Database tasks completed for Module 1: Project 1 a. Project Report Description: The following provides a brief description and list of fields for available Project Reports. Frequency Analysis by Project displays performance results for each project task (step number) for the section as a whole. Note that total students equals 12 while the total completed times for Steps 1 are 7 (full credit) + 9 (no credit) equals 16. This is due to the fact that each student is allowed to complete the whole project up to three times to improve their grade. For example, if a student the first time receives 50% and wishes to improve it, he/she can redo the whole project and receive 70% and if he/she wishes to further improve it, he/she can redo the whole project and receive 80%. Full credit is for completing correctly all the activities for a step otherwise student is given no credit.

Table 1

Sample Microsoft Access Database Tasks List

Step #	Description	Activities	FC	NC
1	Create a new table in Datasheet View with the following options: (a) Rename the default primary key ID field State and change the data type to Short Text. (Hint: State should remain the primary key). (b) Change the field size of the State field to 2. (c) Add a new field with the name StateName and the Short Text data type. Save the table with the name States, but do not close it.	Set a field's field size property in Table Datasheet view. Add a field to a table in Table Datasheet view. Create a table in Table Datasheet view. Rename a field in Table Datasheet view. CLT.	7	9
2	With the States table still open in Datasheet View, add the four records shown in Table 1 in the Instruction file. If necessary, resize the StateName field so that all field values are completely visible. Save and close the States table.	Enter a record into a table. CLT.	10	6
3	Open the AdRep table in Datasheet View. Add a new field following the PostalCode field with the field name DateHired and the Date and Time data type. Close the table.	Add a field to a table in Table Datasheet view. CLT.	15	1
4	Open the Billboard table in Design View and make the following changes to the Height field: (a) Change the data type from Short Text to Number. (b) Change the Field Size property to Single. (c) Change the Decimal Places property from Auto to 1.	Set a field's data type in Table Design view. Set a field's field size property in Table Design view. Set a field's Decimal Place property in Design view. CLT.	14	2
5	With the Billboard table still open in Design View, add Daily Effective Circulation as the Description (Optional) to the DEC field.	Add a description to a field in Table Design view. CLT.	13	3

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6	With the Billboard table still open in Design View, change the field size property for the Location field to 75. Save the changes to the Billboard table, and then close it. (Hint: Because there were changes to data types and field sizes, the "Some data may be lost" warning message appears. The data fits within the valid ranges, so ignore this message and continue saving the table).	Set a field's field size property in Table Design view. CLT.	14	2
7	Import the data from the Excel support file Support_SC_AC16_1a_Advertiser.xlsx, available for download from the SAM website. Append the records to the Advertiser table. Do not create a new table, and do not save the import steps.	Import data from an Excel workbook into an existing table. CLT.	10	6
8	Open the Advertiser table in Design View and make the following changes to the AdvertiserID field: (a) Make the field the primary key. (b) Change the Caption property to AdvID. (Hint: Do not type the period). Save the changes to the Advertiser table, and then close the table.	Set a table's primary key in Design view. Set a field's caption property in Table Design view. CLT.	14	2
9	Open the Billboard table in Datasheet View, navigate to the third record (which has a BbrdID field value of LHBU01), and then enter Poster for the Type field value. Navigate to the previous record (which has a BbrdID field value of LHBE01) and enter Digital for the Type field value. Close the table.	Set a field's data type in Table Datasheet view. CLT.	15	1
10	Open the Billboard Listing Query in Design View, and then add a criterion to select only those records with a State field value of WA. Run the query, and then save and close the query.	Add a criterion to a Short Text field to a query in Design view. CLT.	14	2
11	Use the Simple Query Wizard to create a query based on the Advertiser table with the following options: (a) Include all fields from the Advertiser table in the query. (b) Save the query with the name Advertiser Query (which is the default name) and close it, if necessary.	CLT.	12	4
12	Create a simple form for the Advertiser table. Save the form as Advertiser Form, and then close the form. (Hint: Use the Form button to create this form).	Create a form using the Form tool. CLT.	6	10
13	Open the AdRep Update Form in Form View and navigate to the third record, which has the AdRepNumber field value of KS02. Change the Address field value for this record to 90 Mesa Verde St., and then close the AdRep Update Form.	Edit a record using a form. CLT.	12	4

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14	Create a simple report based on the Advertiser table. Save the report as Advertiser Report, and then close the report.	Create a report using the Report tool. CLT.	8	8
15	Open the Idaho Wyoming Billboard Circulation report in Layout View, and then modify the report to match the figure in the Instruction file by following these directions: (a) Delete the Type and Facing columns. (b) Change the column heading for the BbrdID column and the DEC column to the headings shown in the figure. (c) Sum the values in the DEC column. If necessary, expand the size of the total control so it displays completely. (d) Change the report title from "Idaho Wyoming Billboards" to Idaho Wyoming Billboard Circulation. (Hint: Do not type the period. Your report may display a different date and time than what is shown in the figure).	Change the document properties. Edit the text in a label in Report Layout view. Resize a control in Report Layout view. Add totals to a report column in Report Layout view. Delete a control in Report Design view. CLT.	6	10

As part of their active teaching and learning students are coached one-on-one by their teacher-facilitator how to complete the Modules for Microsoft Access Database by implementing six projects of 15 to 25 tasks each. In addition to re-working the solution of a similar project in class, the student at any time can always consult the comprehensive lab training which is always available online demonstrating an interactive computer screen recording for each step of the project. Active learning is a standard adopted by the Association to Advance Collegiate Schools of Business AACSB accreditation organization.

Research methodology

Originality and relevance to the field of this study is the contribution of the effects of active learning on *AACSB* accredited business program which includes a *STEMM* discipline like computer information systems with very diverse student population demographics. The positive influence of active learning methods for higher education is widely studied and is well documented in the research literature. However, there is very little research on active learning impact on *AACSB* accredited business programs which include a *STEMM* discipline such as computer information systems. For this study, the focus is on campus-level data particularly how active learning influences student learning in introductory College of Business computer information systems courses focused on information technology for management. In this study, the researchers investigate whether a relationship exists between the method of learning and the student reactions to instruction and courses. The survey instrument of choice for eliciting student feedback is *IDEA* and the time period that the surveys have been collected and analyzed is more than a decade about 12 academic years, 35 academic semesters for traditional learning and 37 academic semesters for active learning. Linse (2017) reports that when evaluating student ratings over a long time period individual courses with low scores are less important than patterns of consistent high score results. Therefore in this research study it is important to distinguish the teaching method which exhibits a pattern over a long time period with consistent low or high scores. *IDEA* is a nonprofit organization

which provides analytics, resources, and advice to improve student learning in higher education. The Individual Development & Educational Assessment (*IDEA*) Student Ratings of Instruction System originated at Kansas State University during the 1968-69 academic year with a unique emphasis to provide constructive feedback to improve the quality of teaching and student learning. During the next seven years, the system was perfected and refined to assist in the improvement of instruction at Kansas State University. With help from the W. K. Kellogg Foundation, the *IDEA* Center was established in 1975 and the *IDEA* Student Ratings system was made available to other colleges and universities. More than 40 years of research in refined feedback instruments and collaboration with more than 300 Universities in the US provide critical insight to guide personal and programmatic reflection. The *IDEA* survey utilized in this study has a Likert scale (1 no apparent progress, 2 slight progress, 3 moderate progress, 4 substantial progress, 5 exceptional progress) for questions 1-12 to gather the self-assessment of the student´s actual learning progress and a Likert scale (1 definitely false, 2 more false than true, 3 in between, 4 more true than false, 5 definitely true) for questions 13-18 to measure student's attitudes and feelings for the teacher, the course and the field of study.

Statistics analysis

The research question is, does the teaching method make a difference to the *IDEA* survey results of a very diverse University student population for a *STEMM* computer information systems course of an *AACSB* accredited program? The research hypothesis is that active learning enhances teaching and student learning, creates positive impact on self-assessment of the student´s actual learning progress and on student's attitudes and feelings for the teacher, the course and the field of study. The statistical analysis is transparent and contains e.g. t-tests and bootstraps. The focus of this study is on the influence of active learning in comparison to traditional learning on the student learning outcomes of *AACSB* accredited business higher education *STEMM* courses. For this study, the researchers focus on campus-level data particularly how active learning influences student learning in introductory College of Business computer information systems courses focused on information technology for management. In this study, the researchers investigate whether a relationship exists between the method of learning and the student reactions to instruction and courses. Data of *IDEA* evaluations are drawn from over a decade, about 12 academic years, 35 academic semesters for Traditional Learning *TL* and 37 academic semesters for Active Learning *AL*. Data collection took place at California State University Stanislaus over a time period that spans over a decade approximately 12 years from spring semester 2004 to winter inter-session 2016. A total of 35+37=72 academic semester class sections with average 30 students each or N=2,160 students total participated in the study. Each of the N=2,160 students has completed an *IDEA* survey. Two experimental conditions are employed for teaching method traditional and active learning. For the experimental condition, traditional learning 35 academic semester class sections participated and for the active learning 37 academic semester class sections participated.

Sample population

The demographics of the University student population for 2016 are 6,422 (66%) female, 3,340 (34%) male, 4,840 (50%) Hispanic or Latino which designates the University as Hispanic serving Institution (CSU, 2018a). The business course for which the students have provided their feedback is introduction to computer information systems.

Table 2

Introduction to Computer Information Systems Demographics, 2016

University Student Population distribution by race, ethnicity, residency status 2016	
American Indian or Alaskan Native	33 (0.3%)
Asian	973 (10%)
Black or African American	218 (2%)
Hispanic or Latino	4,840 (50%)
Native Hawaiian or other Pacific Islander	48 (0.5%)
Nonresident Alien	320 (3%)
Unknown, not responded	549 (6%)
Two or more races	384 (4%)
White	2,397 (25%)

The vast majority, more than 98%, of the students who took this course were first-time freshman business students with an average age of 18-years old and the next significantly smaller group is mature students at an older age than first-time freshman students. Another important characteristic of the sample population is that the vast majority of the students are first generation college students. Nearly 80% of first-time freshmen are first-generation college students. Another significant fact is that the student to faculty ratio is 20:1 which allows for a more engaging learning experience and plays an important role in active learning teaching and learning methods. The course description is the following. "Students learn current information technologies for business applications including hardware and software concepts, components and their integration into business applications. In addition to discovering current information technologies, the student is introduced to word processing, spreadsheet, database, business presentation and Internet applications. The labs are created to satisfy the requirements for training on the Microsoft Office Specialist certifications for word processing, worksheet, database and business presentation applications" (CSU, 2018b).

Table 3

IDEA survey instrument questions utilized to elicit student feedback

IDEA survey form - student reactions to instruction and courses progress on:
Gaining factual knowledge (terminology, classifications, methods, trends).
Learning fundamental principles, generalizations or theories.
Learning to apply material (to improve thinking, problem solving, and decisions).
Developing Skills, competencies, and points of View needed by professionals in the field most closely related to this course.
Acquiring skills in working with others as a member of a team.
Developing creative capacities (writing, inventing, designing, performing in art, music, drama, etc.).
Gaining a broader understanding and appreciation of intellectual, cultural activity (music, science, literature. etc.).
Developing skill in expressing myself orally or in writing.
Learning how to find and use resources for answering questions or solving problems.
Developing a clearer understanding of, and commitment to, personal values.
Learning to analyze and critically evaluate ideas, arguments, and points of view.
Acquiring an interest in learning more by asking my own questions and seeking answers.
As a rule, I put forth more effort than other students on academic work.
My background prepared me well for this course's requirements.
I really wanted to take this course regardless who taught it.
As a result of taking this course, I have more positive feelings toward thig field of study.
Overall, I rate this instructor an excellent teacher.
Overall, I rate this course as excellent.

For the next diagram the *IDEA* survey questions are noted on the horizontal X axis Q1=2, Q2=3, Q3=4,...Q18=19 and the teaching method is indicated by symbols (○/□) for TL/AL. Traditional Learning is TL (○) and Active Learning is AL (□). The academic semesters' *IDEA* survey mean values are from spring 2004 to winter 2016. The Y axis displays the mean values for TL (○) and AL (□).
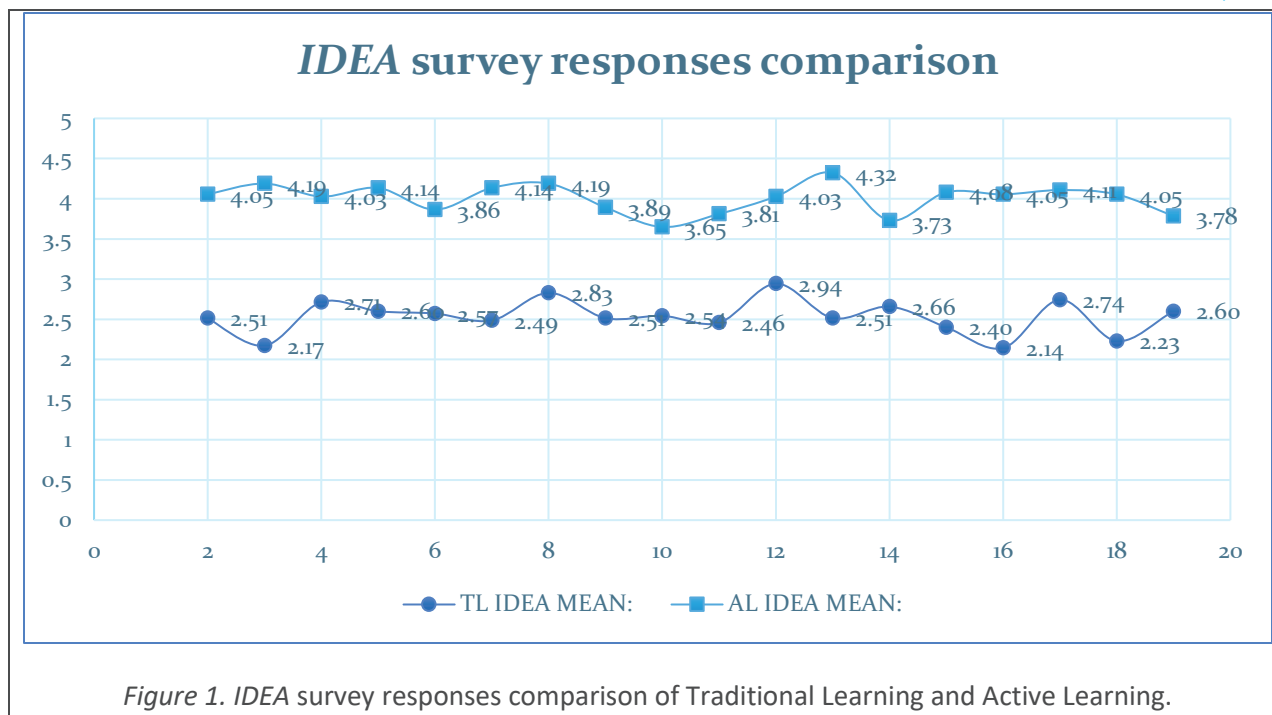
Figure 1. IDEA survey responses comparison of Traditional Learning and Active Learning.

For statistical analysis of the data, *IBM SPSS* was used. The null hypothesis always assumes that the *IDEA* Active Learning and Traditional Learning means are equal. The t-statistic tests the null hypothesis and will indicate if the difference of the two means is different from zero (Pituch, Whittaker, & Stevens, 2015). Comparison of the differences of the means of two groups is the same as utilizing the membership of the two groups to predict an outcome (Lowry, 2014). Cohen (1968) demonstrated that a linear model is utilized when two means are compared. Therefore, this is a regression with one dichotomous predictor utilizing a linear model (Urdan, 2016). For example, the model predicts the student responses on the excellence of the course from whether or not a student participated in active learning (Anderson, Sweeney, Williams, Camm, & Cochran, 2014). Also, Figure 1 indicates that there is a significant difference between active learning and traditional learning means (Lim & Lim, 2016). The independent samples t-test is utilized when there are two experimental conditions—traditional and active learning—and different students participated in the course taught with each condition (Morgan, Reichert, & Harrison, 2016). To run an independent t-test the dependent variable Q18 was selected from the list and assign it to Test Variable(s). Next, the independent variable Teaching Method, which designates the groups traditional learning and active learning, was selected and assigned to Grouping Variable. Then, groups with the numeric codes were assigned to designate the two groups. In this case traditional learning is 1 and active learning is 2. Next, the confidence interval was designated at 95% which is adequately high for this analysis. Next, bootstrapping is utilized to decrease the impact of potential bias in the data and to get a bias corrected and accelerated 95% confidence interval. Last, the survey was deployed.

Table 4

Group Statistics

Teaching Method		Bootstrap results are based on 1,000 bootstrap samples			
Traditional Learning=1.0	Statistic	Bias	Std. Error	Lower BCa 95% Confidence Interval	Upper BCa 95% Confidence Interval
N	35				
Mean	2.600	-.009	.199	2.218	2.972
Std. Deviation	1.193	-.0207	.0794	1.0582	1.2833
Std. Error Mean	.2017				
Active Learning=2.0					
N	37				
Mean	3.784	-.006	.129	3.555	4.000
Std. Deviation	.7865	-.0123	.0589	.6840	.8588
Std. Error Mean	.1293				

In the above Table 4, a summary is provided for the two experimental conditions. The reader can understand from this table that the traditional learning group has 35 class sections participating and the active learning group has 37 class sections participating, numbers are indicated on the right of N. The group of traditional learning on average rated 2.6 on a scale of 5 as an excellent course, with a standard deviation of 1.1931. In addition the standard error of that group is 0.2017. The bootstrap standard error estimate is 0.199 and the bootstrapped confidence interval for the mean has a lower value of 2.218 and upper value of 2.972. The group of active learning on average rated 3.784 out of 5 as an excellent course, with a standard deviation 0.7865 and a standard error of 0.1293, lower than the TL group. The bootstrap standard error is 0.129 lower than TL group and the confidence interval for the mean has a lower value of 3.555 and upper value of 4.

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Table 5

Independent Samples Test

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	Lower 95% Confidence Interval of the Diff.	Upper 95% Confidence Interval of the Diff.
Equal variances assumed	13.206	.001	-4.997	70	.000	-1.1838	.2369	-1.6563	-.7113
Equal variances not assumed			-4.941	58.381	.000	-1.1838	.2396	-1.6633	-.7043

In the above Table 5 , the main test statistics are presented. The test statistics values are displayed in two different rows titled Equal variances assumed and not assumed. In order to determine if the variances in experimental groups are approximately equal, which is assumed by parametric tests, Levene's test is performed to see if this assumption is broken or not. Hence Levene's test puts to the test the hypothesis that the difference of the two variances is zero and the two group variances are equal. If Levene's test is not significant p>0.05 then the variances are assumed approximately equal and the hypothesis is acceptable. If Levene's test is significant p<=0.05 then the assumption of homogeneousness of variances is violated and the hypothesis is not acceptable. In this case Levene's test is significant p=0.001 which is less than 0.05. Hence the test statistics are acceptable from the row titled Equal variances not assumed. Examining the t-test for equality of means the standard error difference is 0.2396, the mean difference is -1.1838 and the t-statistic is equal to the mean difference divided by the standard error difference, t=-4.941. This t value is assessed compared to the expected t-value with no effect in the population and with degrees of freedom 58.381. The significance of the t-test is assessed by if it is greater or less than p=0.05. For this case the two tailed value of p=0.000007 which is less than 0.05 and hence the t-test finds a significant difference between the means of these two groups. If the same test is run as a regression then the values of the t-test and significance are the same. The direction (positive or negative sign) of the correlation coefficient of a dichotomous variable depends on which cases are assigned to which groups. The positive or negative sign (direction) of the t-test value depends upon which group is selected as the base category (the category designated as 1=Traditional Learning). Hence one of the important results of the experiment is that active learning=2 significantly affects the students' assessment of the excellence and quality of the course.

Table 6

Bootstrap for Independent Samples Test

	Mean Difference	Bootstrap results are based on 1,000 bootstrap samples				
		Bias	Std. Error	Sig. (2-tailed)	Lower BCa 95% Confidence Interval	Upper BCa 95% Confidence Interval
Equal variances assumed	-1.1838	-.0025	.2364	.001	-1.6840	-.7493
Equal variances not assumed	-1.1838	-.0025	.2364	.001	-1.6840	-.7493

Table 6 presents the results of bootstrapping procedure. The mean difference standard error value is re-computed and is equal to 0.2364 which is lower than the prior value of 0.2396. The bootstrapped computed confidence interval is -1.6840 to -0.7493 for the difference between means -1.1838. The bootstrap confidence interval indicates that the mean difference for the two population groups is negative and cannot be zero i.e. significant difference between the two population groups. Hence this bootstrap confidence interval confirms the conclusion that active learning seems to affect the assessment of students regarding the quality and excellence of the course.

Future work and limitations of the study

Limitations of this study are that the results pertain to a specific region the central valley of California and to a specific diverse demographics of the university student population. In addition to the diverse demographics with high concentration of Hispanic university student population the study included only small size classes of about thirty students. According to research literature, small class size improves quality of student learning. Another limitation of the study included focus on a specific campus in a specific location in the central valley of California. Nevertheless, these limitations may be balanced by other independent studies which have performed similar experiments on a broader university student population sample in other parts of North and South America, Europe, Middle East, Asia, Africa, Australia and have reached the same positive findings. Numerous independent research studies have reached similar positive results about active learning and are in agreement with the findings of the current study which are independently verified and confirmed. The contribution of this work to the university business faculty and students is therefore confirmed by the experiments of this and other independent international studies which reaffirm the positive influence of active learning. Future work will focus on individual student learning objectives and how they are influenced over time by active learning strategies.

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Conclusion

In this study, the investigation was whether there is a relationship between teaching methodology and student assessment of excellence of the course and how the means of the student assessments compare for two independent groups who participate in traditional lecturing and active learning. Our results reveal that there appears to be a significant difference between traditional lecturing and active learning, as to how the students respond to standard *IDEA* survey for achieving their learning objectives. Results indicate that there is a relatively immediate statistically significant impact of active learning on the excellence and quality of the taught course. This finding is consistent with the research literature that active learning strategies are more efficient and information is absorbed and retained more effectively for active learning participants compared to students subjected to the traditional lecturing.

Hence one of the important results of this study is that active learning meaningfully affects in a positive and significant way the students' assessment of the excellence and quality of the course. There are numerous implications for practice and policy for higher education institutions especially business schools with a *STEMM* discipline which aspire to be or already are *AACSB* accredited. It is an advantage for higher education institutions to include active learning activities for their business programs to enhance teaching and to enrich student learning experiences.

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