

Original research article

The empirical analysis in determining the critical determinants of using technology in utilising online learning platforms for improving academic achievements using Anova analysis

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Abstract: The goal of this study is to identify and investigate the elements that may influence the levels of achievement and contentment experienced by students enrolled in online classes. There is a body of research that has already investigated the advantages and applications of online education. In the current dynamic environment, many people using online platforms, this presents a problem in and of itself. The purpose of this study is to gain a deeper understanding in determining the critical determinants of using technology in utilising online learning platforms for improving academic achievements. In the past, some of the implementation issues that have been highlighted include a lack of trained lecturers, insufficient facilities, and students who are unprepared to use online learning platforms and Learning Management System (LMS) platforms as teaching tools. In addition, a scarcity of trained lecturers has been identified as a challenge. The demand for it among students increased, and it is currently utilized by individuals all over the world as a result of its adaptable design and several helpful functions. There have, for a considerable amount of time, been concerns over the expansion of online learning environments at the expense of those that are more traditional

Keywords: online learning, teaching technology, teaching tools

1. Introduction

Since the early years of the new millennium, many educational institutions have made online learning an essential component of their course offerings, and students have been strongly encouraged to successfully complete their online classes. In addition, during the past few years, there has been a reduction in the number of students who choose not to participate in any form of online education offered. According to researchers, online education is undeniably an effective instrument for both the process of teaching and the process of learning (Alias, 2018). As a result of the ever-growing nature of the internet's resources, online courses are making an attempt to combine social networking capabilities together with specialized content. This is done in order to attract more students. According to reports, the success of these types of classes depends on the independent and active participation of a significant number of students, each of whom acts in accordance with their particular learning objectives, skill sets, and background information (Bouhnik, 2013). However, students' diverse academic talents and the outcomes of their classes are influenced by the distinct perspectives, experiences, and perspectives that they bring to the classroom. It is suggested that even if online education continues to advance, not all students will profit from it. Although there has been rapid growth in the use of online learning in the academic world, very little is known about the students' prior experiences with this mode of instruction. Previous studies have narrowly focused on one aspect of students' attitudes and views, such as the effectiveness of online courses or the adoption of a certain LMS. For example, instructor-student collaboration, the effectiveness of online courses, or the adoption of a particular LMS (Abuhassna, 2020). Researchers found that few studies have looked at bigger sample sizes across one or more independent institutions, and even fewer have evaluated more than a small number of schools or courses. These findings were found in two separate studies. In addition, there is a paucity of research such that contrasts the benefits and drawbacks of face-to-face and online learning

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while taking into account the distinct experiences and points of view that are held by individual students. One of the primary advantages of participating in online learning is the possibility that it will assist students in expanding upon the knowledge, experience, and abilities that they already possess. Moreover, the researchers have also focused their attention on the ways in which students respond to and perform in online courses.

2. Review of Literature

According to the findings of the study, students must have prior experience navigating an online learning environment before it can be successfully applied in a traditional educational setting. There are a number of benefits associated with online learning for both students and teachers. These benefits are particularly useful for self-directed students, who may have difficulty finding a supportive learning environment in traditional classroom settings. Two potential barriers that could prevent students from making efficient use of technology in the classroom are the students' level of technical expertise and their level of familiarity with the operation of the software. Because of their lack of experience, even relatively straightforward activities, like as viewing a film together or discussing a paper, can become more difficult for students and teachers (Panyajamorn, 2018). This can be a consistent source of tension between the two groups. This has been demonstrated to be the case over the course of many years by the observations and comments made by participants in a large number of online sessions. It might be discouraging to complete assessments like online group presentations because there is no face-to-face communication and a dependence on the audience's body language. Participating in online sessions with other coworkers, which may occasionally be nonvisual like a teleconference format, is becoming an increasingly crucial ability in today's modern workplace. This confirms the necessity of brief, clear, and intensive interactions abilities (Jacobs, 2016).

Students collaborating with one another through the use of shared online activities are the focus of this definition of "cooperative learning." In order to examine the concept of transactional distance in academic settings, a survey was constructed. This study was conducted with the intention of enhancing transactional distance as well as quantifying it. 235 students who were enrolled in a synchronous online graduate business course were given the opportunity to respond to a survey on transactional distance and partnerships. For instance, "live on-campus classes are simultaneously conveyed to both in-class students on-campus and remote students on the Web who join via virtual classroom Web collaboration software". This information was gleaned from research (Choy, 2016). The software for the virtual classroom enables students and teachers to engage with one another in real time, which is comparable to two separate systems developed. In addition, instructors have an important role to play as interaction and communication facilitators. This is due to the fact that they are tasked with the responsibility of promoting, insuring, and making it easier for student-to-student discourse. According to analysis, students today regularly use in-person tutorials to discuss and debate subject matter related to the curriculum as well as linked topics (Azhari, 2015).

In the context of this study, the terms "purposeful interaction" and "dialogue" refer to conversations that are held with the intention of acquiring further knowledge either between students or between students and teachers. Engaging in fruitful conversation allows one to build on the efforts of others and inspires further education on their part. According to Moore's research from 1972, students have a responsibility to be aware of both this and the value of learning exchanges. It carried out a case study of a New Zealand teacher education program that, similar to investigated the utilization of digital technology in the process of training future teachers. Also looked at discourse in online classrooms as another area of research for his project. She devised an online poll with the purpose of discovering how students in screencasting-based classes felt about being provided with audio-visual feedback. It contends that self-directed students pick classrooms that focus less emphasis on structure and discussion so that they can better identify their learning goals and move more quickly in their academic development. Researchers have discovered that the degree to which students cooperate with one another affects their reactions to working with peers (Othman, 2015).

The degree to which multiple facets of a student's educational experience (faculty, institution, learner, interaction/communication, course, and learning environment) combine to offer a pleasant educational experience is what is meant by the term "student satisfaction." The role of the instructor in influencing the behaviors, social presences, and utilization of online learning platforms of their students is another topic that will be covered. Researchers

investigated the possibility of gender differences in the positive relationships that exist between student satisfaction, interaction, and self-efficacy. A slightly modified version of the survey questionnaire can be used to assess a student's academic accomplishments as well as their academic performance and their level of satisfaction (Vasala, 2010). It looked into six different psychosocial aspects of education and found that personal relevance, educator support, student engagement and collaboration, student autonomy, authentic learning, and active learning were among the most important aspects. It has been demonstrated that there is a link of some significance between these parameters. Nevertheless, only genuine learning could accurately predict student achievement. It was found that teacher support, student curiosity, and a challenging environment were significant predictors of learner satisfaction.

3. Materials and Methods

3.1 Methodology

The study focuses in understanding the critical determinants of using technology in utilising online learning platforms for improving academic achievements. The study applies descriptive research design as it enables the researcher to have more deeper understanding on the concepts of the impact the online platforms are creating in improving the academic achievements of the students. With the application of various Industry 4.0 tools, the online learning platforms are creating major changes in how the learning can be delivered and enhance the overall academic improvements among the students. The study applies quantitative research design as the data collected will be quantified and analysis will be carried out based on the sourced information. The researcher uses both primary and secondary data source, the primary source is collated by creating detailed questionnaire and the sample respondents considered are the teachers and faculty members who are handling classes for school students in different parts of India. Nearly 200 questionnaires were issued and only 183 completed questionnaires were received, which are used for analysis.

3.2 Research objectives

The basic purpose of the study is to analyse the critical determinants of using technology in utilising online learning platforms for improving academic achievements.

3.3 Research Hypothesis

There is no mean difference between application of creative teaching methods through online learning platforms and enhancing academic performance among students

There is no mean difference between effective classroom engagement through online learning platforms and enhancing academic performance among students

There is no mean difference between providing student autonomy for learning and enhancing academic performance among students

There is no mean difference between cultivating creative skills through online learning platforms and enhancing academic performance among students.

3.4 Data Analysis and Interpretation

This section involves in presenting the overall analysis of the data which are collected by the researcher, the analysis involves in presenting the demographic analysis, correlation analysis and analysis of variance. The ANOVA analysis also involve in analysing whether the differences between the means of different groups.

Table 1. Frequency analysis.

Gender Composition	Frequency	Percent
Male	110	60.1
Female	73	39.9
Age Composition	Frequency	Percent
Less than 30 years	50	27.3
31-40 years	84	45.9
41-50 years	18	9.8
Above 50 years	31	16.9
Classes Handled	Frequency	Percent
Handling classes VIII to X	78	42.6
Handling classes XI to XII	50	27.3
Principal	38	20.8
Head of the Institution	17	9.3
Qualification	Frequency	Percent



Completed B.Ed	84	45.9
Completed M.Ed	89	48.6
Completed PhD	10	5.5
Total experience	Frequency	Percent
Less than 3 years	49	26.8
3-6 years	51	27.9
6-9 years	42	23
9-12 years	9	4.9
Above 12 years	32	17.5
Total	183	100

The demographic analysis shows that 60.1 % of them were male respondents, 45.9 % were in the age group between 31 - 40 years, 42.6 % were currently handling class VIII to X, 48.6 % have completed M.Ed course and 27.9 % were having 3 - 6 years of experience.

3.5 Correlation analysis

The next step is to analyse the nature of association between the variables, for this purpose coefficient of correlation is computed, the value lies between -1 to +1, if the value is +1 then it can be stated that there is a high positive correlation between the variables.

Table 2. Correlation analysis.

Karl Pearsons Correlation	Creative teaching methods	Effective classroom engagement	Student autonomy	Cultivating creative skills	Enhancing academic performance
Creative teaching methods	1	.896**	.848**	.853**	.825**
Effective classroom engagement	.896**	1	.846**	.859**	.856**
Student autonomy	.848**	.846**	1	.835**	.755**
Cultivating creative skills	.853**	.859**	.835**	1	.806**
Enhancing academic performance	.825**	.856**	.755**	.806**	1

The coefficient matrix states that the association among the independent variables viz., Creative teaching methods; Effective classroom engagement; Student autonomy and Cultivating creative skills whereas the dependent variable is Enhancing academic performance. The analysis shows that the highest correlation exists between Effective classroom engagement and Enhancing academic performance, this states that the application of online learning enables the students to get more engaged in the class and this is reflecting in enhancing their academic performance, furthermore the correlation coefficient between Creative teaching methods and Enhancing academic performance is at +0.825, also the correlation between Cultivating creative skills and Enhancing academic performance is +0.806, lastly the correlation coefficient is at +0.755 for Student autonomy and Enhancing academic performance.

3.6 Hypothesis testing

The section provides the test of hypothesis using ANOVA, this model enables in understanding if there is any mean difference among the variables and provide the significant differences among them. Also, the researchers applies critical Welch and Brown-Forsythe analysis of variance which supports in comparing various measurements (data presented on an interval or ratio scale). These measurements are supposed to reflect samples from a Gaussian distribution; however, the Welch and Brown-Forsythe analysis does not assume that the variances of the different groups are the same. Moreover, these tools examines whether or not the variances of different groups are comparable by doing an Analysis of Variance (ANOVA) on a transformed version of the response variable.

Hypothesis 1:

Null: There is no mean difference between application of creative teaching methods through online learning platforms and enhancing academic performance among students

Table 3. ANOVA 1.

Creative teaching methods						
Levene Statistics	df1	df2	Sig.			
7.384	4	178	0.00			
ANOVA						
Creative teaching methods	Sum of Squares	df	Mean Square	F	Sig.	
Between groups	182.042	4	45.51	169.57	0.00	
Within groups	47.773	178	0.268			
Total	229.814	182				
Robust Tests of Equality of Means						
Creative teaching methods	Statistics	df1	df2	Sig.		
Welch	168.696	4	35.846	0.00		
Brown-Forsythe	135.543	4	67.375	0.00		

The analysis mentions that the Levene's statistics is 7.384 also if, the Levene's value states that if the significance value is more than 0.05, then the variance are not significant between the variables, however, in the analysis the value is at 0.00, furthermore, it is mentioned by researchers that Welch and Brown-Forsythe test are applied to understand whether the variances across the different groups are not equal. From the table it is noted that the significance value is less than 0.05 and hence the variances are equal and hence can be concluded that there is a mean difference between application of creative teaching methods through online learning platforms and enhancing academic performance among students

Hypothesis 2

Null: There is no mean difference between effective classroom engagement through online learning platforms and enhancing academic performance among students

Table 4. ANOVA 2.

Effective classroom engagement						
Levene Statistics	df1	df2	Sig.			
58.245	4	178	0.00			
ANOVA						
Effective classroom engagement	Sum of Squares	df	Mean Square	F	Sig.	
Between groups	215.626	4	53.906	221.92	0.00	
Within groups	43.238	178	0.243			
Total	258.863	182				
Robust Tests of Equality of Means						
Effective classroom management	Statistics	df1	df2	Sig.		
Welch	183.729	4	432.272	0.00		
Brown-Forsythe	133.411	4	56.697	0.00		

The analysis mentions that the Levene's statistics is 7.384 also if, the Levene's value states that if the significance value is more than 0.05, then the variance are not significant between the variables, however, in the analysis the value is at 0.00, furthermore, it is mentioned by researchers that Welch and Brown-Forsythe test are applied to understand whether the variances across the different groups are not equal. From the table it is noted that the significance value is less than 0.05 and hence the variances are equal and hence can be concluded that there is a mean difference between effective classroom engagement through online learning platforms and enhancing academic performance among students.

Hypothesis 3

Null: There is no mean difference between providing student autonomy for learning and enhancing academic performance among students

Table 5. ANOVA 3.

Student autonomy						
Levene Statistics		df1	df2	Sig.		
8.066		4	178	0.00		
ANOVA						
Student autonomy	Sum of Squares		df	Mean Square	F	Sig.
Between groups	155.87		4	38.967	91.35	0.00
Within groups	75.934		178	0.427		
Total	231.803		182			
Robust Tests of Equality of Means						
Student autonomy	Statistics	df1	df2	Sig.		
Welch	87.019	4	36.061	0.00		
Brown-Forsythe	68.838	4	58.78	0.00		

The analysis mentions that the Levene's statistics is 8.066 also if, the Levene's value states that if the significance value is more than 0.05, then the variance are not significant between the variables, however, in the analysis the value is at 0.00, furthermore, it is mentioned by researchers that Welch and Brown-Forsythe test are applied to understand whether the variances across the different groups are not equal. From the table it is noted that the significance value is less than 0.05 and hence the variances are equal and hence can be concluded that there is a mean difference between providing student autonomy for learning and enhancing academic performance among students.

Hypothesis 4

Null: There is no mean difference between cultivating creative skills through online learning platforms and enhancing academic performance among students.

Table 6. ANOVA 4.

Cultivating creative skills						
Levene Statistics		df1	df2	Sig.		
8.386		4	178	0.00		
ANOVA						
Cultivating creative skills	Sum of Squares		df	Mean Square	F	Sig.
Between groups	165.051		4	41.263	129.39	0.00
Within groups	56.763		178	0.319		
Total	221.814		182			
Robust Tests of Equality of Means						
Cultivating creative skills	Statistics	df1	df2	Sig.		
Welch	172.598	4	37.979	0.00		
Brown-Forsythe	112.768	4	70.954	0.00		

The analysis mentions that the Levene's statistics is 8.386 also if, the Levene's value states that if the significance value is more than 0.05, then the variance are not significant between the variables, however, in the analysis the value is at 0.00, furthermore, it is mentioned by researchers that Welch and Brown-Forsythe test are applied to understand whether the variances across the different groups are not equal. From the table it is noted that the significance value is less than 0.05 and hence the variances are equal and hence can be concluded that there is a mean difference between cultivating creative skills through online learning platforms and enhancing academic performance among students.

4. Discussion

The individuals in charge of educational institutions of higher learning are the recipients of the first piece of guidance that may be derived from the findings of the study. To ensure the success of any online learning project, it is essential to first develop a course structure that is guided by both theory and literature. It is essential to the viability of online education that instructors and those developing the curricula have access to the tools and information they require to do their duties effectively. Learning management systems like Moodle and LMS are introduced to participants in seminars and training sessions, which are beneficial to both the instructors and the students. Because of this, the program does not make it possible to create a shared online learning environment that can accommodate the requirements of both students and instructors. If teachers are either untrained or do not employ relevant technologies (like Moodle) in the classroom, the quality of education that their students receive can be drastically degraded. Investing in training, reviewing, and adapting the software as well as the teacher could result in a better working environment for the teacher and a better education for the children. Both a student's academic performance and their level of enjoyment are impacted by the degree to which they are comfortable with and have utilized online learning settings.

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