HONG KONG JOURNAL OF SOCIAL SCIENCES

香港社會科學學報

第一的第 60 期 (2022 春/夏) Vol. 60 Autumn/Winter 2022

Open Access Article https://doi.org/10.55463/hkjss.issn.1021-3619.60.89

E-Learning Platforms Analysis – Modern Review

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Received: January 2, 2023 ▪ Reviewed: January 24, 2023

▪ Accepted: February 6, 2023 ▪ Published: February 28, 2023

Abstract:
E-learning is a novel instructional technique for imparting necessary information and skills to students. This article gives a thorough examination of the current state of e-learning approaches in organizations. The authors also assess the efficacy of e-learning by analyzing the current research articles. This study is presented and evaluated in several models to explain student intention to use an e-learning system as a substitute for traditional classroom learning or as a stand-alone distant education approach. The results of a survey related to eLearning platforms were reviewed by other researchers to determine the identified discoveries and uncover the research gaps. This work is unique as it contributes to the current literature discussion. The article's scientific uniqueness also includes a large-scale investigation that describes the author's theoretical and practical prerequisites. A critical examination of the literature is offered in this paper to establish a more realistic foundation for e-learning success. This paper reviews various e-learning tools and presents visualizations of web search data that display the popularity of electronic learning systems.

Keywords: e-learning, Moodle, Blackboard, Top Hat, Google Classroom.

电子学习平台分析——现代评论

摘要：
电子学习是一种新颖的教学技术，用于向学生传授必要的信息和技能。本文对组织中电子学习方法的当前状态进行了全面检查。作者还通过分析当前的研究文章来评估电子学习的功效。本研究以多种模型进行介绍和评估，以解释学生使用电子学习系统替代传统课堂学习或作为独立远程教育方法的意图。其他研究人员审查了与电子学习平台相关的调查结果，以确定已发现的发现并揭示研究差距。这项工作是独一无二的

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，因为它有助于当前的文献讨论。这篇文章的科学独特性还包括描述作者的理论和实践先决条件的大规模调查。本文提供了对文献的批判性检查，以为电子学习的成功建立更现实的基础。本文回顾了各种电子学习工具，并呈现了网络搜索数据的可视化效果，这些数据显示了电子学习系统的流行程度。

关键词：电子学习、心情、黑板、礼帽、谷歌课堂.

1. Introduction

In this day and age, there are great movements of individuals as learners, facilitators, and administrative employees opting for an e-learning platform, which implies a user-centered approach. It is for improved accessibility of training content, real-time collaboration with the facilitator, and allowing administrators to evaluate participant performance (Hariyanto, 2014). E-learning is described as "learning that is facilitated electronically" in simple terms. E-learning is typically performed through the Internet, with students having access to their learning materials at any time and from any location. Online courses, online degrees, and online programs are the most common forms of e-learning. Several e-learning examples are available; the authors have discussed those in greater depth in previous articles. There are various advantages to online learning over traditional learning techniques. Some of these features include the ability for students to engage in self-paced learning and to select their own learning settings. Furthermore, because it eliminates the geographical barriers that are typically associated with traditional classrooms and education, e-learning is both cost-effective and cost-efficient. Various authors have described e-learning as the use of electronic media for various learning goals, ranging from traditional classroom add-on capabilities to online meetings that replace face-to-face meetings.

E-Learning will continue to increase at an exponential rate in the future. Online learning's relevance in education will only grow as more educational institutions, organizations, and online learners throughout the world discover its value. Online learning currently has a wide range of applications in education, and its future potential is enormous. While the world of online education is undeniably intriguing, many students who are uneasy with it still prefer the conventional live, in-person teaching techniques that they are accustomed to.

The intuitive learning software with user-friendly interfaces enables the learner and facilitator to learn, upload, update with resources and attempt online activities or sessions such as quizzes, zoom meetings, participate in forums access gradebooks along with intuitive navigations that create an enjoyable interactive learning environment (Moreno et al., 2016). It consists of content modules, learning modules, communication modules, and evaluation modules that support in controlling, distributing, understanding, and development of the course (Hariyanto, 2014).

The availability of an E-learning platform depends on the connectivity of the network in the interaction process of the system to boost one's performance, which is viewable from any size screen of the digital devices (Alsalim, 2021). Various E-Learning tools are being used in this digital world and which were more effectively utilities during the pandemic (Alsalim, 2021) that empowers both parties to be virtually connected to meet one's objectives. This paper reviews various E-Learning tools and presents visualizations of web search data that display the popularity of Electronic Learning Systems.

2. Methodology

A longitudinal study was proposed where both sides of qualitative and quantitative methods were adapted as a mixed method to support the findings in this research paper. The first procedure was entirely based on qualitative data analysis to gather in-depth insights into the research problem. Subsequently, the second procedure dealt with quantitative data analysis, which gathered statistical data for examination and analysis.

The first procedure for this research included qualitative research, which included data collection using the following approaches.

2.1. Literature Review

A survey related to eLearning platforms was reviewed to determine the identified discoveries and unveil the findings of the research gap.

2.2. Ethnography

This method involved participation in an organization (Fiji National University) to closely observe the relationship between students with various eLearning platforms to gather in-depth findings for the research problem.

2.3. Focus Groups

A group of first-year Information technology students were selected as the focus group where face-to-face discussions were conducted and the results were recorded as findings.

2.4. Interview

A group of university lecturers were involved in an open discussion to determine the years' experiences and support the findings.

The second procedure for this research included quantitative research, which included data analysis using the following approaches.

2.5. Observations

A routine observation was conducted on students in accordance with different eLearning environments to determine the results and support findings.

2.6. Survey

A list of closed-ended questionnaires was circulated via Google Forms to gather and analyze the findings from the students' perspective.

2.7. Experiment

A pre-test and post-test were conducted to determine the best eLearning platforms with the use of different categories and usability areas.

2.8. Selection Criteria

Only papers published after 2005 in English were selected and included if the paper gave details about the use and application of E-Learning in today's learning environment.

Direct observation and experimental analyzes are the core research methods for this research. Figure 1 shows the steps taken in doing this research.

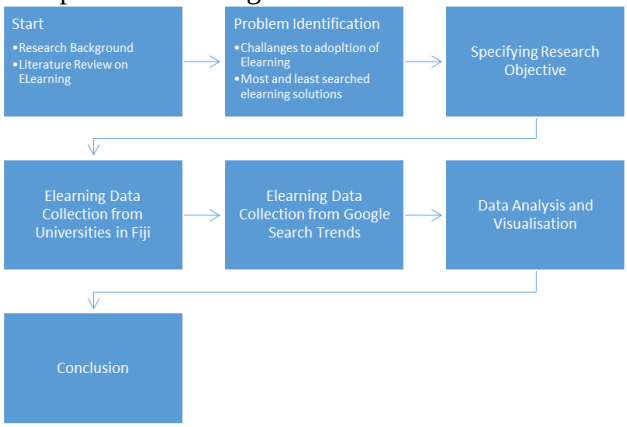

Figure 1. The flowchart to show the steps taken in performing this research (Developed by the authors)

3. Related Works

A literature review was conducted for this research paper, where different databases were used to search journal and conference categories. The research papers were explored to identify and determine the top five eLearning platforms used in tertiary education to enhance learning. Educators in both schools and universities use E-learning platforms by as online learning media providing a digital classroom to interact with the registered users without visually being present in real-time classrooms. The following section discusses the top five widely used eLearning platforms currently being used in schools and universities.

3.1. Moodle (Modular Object-Oriented Dynamic Learning Environment)

Moodle environment is constructed on socio-constructivist pedagogy design supporting inquiry and discovery-based approach allowing collaborative interaction among students and educators. It is considered as one of the most commonly used open-source E-learning platforms which is written using general-purpose scripting language. Moodle consists of modules, plugins, core libraries, and API's, that further support collaborative learning and managing the system that displays the Moodle page with header, content display section, navigation, and footer. It requires users to validate the username during the log-in process of the application.

It is considered as one of the most widely used open-source E-learning platforms across 193 countries with more than 400,000 registered users (Mirdha et al., 2014). Moodle platforms are packed with configurable and customizable features and tools to support both online and blending learning and teaching processes, including assessments and activities portals, supervised online tests and quizzes, instant messaging and communication, learning resources and announcement forums, and endless plugins and functionalities (Costa et al., 2012). According to a case study result (Kc, 2017), Moodle is commonly used for delivering learning content and grading across schools and universities where features such as assignments, quizzes, workshop modules and feedbacks are vastly used.

3.2. Google Classroom

Google Classroom is another famous E-learning tool developed by the Google company to enhance educators work flow activities with a set of powerful features making an ideal learning platform to deliver learning contents to students (Ketut Sudarsana et al., 2019). Google classroom is a free of service file sharing program that is available on demand via the internet to share resources using cloud storage that further assist in file synchronization services. The administrator creates a class to allow students by emails to browse the page, announcements, and post comments that provide two ways to control of interaction along with the navigation tools. This powerful free productivity suite is available for anyone who has a Gmail account, which is part of the Google Apps for Education (GAFE) (Ketut Sudarsana et al., 2019), where the setup features are integrated in the app promoting ease of use (Iftakhar, 2016).

Google classroom provides the functionality of notifying information to student email directly from the app itself, saving educators time and classes well organized and it is effective for classroom submission (Khanchandani et al., 2019). This e-learning platform is one of the most recent developments in the productive and learning management area introduced in 2014 as part of GAFE (Dash, 2019). Google Classroom allows the creation and organization of online classes for both small and medium scale, providing a cognitive tool in the teaching and learning process to promote critical thinking, problem-solving skills, and supports "What if" type of questions. According to the authors Sukmawati and Nensia, Google Classroom can be devoted to any educational scope that can transition to paperless learning and teaching approach (Sukmawati

& Nensia, 2019).

3.3. Blackboard

Blackboard is a proprietary e-learning application that is very similar to Moodle with some additional features, making the application special in its own ways, which is naturally targeted by universities. The additional features of Blackboard namely, creates conducive virtual sessions, controls the gallery views after that allows the participants to stay focus while the facilitator is in front noticing the participants in the virtual meet, enables attendee to provide feedback, assist the administrator to split the attendee into groups for group discussions and presentations, and hand-raising deepen and chats assist learners to further clarify on doubts (Bradford et al., 2007). A blackboard learning management system produces benefits for both students and facilities with increased availability, quick feedback, improved communication, tacking, and skill building (Bradford et al., 2007).

A survey (Carnevale, 2003) was conducted in the University of Wisconsin System, where 730 faculties, staff and student used Blackboard systems, many responders found that it is harder to learn blackboard compared with other learning management systems. On the other hand, another survey (Liaw, 2008) was conducted among 424 universities, where the results showed that learners characteristics influence the learners perceived satisfaction and perceived usefulness of a product. Liaw (2008) mentioned that the environmental characteristics play a vital role that can affect the perceived satisfaction, perceived usefulness, and e-learning effectiveness among learners.

Two similar studies (Mouakket & Bettayeb, 2015; Tella, 2012) were piloted to examine the level of satisfaction; Mouakket and Bettayeb (2015) gathered sample data from 158 university instructors in the United Arab Emirates (UAE), which indicated well-presented user-interface design with good technical support and proper training can increase the benefits of blackboard system. On the other hand, the authors findings indicate that users with high computer self-efficacy and good amount of training will not offer the university instructors the satisfaction toward blackboard system.

Tella's (2012) survey shows that all system-related factors focused in the study interrelated with user's satisfaction predicting 54% variation in student's satisfaction, based on the findings that the university must improve the support services provided for bettering Blackboard system adoption by users. Hence, creates effective learning in a web-based virtual learning environment.

3.4. Top Hat

Top Hat is a modern flipped classroom that increases student engagement in online class participation raising awareness in eLearning. It is an online teaching tool that is accessible from a web browser and from Google play to download a Top Hat mobile application for one to enjoy teaching and learning along with an interactive text platform.

The user-friendly platform enables the user to stream video on the same platform on which the content is delivered, provides in-class experiences even when the lesson was concluded and assisted with programmed record of attendance (Balula et al., 2015). Top Hat was introduced in 2009, and many organizations widely used to create curiosity among students by providing effective attendance marking, quick quizzes between lecture slides, supervised online exams, and accessibility features to support multi-challenged students.

According to Balula et al. (2015), Top Hat was effective for improving language proficiency, where the results unveil a positive impact of students toward learning English with boosting in student performance over time. Top Hat provides a mechanism for traditional learning with supervised features during exams where students will be closely monitored with webcam motion detections; these e-Learning tools will be an ideal choice to provide high-quality learning among other eLearning tools.

According to Lucke, Dunn and Christie (2016), students were very immersive in terms of discussion and online participation, which were measured in the form of noise level. Christopher and Simon (Mariani & Roe, 2021) highlighted the strengths of Top Hat in accordance with the response features allowed a more efficient use of class sessions to accommodate for misunderstood and challenging topics for students. In accordance with many ARD studies (Caldwell, 2007; Kay & LeSage, 2009), instructors and teachers felt dramatic improvements with student engagement in the teaching sessions.

3.5. Canvas

Canvas platform shares multiple learning management system features ranked among the top 10 widely consumed platforms, which is widely used in institutions of higher education(IHE) from developed countries like the United States, the United Kingdom, Australia and others whereas Moodle is popular among developing countries such as South Africa, Brazil, and India (Cavus & Zabadi, 2014). It is one of web-based learning management systems that engages students with learning wherever the participant is stationed also tracks the records of the participant anytime like grade, attendances, outstanding balances, and remarks (Marachi & Quill, 2020). It offers a centralized learning hub (Fathema & Akanda, 2020) along with the Canvas API for setting up the internet-based collaboration in terms of managing the course. Canvas is extensively used across K-12 and higher education internationally,

Marachi and Quill analyzed the development of Canvas and concluded that higher education institutions

are not well equipped to protect students and faculty required to use the Canvas Instructure from data harvesting or exploitation (Marachi & Quill, 2020). Canvas is the most reliable learning management system; two similar studies (Endozo et al., 2019; Fathema & Akanda, 2020) were conducted for academic instructors, where results were evaluated to analyse the relationship between Canvas and teachers.

An examination was conducted by Endozo, Oluyinka, and Daenos (2019) toward the instructor's usage in accordance the UTAUT (Unified Theory of Acceptance and Use of Technology) model, where the results encouraged teachers to maximize the usage of technology together with promoting improvement toward effective usage of the Canvas system.

Quantitative analysis was by Fathema and Akanda (2020) conducted to determine the effect of instructor's academic discipline and prior experience with Canvas and the results suggest that prior learning management system knowledge, experience and academic discipline can have a huge impact on the usage of the Canvas platform.

4. Findings

4.1. Basic Skills for LMS

According to the findings from the literature review, it was discovered that users can easily adopt and transition to a newer learning management system with basic knowledge and experience of LMS.

The basic skills of LMS can enable users to easily transition and adapt to similar and newer LMS however different platforms have different user styles, layout and similar additional features and functions. The transition to a newer LMS entirely depends on the choice that needs to be determined according to the satisfaction rate of the organization with its teaching and learning curriculum.

4.2. Acceptance and Non-Acceptance of LMS

A group of lecturers were interviewed from various fields including Mathematics, English, Computing Science, Accounting, Hospitality, Management, Engineering and Medical at Fiji National University, and the results were formulated in Figure 2.

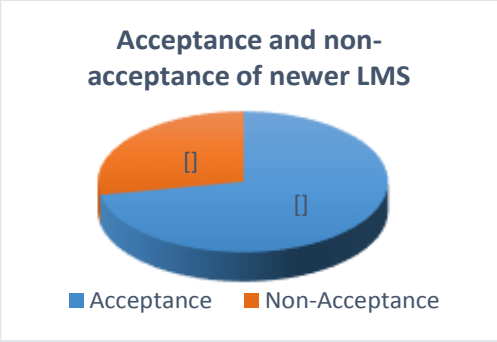

Figure 2. Percentage of acceptance and non-acceptance of a newer LMS by academic lecturers

The above chart result clearly indicates that the level of acceptance for newer learning management systems is high compared to non-acceptance. The majority of the lecturers are not completely satisfied with the current LMS and feel there is room for improvements with features that can be solved with probably a newer LMS. Moreover, there are still a group of lecturers who are satisfied with the current LMS and are against the transition.

4.3. The Relationship between Age Group and Acceptance of LMS

The following table summarizes the age group, qualifications and acceptance, and non-acceptance.

Table 1. The acceptance of LMS according to the age group of lecturers

Age Group	Qualification	Outcome
23-26	Fresh Bachelor Degree holders	Freshly graduate lecturers were familiar with LMS from the university level and were very much interested in transitioning to a newer platform for better efficiency in learning and delivering learning content to students.
27-34	Postgraduate Certification/Diploma holders	Postgraduate lecturers had been using LMS for years and are interested in transition to a newer platform to analyse the pros and cons of different LMS.
35-40 40 above	Masters Masters and PhD	Matured-level lecturers are very much well versed and satisfied with the current LMS and would not like a dynastic change and transition at this stage.

The current system used in Fiji National University is Moodle, and according to the interview findings and survey, it was determined that lecturers of 23 to 34 years are ready to adopt and transition to a newer system for bettering learning and teaching. However, mature lecturers were adopted to the current LMS and think that such enormous changes will not be a good approach as a lot of training and effort will be required to understand and use the system. Thus, it can be concluded that there is a significant relationship between the age group of people and the acceptance of LMS.

4.4. LMS Relationship among Different Courses

A survey was conducted with different course lecturers at Fiji National University to determine the satisfaction and dissatisfaction rate among different courses.

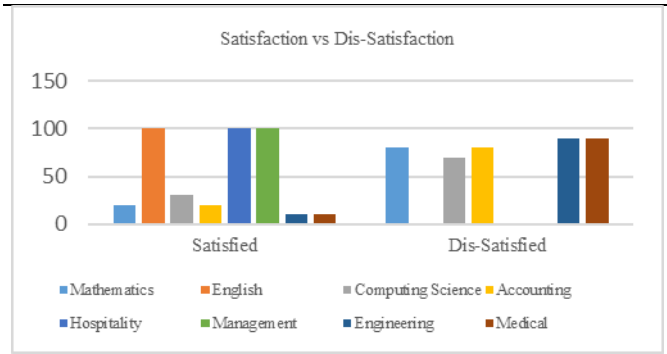

Figure 3. The current Moodle satisfaction and dissatisfaction of course by academic lecturers

The above results illustrated that theoretical courses such as English, Hospitality, and Management can be easily taught using LMS as it does not require any additional plugins for computations or equations. However, hands-on courses such as Mathematics, Computing Science, Accounting, Engineering, and Medical that require computations and working with equations are not very much satisfied with the current LMS, and these course lecturers are keen to try newer LMS to see if these issues can solve the current problem.

4.5. Relationship between Era of Users and LMS

Age factors play a major role in the adoption and transition of LMS as lecturers and instructors come from different era that impacts organization. For this survey, 7 lecturers were selected from each era, making it a total of 21 responders. The lecturers were divided into eras as to when they were born to determine how the era of users had exposure with computers and LMS to reflect to the adoption and transition. The results illustrate that 90s era users had a lot of exposure with computers and LMS in high school and university thus it is very simple process for them to learn newer LMS and easily transition and adopt to it. Subsequently, we have 80's users who did not have much exposure in high school however they acquired adequate exposure at university level with computers and LMS thus this group of lecturers will not find it difficult to adopt to the newer system. Finally, the authors have 70s users who had little to zero exposure with computers and LMS in universities; however, however knowledge of LMS was acquired in the work field where they learned how to use and use LMS; thus for this reason, it was very tough for them to adopt and transition to a newer LMS.

Table 2. Transitions according to the era lecturers

Era	No. of Lecturers Selected	Ready for Transition	Not Ready for Transition
90's	7	7	0
80's	7	5	2
70's	7	6	1
Total	21		

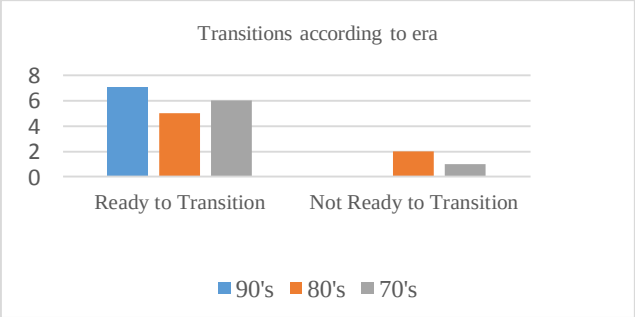

Figure 4. Transitions to LMS in accordance with the era of users

According to a survey conducted at Fiji National University, it was observed that academic lecturers and instructors who were born in the era of 90s and 80s will be easily able to try out newer LMS and adopt it, whereas the 70s era will encounter difficulties in adopting to newer systems as they do not want to emigrate their comfort zone of eLearning and migrate to a newer system. The results clearly illustrate that age factors play an important role in adoption and transition to a newer LMS. In today's era of technology, eLearning has rapidly grown and there are newer LMS that can improve the productivity of teaching and learning thus it is vital that organization try different forms of LMS before finalizing a single LMS.

4.6. Comparison of the Top 5 LMS

Tables 3-11 will be able to help you make a productive choice for your eLearning.

Table 3. Comparison of the top 5 LMS

	Moodle	Google Classroom	Blackboard	Top Hat	Canvas
Launched	2002	2014	1997	2009	2011
Software type	Open Source	Freemium	Quotation-Based	Quotation-Based	Quotation-Based
Target Institution	Schools, Colleges, Universities, and Large Enterprises	Schools and Small-Scale Universities	Schools and Universities	Universities	Universities and Large Enterprises

Table 4. Operating system compatibility

	Moodle	Google Classroom	Blackboard	Top Hat	Canvas
Computing OS					
Windows	All supported	All supported	All supported	All supported	All supported
Mac	All supported	All supported	All supported	All supported	All supported
Chrome OS	All supported	All supported	All supported	All supported	All supported
Mobile OS					

Continuation of Table 4

Android	All supported	All supported	All supported	All supported	All supported
IOS	All supported	All supported	All supported	All supported	All supported
Harmony	All supported	All supported	All supported	All supported	All supported

Table 5. LMS functionalities

Functionality	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Ease of use	4.5/5	4/5	4/5	4/5	4.5/5
Interface Navigation	User -friendly and fully customizable	Simple and intuitive interface	Convenient with customizable modules	Basic design with very minimal customization	Modern, fresh-looking interface with less customizable
Supported Language	Multiple Language	Multiple Language	Only English	Only English	Multiple Language

Table 6. Communications of LMS

Communication	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Instant Chat (Real Time)	Yes	Yes	No	Yes	Yes
Discussion Forums	Yes	Yes	Yes	Yes	Yes
Group Discussion	Yes	Yes	Yes	Yes	Yes
Email Notification Alerts	Yes	Yes	Yes	No	Yes
Video Conferencing	Yes	Yes	Yes	Yes	Yes
Reminders	Yes	Yes	Yes	Yes	Yes
Polls or Voting	Yes	Yes	Yes	Yes	Yes

Table 7. Features of LMS

Features	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Attendance	Yes	No	Yes	Yes	Yes
Activity Track	Yes	No	No	Yes	Yes
Asynchronous Learning	Yes	No	Yes	Yes	Yes
Blended Learning	Yes	No	Yes	Yes	Yes
Breakout Rooms	Yes	No	No	Yes	Yes
Authoring	Yes	Yes	No	No	Yes
Class Scheduling	Yes	Yes	No	Yes	Yes
Collaboration Tools	Yes	Yes	Yes	No	Yes
Data Imports & Export	Yes	No	No	Yes	Yes
Drag & Drop	Yes	Yes	No (requires multiple clicks)	Yes	Yes
File Sharing	Yes	Yes	No	No	No
Screen Sharing	Yes	Yes	No	Yes	Yes

Table 8. Productivity of LMS

Productive	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Assignment Dropbox	Yes	Yes	Yes	Yes	Yes
Turnitin Plagiarism Detection Support	Yes	Yes	Yes	No	Yes
Quizzes	Yes	Yes	Yes	Yes	Yes
Supervised Online Exam(via webcam)	Yes	Yes	Yes	Yes	Yes
Gradebook	Yes	Yes	Yes	Yes	Yes
Student alertness during classes	No	No	No	Yes	Yes

Table 9. The file formats supported by different LMS

File Support	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Word File	Yes	Yes	Yes	Yes	Yes
PDF File	Yes	Yes	Yes	Yes	Yes
Audio File	Yes	Yes	Yes	Yes	Yes
Video File	Yes	Yes	Yes	Yes	Yes
Power point File	Yes	Yes	Yes	Yes	Yes
Excel File	Yes	Yes	Yes	Yes	Yes
Zip/Compressed File	Yes	Yes	Yes	Yes	Yes
Embedded Link	Yes	Yes	Yes	Yes	Yes

Table 10. The browser compatibility by different LMS (Developed by the authors)

Browser Compatibility	**Moodle**	**Google Classroom**	**Blackboard**	**Top Hat**	**Canvas**
Google Chrome	Yes	Yes	Yes	Yes	Yes
Mozilla Firefox	Yes	Yes	Yes	Yes	Yes
Microsoft Edge	Yes	Yes	Yes	Yes	Yes
Safari	Yes	Yes	Yes	Yes	Yes

Table 11. The pros and cons of LMS (Developed by the authors)

Pros and Cons	Moodle	Google Classroom	Blackboard	Top Hat	Canvas
Pros	Open-source platform with various customization features Enormous plugins Easily hosted on an outside server Availability of learning analytics tools	Straightforward and simple to set up Best alternative compared to paid LMS Free of charge and available to anyone Communication and sharing are effective Collaboration with Google apps	Quick feedback Increased amounts of availability Better communication	Deliver high-quality education Better student collaboration and engagement in class	Well-organized notification Cloud hosting Integration with 3rd party applications
Cons	Include some minor bugs while using Not developed to work with a larger project IT team required for alteration	Does not support organization and deadlines as it is not being integrated with the Google calendar Active feed is not updated automatically and need frequent refresh by users It is not a standalone video conference tool which need additional tools	Hard to learn Some features are restricted to certain operating system The cost is on the higher side	Class-dropping issue (Network) Live documents are not available Computing devices are used to participate in communication	User experience is clunky Generally, not desired for higher education Not suitable for smartphones, non-friendly interface

According to the literature review, the main reason for Moodle being the overall best selection is because of it rating according to the findings that has a high rate of acceptance in the eLearning community (Al-Ajlan & Zedan, 2008). However, the abovementioned table comparison could not be an absolute solution as to which platform is best, and it naturally boils down to the requirement of the organization and the target audience. If you are looking to set up an LMS for secondary school without any additional cost, then the best option will be a Google classroom or Moodle as it is free to operate. If you must operate a larger university-like environment with more than 500 students, then Moodle, Top Hat, Blackboard or Canvas will be an ideal choice. When choosing between Moodle, Top Hat costs can also be considered.

4.7. Transition from Moodle to Top Hat Survey

A survey was conducted in 2021 when education was delivered via online due to Covid-19 lock-downs. Top Hat LMS was introduced to a university in Fiji, where students and lecturers had to transition from Moodle to Top Hat. A group of 30 postgraduate students were selected who adopted to Top Hat as the main LMS for the semester, and during the transition, even there were numerous observations and findings noticed. First, students were very well adapted with Moodle and felt that such as transition is not required at this stage. The major reason why this transition was in place by the university was to add quality to education as Top Hat included some promising features that could help bring quality education to the university. While using Top Hat for 2 weeks, it was found that students are more engaged in classes compared to Moodle as Top Hat allows lecturers to circulate attendance with 60 second time frame and spot quizzes which create curiosity among students. While in Moodle, students were not really engaged during lectures and most students do other tasks while putting the speaker on mute. During lab classes, it was discovered that the internet connection used to drop for Top Hat more frequently compared to Moodle, and students experienced much lags between online video conferencing. As online exams were concerned, Top Hat could provide functionalities that limited students cheating by searching answers on Google and this encouraged more quality in the education, which was an eye-opener for students.

4.7.1. Pre-Test Results

Two exams were conducted for students which was exam 1 (30 marks) and exam 2 (30 marks). The students were introduced to Top Hat and exams were simultaneously tested in Top Hat. At first, students were excited and thought the exam will be similar to Moodle, where answers can be searched online however during the actual examination the students were traumatized when they could not go out of the exam windows and when a student tried opening a newer tab to do Google search the lecturers were notified and the exam interface got locked. From the student's and lecturer's perspective, there were mixed reviews about the new LMS with both pros and cons. A pre-test was conducted for Exam 1, where 15 students were randomly selected and their acquired marks and the time taken to complete the online test were recorded (Table 12).

Table 12. Exam 1 marks for postgraduate students using Top Hat LMS

Student	Marks Attained	Marks Allocated	Time Allocated (minutes)	Time Taken (minutes)
Student 1	21	30	60	58.05
Student 2	12			60
Student 3	7			46.35
Student 4	17			60
Student 5	21.5			60
Student 6	9			47.50
Student 7	11			60
Student 8	20.5			44.32
Student 9	19			60
Student 10	14.5			47.19
Student 11	18			60
Student 12	19			60
Student 13	16.5			60
Student 14	12			60
Student 15	19.5			60

According to the interview and the gathered results, it indicated that students were not prepared for the exam, which were reflected in the marks and time taken to accomplish the exam. The lecturers of this course were interviewed and it was shared that many student's exam portals were closed during the exam as they were trying to open a new window to open the Google search. The lecturer also mentioned that this is the beginning of quality education for the university over the duration more features such as supervision using webcam and microphone will be implemented in the upcoming semesters.

4.7.2. Post-Test Results

A post-test was conducted for Exam 2 after 5 weeks from the initial exam, where the same 15 students were selected and there acquired marks and the time taken to complete the online test were recorded as follows (Table 13).

Table 13. Exam 2 marks for postgraduate students using Top Hat LMS

Student	Marks Attained	Marks Allocated	Time Allocated (minutes)	Time Taken (minutes)
Student 1	26	30	60	58.17
Student 2	19.5			57.04
Student 3	16.5			56.15
Student 4	20.5			59.02
Student 5	24			58.55
Student 6	15.5			52.07
Student 7	16			58.18
Student 8	22			49.43
Student 9	21.5			54.31
Student 10	18.5			56.48
Student 11	22			58.55
Student 12	23.5			51.48
Student 13	19			59.09
Student 14	16.5			57.38
Student 15	21			56.19

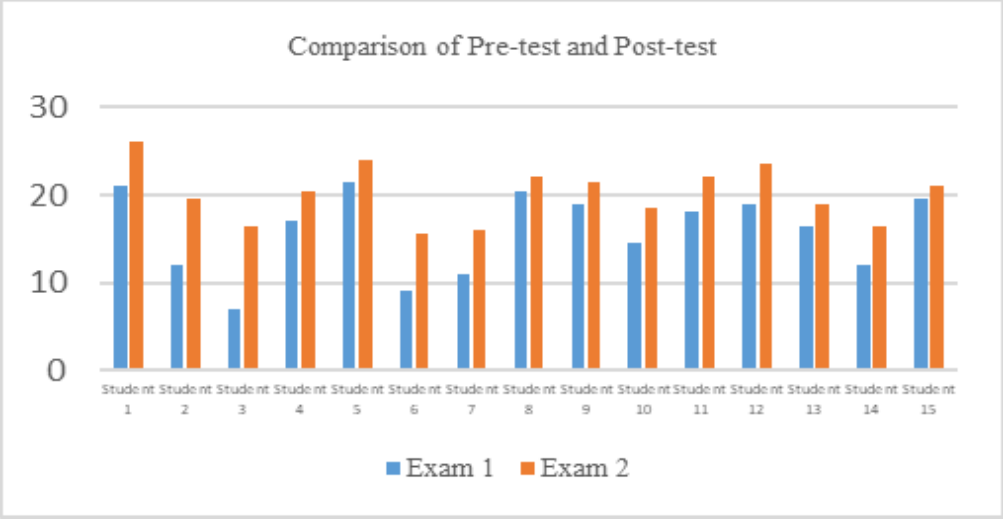

Figure 5. Comparison of students pre-test and post-test

According to post- test results, many things were clear where it was seen that student performance was dramatically improved where students started to take exams more seriously, which were reflected through the performance. The student time of completing and handing the online exam was also improved as no students handed the paper after the closing time. There was an important point highlighted that no student failed the second exam as the first exam was an eye opener to many students who were not taking exam seriously. At the end, we could see that this enabled the university to deliver quality results, which could better improve the course quality and university as a whole.

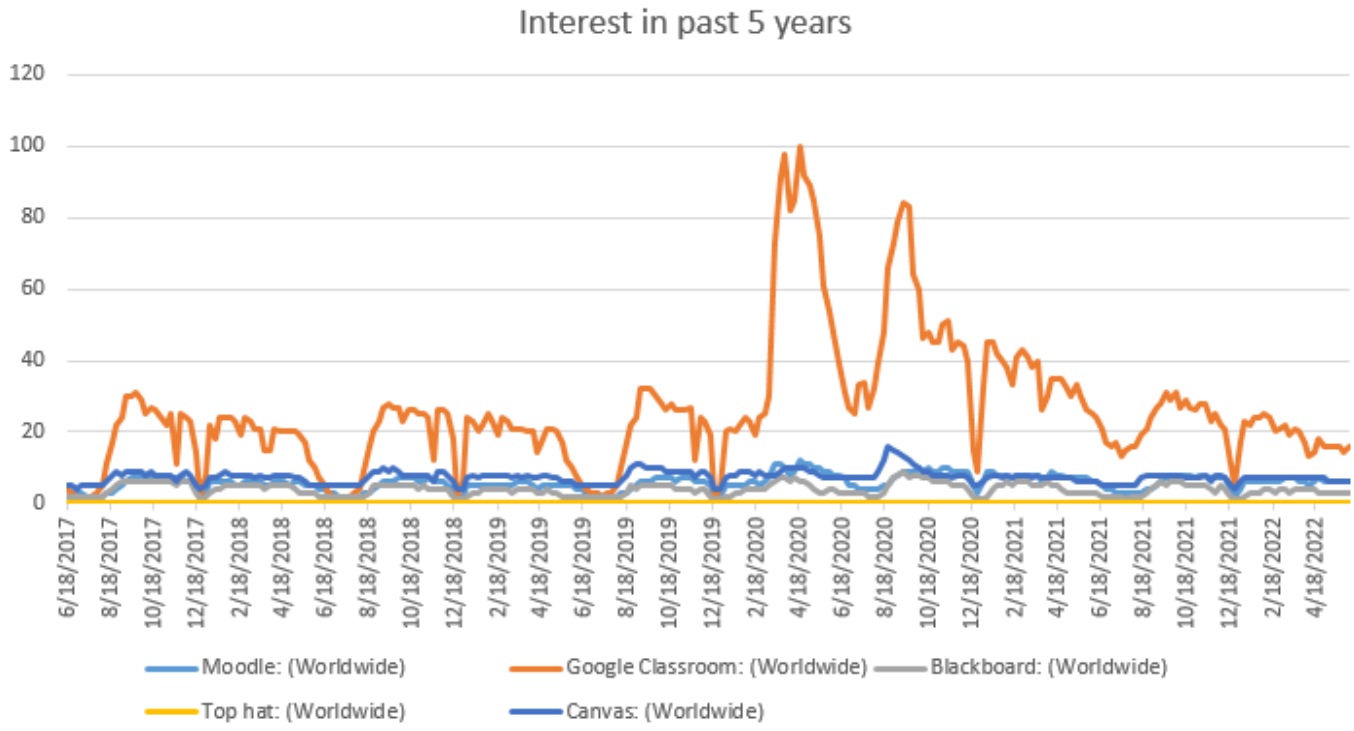

Figure 6. Comparison of students pre-test and post-test

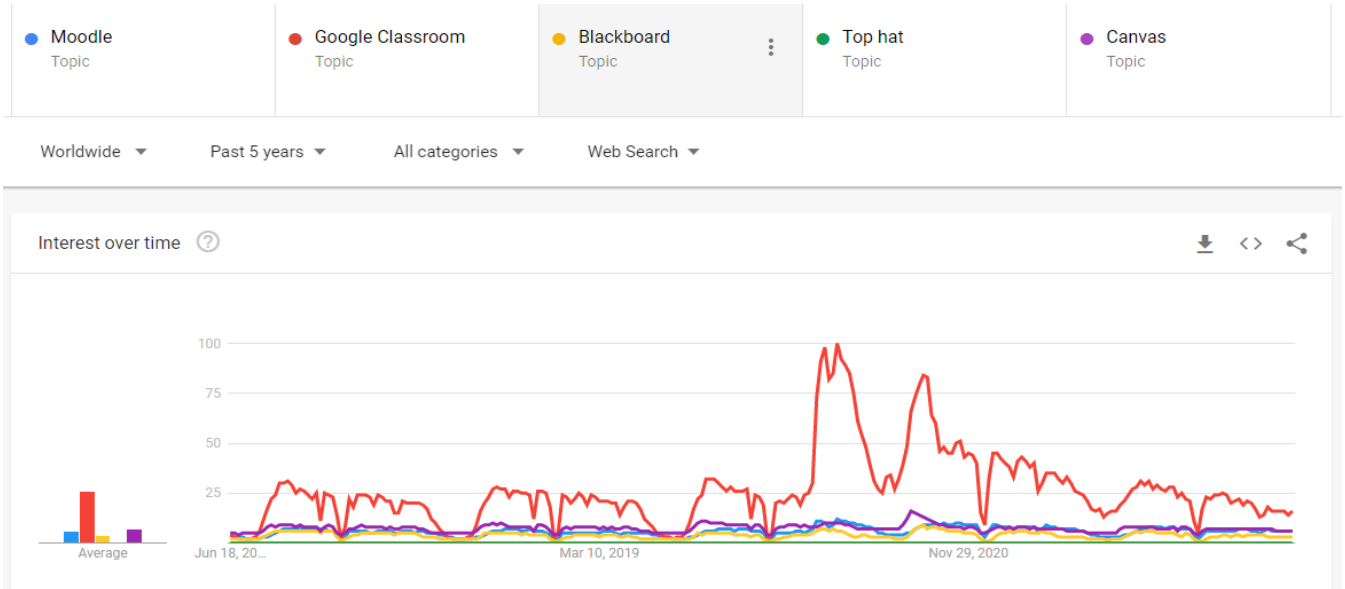

Figure 7. Top most searched e-learning platform in the last five years

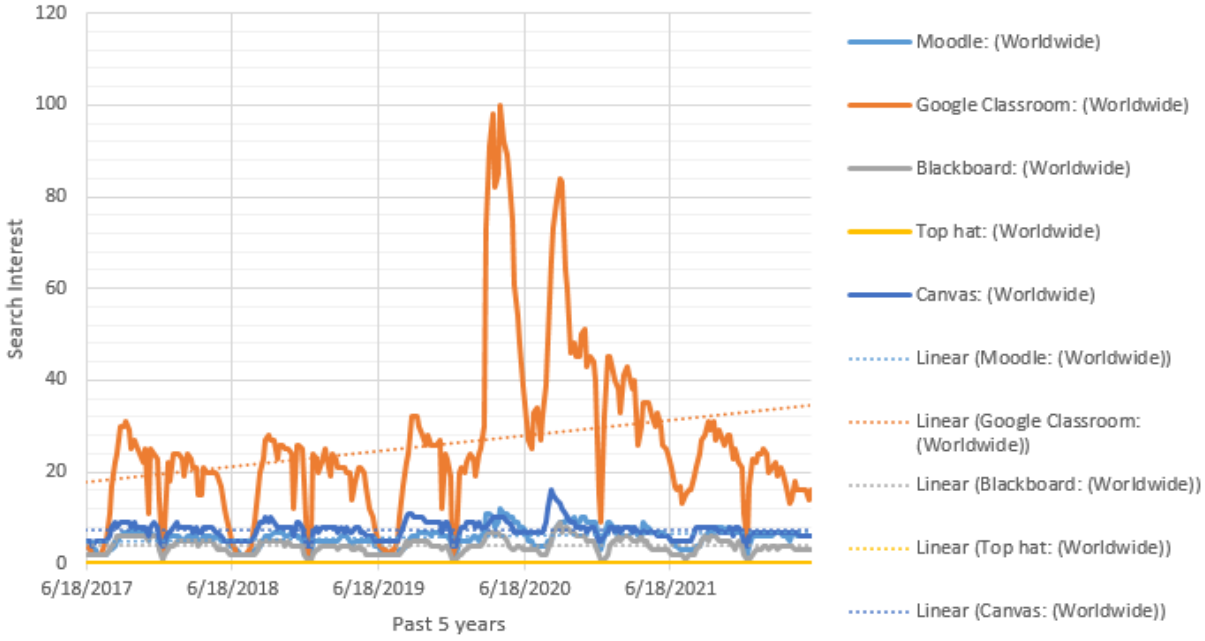

Figure 8. Google Classroom liner progression trend

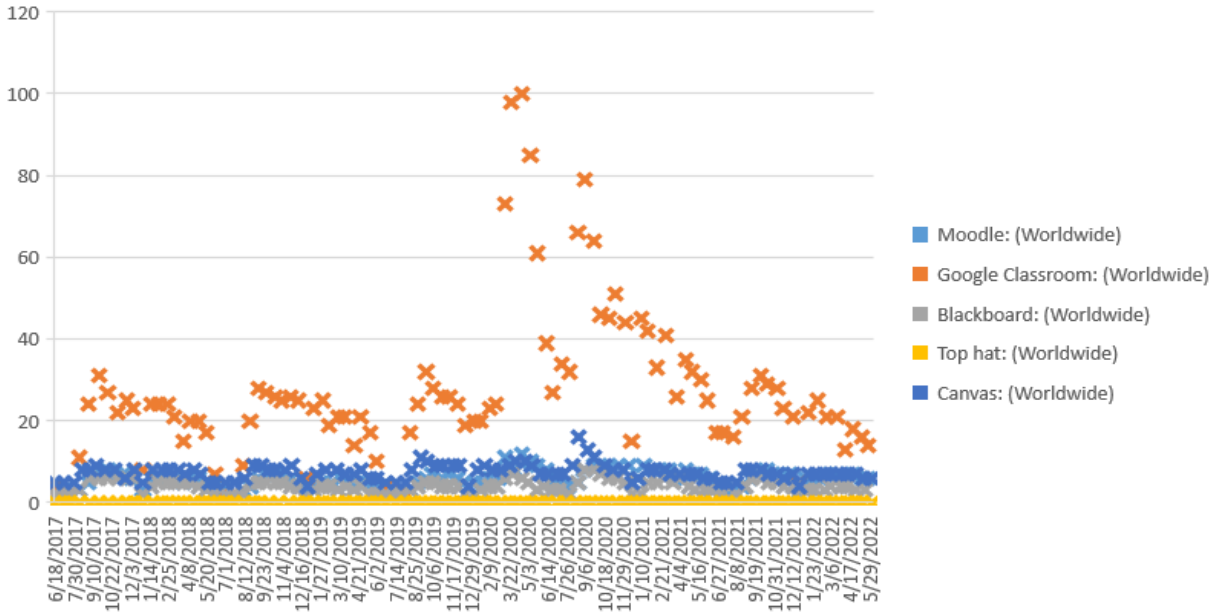

Figure 9. Google Classroom search popularity compared to other E-Learning tools in the last five years

5. Discussion and Conclusion

E-learning is here to stay as an instructional technique for imparting necessary information, skills, and attitudes in enterprises. How it is created, delivered, and assessed has a big impact on its feasibility, efficacy, and capacity to yield concrete advantages to companies. Our findings indicate that, while considerable progress has been achieved in understanding the benefits of eLearning, there is still more work to be done. And there's still a lot to learn about how to create the ideal e-learning environment, how to deliver it effectively, and what works when and why.

Despite the evolution of e-Learning tools, some new difficulties have been identified that influence successful e-Learning installations in higher education. These are some of them: Identifying the pedagogies that underpin online is required for successful e-Learning adoption. The term “learning” refers to the pedagogical elements of how people learn, acquire and retain skills and information to support knowledge development. The letter 'e' stands for technologies that transmit knowledge to be learned. This means that the use of technology does not cause or increase learning quality in and of itself. The effective use of technology to enhance online education is influenced by the degree of ICT abilities of both teachers and students. Having confidence and competence with ICT eliminates obstacles to social contact, administration, learner motivation, and time. As a result, a lack of essential abilities obstructs the learning process and frequently causes issues for both teachers and students.

This paper is novel because it seeks to contribute to the current debate in the literature. Several articles and authors explored the barriers to E-learning adoption, as well as numerous papers and authors that strongly favor E-learning efforts above traditional face-to-face learning and teaching. This article's scientific originality is a large-scale experimental research that describes the adaptability and problems of E-learning solutions in certain universities in Fiji. The authors also evaluate and visualize the top five most searched E-learning platforms in the last five years.

The outcomes of this study show that in addition to the basic usability features, extra elements such as navigation and attitude should be considered, as well as a combination of assessment methods such as focus groups and surveys. Furthermore, the research showed that the top most searched E-Learning platform in the last 5 years was Google Classroom followed by Canvas then Moodle. Blackboard and Top Hat was the least popular in the last 5 years. The authors believe that this review energizes and stimulates theoretically grounded, methodologically sound research that provides organizations with practical advice and instructions. There is a pressing need to identify appropriate techniques for efficient e-Learning implementation, and the authors have offered a comprehensive review of several learning theories and approaches here. The authors looked at some recent e-Learning implementation trends and addressed several elements of e-Learning deployment.

More precisely, this study analyzed the current state of e-Learning, generating several implementation options that demonstrate e-ongoing Learning's progress. This paper also looked at e-Learning in the context of higher education and the growing difficulties that have an influence on its implementation. A limitation of this research is that the authors have focused on the top five eLearning platforms only. There are various other smaller e-Learning platforms that can be compared and analyzed in future research projects. Two challenges emerge from the increasing issues of e-Learning implementation in higher education: 1) the limited acceptance of technology as a means of instruction delivery; and 2) the poor use of technology to promote learning. Considering this, future studies should strive to better analyze these features as well as to develop appropriate techniques for using e-Learning to assist learning.

Acknowledgments

The publication of this article was funded by The Fiji National University, College of Engineering Science and Technology in conjunction with The University of Fiji.

Authors' Contributions

Anal Kumar: Formal analysis, Methodology, Software testing, writing – original draft, Writing – review and editing. Monesh Sami: Data curation, Formal analysis, Methodology, Software testing, and Conceptualization. Vishal Sharma. Ashwin Ashika and Anupriya Narayan: Literature Review, Discussion and Conclusion, and final template conversion. Abm Shawkat Ali: Conceptualization, Project administration, Methodology and Validation.

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