



EVALUATING THE USABILITY OF CANVAS AS A MOBILE EDUCATION APPLICATION: A QUANTITATIVE STUDY OF GRADUATE STUDENT EXPERIENCES

Nguyen Thi Nham

The College of Social Sciences; Yangzhou University, China

***Nguyen Thanh Tu**

VNU University of Education, Hanoi, Vietnam

Ola Madi Mohammed Al Mari

Head Of Registration - Al Nahda National Schools, Abu Dhabi, United Arab Emirates

*Corresponding Author's Email: tunt@vnu.edu.vn

Abstract

The study aims to examine the usability of Canvas as a mobile education application among graduate students, employing Nielsen's usability framework. The research utilized a quantitative approach, questionnaire based to assess Canvas's effectiveness based on Nielsen's usability principles involving 75 students from various academic disciplines. Data were collected through surveys and web scraping, ensuring a comprehensive analysis of user experiences. The study's reliability was confirmed with a Cronbach's alpha coefficient of 0.961. Results indicate high user satisfaction across multiple usability dimensions, including system visibility, the match between the system and the real world, aesthetic design, recognition rather than recall, workload reduction, flexibility, user control, consistency, and efficiency. Participants particularly appreciated Canvas's accessibility in diverse settings, organizational benefits, and inclusive features. While error management received slightly lower scores, it still garnered favorable ratings. The findings suggest that Canvas effectively meets the needs of graduate students, offering a user-friendly, efficient, and consistent mobile education experience. However, minor concerns about interface ergonomics were noted, indicating potential areas for future improvement.

Keywords: Canvas Application, Graduate Student Experience, Learning Management System (LMS), Mobile Education, Usability Evaluation.

I. Introduction

Learning Management Systems (LMS) have become integral to the educational landscape, providing students and instructors with a centralized platform for managing course content, communication, and assessment (Canuel & Crichton, 2015; Hoehle & Venkatesh, 2015). Among the prominent LMS solutions is Canvas, widely adopted in higher education institutions (Canuel & Crichton, 2015).

The usability of Canvas is an essential aspect that decides its relevance and the level of adoption by users of any application software (Truong, 2013). Using Nielsen's usability framework, which consists of learnability, efficiency, memorability, errors and satisfaction to measure the

usability of Canvas as a mobile education application, one gets a broad perspective of the application's usability (Murphy et al., 2014; Truong, 2013).

The learnability of Canvas is a substantial component as it defines the ability and complexity with which students and instructors can work in the platform to achieve goals (Canuel & Crichton, 2015; Truong, 2013). The easy-to-use interface and beautiful design of Canvas make it easily learnable, and the people viewing the site get to understand the available tools and how to use them quickly (Canuel & Crichton, 2015). Some essential forms of efficiencies featured by Canvas contribute to educational management and organization (Canuel et al., 2017; Truong, 2013). Configuration of different tools and resources, including assignment submission, grading, and communication, allows students to accomplish tasks optimally, enhancing their learning and satisfaction (Canuel et al., 2017).

The Canvas memorability defines how easily the users can recall and work on the platform after some inactivity (Truong, 2013). Therefore, the high consistency and intuitive interface of Canvas has a strong memorability, allowing users to easily remember and recall the use of the different features of the platform; the compatibility with mobile devices is also a highly positive factor for the use of the Canvas (Canuel & Crichton, 2015). Concerning error prevention and control, the authors established that the Canvas system does not have many buttons or links to confuse users. In case of a mistake, the system offers feedback to address the error (Truong, 2013). Prior work has described how the platform has reliable mechanisms for handling errors, keeping learners' confidence and frustration low during knowledge acquisition (Canuel et al., 2017). Users' satisfaction directly determines the effectiveness of the implementation of the Canvas platform (Truong, 2013). This paper regards the usefulness, ease of use, and ability of the platform to meet the users' educational needs as some of the determinants of user satisfaction (Canuel & Crichton, 2015). These include flexibility in the design of the platform, the personalized three learning features, and accessible communication interfaces that can go a long way in satisfying users (Canuel et al., 2017). Canvas CSU mobile application enables learners to access course content, post feedback, submit performance, and interact with their fellow learners and tutors using their mobile phones (Hinze et al., 2023). They significantly benefited from the COVID-19 pandemic with remote and hybrid learning models (Gibson et al., 2012). The use of mobile media in learning environments has been another emerging trend in recent years, and a lot of research has been conducted on mobile learning. Portability, social connectivity, context sensitivity, and individuality – these features deliver new opportunities for improving a learning process using mobile devices, making the process more convenient and close to students' preferences (Park, 2011). However, it is also important to note that the success of mobile learning applications which include Canvas has been an issue of discussion and research.

A study by Bannan et al. highlights that students widely use their mobile devices but are not yet prepared to embrace mobile learning technology in the teaching and learning process (Bannan et al., 2016). The researchers also noticed that it is partly due to considerations like low connectivity to the Internet, which puts some learners at a disadvantage. However, other research findings showed that mobile learning could improve students' learning participation, performance, and perceived satisfaction Level (Bomhold, 2013; Hamzah et al., 2018; Hidayatullah et al., 2023; Jumaat & Tasir, 2013; Song & Luan, 2020; Truong, 2014).

The Canvas application for mobile devices has been developed with the understanding that mobile devices contain characteristics that can enhance learning. For example, the mobile version allows the user to conveniently go through other resources from a smartphone or tablet – content, discussion topics, submission boxes, etc. Flexibility and convenience inherent in online learning can suit learners with certain commitments to meet during learning, such as career obligations or family (Anwar, 2009).

In addition, the Canvas LMS has a similar mobile application with features different from the application functions of the Canvas LMS, which incorporates media-related content, virtual plus and whiteboards, and real-time communication tools that could complement the lessons and improve the learning environment of the program (Coelho et al., 2023). Therefore, by enabling students to participate in discussions, pose questions, and receive comments on the topic from instructors and peers, the mobile app may enhance the general quality of the educational process (Bannan et al., 2016; Crompton & Burke, 2018). Regarding the credibility of the delivery of management training based on a mobile learning study to test its efficacy, the participants using the mobile phone 4 or more a day mentioned the mobile learning material as convenient, easier and more flexible. The researchers also noticed that mobile content usage frequencies increases as learners spend the day in Computer Internet areas; mobile learning effectiveness in learning that is conducted outside Multimedia-Linked Computers (Miraz et al., 2017).

However, having a stable internet connection always poses a huge problem, even from a student's perception, if they are in areas with weak or no internet connection at all (Bannan et al., 2016). It also points out a couple of potential usability problems with entering data or using applications requiring a lot of input – due to the small and limited input interfaces of most MO devices.

To overcome these challenges, Canvas has adopted different measures to improve the mobile application's usability. For instance, the website and app flexibility and layout goals are to offer specific convenience to its users. On the other hand, its offline feature allows students to read and complete lessons and assignments without a net connection (Miraz et al., 2017). Moreover, Canvas has sought feedback from users and frequently developed mobile applications according to users' requirements. The evaluation of the usability of a higher education mobile application among postgraduate and undergraduate students revealed that although most of the participants reported they had a positive experience using the Canvas mobile application, there were some problems regarding the structure of the content and additional options that could be supplemented into the application more effectively (Abazi-Bexheti et al., 2014). Education institutions are gradually considering the value of m-learning in their teaching activities; therefore, the ease of use of the LMS such as Canvas will remain instrumental in their adoption and integration into the systems (Abazi-Bexheti et al., 2014; Anwar, 2009; Bannan et al., 2016; Miraz et al., 2017).

Mobile learning is gradually emerging to transform the delivery of higher education, and thus, the role of LMS, such as Canvas, becomes functional. Canvas has been widely implemented across universities, and with good reason: It provides learners and teachers with an unenclosed and relatively flexible environment within which one has to operate (Canuel & Crichton, 2015). Mobile applications have changed how students approach their lessons, communicate with other learners and instructors, and task-solving (Gibson et al., 2012). However, apart from

having several features, it is essential to consider how easily navigable and malleable the platforms it displays are in relation to student demands and learning styles and the various demanding roles learners participate in, such as being graduate students with full-time jobs (Bannan et al., 2016). Therefore, the ability to interact with Canvas through mobile devices has been established as a critical determinant of its success.

As mobile learning becomes integrated into today's education systems, this paper will also identify the level of usability and functionality of Canvas for mobile devices (Park, 2011). Also, it will investigate how the structure of the adopted platform enhances or limits students' interaction, output, and performance (Hinze et al., 2023). The study will target Graduate students to understand their usability strengths and weaknesses. It will differ from that of undergraduate students or instructors. In conclusion, this paper presents relevant implemented strategies for enhancing Canvas's mobile design and functionality to address the complex and constantly evolving learners' requirements in the contemporary learning context (Anwar, 2009; Bannan et al., 2016). Therefore, The study aims to examine the usability of Canvas as a mobile education application among graduate students, employing Nielsen's usability framework.

II. Methodology

A. Research Design

This study adopted a quantitative analysis to assess the usability of Canvas applications in detail. This method was used to investigate the kind of experiences that the users have when trying to discern statistical patterns. The quiz designed and included in the present study consists of closed and open questions, including the Likert scale items, which were used to compare the effectiveness of the educational tools with the Jacob Nielsen usability criteria. The closed-ended questions provided quantifiable data, while the Likert scale items assessed critical usability factors: learning, time required, memory, mistakes, and satisfaction. Data was collected through self-completed questionnaires, in which participants agreed with the values on a given rating scale, providing information on their stand and practices. Apart from that, using open-ended questions effectively provided participants with a free space to share their ideas and recommendations about the research topic, which introduced richness to the results.

B. Study Sample

The sample consisted of students who reported being more engaged in the teaching activities and frequently using Canvas applications. These participants were placed from different disciplines to capture the value of Canvas across the disciplines. Selection criteria were based on using Canvas for at least one month to ensure they understood the platform as an LMS to offer relevant feedback.

Voluntary participation was encouraged in the study through e-mail invitations and postings on student forums describing the purpose of the study. 75 students responded to the survey and represented diverse ages, genders and education levels. Such diversity allowed to get a more general view of the usefulness of the canvas applications in the opinion of students who are part of a large and diverse student community.

C. Validity and Reliability

Rigorous measures were followed to ensure the credibility and reliability of the instruments used in this study, including the questionnaire used to assess Canvas's effectiveness. The validity process was applied by experts' surveys to estimate the relevance and completeness of the questionnaire based on Nielsen's usability principles. These assessments were done by

educational technology and usability specialists. In establishing construct validity, the questionnaire analyses were conducted with the principles of focus in mind regarding the theoretical underpinnings of these principles to capture the intended ideas as implemented. Criterion validity was also established by comparing the findings with usability benchmark measurements. Cronbach's Alpha coefficient was used in this study to confirm the internal consistency reliability value of the developed questionnaire. The results, structure, and training were validated in an expert's opinion to determine the results' credibility. Cronbach's alpha values are included as estimates of the consistency and reliability of the outcomes of the internal study. The validity and trustworthiness of the instrument were confirmed by the internal consistency measures as estimated by the coefficients Alpha Cronbach of .961 for the overall measurement scale of the study.

D. Data Collection Procedures

Reviews and comments from various sites were collected, and web scraping to get real-time users' feedback formed a cautious data collection and analysis process. This systematic approach was complimented by University Quarrels software, which ensured that the data was collected accurately and incorporated.

Participant questions supported the study's reliability throughout the research phases. Experts in the given subject area analyzed the process of analysis and results, which increased the research's credibility and conformability. It was easier to advance cultural validity in educational studies after conducting collaborative data assessments with peers and specialists. To minimize external and internal bias and increase credibility, the study employed triangulation of data from many sources using many approaches.

Ethical study was approved by obtaining permission from the Institutional Review Board (IRB). To fulfil the requirement of obtaining informed consent, the participant read the study's objectives in detail. Lastly, measures were implemented to protect the participant's identity and confidentiality to increase the study's validity and reliability. Incorporating these citations and deeming the compilation of big data for ethical analysis, the current study presented a comprehensive, thorough, and ethical investigation of users' perceptions of Canvas.

E. Data analysis

The data were analyzed using version 28.0 of the IBM SPSS software package (Armonk, NY: IBM Corp) and visualized using Microsoft Excel 365. Quantitative data was summarized using mean and standard deviations for continuous data, while qualitative data was outlined in number and proportions (%). The one-way ANOVA test was used to compare more than two quantitative data. Moreover, univariate and multivariate regression analysis was performed to detect the impact of the study factors on usability satisfaction. Values less than 0.05 were considered statistically significant, and values less than 0.01 were considered highly statistically significant.

III. Results

A. Information Background of the students

Figure 1 displays the background information of Canvas users in the study. Regarding the duration, 42.7% of users have been using the application for 6 months to 1 year, followed by those using it for more than a year (33.3%). A smaller portion (24.0%) represents users using the application for less than 6 months. For the academic department distribution of the users,

most users (68.0%) belong to the Computer Science department, while 22.7% are from the Artificial Intelligence department. A minority of 9.3% comes from other departments.

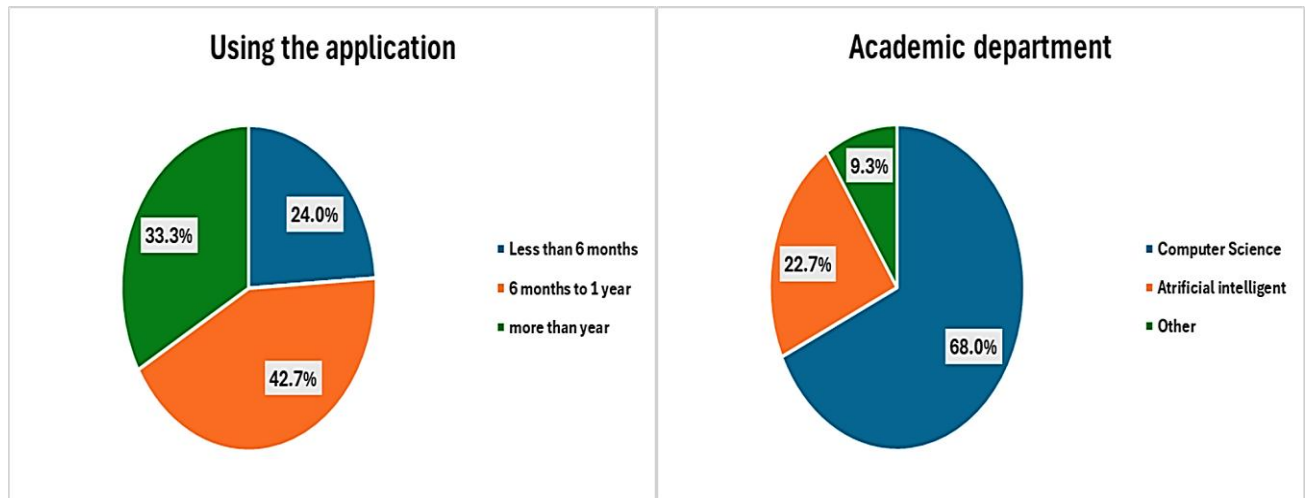


Figure 1: Information Background of Canvas Users in the Study

B. Descriptive statistics analysis

Table 1 shows the descriptive statistics, including mean, standard deviation, and the agreement levels of the Canvas users factors in the study. The "Visibility of System Status" factor reflected a positive user sentiment. The users agreed that icons were indicated ($M = 4.46$, $SD = 1.157$), and the graphical user interface menus clarified deselection ($M = 4.28$, $SD = 1.161$). The whole mean score factor was 4.37, indicating a high agreement of the Canva users toward its Visibility of System Status.

Similarly, the factor "Match Between System and Real World" garnered agreement. Users found that selected colours aligned with common expectations ($M = 4.38$, $SD = 0.947$), and function keys were distinctly labelled ($M = 4.32$, $SD = 1.025$). Also, the overall mean score of this factor was 4.35, reflecting the higher matching between the Canva system and the real world. In terms of "Aesthetic and Minimalistic Design," users appreciated the use of brief, familiar, and descriptive field labels ($M = 4.44$, $SD = 1.065$) and the incorporation of large objects and bold lines to distinguish icons ($M = 4.49$, $SD = 1.094$). The overall mean score of this factor was 4.46.

Furthermore, the "Recognition Rather than Recall" factor emphasized user-friendly design, with users recognizing the presence of mapping between controls and actions ($M = 4.35$, $SD = 1.148$) and appreciating good colour and brightness contrast ($M = 4.54$, $SD = 0.998$). The overall mean score for this factor was 4.44, indicating the increased agreement of Canva users toward this factor. In addition, the "Effective Design to Lessen User's Workload" factor suggested that a simple design reduced cognitive load ($M = 4.59$, $SD = 0.919$), and users found feedback and error messages helpful ($M = 4.52$, $SD = 1.040$) in streamlining tasks. The overall mean score showed a high agreement degree with a mean score of 4.56.

Similarly, the "Flexibility and Efficiency of Use" factor demonstrated Canvas's support for beginner and expert users ($M = 4.55$, $SD = 0.953$). Also, the "find next" and "find previous" shortcuts received a high agreement ($M = 4.39$, $SD = 1.102$). The overall mean score of this factor (4.47) indicated the flexibility and efficiency of the Canva use by the participants in the study. Moreover, the "User control and obviousness" factor underscored Canvas's customizability and ease of use ($M = 4.54$, $SD = 0.969$), aligning with users' positive perceptions

of its design and services ($M=4.46$, $SD=1.012$). In this context, the mean score for user control and obviousness was 4.50. In terms of "Realistic error management," users agreed that Canvas provided clear error messages ($M=3.90$, $SD=1.278$) and emphasized plain language over technical jargon ($M=4.08$, $SD=1.228$). The overall mean score (3.99) indicated an agreement level of response.

On the other hand, the "Consistency and standards" factor reflected users' positive reactions to consistent symbols and icons ($M=4.38$, $SD=0.884$), familiar interaction experiences ($M=4.56$, $SD=0.788$), and a navigational design standard on the homepage ($M=4.54$, $SD=0.969$). The overall mean score was consistent with these variable scores, with 4.49. Lastly, the "Efficiency of use and performance" factor highlighted Canvas's potential efficiency in locating information ($M=4.42$, $SD=0.936$) and the potential workflow improvements brought by shortcuts ($M=4.38$, $SD=1.074$). The overall mean score of this factor was 4.40, suggesting highly effective use and good performance of the Canva application.

In addition, users indicated a high level of agreement ($M=4.52$, $SD=1.012$) regarding the application's accessibility across diverse settings, such as walking, standing in crowded areas, or sitting in quiet spaces. This suggested that Canvas was versatile and adaptable to different usage environments, a crucial aspect of mobile usability. However, there was a notable concern regarding the ergonomics of the interface, with users expressing moderate agreement ($M=3.37$, $SD=1.476$) that buttons or contact points were too small or too closely spaced. This feedback highlighted the need for application design improvements to enhance ease of use, particularly for users with more giant fingers.

On the other hand, participants strongly agreed ($M=4.65$, $SD=0.758$) that Canvas helped them stay organized with assignments, quizzes, and follow-up meetings, underlining the effectiveness of its features in supporting academic management. This positive perception was further supported by the overall high usability satisfaction ($M=4.62$, $SD=0.781$), indicating that users were likely to recommend Canvas as a learning management system. Additionally, users agreed ($M=4.30$, $SD=1.047$) that Canvas included accessibility features like audio descriptions and closed captioning, which benefited individuals with visual or hearing impairments. This demonstrated Canvas's commitment to inclusivity, making it a valuable tool for a diverse student population.

Table 1: Canvas users factor statistics into the study

Items	Mean	SD	Response Level
The status of icons is indicated in the application.	4.46	1.157	Agree
Graphical user interface menus make it evident whether deselection is possible.	4.28	1.161	Agree
Visibility of System Status mean score	4.37	1.127	Agree
The selected colours correspond to common expectations about the colour codes.	4.38	0.947	Agree
Function keys are labelled clearly and distinctively, even if this means breaking consistency rules.	4.32	1.025	Agree
Match Between System and Real-world mean score	4.35	0.880	Agree
Field labels are brief, familiar, and descriptive.	4.44	1.065	Agree

Large objects, bold lines, and simple areas were used to distinguish icons.	4.49	1.094	Agree
Aesthetic and Minimalistic Design mean score	4.46	1.043	Agree
The system provides mapping: do the relationships between controls and actions appear to the user?	4.35	1.148	Agree
There is a good colour and brightness contrast between the image and background colours.	4.54	0.998	Agree
Recognition Rather than Recall mean score	4.44	0.966	Agree
A simple design canvas is easy to navigate and understand, and it can significantly reduce the cognitive load required to complete a task.	4.59	0.919	Agree
Feedback and error messages can help users quickly identify and correct mistakes, reducing the time and effort needed to complete a task.	4.52	1.040	Agree
Effective Design to Lesson User's Workload Mean Score	4.56	0.936	Agree
The canvas supports both beginner and expert users, and multiple levels of error message detail are available.	4.55	0.953	Agree
Canvas offers "find next" and "find previous" shortcuts for database searches.	4.39	1.102	Agree
Flexibility and efficiency of use mean score	4.47	0.925	Agree
Canvas has designs and services that make it customizable and easy to use	4.54	0.969	Agree
Canvas is customizable and simple to use because of its design and service features.	4.46	1.012	Agree
User control and obviousness mean score	4.50	0.926	Agree
Canvas provides clear and concise error messages communicating what went wrong and how the user can fix it.	3.90	1.278	Agree
Error messages should be written in plain language; avoid technical jargon or cryptic error codes.	4.08	1.228	Agree
Realistic error management mean score	3.99	1.123	Agree
Canvas symbols, icons, and symbolism should be consistent.	4.38	0.884	Agree
When users interact with content on Canvas categories, they should expect a clear and familiar experience	4.56	0.788	Agree
The Canvas homepage is a navigation design standard. It provides a simple way for users to return to your website.	4.54	0.969	Agree
Consistency and standards mean score	4.49	0.754	Agree

The Canvas application offers specific features and tools to help users quickly locate the information they need, potentially making it more efficient than other learning management systems.	4.42	0.936	Agree
The "find next" and "find previous" shortcuts in Canvas for database searches can improve workflow and efficiency in navigating search results.	4.38	1.074	Agree
Efficiency of use and performance mean score	4.40	0.913	Agree
Users may access the device in various settings, such as walking, standing in a crowded area, or sitting in a quiet space. (Handling the diverse context of use in mobile environments).	4.52	1.012	Agree
Buttons or contact points are too small or too close to each other. (Finger size and ergonomics controls).	3.37	1.476	Neutral
The Canvas application has the potential to help users stay organized and on track with completing assignments, quizzes, and follow-up Zoom meetings. (Feature specific).	4.65	0.758	Agree
Canvas potentially includes accessibility features like audio descriptions and closed captioning that can assist individuals who are blind or rely on hearing. (Accessibility).	4.30	1.047	Agree
The overall opinion of the Canvas application can be an essential factor in deciding whether to recommend it to others looking for a learning management system (Usability satisfaction).	4.62	0.781	Agree

Response levels: 1-2.33 disagree, 2.34-3.66 neutral, and 3.67-5.0 agree.

C. Comparison of Usability satisfaction among Graduate students

Table 2 shows the usability satisfaction among students regarding their durations of application use and different academic backgrounds. The results indicated that those who have used the application for over a year had a lower mean score = 4.35 ± 1.071 , suggesting a decrease in usability satisfaction over time. However, the p-value of 0.125 indicates that these differences are not statistically significant. Similarly, students from different academic departments show varying satisfaction levels. Other department students reported perfect satisfaction (mean = 5.00 ± 0.151); however, the F-value of 0.882 with a p-value of 0.419 suggests that these differences are also not statistically significant.

Table 2 Usability satisfaction comparison regarding the information background of the participants

Variable	Mean	SD	F-value	P-value
Using the Less than 6 months application	4.78	0.428	2.15	0.125

	6 months to 1 year	4.73	0.640		
	More than year	4.35	1.071		
Academic department	Computer Science	4.55	0.891	0.882	0.419
	Artificial intelligent	4.71	0.470		
	Other	5.00	0.151		

D. Factors influencing Usability satisfaction among Graduate students

Table 3 explores the impact of various usability factors on student satisfaction through univariate and multivariate regression analyses. Notable factors such as "Consistency and standards" and "Feature specific" display strong positive coefficients in both univariate and multivariate analyses, indicating a significant impact on usability satisfaction. Notably, consistency and standards (multivariate $B = 0.386$, $p = 0.009$) and Feature-specific (multivariate $B = 0.480$, $p = 0.000$) show statistically significant positive impacts in multivariate analysis, underscoring their importance in system design. Accessibility also significantly influenced usability satisfaction (multivariate $B = 0.332$, $p = 0.017$). All other factors show significant impacts in univariate regression but are not statistically significant in the multivariate context.

Table 3: Impact of the study factors on the Usability satisfaction of the participants

Factors	Univariate regression				Multivariate regression			
	B	95.0% CI for B		P-value	B	95.0% CI for B		P-value
		Lower Bound	Upper Bound			Lower Bound	Upper Bound	
Visibility of System Status	0.265	0.111	0.419	0.001**	0.079	-0.075	0.233	0.307
Match Between System and Real World	0.378	0.185	0.571	0.000**	0.021	-0.244	0.286	0.875
Aesthetic and Minimalistic Design	0.296	0.131	0.461	0.000**	-0.121	-0.377	0.135	0.348
Recognition Rather than Recall	0.344	0.169	0.520	0.000**	-0.176	-0.440	0.088	0.187
Effective Design to Lesson User's Workload	0.449	0.280	0.618	0.000**	-0.032	-0.344	0.279	0.837
Flexibility and efficiency of use	0.454	0.284	0.625	0.000**	0.146	-0.158	0.450	0.341
User control and obviousness	0.425	0.250	0.600	0.000**	0.086	-0.199	0.372	0.548

Realistic error management	0.315	0.166	0.464	0.000**	-	-0.180	0.107	0.613
					0.037			
Consistency and standards	0.695	0.511	0.880	0.000**	0.386	0.098	0.674	0.009**
Efficiency of use and performance	0.460	0.287	0.634	0.000**	-	-0.472	0.174	0.360
					0.149			
Feature specific	0.783	0.622	0.944	0.000**	0.480	0.224	0.737	0.000**
Accessibility	0.456	0.314	0.597	0.000**	0.232	0.044	0.420	0.017*

IV. Discussion

This study provides a comprehensive analysis of the usability and user satisfaction of the Canvas LMS among graduate students. In particular, it focuses on the Computer Science and Engineering (CSE) department. The results revealed high user satisfaction with Canvas, driven by crucial usability factors such as system visibility, aesthetic design, and the alignment between system features and real-world expectations. However, particular areas, such as error management and ergonomics, have been identified as needing improvement. It contributes to the existing literature regarding the usability of LMS and offers constructive recommendations for enhancing users' experience in educational technologies.

The findings of this work align with the findings of previous studies that established that the usability of the developed interface enhances the user experience of users of LMS. It is similar to the works done by Maslov et al. (2021) where they also talked about the importance of visibility, but in more detail about the importance of the size of interfaces in defining the level of usability and user satisfaction (Maslov et al., 2021; Yamani et al., 2022). As high as 4.37 for fifteen factors, the Learning management system Canvas, therefore, has a strong positive correlation with users in aspects of satisfaction of LMS where designs are simple, clear and satisfy expectations in aspects such as 'Visibility of System Status' and 'Aesthetic and Minimalistic Design.' Furthermore, the format also allowed users to get used to the generic format of function keys in clear label form (M=4.32) and good use of symbols and icons (M=4.49).

Nevertheless, the present study revealed that error management was considered less satisfying (M= 3.99), where technical terminology was identified as a problem. This difference pointed out that more work must be done to improve how Canvas explains errors to users depending on their level of understanding.

The conclusions drawn in the study also supplemented the discussion on the necessity of LMS flexibility for the modification according to the initial or advanced learners. Canvas can suggest shortcuts for the database search (M=4.39) and enhance the users' experience in various settings (M=4.52, e.g., walking or standing), proving the system's flexibility and orientation to the end-users. The factor "Flexibility and Efficiency of Use" (M=4.47) supported all the above findings further by indicating that Canvas is a very flexible tool that can be used to manage different academic needs and different levels of technology skills.

A trend toward a reduced level of satisfaction was observed over the time of using the app, especially among the participants using it for more than a year. The average score in this group was 4.35 out of 10. We could conclude that the system had limitations in terms of long-term

usage. While this trend might not be statistically meaningful, it might suggest that there might need to be new changes to the site to retain old long-term users. This understanding supports the study by Kumar et al (202), which observed that tutorial and technology is significant in revamping education given that it is student centered and thus improves engagement and participation (Kalyani, 2024).

The study also focused on Canvas and how it helps in academic management. The respondents agreed that using Canvas, they organize themselves well in assignments, quizzes, and meetings (Mean=4.65). In line with Furqon et al. (2023), the present study also revealed that Practical LMS tools create value for students by enhancing academic-related task Performance (Furqon et al., 2023). In addition, the analysis of feature-specific factors for usability satisfaction proved highly significant ($B=0.480$, $p<0.001$), reflecting that users appreciate most of all the features influencing their working processes, like assignments tracking and notifications. The multivariate regression analysis also showed that "Consistency and Standards" ($\beta=0.386$; 95% CI = 0.16; $p=0.009$) and "Accessibility" ($\beta=0.332$; 95% CI= 0.17, $p=0.017$) had a significant influence on satisfaction levels. These findings suggest that, for an LMS to be effective in practice, it has to have a consistent and inclusive design.

The substantial contribution of accessibility to usability satisfaction is highly commendable, mainly because it proved that Canvas is an inclusive platform, as reported by Al-Mamari and Al- Hashmi (2021) who noted that the Accessibility aspects enable the LD users to actively participate in engaging in the learning materials with LMS. These features assist in eradicating challenges that LD users experience, allowing them access to educational content and tools (Pirani & Sasikumar, 2014). With such aspects, Canvas cultivates itself as effective for a wide range of students, particularly those with a vision or hearing impairment.

However, the current study highlighted many strengths of the Canvas system and identified several areas for improvement. One notable concern is the ergonomics of the interface, with users expressing moderate agreement ($M=3.37$) that buttons or contact points are too small or too closely spaced. This issue is particularly relevant for mobile app users, where screen space is limited, and precise interaction can be challenging. Improving the ergonomics of Canvas could significantly enhance its ease of use, particularly for users with more giant fingers or those operating the app in less stable environments (e.g., while walking). This finding aligns with research by Petit and Santos (2014), who argue that ergonomic design is essential for optimizing mobile learning experiences, particularly in educational contexts where prolonged use is every day (Petit & Santos, 2014).

Another area for improvement is Canvas's error management system, which received the lowest mean score among all usability factors ($M=3.99$). The need for more precise, user-friendly error messages, particularly those that avoid technical jargon, is evident. Effective error management is crucial for minimizing user frustration and enhancing system usability in mobile applications (Harrison et al., 2013). Hence, addressing this issue could significantly improve the user experience, particularly for less technically savvy users who may struggle with cryptic error codes and technical language.

V. Conclusion and Implications for Future Research

In conclusion, the study enriched the understanding of Canvas LMS's usability and user satisfaction with its primary benefits and weaker points. The satisfaction levels relating to system visibility, aesthetic design and features that enhance academic management supported

Canvas's teaching and learning role as a learning management tool. However, six misunderstandings relating to error management and 17 ergonomics indicated another room for improvement: Optimize the long-term percentage for all users and users with disabilities using The Measure.

Further research might embellish these areas, especially if future works look at how particular additions could enhance the use of Canvas. Other study forms could reveal how user satisfaction changes over time so that developers can build more fluid and exciting systems. Focusing on the efficiency of accessibility features in producing improved academic outcomes, the component of the study might also be deemed insufficient since more research would be necessary to understand how LMS tools can more effectively assist a range of students.

Consequently, the study results have significant implications for the current continuous improvements of Canvas and other LMS platforms, especially in maintaining constant variations and variability centred around the usability needs of learners. Thus, having discussed the areas of improvement, Canvas can continue to help achieve academic success in various and constantly developing learning environments.

VI. References

- Abazi-Bexheti, L., Apostolova-Trpkovska, M., & Kadriu, A. (2014). Learning management systems: Trends and alternatives. 2014 37th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO),
- Anwar, K. A. (2009). Towards a role framework for mobile devices in educational contexts. 2009 IEEE Toronto International Conference Science and Technology for Humanity (TIC-STH),
- Bannan, B., Cook, J., & Pachler, N. (2016). Reconceptualizing design research in the age of mobile learning. *Interactive Learning Environments*, 24(5), 938-953.
- Bomhold, C. R. (2013). Educational use of smart phone technology: A survey of mobile phone application use by undergraduate university students. *Program*, 47(4), 424-436.
- Canuel, R., & Crichton, C. (2015). Leveraging apps for research and learning: a survey of Canadian academic libraries. *Library hi tech*, 33(1), 2-14.
- Canuel, R., MacKenzie, E., Senior, A., & Torabi, N. (2017). Apps for academic success: Developing digital literacy and awareness to increase usage. *Education for Information*, 33(3), 135-152.
- Coelho, R. C., Marques, M. F., & de Oliveira, T. (2023). Mobile Learning Tools to Support in Teaching Programming Logic and Design: A Systematic Literature Review. *Informatics in Education*, 22(4), 589-612.
- Crompton, H., & Burke, D. (2018). The use of mobile learning in higher education: A systematic review. *Computers & education*, 123, 53-64.
- Furqon, M., Sinaga, P., Liliyasi, L., & Riza, L. S. (2023). The Impact of Learning Management System (LMS) Usage on Students. *TEM Journal*, 12(2).
- Gibson, J., Taylor, T., Seymour, Z., Smith, D. T., & Fries, T. P. (2012). Educational aspects of undergraduate research on smartphone application development. Proceedings of the World Multi-Conference on Systemics, Cybernetics and Informatics,

- Hamzah, A., Persada, A. G., & Hidayatullah, A. F. (2018). Towards a framework of mobile learning user interface design. Proceedings of the 2018 2nd International Conference on Education and E-Learning,
- Harrison, R., Flood, D., & Duce, D. (2013). Usability of mobile applications: literature review and rationale for a new usability model. *Journal of Interaction Science*, 1, 1-16.
- Hidayatullah, A., Artharina, F. P., Sumarno, S., & Rumiarsi, E. (2023). Penggunaan Aplikasi Canva pada Pembelajaran di Sekolah Dasar. *Jurnal Educatio Fkip Unma*, 9(2), 943-947.
- Hinze, A., Vanderschantz, N., Timpany, C., Cunningham, S. J., Saravani, S.-J., & Wilkinson, C. (2023). A study of mobile app use for teaching and research in higher education. *Technology, Knowledge and Learning*, 28(3), 1271-1299.
- Hoehle, H., & Venkatesh, V. (2015). Mobile application usability. *MIS quarterly*, 39(2), 435-472.
- Jumaat, N. F., & Tasir, Z. (2013). Integrating project based learning environment into the design and development of mobile apps for learning 2D-animation. *Procedia-Social and Behavioral Sciences*, 103, 526-533.
- Kalyani, L. K. (2024). The role of technology in education: Enhancing learning outcomes and 21st century skills. *International Journal of Scientific Research in Modern Science and Technology*, 3(4), 05-10.
- Maslov, I., Nikou, S., & Hansen, P. (2021). Exploring user experience of learning management system. *The International Journal of Information and Learning Technology*, 38(4), 344-363.
- Miraz, M. H., Khan, S., Bhuiyan, M., & Excell, P. (2017). Mobile academy: A ubiquitous mobile learning (mLearning) platform. *arXiv preprint arXiv:1708.04655*.
- Murphy, A., Farley, H., Lane, M., Hafeez-Baig, A., & Carter, B. (2014). Mobile learning anytime, anywhere: what are our students doing? *Australasian Journal of Information Systems*, 18(3).
- Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *International Review of Research in Open and Distributed Learning*, 12(2), 78-102.
- Petit, T., & Santos, G. L. (2014). Mobile Learning: An Ergonomic Alternative for Long-Awaited Educational Changes? International Conference on Mobile and Contextual Learning,
- Pirani, Z., & Sasikumar, M. (2014). Accessibility issues in learning management systems for learning disabled: A survey. Recent Advances in Intelligent Informatics: Proceedings of the Second International Symposium on Intelligent Informatics (ISTI'13), August 23-24 2013, Mysore, India,
- Song, Y., & Luan, Z. (2020). Function design optimization of learning management system (LMS) based on student perspective—case study of canvas application university of Colorado Denver. *Journal of Physics: Conference Series*,
- Truong, D. (2014). How to design a mobile application to enhance teaching and learning? *International Journal of Emerging Technologies in Learning*, 9(3).

- Truong, M. H. (2013). 18: MOBILE APP LEARNING LOUNGE: A SCALABLE AND SUSTAINABLE MODEL FOR TWENTY-FIRST-CENTURY LEARNING. *To Improve the Academy*, 32(1), 301-315.
- Yamani, H., Alharthi, A., & Smirani, L. (2022). Evaluation of Learning Management Systems: A Comparative Study Between Blackboard and Brightspace. *International Journal of Emerging Technologies in Learning (iJET)*, 17(7), 125-144.