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Mobile Application for Practical Structural Engineering Learning: A USE Questionnaire-Based Student Evaluation on Usefulness, Satisfaction and Ease of Use

Nur Ashikin Lakman[1], Zamry Ahmad Mokhtar[2]

[1]*Department of Civil Engineering, Sultan Abdul Halim Mu'adzam Shah Polytechnic, Jitra, Kedah, Malaysia*
E-mail: nurashikin@polimas.edu.my

[2]*Department of Civil Engineering, Sultan Abdul Halim Mu'adzam Shah Polytechnic, Jitra, Kedah, Malaysia*
Kedah Darulaman, Malaysia
E-mail: zamry@polimas.edu.my

Abstract

Mobile learning (m-learning) is a modern approach to education that uses mobile devices, such as smartphones and tablets, to improve how students and educators interact with learning materials and activities. This study investigates the effectiveness of a mobile application designed for structural engineering practical courses, focusing on usability, satisfaction, and ease of learning. Using a quantitative methodology, data were collected from 58 students at Sultan Abdul Halim Mu'adzam Shah Polytechnic through the USE Questionnaire, a validated tool for assessing user experience. The USE Questionnaire evaluates four key dimensions: usefulness, which measures how well the system fulfills its intended purpose; ease of use, assessing the simplicity and effortlessness of using the system; ease of learning, which gauges how quickly and intuitively users can become proficient with the system; and satisfaction, capturing users' overall contentment and enjoyment. Each dimension comprises multiple items rated on a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree." Analysis revealed consistently high mean scores across all dimensions, with usefulness scoring between 6.138 and 6.397, ease of use ranging from 6.155 to 6.397, ease of learning between 6.207 and 6.310, and satisfaction scoring from 6.207 to 6.379. These results highlight the application's ability to enhance productivity, simplify tasks, and foster engaging learning experiences. While minor variability in responses indicated areas for improvement, the overall findings demonstrated the tool's reliability, accessibility, and adaptability in meeting educational needs. These results reinforce the significant role of m-learning in creating dynamic, interactive, and self-directed educational environments, making it an essential component of modern education.

Keywords **:** *Mobile Applications; Mobile Learning; Satisfaction; Usability, Usefulness*

I. INTRODUCTION

Mobile learning (m-learning), a subset of e-learning, represents a specialized area within the broader field of digital education. In order to share information and improve learning, instructors and students around the world are depending more on mobile phones for educational reasons, according to [1]. This trend has been further fuelled by the introduction of sophisticated mobile technology, such as wearables, tablets, and smartphones, which have made mobile learning a flexible and essential component of contemporary education.

Advanced technology in mobile devices inspires educators and researchers to promote teaching and learning in innovative ways. According to [2], mobile learning has gained popularity in the last ten years and offered fresh chances to improve teaching methods. M-learning is defined as an education that takes place in various contexts, driven by social involvement and engagement with content, using personal electronic devices.

As highlighted by [3], mobile learning offers a significant opportunity to bridge educational gaps, particularly in underserved areas. The organization emphasized the importance of leveraging mobile technologies to expand access to education, support teacher training, and facilitate lifelong learning. Similarly, [4] described m-learning as an evolution toward learner-centered education, showcasing how mobile technologies allow students to engage with content in flexible and innovative ways.

A key advantage of m-learning lies in its flexibility, as it facilitates learning that can occur anytime and anywhere. This is enabled through mobile applications and content delivery platforms designed to provide seamless access to educational resources. Advocates of m-learning emphasize its

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potential to broaden educational opportunities by reaching diverse learners, including those in remote or underserved areas. Furthermore, m-learning promotes engagement through interactive and multimedia content, encouraging a more interactive and engaging educational atmosphere. It also supports personalized and self-directed learning pathways, enabling learners to customize their learning experiences to align with their unique needs and preferences [5].

Despite these promising benefits, the successful implementation of m-learning requires more than merely incorporating mobile tools and activities into educational settings. The effectiveness of m-learning is heavily dependent on thoughtful instructional design and strategic integration into the broader curriculum. Educators play a crucial role in ensuring that mobile apps and technologies align with specific learning objectives and teaching practices. Effective use of m-learning tools involves careful planning to harmonize these technologies with traditional classroom methods, ultimately creating a cohesive and impactful educational experience [6].

II. LITERATURE REVIEW

Constructivism emphasizes the importance of training students to be independent and self-directed learners, advocating for active participation in their learning processes [7]. Within this framework, mobile devices have been recognized as invaluable tools that significantly enhance teaching and learning. These devices empower both learners and educators to retrieve information, access resources, communicate efficiently, and collaborate effortlessly [8,9,10,11].

M-learning facilitates the development of social knowledge by promoting critical thinking, innovation, teamwork, and effective communication. It supports the creation of learning networks and strengthens interactions among learners, making the experience more interactive and vibrant. M-learning fosters deeper and more meaningful interaction with the content by motivating students to take an active role in various activities [12].

Educational content delivered through m-learning platforms is augmented with multimedia components like visuals, animations, written text, sound, and video elements. These features are crafted to grab students' attention and promote interaction, creating a more engaging and impactful learning experience [13]. Furthermore, mobile technologies enable group discussions and professional guidance through online platforms, enhancing the collaboration between students and lecturers. This integration of digital tools fosters class discussions and reshapes the interaction dynamics between educators and learners [14,15]. The flexibility, adaptability, and accessibility of mobile technologies provide a convenient and efficient learning environment that supports both students and educators [16].

Digital technologies have become indispensable in education, offering interactive ways to engage with information and serving as vital tools for academic activities. Mobile applications are increasingly being utilized in education due to their practicality and ability to motivate students. These applications enhance the learning process by ensuring it is more engaging, easily accessible, and efficient [16,17].

In summary, m-learning offers significant advantages in education by combining the benefits of mobile technology with innovative teaching strategies. It enhances student engagement, promotes active participation, and enables flexible learning environments, making it an essential component of modern education.

III. RESEARCH METHODOLOGY

A. Research Design

This study utilizes a quantitative research approach to evaluate the effectiveness of a mobile application aimed at enhancing practical learning in structural engineering. The research specifically aims to evaluate the application's usefulness, satisfaction, and ease of use using the USE Questionnaire framework. The questionnaire collects feedback on how the application enhances students' learning experience, focusing on three core metrics: usability, satisfaction, and perceived usefulness. The study uses a survey approach, gathering data once from students who have actively utilized the application. The feedback is then quantitatively analyzed to gain insights into the application's impact on student learning.

B. Data Collection

Data collection was conducted through the USE Questionnaire were adapted from [18], which measures four key aspects of usability across 30 items using a 7-point Likert scale, where respondents indicate their level of agreement, ranging from "strongly disagree" to "strongly agree.". Each item reflects a distinct usability attribute (usefulness, ease of use, ease of learning, satisfaction), allowing for a comprehensive understanding of the system's usability.

The Usefulness dimension, comprising 8 items, evaluate how effectively the system fulfills its intended purpose for users, assessing practical benefits and productivity gains. Ease of Use, with 11 items, examines the system's accessibility and overall user-friendliness, measuring the effort

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required by users to operate the system efficiently. The Ease of Learning dimension, covered by 4 items, measures how quickly users can learn to use the system, reflecting the learning curve associated with the interface. Lastly, the Satisfaction dimension, with 7 items, captures users' overall enjoyment and contentment with the system, assessing their emotional responses and comfort during use.

The 58 respondents in Semester 4 of the Structural Engineering Practical course at Sultan Abdul Halim Mu'adzam Shah Polytechnic provided feedback anonymously to encourage honesty and reduce social desirability bias, ensuring data reliability. The format of the questionnaire enables straightforward analysis of patterns across participants' responses.

C. Data Analysis

The collected data were analyzed quantitatively to assess central tendencies and variability within the usability scores. Descriptive statistics, such as mean and standard deviation, were calculated for each item in the USE Questionnaire.

IV. RESULT AND DISCUSSION

Table 1, summarizing the mean and standard deviation values for each statement in the "Student Evaluation on Usefulness".

Table 1 Student Evaluation on Usefulness

No.	Statement	Mean	Standard Deviation
1.	It helps me be more effective.	6.362	0.912
2.	It helps me be more productive.	6.345	0.928
3.	It is useful.	6.328	0.980
4.	It gives me more control over the activities in my life.	6.241	0.924
5.	It makes the things I want to accomplish easier to get done.	6.397	0.897
6.	It saves me time when I use it.	6.397	0.877
7.	It meets my needs.	6.172	1.045
8.	It does everything I would expect it to do.	6.138	1.067

This statement “It helps me be more effective” reflects how the tool or resource contributes to enhancing effectiveness. With a high mean of 6.362, this shows users generally find the tool significantly effective in helping them reach their goals. The relatively low standard deviation of 0.912 suggests that most users agree on this point, with minimal variation in responses, indicating a consistently positive impact on effectiveness.

A mean of 6.345 implies that users perceive the tool as highly beneficial for boosting productivity, enables users to perform tasks faster or more efficiently, possibly by automating certain processes or providing helpful shortcuts. The standard deviation of 0.928 indicates low variation, meaning most users experience a similar productivity benefit from using the tool, confirming its reliability in enhancing productivity.

This general usefulness score, with a mean of 6.328 reflects students’ overall perception of the tool’s relevance to their needs. The standard deviation of 0.980 shows slightly more varied opinions, suggesting that while most users find it useful, a few may have different experiences or expectations of usefulness.

A mean of 6.241 shows that users feel the tool moderately enhances control over their activities, allowing for better task management. With a standard deviation of 0.924, user opinions are relatively consistent, pointing to a shared sense of improved control.

Statement five has the highest mean of 6.397, which highlights that users strongly agree the tool simplifies task completion, it indicates that the tool reduces the complexity or difficulty of tasks. A standard deviation of 0.897, the lowest of all items, shows very little variation in responses, meaning users almost universally find the tool makes tasks easier.

With the same high mean of 6.397, users agree that time-saving is a major benefit, marking it as one of the tool’s strongest features. The very low standard deviation of 0.877 underscores that this time-saving aspect is a common and reliable benefit for nearly all users.

A mean of 6.172 suggests the tool generally fulfills user requirements, though this is slightly lower than other items. The standard deviation of 1.045 is among the highest, indicating more variation in responses. This might mean the tool

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meets needs well for some but could have room for improvement in certain cases.

With the lowest mean of 6.138, users find it meets expectations, though perhaps not as strongly as other areas. The standard deviation of 1.067, the highest among all items, suggests greater variability in responses, indicating some users may have unmet expectations while others feel it performs well within expected parameters.

Overall, the student evaluation on usefulness reveals a highly positive perception of the tool, with strong ratings across all statements. Students consistently find it effective, productive, and time-saving, indicating that it supports them well in managing their tasks and achieving goals more efficiently. The high mean scores show the tool's reliability in enhancing productivity and ease of task completion, while the generally low standard deviations suggest that most students have a similar, favourable experience with it. Although there is slightly more variation in responses regarding how well the tool meets all individual needs and expectations, the overall impression is one of substantial usefulness and value in a student setting.

Table 2 displays the analysis of mean and standard deviation for each of the statements on ease of use.

Table 2 Student Evaluation on Ease of Use

No.	Item	Mean	Standard Deviation
1.	It is easy to use.	6.397	0.897
2.	It is simple to use.	6.345	0.928
3.	It is user friendly.	6.310	0.940
4.	It requires the fewest steps possible to accomplish what I want to do with it.	6.241	1.048
5.	It is flexible.	6.259	0.928
6.	Using it is effortless.	6.241	0.961
7.	I can use it without written instructions.	6.293	0.955
8.	I don't notice any inconsistencies as I use it.	6.155	1.056
9.	Both occasional and regular users would like it.	6.259	0.965
10.	I can recover from mistakes quickly and easily.	6.259	1.001
11.	I can use it successfully every time.	6.172	0.994

With a high mean of 6.397, this statement indicates that students generally find the tool straightforward and accessible. The relatively low standard deviation of 0.897 shows that most users have a consistent, positive experience regarding ease of use.

Mean score of 6.345 for the second statement reflects a strong agreement that the tool's design or functions are uncomplicated, making it intuitive. A standard deviation of 0.928 suggests that most students have a similar experience, reinforcing its simplicity.

Scoring a mean of 6.310 for "It is user friendly", this statement suggests a positive perception of the tool's user-centered design. The standard deviation of 0.940 indicates relatively consistent feedback, affirming its accessibility for users of various skill levels.

With a mean of 6.241, users feel the tool minimizes unnecessary steps, enhancing efficiency. The standard deviation of 1.048, among the highest here, shows that while many users appreciate this simplicity, others may feel there's room for improvement.

A mean score of 6.259 suggests that the tool allows users to adapt it to different tasks or needs. The standard deviation of 0.928 indicates a stable consensus, pointing to reliable flexibility for various user goals.

"Using it is effortless", the mean of 6.241 indicates that students generally feel the tool requires minimal effort to operate. The standard deviation of 0.961 suggests consistent ease, though a few users may find some aspects could be further simplified.

A mean of 6.293 reflects confidence in intuitive usability without needing external guidance or written instructions. The standard deviation of 0.955 is fairly low, suggesting that most users quickly learn to navigate the tool independently.

With a mean of 6.155, this score implies that the tool's functionality feels coherent and predictable to most users. However, the standard deviation of 1.056, the highest in this set, suggests

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that some users occasionally experience inconsistencies.

A mean of 6.259 indicates that students feel the tool would be beneficial for both novice and frequent users, highlighting broad appeal. The standard deviation of 0.965 reflects general agreement, showing the tool's versatility.

With a mean of 6.259, students feel the tool allows for easy error correction. The standard deviation of 1.001 shows some variation, indicating that while recovery is generally smooth, a few users may encounter challenges.

Statement "I can use it successfully every time", this mean of 6.172 reflects a high level of reliability in usage, with students confident in its consistent functionality. The standard deviation of 0.994 suggests a steady, though not universal, positive experience.

In summary, the high mean scores across these statements demonstrate that students find the tool highly usable, intuitive, and flexible. The relatively low standard deviations indicate consistency in their positive perceptions, though aspects like handling inconsistencies and error recovery show slightly more variability in user experience.

Table 3 shows the analysis of mean and standard deviation for each of the statements on ease of learning.

Table 3 Student Evaluation on Ease of Learning

No.	Item	Mean	Standard Deviation
1.	I learned to use it quickly.	6.310	0.959
2.	I easily remember how to use it.	6.241	1.048
3.	It is easy to learn to use it.	6.276	0.988
4.	I quickly became skillful with it.	6.207	1.005

With a mean score of 6.310, this statement reflects that students generally find the tool easy to pick up and understand right from the start. The relatively low standard deviation of 0.959 indicates consistency in student experiences, showing that most users were able to learn how to use it quickly, with minimal need for extensive guidance or trial-and-error.

A mean of 6.241 suggests that students feel confident in recalling how to use the tool after their initial learning experience, which is crucial for tools that students might use intermittently. However, the slightly higher standard deviation of 1.048 indicates that a few users may occasionally find it challenging to remember certain aspects, suggesting potential areas for improvement in user interface design or instruction.

This mean score of 6.276 points to a general consensus that the tool has an intuitive, user-friendly design, making it easy for students to learn without a steep learning curve. The standard deviation of 0.988 suggests moderate consistency in responses, indicating that most students find it easy to learn, with a few reporting slightly more effort in understanding its features.

A mean of 6.207 indicates that students feel they could quickly become adept at using the tool after a short period of practice. The standard deviation of 1.005, though slightly higher, shows that while many students found the skill acquisition to be straightforward, others required a bit more time or practice to become fully comfortable.

Overall, the high mean values in Table 3 reflect positive student perceptions of the tool's ease of learning, suggesting that its design minimizes the time needed to become proficient. The relatively low standard deviations, although slightly variable, indicate a generally consistent experience across students, with a few experiencing minor difficulties in memorability and skill acquisition.

Table 4 shows the analysis of mean and standard deviation for each of the statements on satisfaction.

Table 4 Student Evaluation on Satisfaction

No.	Item	Mean	Standard Deviation
1.	I am satisfied with it.	6.345	0.965
2.	I would recommend it to a friend.	6.379	0.933
3.	It is fun to use.	6.345	0.983
4.	It works the way I want it to work.	6.328	0.962
5.	It is wonderful.	6.328	0.906
6.	I feel I need to have it.	6.207	1.039
7.	It is pleasant to use.	6.362	1.021

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A mean of 6.345 reflects that students are generally satisfied with the tool, feeling it meets their expectations and provides a positive experience. The standard deviation of 0.965 indicates a fairly consistent level of satisfaction across users, though there is some variation, suggesting a few students may have specific preferences or areas for improvement.

This high mean score of 6.379 suggests that students have a strong positive opinion of the tool and are likely to recommend it to others, a good indicator of overall satisfaction and perceived usefulness. The standard deviation of 0.933, one of the lowest in this set, shows that most students share a similar enthusiasm, reinforcing the tool's high satisfaction level.

With a mean of 6.345, students generally find the tool enjoyable to use, adding an element of engagement to their experience. The slightly higher standard deviation of 0.983 reflects that while most students agree, some may find it less entertaining, potentially depending on their individual preferences or learning styles.

A mean of 6.328 indicates that students feel the tool aligns well with their expectations and requirements, meeting functional needs effectively. The standard deviation of 0.962 shows that this experience is consistent for most students, with minimal deviations, which is a good sign of reliability.

The mean score of 6.328 shows that students hold the tool in high regard, viewing it as a high-quality resource. The low standard deviation of 0.906 suggests a steady consensus, with many students agreeing on its overall excellence.

This mean of 6.207 indicates that students find the tool beneficial and feel it adds value to their experience, though it is slightly lower than other statements. The higher standard deviation of 1.039 suggests a bit more variability in responses, with some students seeing it as essential while others might view it as supplementary.

With a mean score of 6.362, students generally find the tool enjoyable and comfortable to use. The standard deviation of 1.021, while slightly higher, indicates that the experience of pleasantness is generally shared, though some students might have mixed reactions based on personal preferences or interaction with the tool.

In summary, these high mean values demonstrate a strong level of student satisfaction, with consistency across responses in most areas. The slightly higher standard deviations in a few statements, such as "I feel I need to have it" and "It is pleasant to use," suggest some variability, but overall, students perceive the tool as satisfying, recommendable, and enjoyable to use.

V. CONCLUSION

The findings strongly emphasize the pivotal role mobile devices play in transforming the teaching and learning experience for both educators and students. Mobile devices were consistently rated highly for enhancing effectiveness and productivity, with respondents acknowledging that these tools make tasks easier to accomplish and provide greater control over their activities. This highlights the devices' ability to streamline educational tasks and align with the needs of modern learners and teachers. Furthermore, the high ratings for user-friendliness, flexibility, and minimal effort required for usage underline their accessibility and adaptability. The ability to use these devices without extensive instructions and their suitability for both occasional and regular users ensure inclusivity across diverse user groups.

In terms of learning, the devices were perceived as easy to adopt and use, with respondents agreeing that they quickly became skilled in their operation. This underscores their value in educational environments where quick adaptability is essential. The interactive and intuitive nature of mobile devices makes them ideal for engaging learners, fostering active participation, and supporting self-directed learning.

Additionally, the satisfaction levels reported indicate a deep sense of enjoyment and fulfilment associated with using mobile devices. Respondents found them to be not only effective but also fun and pleasant to use, enhancing the overall learning experience. The devices' ability to meet and often exceed user expectations reinforces their reliability and value in academic contexts. Their capability to integrate seamlessly into teaching strategies and support diverse educational needs makes them indispensable tools for modern education.

In conclusion, mobile devices are far more than just tools for information access—they serve as enablers of efficient, engaging, and enjoyable educational experiences. By fostering productivity, enhancing interaction, and promoting satisfaction, they address critical aspects of teaching and learning, making them essential for fostering meaningful educational outcomes in today's digital age.

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AUTHOR'S INFORMATION

First Author: **Nur Ashikin Lakman** 	Department of Civil Engineering, Sultan Abdul Halim Mu'adzam Shah Polytechnic, Bandar Darulaman, 06000 Jitra, Kedah Darulaman, Malaysia E-mail: nurashikin@polimas.edu.my
Second Author: **Zamry Ahmad Mokhtar** 	Department of Civil Engineering, Sultan Abdul Halim Mu'adzam Shah Polytechnic, Bandar Darulaman, 06000 Jitra, Kedah Darulaman, Malaysia E-mail: zamry@polimas.edu.my

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