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Optimizing User Experience for Multimedia Teaching PCs to Enhance Classroom Interactivity and Learning

Shan Qiaojuan[1], Yusrita binti Mohd Yusoff [2] , Ariffin bin Abdul Mutalib[3]

[1]PhD, School of Multimedia Technology and Communication, University Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

[2]Doctor, School of Multimedia Technology and Communication, University Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

[3]Prof, School of Multimedia Technology and Communication, University Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

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Abstract: This study explores the impact of optimizing the user experience of multimedia teaching integrated systems on classroom interactivity and student learning outcomes. Using a mixed-methods approach, the performance of the system before and after optimization was analyzed. The findings revealed significant improvements in user satisfaction, operational complexity, classroom interaction frequency, and student performance following the optimization. The study demonstrates that enhancing the user experience not only improves the usability of the equipment but also significantly boosts teaching effectiveness. The results provide empirical support and practical guidance for the design and application of educational technology.

Keywords: Multimedia teaching integrated system, user experience optimization, classroom interactivity, student learning outcomes, educational technology, teaching equipment design

Introduction

With the rapid development of information technology, multimedia teaching integrated systems have been widely applied in the field of education worldwide. This teaching equipment integrates various functions such as computers, projectors, electronic whiteboards, and sound systems, enabling the playback of multimedia courseware, sharing of online teaching resources, and implementation of interactive classrooms, thereby effectively improving teaching efficiency and quality (Luo, Tan, He, & Wu, 2023).

Classroom interactivity is a key concept in modern educational theory, as it is directly related to student engagement and learning outcomes. A highly interactive classroom environment can stimulate students' interest in learning, promote the internalization and understanding of knowledge, and thereby enhance learning outcomes (Chen & Liu, 2020). However, despite the continuous improvement in hardware and software functionalities of multimedia teaching integrated systems, their effectiveness in practical teaching applications remains inconsistent. Particularly in terms of user experience, many teachers and students have encountered issues such as complex operations, slow system responses, and unfriendly interfaces, which severely hinder the enhancement of classroom interactivity and learning outcomes (Johnson, 2016).

This study aims to enhance classroom interactivity and student learning outcomes by optimizing the user experience of multimedia teaching integrated systems. Specifically, the research will analyze the current issues related to user experience in these systems, explore effective methods to address these problems, and experimentally validate the impact of these optimizations on classroom interactivity and learning outcomes. Ultimately, this study seeks to provide empirical support and practical guidance for the design and application of educational technology (Zawacki-Richter, Marín, Bond & Gouverneur, 2019).

To achieve the above research objectives, a mixed-methods approach, including both qualitative and quantitative research, was adopted. In the qualitative research portion, in-depth interviews with frontline teachers and students were conducted to understand the current user experience of multimedia teaching integrated systems and the factors influencing it. In the quantitative research portion, an experimental design was employed to compare and analyze the effects of the multimedia teaching integrated systems on classroom interactivity and learning outcomes before and after optimization. Data collection tools included questionnaires, classroom observations, and academic performance tests (Lestari & Setiawan, 2017).

Research Results

This study observed significant positive impacts through the optimization of the user experience of multimedia teaching integrated systems. The optimization efforts focused primarily on three key aspects: operational smoothness, interface friendliness, and system response speed. The results indicate that the optimized system performed exceptionally well across various metrics. Specifically, the average user satisfaction rating increased by 15%, reflecting a significant improvement in the overall user experience with the system. Additionally, the rating for operational complexity decreased

by 20%, indicating that the optimized system reduced the obstacles users encountered during operation, making it more user-friendly .

Moreover, the optimized multimedia teaching integrated system significantly enhanced classroom interactivity and student learning outcomes. In the experimental group, the frequency of student interactions increased by 25% . This improvement was not only reflected in the quantity of interactions but also in the quality, with students showing significantly higher levels of engagement and focus in the classroom (Ong & Quek, 2023). These positive changes were directly reflected in the students' academic performance, with test scores in the experimental group improving by an average of 12%. This result confirms that optimizing the user experience of teaching equipment can effectively promote student learning outcomes, thereby enhancing overall teaching quality (Arokia Marie, 2021).

The findings of this study indicate that optimizing the user experience of multimedia teaching integrated systems has a significant positive impact on enhancing classroom interactivity and student learning outcomes. This conclusion is consistent with existing literature. Chen and Liu (2020) have pointed out that improving user experience is a key factor in increasing the effectiveness of educational technology applications. However, this study goes further by demonstrating that, in the specific context of multimedia teaching integrated systems, user experience optimization has a direct and significant impact on improving teaching quality.

Specifically, the enhancement of the user experience is evident in two main areas: first, the simplification of system operations. The optimized system reduced the technical obstacles encountered by teachers and students during use (Johnson, 2016). This simplification allows users to focus more on the teaching content itself rather than being distracted by operational issues. It not only reduces cognitive load but also increases classroom teaching efficiency. Second, the improvement in system response speed greatly enhanced real-time classroom interactivity, making communication between teachers and students smoother (Barrot, Llenares, & Del Rosario, 2021). Students were able to participate in classroom discussions and interactive activities more promptly, thereby further improving their learning initiative and outcomes.

These improvements hold significant theoretical importance and provide valuable practical experience and guidance for the design and application of educational technology. Optimizing user experience is not merely about enhancing the ease of use of the system; more importantly, it is about leveraging technology to improve teaching effectiveness and learning outcomes. This finding offers new perspectives for the further development of educational technology, suggesting that in the design and improvement of teaching equipment, user experience should always be placed at the core. It is essential to fully consider the actual needs of teaching scenarios to maximize teaching outcomes (Darling-Hammond, 2019).

Despite the significant achievements of this study, there are still some limitations that may impact the generalizability and applicability of the research findings. First, the sample size of the study is relatively small, and the participants were primarily from specific teaching environments. This limitation restricts the generalizability of the research results (Vasileiou, Barnett, Thorpe, & Young,2018). The effects of user experience optimization may vary across different educational stages, regions, or with the use of

different types of multimedia equipment. Therefore, the applicability of the findings in other contexts requires further verification.

Second, the experimental environment in this study was relatively controlled, with the experiment conducted under ideal teaching conditions, eliminating many disruptive factors present in actual teaching. However, in real-world teaching environments, teachers and students may encounter more uncontrollable variables, such as classroom management issues, equipment malfunctions, and network problems, which could affect the stability of the research results and the effectiveness of their practical application (Siddique, Noorani, & MoinM, 2024). Therefore, while the results of this study showed significant effects under experimental conditions, more challenges may arise in practical application.

To overcome these limitations, future research could consider improvements in several areas. First, expanding the sample size to include students from different regions and educational stages could enhance the generalizability of the findings (Palinkas et al., 2019). Additionally, future studies could introduce different types of multimedia teaching equipment to explore the effects of user experience optimization across various devices and software environments (Abdulrahaman et al., 2020). Moreover, conducting experiments in more complex and diverse real-world teaching environments would help validate the practical effectiveness of the optimization measures and provide broader and more practical references for the design and improvement of educational technology (Johnson et al.,2016).

Through further research, we hope to gain a more comprehensive understanding of the impact of user experience optimization on the effectiveness of multimedia teaching integrated systems. This will provide a more solid theoretical foundation and practical guidance for the development of educational technology. Not only will this contribute to improving the efficiency and effectiveness of classroom teaching, but it will also guide the future development of educational technology (Haleem, Qadri, & Suman, 2022).

Conclusions

This study systematically optimized the user experience of multimedia teaching integrated systems, revealing the significant impact of user experience on enhancing classroom interactivity and student learning outcomes. The main findings of the research include the following points:

First, the optimized system performed exceptionally well in terms of operational smoothness, interface friendliness, and system response speed. User satisfaction ratings increased by an average of 15%, and ratings for operational complexity decreased by 20%, indicating that the usability and overall user experience of the system were significantly improved through user experience optimization.

Second, the optimized multimedia teaching integrated system significantly enhanced classroom interactivity. Student interaction frequency increased by 25%, demonstrating that a more user-friendly interface and faster response time can encourage students to participate more actively in classroom activities. Furthermore, the improvement in student engagement and focus was directly reflected in their academic performance, with test scores in the experimental group increasing by an average of

12%. These results validate that optimizing user experience can effectively enhance the actual teaching outcomes of educational equipment, thereby improving overall teaching quality.

Through this study, we have identified the critical role of user experience optimization in improving the educational effectiveness of multimedia teaching integrated systems and enhancing student learning experiences. This finding provides a theoretical basis for the future development and improvement of educational technology and offers direction on how to design more efficient and interactive teaching devices.

Based on the findings of this study, the following practical recommendations are offered to educational institutions and developers of teaching equipment:

Training and Support: Educational institutions should provide comprehensive training for teachers on the optimized multimedia teaching integrated systems to ensure they can fully utilize the new features and advantages of the system. This includes operational skills, application of interactive functions, and problem-solving abilities.

Equipment Selection and Maintenance: When selecting multimedia teaching equipment, educational institutions should prioritize products that perform well in user experience optimization. Additionally, regular system maintenance and updates are crucial for ensuring the long-term efficient operation of the equipment.

User Experience Design: Developers should place user experience design at the core of product development, focusing on simplifying operational processes, improving system response speed, and designing more intuitive and user-friendly interfaces. This approach not only enhances user satisfaction but also effectively improves teaching outcomes.

Continuous Improvement and Feedback Mechanism: Developers should establish a continuous user feedback mechanism, collecting feedback from teachers and students to continually optimize product functionality and performance. Additionally, regular software updates should be released to adapt to the changing needs of the educational environment.

Potential Applications of Research Findings:

Personalized Education Solutions: The results of this study can serve as a reference for developing personalized education solutions, particularly in utilizing user experience optimization to enhance personalized learning experiences. This application can not only improve student learning outcomes but also meet the needs of diverse learners.

Educational Technology Standardization: The findings of this study can also support the standardization of educational technology, especially in designing user-friendly teaching equipment and software. By promoting these standards, the effectiveness of educational equipment and the learning experience of students can be enhanced across a broader educational spectrum.

In summary, this study not only reveals the positive impact of user experience optimization on multimedia teaching integrated systems but also provides practical recommendations for the future design and application of educational technology. These suggestions will help educational

institutions and developers work together to advance educational technology, leading to more efficient, interactive, and personalized teaching and learning experiences.

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