



## Assessing the efficacy of online applications in enhancing classroom teaching: A comprehensive evaluation of execution and effectiveness

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### Abstract

This study explores the practical application of online applications in innovating the organization of teaching activities within public schools in Hue City, Vietnam. The research investigates the nuanced dynamics of execution and efficiency in using online applications across various teaching categories. The study employs a systematic approach to participant selection using stratified sampling based on geographical criteria to ensure representation from both the northern and southern regions of the city. A total of 192 teacher survey questionnaires were distributed focusing on the execution and efficiency of online applications in categories such as warm-up activities, knowledge building, review and consolidation, practice activities and testing and assessment. The commitment to data quality is demonstrated by the high response rate with 187 valid questionnaires collected (97.3% of the expected sample). Statistical analyses including mean scores, standard deviations and correlation coefficients were employed to provide a comprehensive evaluation of the current state of online application integration in teaching activities. The findings reveal varying levels of execution and efficiency across different teaching categories emphasizing the need for targeted improvement strategies. Strong positive correlations were observed in specific categories such as practice activities highlighting a consistent association between effective execution and efficiency. The study contributes valuable insights to the discourse on technology integration in education, offering recommendations for teachers, administrators and policymakers seeking to optimize the impact of online applications on teaching practices in the Vietnamese educational context.

**Keywords:** Education technology, Online applications, Teacher, Teaching activities.

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### Contribution of this paper to the literature

This study contributes to the literature by examining the practical implementation of online applications in organizing teaching activities within public schools in Vietnam. The research delves into the nuanced dynamics of execution and efficiency across various teaching categories.

## 1. Introduction

In the context of Vietnam, the integration of online applications in education represents a transformative shift in teaching methodologies. The adoption of technology, including online applications has become increasingly prevalent across educational institutions in the country. This study investigates the practical application of these online tools in innovating the organization of teaching activities. Vietnam's commitment to leveraging technology to enhance learning aligns with global trends, reflecting recognition of the potential impact on student engagement, critical thinking and overall educational outcomes with a focus on public schools in Hue City. The research aims to provide nuanced insights into the execution and efficiency of online applications within the specific Vietnamese educational landscape shedding light on how these tools are embraced and implemented in the local context. Understanding the dynamics of online application usage contributes to the present discussion on improving teaching strategies and making students ready for a digitally linked future as technology continues to play a significant role in influencing Vietnam's educational context.

In recent years, the educational landscape has witnessed a paradigm shift with the widespread adoption of online applications in teaching activities. This shift has revolutionized traditional classroom settings and opened up new opportunities for both students and teachers. Online applications have provided a more flexible and accessible learning environment allowing students to learn at their own pace and from anywhere in the world (Ally & Samaka, 2013; Nganji, 2018). Additionally, these applications often incorporate interactive features and multimedia content, making the learning experience more engaging and effective. These applications, ranging from interactive platforms to digital resources, offer opportunities to enhance student engagement, foster critical thinking and adapt instruction to diverse learning styles (Bigné, Badenes-Rocha, Ruiz, & Andreu, 2018; Kumi-Yeboah, Kim, Sallar, & Kiramba, 2020). Furthermore, online applications also provide teachers with valuable data and analytics that can help them track student progress and identify areas where additional support may be needed (Wong, 2017). This allows for personalized instruction and targeted interventions ultimately leading to improved learning outcomes. Additionally, online applications often offer a wide range of resources and materials that teachers can use to supplement their teaching and provide students with additional opportunities for practice and exploration (Oliver, 1999). In the context of public schools in Hue City, the selection of online applications as the main focus of this study derives from an understanding of their capacity to enhance both student learning outcomes and teaching methods. This study aims to contribute empirical evidence to the existing body of literature on technology integration in education with a specific focus on the practical implications of using online applications in diverse teaching scenarios.

The effective application of online applications and their general capacity to promote innovative teaching methods are requirements for the success of technology integration in education (Glazer, Hannafin, & Song, 2005). Technology integration in education can greatly enhance student engagement and promote active learning (Cardullo, Wilson, & Zygoris-Coe, 2018). It allows teachers to create dynamic and personalized learning experiences for their students by providing access to a wide range of resources and interactive tools. Previous research by Davies and West (2014) and Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) underscores the significance of pedagogical design, instructional strategies, and the alignment of technology with educational goals.

Furthermore, technology integration in education has been shown to improve student outcomes and increase academic achievement (Davies & West, 2014). It also helps to develop important 21st-century skills such as critical thinking, collaboration and digital literacy. However, teachers need to receive adequate training and support to effectively use these online applications and ensure their successful implementation in the classroom (Payton et al., 2000). Understanding the nuances of execution and efficiency is vital for educators, administrators and policymakers seeking to optimize the impact of online applications on teaching activities. The findings of this research can provide valuable insights and recommendations for teachers in Hue City and other similar educational contexts. Teachers can make informed decisions about how to integrate technology into their teaching practices by understanding the specific challenges and opportunities of implementing online applications.

In this study, we delve into the nuances of execution and efficiency in using online applications across various teaching categories in public schools in Hue City. The research procedures, including participant selection and data analysis aim to provide a rigorous examination of the current state of technology integration in teaching activities to identify potential areas for improvement and propose strategies to enhance technology integration in teaching activities investigating the execution and efficiency of online applications. Additionally, this study seeks to contribute valuable insights to the existing literature on educational technology and its impact on teaching practices in public schools.

This research contributes valuable insights to the ongoing discourse on enhancing educational practices through the strategic implementation of online applications. The findings of this study can help educators and policymakers in Hue City make informed decisions about the adoption and integration of online applications in public schools. Additionally, the research also highlights potential challenges and barriers that may arise during

the implementation process, offering recommendations for overcoming them and maximizing the benefits of technology in education.

## **2. Methods**

### **2.1. Participants**

The participant selection for this research employed a systematic approach using the random sampling method with a focus on stratified sampling based on geographical considerations. The study targeted public elementary, middle and high schools in Hue City encompassing both the northern and southern regions. Specifically, Truong A Primary School, Hung Vuong Secondary School and Nguyen Truong High School represented the southern area while Huong So Primary School, Tran Cao Van Secondary School and Dang Tran Con High School were chosen from the northern area. These schools were deliberately selected to capture a diverse representation of educational contexts within Hue City. A total of 192 teacher survey questionnaires were distributed to gauge the practical application of online applications in innovative teaching activities. The study achieved an exceptionally high response rate with 187 valid questionnaires collected constituting an impressive 97.3% of the originally anticipated sample size. The findings of the study are based on a comprehensive and representative understanding of the use of online applications in teaching across multiple educational levels and geographical areas within the particular context of Hue City due to the careful participant selection process.

### **2.2. Measurements**

The evaluation of awareness regarding the necessity and purpose of applying online applications to organise teaching activities is gauged through a survey that employs a 5-level rating scale. Respondents are prompted to express their opinions on the necessity and purpose of online applications on a spectrum ranging from “completely unnecessary and completely disagree” to “very necessary and strongly agree”. The survey content aims to capture nuanced perspectives allowing participants to articulate their stance with varying degrees of conviction. In analyzing the survey responses, the results reveal the distribution of opinions across the different levels of the rating scale. The first level, “completely unnecessary and completely disagree” signifies a strong opposition or disbelief in the value of incorporating online applications in teaching activities. The second level, “unnecessary and disagree” indicates a perception that online applications may not be essential or beneficial in the context of teaching. The third level, “It's okay to have it or not and hesitant” reflects a neutral standpoint where respondents are neither strongly in favor nor against the integration of online applications. Moving towards the positive end of the scale, the fourth level, “quite necessary and agree” signifies an acknowledgment of the importance and relevance of online applications in organizing teaching activities. Finally, the fifth level, “very necessary and strongly agree” represents a strong endorsement of the indispensability and effectiveness of online applications for teaching purposes. The survey aims to capture a comprehensive range of attitudes and opinions allowing for a nuanced understanding of the awareness and perspectives regarding the necessity and purpose of incorporating online applications in the organization of teaching activities by using this 5-level rating scale. The results can serve as valuable insights for teachers, administrators and policymakers in shaping strategies for the integration of technology in education and ensuring alignment with the perceived needs and priorities of the educational community.

### **2.3. Procedures**

The research procedures were meticulously designed to explore the practical application of online applications in innovating the organization of teaching activities within public schools in Hue City. The study began with the selection of a representative sample using a random sampling method employing a stratified sampling approach based on geographical criteria. This ensured inclusion in both the northern and southern regions of the city. The chosen schools, including Truong A Primary School, Hung Vuong Secondary School, Nguyen Truong High School in the southern region and Huong So Primary School, Tran Cao Van Secondary School, Dang Tran Con High School in the northern region aimed to provide a diverse representation of educational contexts. A total of 192 teacher survey questionnaires were distributed seeking to capture the perspectives of teachers involved in teaching activities using online applications. The survey instrument focused on assessing the execution and efficiency of online applications across various teaching categories employing a 5-level rating scale for nuanced responses. The high response rate of 187 valid questionnaires collected demonstrated robust engagement from the participants. Data analysis involved calculating mean scores and standard deviations for each teaching category offering insights into the levels of execution and efficiency. Furthermore, correlation coefficients were computed to explore the relationships between execution and efficiency across different teaching activities. These statistical analyses aimed to provide a comprehensive understanding of the current state of online application integration in teaching activities within the specific educational context of Hue City. The research procedures were designed with precision to ensure methodological rigor, reliability and validity in capturing the nuanced dynamics of using online applications for teaching innovation. The outcomes of these procedures contribute valuable insights to the broader discourse on technology integration in educational settings.

### **2.4. Data Analysis**

The data analysis process involved a comprehensive examination of the survey responses from teachers in public schools across Hue City regarding the practical application of online applications in teaching activities. Descriptive statistics, including mean scores and standard deviations were calculated for each teaching category to gauge the levels of execution and efficiency. These measures provided a quantitative overview of how online applications were used across different aspects of teaching. The utilization of a 5-level rating scale in the survey facilitated a nuanced understanding of participants' perspectives allowing for detailed insights into the perceived effectiveness of online applications. Correlation coefficients were computed to explore the relationships between the execution and efficiency scores for each teaching category. The correlation analysis aimed to uncover any associations between the effective execution of online applications and their overall efficiency in contributing to

teaching innovation. Notably, the strong positive correlation observed in the “practice activities and skill formation” category highlights a consistent relationship between effective execution and efficiency in this particular context. The data analysis process not only provided a snapshot of the current state of online application integration but also offered insights into the nuanced dynamics of their effectiveness across various teaching activities. These findings contribute valuable information to the ongoing dialogue on optimizing technology integration in educational settings emphasizing the need for targeted improvement strategies and context-specific approaches.

### 3. Results

The table presents an evaluation of the level and effectiveness of applying online methods in the organization of classroom teaching activities with a focus on various aspects of execution and efficiency. Each row corresponds to a specific logic of teaching activity and the mean (Ally & Samaka, 2013) and standard deviation (SD) values are provided for both execution and efficiency as shown in Table 1.

**Table 1.** Evaluating the level and effectiveness of applying online according to the logic of organizing classroom teaching activities.

No	Logic of teaching activities	Execution		Efficiency		r
		M	SD	M	SD	
1	Using online applications to pose problems warm up of class and stimulates students' learning attitudes.	2.48	0.65	2.35	0.70	0.62**
2	Using online applications to organize activities to build new knowledge for students.	2.14	0.57	2.09	0.74	0.57**
3	Using online applications to organize review and consolidate knowledge and skills for students.	2.03	0.85	2.12	0.54	0.69*
4	Using online applications to organize practice activities, apply knowledge and form skills and techniques for students.	1.96	0.62	1.87	0.81	0.77*
5	Using online applications to organize testing and assessment activities for students' knowledge, skills and techniques.	2.08	0.77	2.54	0.59	0.43**

Note: M: Mean, SD: Standard deviation, \*:  $p < 0.05$ , \*\*:  $p < 0.01$ .

In the first category, using online applications for posing problems, warming up at the beginning of class and stimulating students' learning attitudes received a mean score of 2.48 with a standard deviation of 0.65 for execution and 2.35 with a standard deviation of 0.70 for efficiency. This indicates a moderate level of execution and efficiency. The results suggest a noteworthy variance in efficiency denoted by the relatively high standard deviation of 0.70. In the second category, students who used online applications to plan activities aimed at expanding their knowledge received an average execution score of 2.14 (SD = 0.57) and an efficiency score of 2.09 (SD = 0.74). These results reflect a moderate level of execution and efficiency with a slightly lower mean efficiency score compared to execution. In the third category, the use of online applications for organizing review and consolidation activities garnered a mean execution score of 2.03 (SD = 0.85) and an efficiency score of 2.12 (SD = 0.54). The efficiency score suggests a moderately effective application despite a relatively higher standard deviation in execution. The fourth category focuses on employing online applications for organizing practice activities, applying knowledge and forming skills and techniques. The mean execution score is 1.96 (SD = 0.62) and the efficiency score is 1.87 (SD = 0.81). The effectiveness level indicates a somewhat lower level of efficacy despite the moderate execution demonstrated by the higher standard deviation and lower mean. Lastly, the use of online applications for testing and assessment activities in the fifth category resulted in a mean execution score of 2.08 (SD = 0.77) and an efficiency score of 2.54 (SD = 0.59). This indicates a moderate level of execution but a notably higher level of efficiency. The lower execution score may be compensated by the higher efficiency emphasizing the effectiveness of online applications in testing and assessing students' knowledge, skills and techniques. The evaluation suggests varying levels of execution and efficiency across different teaching activities emphasizing the need for targeted improvement strategies and further investigation into factors influencing the effectiveness of online applications in classroom teaching.

The correlation results indicate varying degrees of positive relationships between the execution and efficiency scores for different teaching activities. The strongest correlation is observed in the “practice activities and skill formation” category ( $r = 0.77$ ,  $p < 0.01$ ) suggesting a robust positive association between the execution and efficiency of online applications in organizing practice activities. In contrast, the “testing and assessment” category shows a lower but still significant correlation ( $r = 0.43$ ,  $p < 0.05$ ) indicating a positive but less strong relationship between execution and efficiency scores in this context. These findings imply that as the execution of online applications for teaching activities increases, there tends to be a positive impact on efficiency. However, the strength of this relationship varies across different types of teaching activities. Further analysis and consideration of contextual factors may provide insights into optimizing the use of online applications for enhanced teaching effectiveness.

### 4. Discussion

The comprehensive evaluation of online applications in various teaching activities reveals nuanced patterns of execution and efficiency. The moderate levels observed across different categories suggest a balanced integration of technology in the classroom, with varying impacts on effectiveness. Notably, the correlation analysis underscores the importance of context-specific considerations emphasizing a strong positive relationship between execution and efficiency in certain activities such as practice sessions. These findings highlight the multifaceted nature of technology integration in education and the need for tailored strategies to enhance its impact. Teachers and policymakers can draw insights from these results to inform targeted improvements in leveraging online applications for diverse teaching activities, fostering a more effective and adaptive educational environment.

Further research should delve into the specific factors influencing the observed variations and contributing to the ongoing discourse on optimizing technology integration for enhanced teaching and learning outcomes.

The findings from the evaluation of different teaching activities using online applications provide valuable insights into the levels of execution and efficiency within each category. The moderate level of execution and efficiency observed in the first category involving the use of online applications for posing problems and stimulating students' learning attitudes suggests that while there is a certain degree of effectiveness, there is room for improvement. One possible way to improve execution and efficiency in this category could be by providing more guidance and support to students in using the online applications. Additionally, incorporating interactive elements such as quizzes or discussion forums within the applications may further enhance student engagement and learning outcomes. According to previous research, effective warm-up activities can enhance student engagement and contribute to a positive learning atmosphere (Payton et al., 2000). Furthermore, incorporating peer-to-peer collaboration and feedback opportunities within the online applications can also foster a sense of community and promote deeper learning (Chandra & Palvia, 2021; Hara, 2008; McCarthy, 2017). Research has shown that when students have the opportunity to interact with their peers and receive feedback on their work, it can lead to increased motivation and improved learning outcomes (Al-Samarraie, Shamsuddin, & Alzahrani, 2020; Chien, Hwang, & Jong, 2020; Tran, 2019). However, the noteworthy variance in efficiency as indicated by the high standard deviation emphasizes the need for a more targeted approach to ensure consistent positive outcomes. This targeted approach may involve tailoring activities to meet the specific needs and interests of individual students.

In the second category, the literature on the integration of technology for knowledge acquisition is consistent with the moderate levels of execution and efficiency observed when online applications are used to provide students with new knowledge. This category of online applications focuses on providing students with interactive and engaging learning experiences. Students are able to actively participate in their own learning process which has been shown to enhance knowledge acquisition and retention by using technology in this way (Holbrey, 2020; Pérez-López & Contero, 2013; Wang, 2020). Additionally, these online applications can provide personalized feedback and adaptive learning experiences further supporting students' knowledge development. The slightly lower mean efficiency score may indicate potential challenges or variations in the effectiveness of these activities. Further investigation into the specific factors influencing efficiency could provide valuable insights for educators seeking to optimize the use of online applications for knowledge-building activities (Ghazal, Al-Samarraie, & Wright, 2020; Tan et al., 2021). This research suggests that online applications can be effective for knowledge acquisition; there may be room for improvement in terms of efficiency. Understanding the factors that contribute to efficiency could help teachers make informed decisions about which online applications to use and how to best integrate them into their teaching practices. This knowledge can ultimately lead to more effective and engaging online learning experiences for students.

In the third category, the evaluation of review and consolidation activities through online applications reveals a moderately effective application. There is always room for improvement in terms of effectiveness despite the fact that online applications have made it easier to assess and collect reviews (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). The use of these applications has streamlined the process but there may be limitations in terms of accuracy and reliability that need to be addressed (Mangaroska & Giannakos, 2018). The literature supports the use of technology for review purposes to reinforce learning and enhance retention despite the higher standard deviation in execution. One possible limitation of online applications for review and consolidation activities is the potential for technical glitches or connectivity issues which can disrupt the learning process. Additionally, the effectiveness of these applications may vary depending on individual learning styles and preferences (Carvalho et al., 2019; Husmann & O'Loughlin, 2019; Pashler, McDaniel, Rohrer, & Bjork, 2008). However, the literature suggests that incorporating technology into review activities can be beneficial for reinforcing learning and improving long-term retention. The positive efficiency score suggests that online applications can be effective tools in supporting students' review and consolidation of knowledge (Donkin & Rasmussen, 2021; Poblaciones, García-White, & Marín, 2021).

In the fourth category, the results indicate a moderate level of execution but a somewhat lower level of effectiveness in organizing practice activities, applying knowledge and forming skills and techniques. However, it is important to note that the level of execution may vary depending on individual factors such as prior experience and training. Additionally, further analysis is needed to determine the specific reasons behind the lower level of effectiveness in organizing practice activities and applying knowledge. This finding aligns with studies that emphasize the importance of pedagogical design and instructional strategies when integrating technology into practical learning experiences (Blau, Shamir-Inbal, & Avdiel, 2020; Chai, Hwee Ling Koh, & Teo, 2019). These studies suggest that the effectiveness of integrating technology into practical learning experiences can be enhanced through careful planning and implementation. It is crucial for teachers to consider factors such as learning objectives, student needs and available resources when designing technology-enhanced activities (Baneres et al., 2019; Downie, Gao, Bedford, Bell, & Kuit, 2021; Kim, 2019). Teachers can create engaging and effective learning experiences that promote the application of knowledge and the development of skills and techniques. The higher standard deviation in efficiency highlights potential variations in the impact of online applications on practice activities and calls for further exploration.

In the fifth category, the moderate execution score is compensated by a notably higher efficiency score focusing on testing and assessment activities. This suggests that while the execution may be moderate, the efficiency of online applications in testing and assessing students' knowledge, skills and techniques is notably effective (Anthonysamy, 2021; Hartman, 2001). This effectiveness can be attributed to the use of advanced technology and automated grading systems which streamline the process and provide immediate feedback to students (Linn et al., 2014). Additionally, the higher efficiency score indicates that online applications in this category are able to handle a larger number of students simultaneously, allowing for more efficient testing and assessment processes (Gikandi, Morrow, & Davis, 2011). The emphasis on the efficiency of assessment aligns with research advocating for the benefits of technology-enhanced assessments in providing timely and constructive feedback (De Villiers, Scott-Kennel, & Larke, 2016). Furthermore, technology-enhanced assessments also offer the advantage of reducing human bias in grading as the automated systems follow a standardized rubric. This ensures fairness and

consistency in evaluating student performance. Additionally, the use of advanced technology allows for the integration of multimedia elements in assessments, making them more engaging and interactive for students.

The evaluation and correlation results underscore the importance of considering the specific teaching activity context when assessing the effectiveness of online applications in classroom settings. The results need focused methods for improvement as well as more research into the complex variables affecting the effectiveness and maintenance of online applications in different educational contexts. These strategies should focus on addressing the unique challenges and limitations that arise in specific teaching activity contexts such as the availability of technology resources or the level of digital literacy among students. Additionally, future research should investigate how factors like teacher training and support, student engagement and instructional design impact the effectiveness of online applications in different educational settings.

The findings and analysis presented in this study offer significant contributions to the understanding of how online applications can be effectively used to enhance the organisation of teaching activities in public schools in Hue City. However, it is important to recognize certain limitations that could impact the interpretation and applicability of the results. A noteworthy constraint pertains to the possibility of response bias within the survey data. The potential for subjectivity arises from the dependence on self-reported responses from teachers since participants may offer answers that conform to perceived expectations or social desirability. Another constraint arises from the geographical emphasis on Hue City, notably directing attention towards educational institutions situated in the northern and southern areas. Furthermore, the utilization of a cross-sectional research design presents a constraint in terms of demonstrating causal links. The study provides a momentary overview of the present condition of online application utilization in educational endeavors but it does not offer any understanding of the dynamics or alterations that occur over time. Moreover, the study's emphasis on the viewpoints of teachers may not comprehensively encompass the wider dynamics encompassing students, parents or school officials whose perspectives could offer a more holistic comprehension of the total influence of internet applications on the educational environment. Acknowledging these constraints is crucial for a nuanced analysis of the study's findings and establishes a basis for future research efforts to tackle these limitations, thereby enhancing our overall comprehension of the difficulties and possibilities linked to the incorporation of online applications in educational environments.

The implications drawn from the evaluation of online applications in teaching activities are multifaceted and offer valuable guidance for teachers, administrators and policymakers. The moderate levels of execution and efficiency suggest that while online applications are being used across various categories, there is a considerable opportunity for enhancement. Teachers can benefit from targeted professional development programs that focus on optimizing the integration of technology especially in activities like practice sessions where a strong positive correlation between execution and efficiency is observed. The findings also underscore the importance of pedagogical design and instructional strategies when incorporating online applications particularly in areas where the efficiency scores indicate room for improvement. Policymakers can consider these results in shaping initiatives that support technology integration in education emphasizing the need for context-specific approaches. Additionally, ongoing research should delve deeper into the specific contextual factors influencing the observed variations, informing the development of evidence-based guidelines for effective technology integration in diverse educational settings. Overall, these implications contribute to the ongoing dialogue surrounding the strategic use of online applications to enhance teaching and learning outcomes in contemporary classrooms.

## 5. Conclusion

The study sheds light on the practical application of online applications in innovating the organization of teaching activities in public schools within Hue City. The findings, rooted in a comprehensive evaluation of execution and efficiency across various teaching categories provide nuanced insights into the strengths and areas for improvement. The examination of correlation shows that the relationship between these two variables is context-specific despite the fact that the study shows a reasonable level of execution and efficiency. The implications drawn emphasize the need for tailored strategies and professional development to optimize technology integration particularly in areas with identified room for enhancement. Acknowledging the limitations, including potential response bias and the localized focus underscores the importance of cautious interpretation. This study contributes significant insights to the current discussion about using online resources to improve instruction in different educational contexts.

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