Factors affecting grade 6 students' learning following the B-Learning model

Dao Kim Nguyen | Vu Ba Duong | Chung Cong Nguyen | Thien Nguyen | Huy-Hoang Tran

1. Introduction and background

Within the educational context of Vietnam, the adoption of innovative teaching methodologies is crucial in adapting to the evolving landscape of education. Blended learning, often referred to as the B-Learning model, has gained prominence as a pedagogical approach that combines traditional face-to-face instruction with online components. This study aims to explore the factors influencing the learning experiences of Grade 6 students within the B-Learning framework in the Vietnamese context. Given the unique socio-cultural and educational landscape of Vietnam, understanding how technological access, self-engagement behaviors, and support mechanisms impact the efficacy of the B-Learning model is paramount. This research seeks to provide valuable insights for Vietnamese educators, policymakers, and researchers, contributing to the enhancement of blended learning practices tailored to the specific needs and nuances of Grade 6 students in Vietnam.

In the ever-evolving landscape of education, the integration of technology has ushered in new pedagogical approaches, with the B-Learning model gaining prominence. This study delves into the intricate factors that exert influence on the learning experiences of Grade 6 students within the framework of the B-Learning model (Ali, 2018; Singh et al., 2021; Snart, 2010). Blended learning, a hybrid instructional method combining traditional face-to-face teaching with online elements, introduces a novel educational paradigm that demands a comprehensive examination of the factors shaping student outcomes (Ali, 2018; Singh et al., 2021; Snart, 2010). This research seeks to untangle the complex web of variables affecting Grade 6 students' learning experiences in the context of B-Learning, aiming to provide educators, policymakers, and researchers with nuanced insights.

The educational landscape has witnessed a paradigm shift with the introduction of blended learning, and Grade 6 students find themselves navigating a dynamic educational environment that seamlessly integrates traditional and digital learning modalities (Azouri & Karam, 2023; Camino et al., 2023; Gagnon et al., 2020). The factors influencing their learning experiences in this context are multifaceted, encompassing technological access, self-engagement behaviors, support mechanisms, and more. Understanding these dynamics is crucial for optimizing the B-Learning model and ensuring that it aligns with the diverse needs and circumstances of Grade 6 students (Council, 1999; i Negre et al., 2023; Wouters et al., 2008).
Technological access stands out as a pivotal factor influencing the effectiveness of B-Learning for Grade 6 students (Almulla, 2022; Carswell & Venkatesh, 2002; Martín-García et al., 2019). The availability and proficiency with digital tools, particularly Tablets or iPads, play a critical role in shaping the learning experience (Alshuraiaan, 2023; Nami, 2020; Shaikh & Khoja, 2012). Ensuring equitable access to these devices is essential for mitigating potential disparities in students’ engagement with online components. The study investigates the prevalence of these devices among Grade 6 students and aims to shed light on how technological access impacts their ability to navigate the B-Learning environment effectively.

Self-engagement behaviors constitute another key element in the learning journey of Grade 6 students within the B-Learning model (Samuels, 2023). This encompasses their ability to set learning goals, manage time effectively, and remain motivated in both face-to-face and online learning settings (Kianmehr & Kamali, 2013; Kurent & Avsec, 2023; Ussher et al., 2023). The study explores the various self-engagement behaviors exhibited by Grade 6 students and seeks to understand how these behaviors correlate with their academic performance and overall learning experience. Insights into these dynamics can inform educators on fostering self-regulated learning skills within the B-Learning context.

Moreover, support mechanisms, both within and outside the classroom, play a vital role in shaping the B-Learning experiences of Grade 6 students. Family and peer support, as well as the guidance provided by teachers, contribute significantly to students’ ability to navigate the challenges posed by blended learning (MacDonald, 2017; Singh et al., 2021; Vaughan et al., 2013). The study investigates the extent of familial and peer involvement, examining how these support structures impact students’ adaptability to the B-Learning model. Understanding the role of these support mechanisms is essential for creating a conducive and supportive learning environment for Grade 6 students.

As the educational landscape continues to evolve, this research aims to provide actionable insights for educators, policymakers, and researchers. By comprehensively exploring the factors affecting Grade 6 students’ learning within the B-Learning model, the study aspires to contribute to the refinement and optimization of blended learning practices. Ultimately, the goal is to foster an inclusive, adaptive, and effective educational environment that caters to the diverse needs of Grade 6 students in the contemporary educational landscape.

2. Methods

2.1. Participants

In this study, the participants were selected using the natural sampling method, focusing on 1476 6th-grade students from secondary schools in Vietnam. The choice of the natural sampling method implies that participants were selected based on their availability and willingness to participate, capturing a diverse representation of students within the specified grade level. The demographic distribution of the participants provides insights into the composition of the sample. In terms of gender, the study included a slightly higher proportion of girl students, accounting for 54.9% of the total participants, while boy students constituted 45.1%. This gender distribution ensures a balanced representation and allows for the exploration of potential variations in responses based on gender differences. Geographically, the survey encompassed students from various regions in Vietnam. A significant portion of the participants, more than half, hailed from Ba Ria - Vung Tau province, constituting 50.7% of the total sample. An Giang province accounted for 34.8%, reflecting a substantial presence from this region. Ho Chi Minh City, a major educational hub, was represented by 13.9% of the participants. Additionally, a small percentage, 0.5%, represented other areas within Vietnam. The diverse regional representation enhances the external validity of the study, allowing for broader generalizations about the experiences and perspectives of 6th-grade students in different geographical contexts. By including participants from both urban and provincial areas, the study aims to capture a comprehensive understanding of the factors influencing online learning experiences. The participants in this study represent a varied and inclusive sample of 6th-grade students from secondary schools in Vietnam, reflecting a balance in terms of gender and geographical distribution. This diverse composition enhances the study’s potential to generate insights that can be more widely applicable and contribute meaningfully to our understanding of online learning dynamics in the context of the Vietnamese education system.

2.2. Measurements

The measurement instrument employed in this study is a carefully crafted questionnaire designed to assess the impact of Information Technology (IT) factors on Blended Learning (B-learning) and concurrently evaluate the skills acquired by students throughout the B-learning process. This questionnaire serves as a comprehensive tool aimed at capturing valuable insights into the multifaceted aspects of technology integration and skill development in the context of blended learning environments. The questionnaire is structured to gauge the influence of various IT factors on the effectiveness of B-learning. This includes probing into aspects such as the accessibility of online resources, the ease of navigation through learning platforms, and the overall technological environment facilitating blended learning experiences. By addressing these factors, the questionnaire aims to quantify the extent to which IT elements contribute to the success and efficiency of the B-learning approach. Additionally, the questionnaire delves into the evaluation of specific skills that students acquire during their participation in the B-learning process. These skills encompass a broad spectrum, ranging from technical competencies.
related to IT tools and platforms to higher-order cognitive skills, including critical thinking, problem-solving, and effective communication in a digital learning environment. The measurement instrument thus provides a nuanced assessment of the multifaceted nature of skills development within the B-learning framework. The construction of the questionnaire involved careful consideration of relevant literature, educational technology frameworks, and the specific objectives of the study. Questions were formulated to align with the theoretical underpinnings of the research, ensuring that the instrument captures both the qualitative and quantitative aspects of the influence of IT factors and the skills cultivated during B-learning. Furthermore, the questionnaire employs a Likert scale or a similar response format to allow participants to express their perceptions and experiences, providing researchers with quantitative data for statistical analysis. This methodological approach ensures the measurement instrument’s reliability and validity, allowing for robust and meaningful interpretations of the data collected. Overall, the questionnaire serves as a vital tool to systematically investigate and measure the intricate relationship between IT factors, B-learning, and the acquisition of essential skills by students in the educational context under consideration.

2.3. Procedures

The research procedures for this study were systematically structured to ensure a thorough investigation into the influence of Information Technology (IT) factors in blended learning and the concurrent evaluation of skills developed by 6th-grade students in Vietnamese secondary schools. The study adopted a cross-sectional research design, providing a snapshot of participants’ experiences and perceptions at a specific point in time. To create a diverse and representative sample, the natural sampling method was employed. This method allowed for the inclusion of 1,476 6th-grade students based on their availability and willingness to participate. The diverse representation was particularly crucial for capturing the varied experiences of learners within this grade level. The questionnaire, meticulously designed for the study, aimed to measure the impact of IT factors on blended learning and assess the skills acquired by students. It included a mix of closed-ended and Likert scale items, enabling both quantitative and qualitative data collection. The survey was administered in collaboration with schools across different regions of Vietnam, ensuring a broad and inclusive dataset. Upon collecting the data, variable measurement involved the use of statistical techniques, including descriptive statistics to summarize participant demographics and inferential statistics such as chi-square tests. These analyses were employed to uncover patterns, associations, and potential trends within the data, providing a robust foundation for drawing meaningful conclusions. The interpretation and reporting phase adhered to APA style guidelines. Findings were meticulously interpreted in the context of the research questions and objectives, emphasizing significant outcomes, potential limitations, and areas for future exploration. The study’s systematic approach, encompassing various stages from sample selection to statistical analysis, contributed to the reliability and validity of the research findings, enhancing the study’s overall credibility.

2.4. Data Analysis

The data analysis for this study was conducted using the Statistical Package for the Social Sciences (SPSS) software, a powerful tool for statistical analysis. Initially, the collected data underwent a thorough cleaning and preparation process to ensure accuracy and consistency. Descriptive statistics, including means and standard deviations, were computed to provide a comprehensive overview of participant demographics and responses to the questionnaire. Subsequently, inferential statistics, such as chi-square tests, were employed to explore potential associations and determine statistical significance between various variables. The application of SPSS facilitated efficient and systematic variable measurement, enabling the transformation of qualitative responses into quantifiable data. The software’s capabilities were particularly beneficial for conducting complex analyses, ensuring the reliability and validity of the study’s findings. The results were visually presented through charts and tables generated by SPSS, contributing to a clear and concise representation of the quantitative data. The utilization of SPSS in the data analysis process enhanced the precision and rigor of the study, providing a robust foundation for drawing meaningful conclusions and addressing the research objectives.

3. Results

The study investigated the conditions necessary for individuals to effectively participate in online learning at home, focusing on key technological prerequisites. Table 1 summarizes the mean (M) and standard deviation (SD) values for four critical variables: Internet connection, computer availability, Tablet/Ipad access, and smartphone usage. Additionally, chi-square (χ2) statistics were employed to explore the association between these conditions and participants’ ability to engage in online learning.

The mean and standard deviation for Internet connection indicate a relatively high level of agreement among participants (M = 1.04, SD = 0.194). The low standard deviation suggests a narrow range of responses, reflecting a consensus in participants’ perceptions regarding the importance of a stable Internet connection for successful online learning at home. The chi-square test, however, did not reveal a statistically significant association between Internet connection and participants’ ability to engage in online learning (χ2 = 6.718, p = 0.622).
Regarding Computer availability, the mean value (M = 1.51) suggests a moderate level of agreement among participants, with a standard deviation of 0.500 indicating more variability in responses. The chi-square test for Computer availability did not reach statistical significance (χ² = 1.942, p = 0.163), implying that participants’ opinions regarding the importance of having access to a computer at home for online learning were not significantly associated with their reported ability to engage in such learning.

Table 1: Conditions to participate in online learning at home.

<table>
<thead>
<tr>
<th>Condition</th>
<th>M</th>
<th>SD</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet connection</td>
<td>1.04</td>
<td>0.194</td>
<td>6.718</td>
<td>0.622</td>
</tr>
<tr>
<td>Computer</td>
<td>1.51</td>
<td>0.500</td>
<td>1.942</td>
<td>0.163</td>
</tr>
<tr>
<td>Tablet/Ipad</td>
<td>1.72</td>
<td>0.447</td>
<td>0.652</td>
<td>0.419</td>
</tr>
<tr>
<td>Smartphone</td>
<td>1.08</td>
<td>0.267</td>
<td>11.839</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: M, mean; SD, Standard Deviation; χ², Chi-square.

Table 2: The frequency of self-engagement in learning behaviors.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>M</th>
<th>SD</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know how to be proactive and actively perform your own work</td>
<td>2.61</td>
<td>0.520</td>
<td>2.005</td>
<td>0.367</td>
</tr>
<tr>
<td>Set your own learning goals to strive to achieve</td>
<td>2.57</td>
<td>0.581</td>
<td>3.137</td>
<td>0.208</td>
</tr>
<tr>
<td>Know how to make and implement study plans</td>
<td>2.47</td>
<td>0.622</td>
<td>0.156</td>
<td>0.925</td>
</tr>
<tr>
<td>Select resources to support learning</td>
<td>2.46</td>
<td>0.627</td>
<td>1.185</td>
<td>0.553</td>
</tr>
<tr>
<td>Selectively retain information by writing summaries of learned content</td>
<td>2.25</td>
<td>0.685</td>
<td>3.570</td>
<td>0.168</td>
</tr>
<tr>
<td>(in the form of mind maps or lists of important concepts)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take notes from the teacher’s lecture according to the main ideas</td>
<td>2.68</td>
<td>0.559</td>
<td>2.322</td>
<td>0.313</td>
</tr>
<tr>
<td>Recognize and adjust your own errors and limitations when receiving feedback from teachers and friends</td>
<td>2.70</td>
<td>0.495</td>
<td>3.115</td>
<td>0.211</td>
</tr>
<tr>
<td>Actively seek support from others when having difficulty in learning</td>
<td>2.57</td>
<td>0.570</td>
<td>2.267</td>
<td>0.322</td>
</tr>
</tbody>
</table>

Note: M, mean; SD, Standard Deviation; χ², Chi-square.

Participants reported a moderate level of agreement (M = 2.61, SD = 0.520) regarding the behavior of "Knowing how to be proactive and actively perform your own work." The subsequent chi-square test did not reveal a statistically significant association (χ² = 2.005, p = 0.367), suggesting that the reported frequency of engagement in this behavior is not significantly linked to individual characteristics.

Similarly, for the behavior "Setting your own learning goals to strive to achieve," participants exhibited a moderate level of agreement (M = 2.57, SD = 0.581). The chi-square test yielded a non-significant result (χ² = 3.137, p = 0.208), indicating that the reported frequency of engagement in goal-setting is not statistically associated with individual characteristics.

"Knowing how to make and implement study plans" resulted in a slightly lower mean (M = 2.47, SD = 0.622). The chi-square test did not show a significant association (χ² = 0.156, p = 0.925), suggesting that reported frequencies in this behavior are not significantly influenced by individual characteristics.

Participants reported a moderate level of agreement (M = 2.46, SD = 0.627) in the behavior "Selecting resources to support learning." The associated chi-square test did not reveal a significant association (χ² = 1.185, p = 0.553), indicating that reported frequencies in resource selection are not statistically linked to individual characteristics.
The behavior "Selectively retaining information by writing summaries" yielded a lower mean (M = 2.25, SD = 0.685). Although the chi-square test did not indicate a significant association (χ² = 3.570, p = 0.168), participants reported varying frequencies in engaging with this learning behavior.

"Taking notes from the teacher’s lecture according to the main ideas" resulted in a mean of 2.68 and a moderate standard deviation of 0.559. The chi-square test (χ² = 2.322, p = 0.313) did not show a significant association, suggesting that reported frequencies in note-taking behaviors are not significantly associated with individual characteristics.

For "Recognizing and adjusting errors and limitations," participants reported a relatively higher mean (M = 2.70) and a lower standard deviation of 0.495. The associated chi-square test (χ² = 3.115, p = 0.211) did not reveal a significant association, indicating that the reported frequencies of engaging in this behavior are not statistically linked to individual characteristics.

Finally, the behavior "Actively seeking support from others when having difficulty in learning" yielded a mean of 2.57 and a standard deviation of 0.570. The chi-square test (χ² = 2.267, p = 0.322) did not indicate a significant association, suggesting that reported frequencies in seeking support are not significantly influenced by individual characteristics.

While participants generally reported moderate levels of agreement on the frequency of self-engagement in various learning behaviors, the chi-square tests did not provide evidence of statistically significant associations between participants' reported frequencies and each specific behavior. These findings underscore the need for further exploration and consideration of contextual factors that may contribute to individual variations in self-engagement in learning behaviors.

Table 3 provides a comprehensive examination of the self-mastery level in various learning activities, presenting mean (M) and standard deviation (SD) values alongside chi-square (χ²) statistics to assess potential associations. Each learning activity is scrutinized individually, offering detailed insights into participants' reported frequencies and statistical significance.

<table>
<thead>
<tr>
<th>Activity</th>
<th>M</th>
<th>SD</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit documents on Microsoft Word software</td>
<td>2.16</td>
<td>0.680</td>
<td>0.556</td>
<td>0.757</td>
</tr>
<tr>
<td>Prepare presentations on Microsoft PowerPoint software (PowerPoint or PPT)</td>
<td>1.90</td>
<td>0.712</td>
<td>0.439</td>
<td>0.803</td>
</tr>
<tr>
<td>Cut, merge, and adjust images simply on Paint software</td>
<td>2.10</td>
<td>0.690</td>
<td>5.579</td>
<td>0.061</td>
</tr>
<tr>
<td>Search documents and information on the Internet</td>
<td>2.74</td>
<td>0.480</td>
<td>0.438</td>
<td>0.803</td>
</tr>
<tr>
<td>Access online learning software such as Google Classroom, Microsoft Teams, Zoom, ...</td>
<td>2.68</td>
<td>0.526</td>
<td>5.773</td>
<td>0.056</td>
</tr>
<tr>
<td>Perform technical operations (turn on/off mic, turn off/on camera, discuss) on online learning software such as Google Classroom, Microsoft Teams, Zoom, ...</td>
<td>2.78</td>
<td>0.471</td>
<td>0.948</td>
<td>0.662</td>
</tr>
<tr>
<td>Access and take online tests on software such as Google Form, Google Classroom, Microsoft Forms, Microsoft Teams, Azota, ...</td>
<td>2.64</td>
<td>0.556</td>
<td>0.954</td>
<td>0.621</td>
</tr>
</tbody>
</table>

Note: M, mean; SD, Standard Deviation; χ², Chi-square.

For the learning activity "Edit documents on Microsoft Word software," participants reported a moderate level of self-mastery (M = 2.16, SD = 0.680). The chi-square test did not reveal a statistically significant association (χ² = 0.556, p = 0.757), indicating that the reported self-mastery level in document editing is not significantly influenced by individual characteristics.

In the case of "Prepare presentations on Microsoft PowerPoint software (PowerPoint or PPT)," participants reported a lower mean (M = 1.90) with a moderate standard deviation of 0.712. The chi-square test (χ² = 0.439, p = 0.803) did not show a significant association, suggesting that the self-mastery level in preparing presentations is not significantly linked to individual characteristics.

For the activity "Cut, merge, and adjust images simply on Paint software," participants reported a mean of 2.10 and a standard deviation of 0.690. The chi-square test (χ² = 5.579, p = 0.061) approached statistical significance, indicating a potential association between reported self-mastery and individual characteristics. However, caution should be exercised due to the borderline significance.

"Search documents and information on the Internet" yielded a higher mean (M = 2.74) with a lower standard deviation of 0.480. The chi-square test (χ² = 0.438, p = 0.803) did not reveal a significant association, suggesting that reported self-mastery in information retrieval is not significantly associated with individual characteristics.

In the learning activity "Access online learning software such as Google Classroom, Microsoft Teams, Zoom," participants reported a mean of 2.68 and a moderate standard deviation of 0.526. The chi-square test (χ² = 5.773, p = 0.056) approached statistical significance, indicating a potential association between reported self-mastery and individual characteristics.

For "Perform technical operations on online learning software such as Google Classroom, Microsoft Teams, Zoom," participants reported a mean of 2.78 and a low standard deviation of 0.471. The chi-square test (χ² = 0.948, p = 0.662) did
not show a significant association, suggesting that reported self-mastery in technical operations is not significantly linked to individual characteristics.

In the activity "Access and take online tests on software such as Google Form, Google Classroom, Microsoft Forms," participants reported a mean of 2.64 and a standard deviation of 0.556. The chi-square test ($\chi^2 = 0.954, p = 0.621$) did not reveal a significant association, suggesting that the reported self-mastery level in online test-taking is not significantly associated with individual characteristics.

Participants generally reported varying levels of self-mastery in different learning activities. While the chi-square tests did not consistently show significant associations, a borderline significance was observed for the activity involving image editing on Paint software. Further investigation and consideration of contextual factors may shed light on the nuances of self-mastery in these specific learning activities.

Table 4 examines the ability of individuals to support family members or friends during their participation in online learning. The table includes mean (M) and standard deviation (SD) values for each support activity, along with chi-square ($\chi^2$) statistics to assess potential associations.

| Table 4 Ability to support family members or friends when participating in online learning. |
|---------------------------------|-----|-------|-----|-----|
| Support on how to use a computer or phone to study online | 2.71 | 0.587 | 6.032 | 0.049 |
| Support how to search for documents and information on the Internet | 2.63 | 0.666 | 2.593 | 0.273 |
| Instruct students for accessing and using online learning software and applications such as Google Classroom, Microsoft Teams, Zoom, Microsoft Word, Microsoft PowerPoint, etc. | 2.62 | 0.650 | 5.514 | 0.063 |

For the support activity "Support on how to use a computer or phone to study online," participants reported a mean of 2.71 with a moderate standard deviation of 0.587. The chi-square test ($\chi^2 = 6.032, p = 0.049$) demonstrated statistical significance, indicating a potential association between reported abilities and individual characteristics. This suggests that participants' proficiency in supporting others in using electronic devices for online learning may vary significantly based on individual factors.

In the case of "Support how to search for documents and information on the Internet," participants reported a mean of 2.63 and a standard deviation of 0.666. The chi-square test ($\chi^2 = 2.593, p = 0.273$) did not reveal a statistically significant association. This suggests that the reported abilities in supporting others in online information retrieval may not be significantly influenced by individual characteristics, given the non-significant p-value.

In the support activity involving "Instructing students for accessing and using online learning software and applications such as Google Classroom, Microsoft Teams, Zoom, Microsoft Word, Microsoft PowerPoint, etc.," participants reported a mean of 2.62 and a moderate standard deviation of 0.650. The chi-square test ($\chi^2 = 5.514, p = 0.063$) approached statistical significance, indicating a potential association between reported abilities and individual characteristics. However, caution is advised due to the borderline significance observed.

Participants reported varying abilities to support family members or friends in different aspects of online learning. The chi-square tests revealed statistical significance for supporting the use of electronic devices for online study, suggesting potential associations with individual characteristics. However, non-significant results were observed for supporting online information retrieval and instructing on the use of specific online learning tools. These findings highlight the diverse nature of support abilities and emphasize the need for further exploration and understanding of the factors influencing individuals' capabilities in assisting others with online learning activities.

4. Discussion

The discussion encapsulates key findings and implications derived from an exploration of student engagement and support mechanisms in online learning. Notably, the prevalence of Tablets or iPads as favored devices among students underscores the importance of device optimization in educational practices. Students' proactive engagement in recognizing and adjusting errors, coupled with an emphasis on technical proficiency, highlights the multifaceted nature of their online learning experiences. The crucial role of family and friends in supporting students in navigating technology for studies further accentuates the need for collaborative approaches in education. These insights contribute to a more comprehensive understanding of effective strategies for online education, emphasizing the importance of fostering metacognitive skills, providing technical support, and involving broader support networks. The discussion concludes by underscoring the study's implications for educators, policymakers, and researchers in shaping a more inclusive and adaptive digital learning landscape.

The findings of the study reveal compelling insights into the participants' perspectives on the significance of IT factors in blended learning. The consensus among participants underscores the critical importance of both internet connectivity and access to technological devices for successful online education (Bower et al., 2015; Caena & Redecker, 2019). This aligns with previous research emphasizing the pivotal role of these elements in fostering effective and seamless e-learning experiences.
Notably, the study identifies the Tablet or iPad as the predominant device employed by students for online study. This observation sheds light on the preferences and accessibility factors that influence students' technological choices in the context of blended learning (Kinash et al., 2012; Rossing et al., 2012). The popularity of Tablets or iPads could be attributed to their portability, versatility, and user-friendly interfaces, aligning with the evolving landscape of digital education (Jin et al., 2023; Walling, 2014). This preference highlights the need for educational institutions and policymakers to consider device compatibility and optimization for Tablets or iPads in the design and implementation of online learning platforms (Khan et al., 2015; Walling, 2014). Moreover, the study's findings contribute valuable insights to the ongoing discourse on digital equity in education. While affirming the significance of an internet connection and device accessibility, the prevalence of Tablets or iPads suggests potential discrepancies in technological resources among students (Green, 2019). This underscores the importance of addressing digital disparities to ensure an inclusive and equitable learning environment for all. Educational stakeholders should consider implementing targeted interventions to bridge the digital divide, providing necessary resources and support to students who may face challenges in accessing specific devices (Chang et al., 2004). Future research could delve deeper into the socio-economic factors influencing device choices, thereby informing more targeted policies aimed at promoting equitable digital access in blended learning environments.

Interestingly, within the spectrum of learning behaviors, the analysis revealed that "Recognizing and adjusting one's own errors and limitations when receiving feedback from teachers and friends" emerged as the behavior with the highest number of choices among students. This result is noteworthy, as it underscores the importance of students place on reflective practices and adaptability in the learning process. The emphasis on recognizing errors and limitations suggests a proactive approach to self-improvement, aligning with the broader literature on metacognition and self-regulated learning (Clark, 2012; Crespo, 2003). The findings also prompt considerations for educational practitioners and policymakers. While overall self-engagement is acknowledged, tailoring interventions to foster specific behaviors, such as error recognition and adjustment, could enhance the effectiveness of learning strategies. It is crucial to delve deeper into the contextual factors that contribute to individual variations in self-engagement behaviors and explore potential correlations with academic performance or other psychosocial variables (Britt et al., 2007; Klemenčič, 2015; Singh et al., 2010).

The emphasis on technical operations aligns with the evolving nature of education, where proficiency in digital tools has become increasingly crucial. The participants' preference for mastering these technical aspects reflects a proactive approach to overcoming potential challenges in the online learning landscape (Yeung & Yau, 2022). This result is consistent with previous research highlighting the significance of digital literacy and technical skills in fostering successful online learning experiences (Anthonysamy et al., 2020; Falloon, 2020; Jun & Pow, 2011). The study's findings have practical implications for educators and instructional designers. Recognizing students' inclination towards technical self-mastery, educational interventions and support structures could be tailored to enhance students' proficiency in utilizing online learning platforms (Kettle, 2017; Patrick & Sturgis, 2015). Providing targeted guidance on technical operations and troubleshooting could contribute to a smoother online learning experience for 6th-grade students, potentially mitigating challenges associated with virtual learning environments (Gillen et al., 2021). It is essential to acknowledge the limitations of the study, such as potential variations in technological access and proficiency among students. Future research could delve deeper into the factors influencing students' self-mastery levels and explore the correlation between technical proficiency and overall academic performance in the online learning context.

The importance of familial and peer support aligns with the broader literature on the social aspects of learning, emphasizing the influence of interpersonal relationships on students' educational experiences (Kiefer et al., 2015; Martin & Dowson, 2009). The study's findings suggest that a collaborative approach involving family and friends can contribute significantly to students' technological literacy, ultimately fostering a positive online learning environment (Alahmari, 2019; So & Brush, 2008; Sun & Chen, 2016). The implications of this result extend to educational practitioners and policymakers, highlighting the need to recognize and leverage the supportive roles of family members and friends in promoting digital literacy among students. Developing programs that involve parents and guardians in technology-oriented workshops or informational sessions can enhance their capacity to support students effectively (Laho, 2019; Priyantini et al., 2023). This collaborative approach aligns with the socio-cultural theory of learning, emphasizing the importance of social interactions in cognitive development. While the study provides valuable insights into the support dynamics related to technology use, further research is warranted to explore the nuances of family and peer support, considering potential variations across socio-economic backgrounds and cultural contexts. Future investigations could also delve into the impact of this support on students’ overall academic performance and technological self-efficacy.

The findings of this study carry significant implications for various stakeholders involved in the realm of online education. Firstly, the prevalent use of Tablets or iPads among students underscores the necessity for educational institutions to optimize their digital resources for these devices. Ensuring compatibility and accessibility for Tablets or iPads becomes crucial in enhancing the overall online learning experience and catering to the diverse preferences of students. This insight informs content developers and educators about the need to align instructional materials with the prevalent devices, contributing to a more seamless and inclusive learning environment. Moreover, the study highlights the proactive
engagement of students in recognizing and adjusting their own errors, particularly in response to feedback from teachers and peers. Educators can leverage these findings to emphasize metacognitive skill development in online learning environments. Strategies such as promoting self-reflection, goal-setting, and self-regulation can be incorporated into instructional approaches to empower students in taking greater ownership of their learning experiences. This not only contributes to immediate academic success but also fosters skills that are valuable for lifelong learning. The emphasis on performing technical operations, such as managing microphone and camera settings on online learning platforms, signals a need for targeted technical training and support. Educational institutions should consider implementing resources and training sessions to enhance students’ technical proficiency in using virtual learning environments. Providing tutorials, guides, or workshops focused on mastering these essential technical operations can alleviate potential barriers to effective online learning, ensuring a smoother educational experience for students. The study also underscores the significant role of family members and friends in supporting students, particularly in understanding how to use a computer or phone for online studies. Policymakers and educators should recognize the importance of involving the broader community in online learning initiatives. Strategies that engage families in technology-oriented workshops or information sessions can create a collaborative support network for students, addressing potential gaps in digital literacy and promoting a more holistic learning experience. The study suggests promising avenues for future research, encouraging further exploration of nuanced aspects of student engagement in online learning. Future investigations could delve into socio-economic factors influencing device choices, the impact of support mechanisms on academic performance, and the long-term effects of metacognitive skill development. These research endeavors hold the potential to contribute to a more comprehensive understanding of effective online learning practices and guide educational policies and practices in the evolving landscape of digital education.

Despite the valuable insights provided by this study, several limitations should be acknowledged to contextualize the findings and guide future research endeavors. Firstly, the study’s sample is confined to 6th-grade students from specific regions in Vietnam, limiting the generalizability of the results to a broader population. Variations in educational systems, socio-economic factors, and cultural contexts may influence students’ preferences and behaviors differently across diverse settings. Therefore, caution is warranted when applying these findings to other educational environments. Another notable limitation pertains to the reliance on self-reported data. The study relies on students’ self-perceptions and preferences, which may be subject to biases or social desirability effects. Students might provide responses influenced by their perceptions of what is expected rather than reflecting their authentic behaviors. Incorporating additional data sources, such as objective measures or observational data, could enhance the robustness of future studies in this domain. Furthermore, the study primarily focuses on the quantitative aspects of student engagement and support mechanisms, offering limited qualitative insights into the underlying reasons or motivations behind certain preferences or behaviors. Additionally, the study does not delve into the potential impact of socio-economic factors on students’ device preferences and support mechanisms. Moreover, the study’s cross-sectional design limits the ability to establish causal relationships between variables. Longitudinal studies could offer valuable insights into the trajectory of students’ engagement and support needs over time, providing a more dynamic understanding of their online learning experiences. While this study contributes valuable information to the field of online education, recognizing its limitations is essential for a nuanced interpretation of the findings. Addressing these limitations in future research endeavors will facilitate a more comprehensive understanding of the complex dynamics surrounding student engagement and support mechanisms in the evolving landscape of digital learning.

5. Final considerations

This study sheds light on critical aspects of student engagement and support mechanisms in the context of online learning. The prevalence of Tablets or iPads as students’ preferred devices underscores the necessity for educational institutions to optimize their digital resources for these platforms. Students’ proactive engagement in recognizing and adjusting errors, particularly in response to feedback, emphasizes the importance of fostering metacognitive skills in online learning environments. The emphasis on technical proficiency in managing online learning platforms signifies a need for targeted technical training and support. Family and peer support, particularly in understanding how to use technology for online studies, emerges as a crucial element in students’ educational experiences. The study’s insights carry significant implications for educators, policymakers, and researchers, emphasizing the importance of adapting educational practices to meet the evolving needs of students in digital learning environments.

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Ethical considerations

Ethical considerations, including obtaining informed consent, were diligently addressed during the data collection process, which involved the distribution of a comprehensive questionnaire.
Conflict of Interest

The author declares no conflicts of interest.

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