



## Beyond Traditional Methods: How Online Whiteboarding Transforms Learning, Collaboration, and Engagement

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### ABSTRACT

This study explored the effect of online or digital whiteboarding on students' academic experiences to evaluate its efficacy, contribution to promoting collaboration, and effect on retention and engagement. Analysis of questionnaire responses from 51 students revealed how Padlet has diverse and significant influences on educational environments. Specifically, the tool demonstrated considerable potential in enhancing students' understanding of subjects, surpassing traditional learning methods. Furthermore, its use significantly improved student teamwork and communication, proving an effective collaboration tool in learning sessions. Finally, Padlet positively affected concept recall, improving overall engagement and satisfaction with the learning process. This study underscores the significant benefits of incorporating online whiteboarding tools like Padlet into the instructional environment. It highlights how Padlet enhances learning experiences, fosters collaboration, and increases student satisfaction with learning. Thus, the study advocates for integrating Padlet as a novel technological solution to enrich education and provide students with a more interactive and efficient learning environment.

**Keywords:** online whiteboard, padlet, student's learning

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## 1 INTRODUCTION

Technology has become an integral part of human life and has significantly influenced the field of education (Singh, 2021). Technology adoption in educational settings has transformed traditional teaching approaches over recent decades. The emergence of educational technologies, such as Padlet, has sparked considerable discussion among educators and academics regarding their effectiveness in enhancing student learning experiences. The digital revolution sweeping the globe has begun to permeate education, rapidly transforming how students learn. Consequently, technology is expected to improve education by making it more affordable and accessible (Haleem et al., 2022). As higher education increasingly integrates new technologies to enhance learning and teaching, many innovative digital tools have emerged to support student-centred, active, and collaborative education (Li, 2022). Technology integration is crucial in student-centred teaching methods, as it simplifies the learning process compared to traditional methods (Ramadhani et al., 2023).

Platforms like Padlet, Jamboard, Ideboardz, and Blogger offer innovative ways to enhance student engagement and foster learning development. Research by Johnson and Johnson (2019) found that interactive tools such as Jamboard significantly increase student participation and collaboration. These tools enable real-time interaction, allowing students to actively participate in discussions, share ideas, and collaborate on projects, promoting a more dynamic and engaging learning environment. Furthermore, educational technology tools cater to diverse learning styles, addressing the varied needs of students in higher education. Anderson and Dron (2011) highlight the importance of adaptive learning technologies in providing personalised learning experiences. For instance, platforms like Padlet allow instructors to create interactive content, enabling students to explore and absorb information at their own pace. This customisation enhances individual understanding and encourages students to take responsibility for their learning journeys. Digital technologies are integral to teaching and learning success, particularly improving student participation and motivation (Ahmed et al., 2016).

In addition to engagement, educational technology tools also contribute to developing critical skills essential for success in the 21st-century workforce. Blogging platforms like Blogger allow students to express their thoughts, develop digital literacy, and improve communication skills (Walker, 2014). These tools facilitate the acquisition of subject-matter knowledge and foster skills such as collaboration, communication, and digital competence, ensuring that students are well-prepared for the challenges of the modern world. Thus, integrating educational technology tools in higher education fosters a more engaging and inclusive learning environment, catering to diverse learning styles and preparing students with the skills necessary for success in a rapidly evolving global landscape. Amid this ever-changing educational paradigm, Padlet has emerged as a dynamic platform that enables students and instructors to communicate, exchange ideas, and participate in interactive learning experiences. Digital technologies play an integral role in the success of teaching and learning. Learning tools are crucial for enhancing students' participation and motivating them to learn (Megat Mohd. Zainuddin et al., 2020). Padlet is a digital platform that allows students to organise and display material on virtual bulletin boards using an intuitive drag-and-drop interface. This platform can be used in both traditional and online learning environments to encourage student collaboration and provide a virtual bulletin board for students to work on

assignments, share resources, and organise course content (Zainuddin et al., 2020). Padlet is as a digital platform resembling a page filled with virtual sticky notes, allowing students to start with an empty canvas and incorporate videos, text, links, documents, and photographs. Students can add unlimited notes to a wall, which can be scrolled in any direction. Instructors can oversee all postings, requiring students to display their names on the board for evaluation purposes. The application offers several benefits to students, including the ability to collaborate in real time with their classmates (Beltrán-Martín, 2019).

As an easily accessible platform, Padlet is helpful for both classroom and self-directed learning situations, helping students interact synchronously or asynchronously with content and feel connected to their peers (Shuker & Burton, 2021). Padlet helps to organise and clarify information for learners in a way that allows students to apply critical thinking skills while reading, reflecting, and commenting on their peers' contributions (Arouri et al., 2023). Additionally, because each student uses Padlet uniquely, it enhances students' motivation to learn. Digital technologies play an integral role in the success of teaching and learning. Although growing evidence supports the beneficial effects of educational technology on learning outcomes, gaps still need to be made in our understanding of how tools such as Padlet affect student knowledge acquisition compared to traditional teaching methods. The main question is whether Padlet truly increases student collaboration and class engagement. To address this question, the study aims to conduct a targeted investigation into the impact of Padlet on students' educational experiences. In other words, this study seeks to enhance researchers' understanding of the optimal use of Padlet in classroom teaching. Specifically, the study aims to identify the effects of Padlet on students' educational experiences.

Specifically, the study's objectives are to assess the effectiveness of Padlet, its impact on fostering student collaboration, and its influence on retention and engagement in educational environments. The target sample comprises second-year students from the Human Resource Development programme at a public university in Sarawak. These students are enrolled in a Career Development in Organisation class, one of their academic programme's core courses. Observations from past teaching experiences indicate that perceived barriers to student participation in classroom activities include difficulties in speaking, shyness, and a fear of interacting or providing comments. Therefore, the study focuses on using Padlet to engage and stimulate students in active learning. This approach allows instructors to gather information from each student by encouraging participation through Padlet.

## **2 METHODS**

### **2.1 Participants and Design**

The population of the study consists of 60 undergraduate students from the Human Resource Development programme at the Faculty of Cognitive Sciences and Human Development, Universiti Malaysia Sarawak. Specifically, these students were enrolled in a class for the Career Development in Organisation course. From this population, a total of 51 students responded to the survey, meeting the minimum sample size. This study adopts a quantitative methodology.

## 2.2 Instruments

A comprehensive survey questionnaire was designed based on past research to collect data. The questionnaire used in this study was adapted from the survey outlined by Sim (2018). Modifications were made to transition from a binary response format (positive "yes" or negative "no") to a 5-point Likert scale response system. As Creswell (2005) recommended, a pilot test was conducted before the questionnaire's final administration to ensure the research instrument's reliability and validity. To minimise potential errors, several specific steps were taken to confirm the validity and reliability of the survey instrument used in the study, which comprised:

*Verification and Feedback from an Expert Panel:* To further enhance the validity of the research questionnaire, an expert panel was consulted for verification and feedback, as indicated by Chen, Gully, and Eden (2001). The panel included a senior lecturer with a PhD in Human Resource Development. Although the panel provided few comments on the scale used to measure variables—since the instrument was adapted from an established tool—they agreed that the content suited its purpose and that all items effectively operationalised the constructs. Discussions were conducted through face-to-face meetings, and the instrument was amended accordingly based on the feedback received.

*Evaluation of Item Clarity:* Before the final survey administration, the questionnaire was administered to a small group of students to obtain their feedback on item clarity. This process aimed to ensure that the items were understood as intended. The students found the questionnaire items comprehensible, unambiguous, and relevant.

*Assessment of Internal Consistency Reliability:* A pilot test using Cronbach's Alpha was conducted prior to the final administration of the questionnaire to assess internal consistency reliability. The pilot respondents were randomly selected from students enrolled in a Career Development in Organisation course. The results indicated that all research constructs exceeded the acceptable reliability standard of 0.70, confirming the reliability of the measurement scales used in this study. This assessment of internal consistency reliability was performed only for section three of the questionnaire, which contained six items with a 5-point Likert scale. The other sections of the questionnaire comprised open-ended questions and did not assess respondents' perceptions of Padlet.

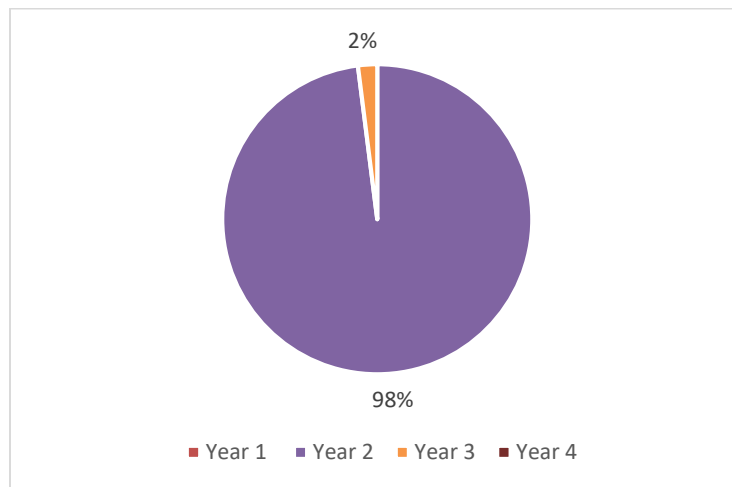
The final questionnaire consisted of four sections, incorporating multiple-choice and open-ended questions to capture a broad range of participant responses. Section one comprised two items with general questions. Section two included two items using a 5-point Likert scale, focusing on Padlet usage. Section three contained six items on a 5-point Likert scale, addressing the perceived impact of Padlet. The final section consisted of three items related to preferences and feedback.

## 2.3 Data Collection

The research questionnaire was administered online using Google Forms, facilitating a more effective and simplified distribution and response collection process. This approach also enabled rapid data compilation, ensuring that responses were categorised and ready for analysis as soon as they were completed.

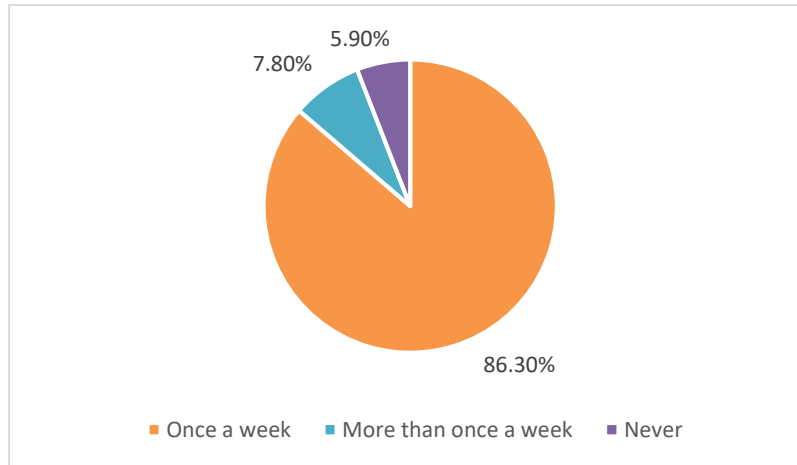
### 3 RESULTS

Data were gathered and organised using Microsoft Excel software, capturing responses based on a 5-point Likert scale. Percentages for each rating scale point (from 1 to 5) were calculated to represent the degree of agreement or disagreement. Frequencies and percentages were determined using Microsoft Excel. Frequencies were calculated by counting the occurrences of each response option for every statement in the questionnaire. Percentages were computed by dividing the frequency of each response option by the total number of students (51) and then multiplying by 100%. This calculation depicted the distribution and proportion of responses for each Likert scale option.



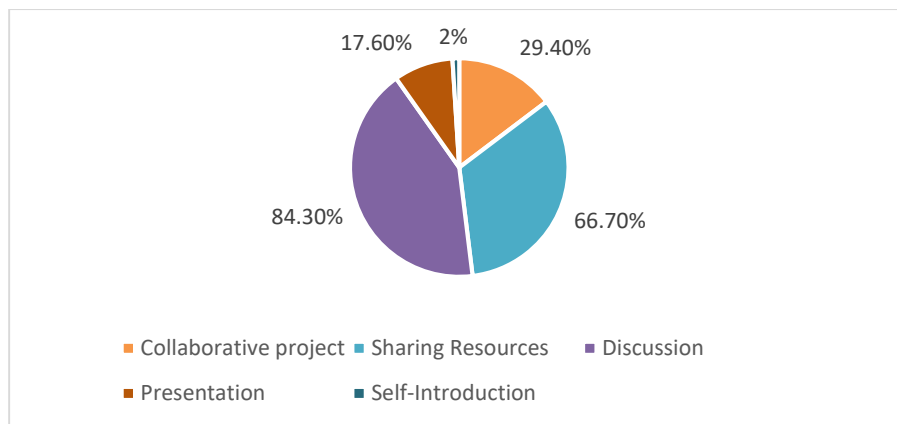
**Figure 1.** Year of study.

Figure 1 shows that 98% of survey respondents are in their second year of study, highlighting a focus on their experiences and opinions regarding the subject matter. In contrast, only a small percentage of respondents are in their third year.



**Figure 2.** Frequency of Padlet usage.

Furthermore, the study revealed a high frequency of Padlet usage among students, with the majority of respondents (86.3%) using it at least once a week. This indicates Padlet's significant role in their regular academic activities. A smaller yet notable fraction (7.8%) use Padlet more than once a week, while only 5.9% of the students reported never using it. These statistics highlight Padlet's prevalence in the educational process. Teaching Career Development in Organisations to degree students requires effective pedagogical methodologies to ensure a comprehensive understanding and application of concepts and theories. Using Padlet effectively enriches students' learning experiences, as it helps instructors facilitate collaboration, critical thinking, and engagement among students. In addition, Padlet serves as a useful platform for collecting, organising, and sharing multimedia content related to career development issues and challenges. This means that instructors can create Padlet boards for specific topics or assignments, allowing students to contribute resources, reflections, and questions. Features such as comments, likes, and replies encourage peer interaction and feedback, thus promoting collaborative learning (Bruff et al., 2013). This demonstrates that Padlet's multi-features enable flexible learning and accommodate diverse learning styles and preferences.



**Figure 3.** Padlet used in learning activities.

Figure 3 illustrates the use of Padlet in students' learning. The platform's strength in

communicative and interactive learning is evident, with 43 students (84.3%) preferring to use it for discussions, while 34 students (66.7%) utilise Padlet to share instructional materials. With 15 students (29.4%) using the application for collaborative work, it benefits group-based learning. Padlet also aids students in preparing presentations, with nine students (17.6%) employing it for this purpose. Self-introduction is the least common application, reported by only one student (2%). Padlet's widespread use in education highlights its adaptability and suggests potential areas for improvement.

**Table 1.** Perception of the Influences of Padlet.

QUESTIONNAIRE ITEMS	PERCENTAGE				
	Not at all	Slightly	Moderately	Very much	Extremely
	1	2	3	4	5
On a scale of 1 to 5, how comfortable are you with using Padlet?	0.00%	0.00%	27.45%	<b>39.22%</b>	33.33%
How do you feel Padlet has influenced your understanding of the topics covered in classes?	0.00%	3.92%	41.18%	<b>47.06%</b>	7.84%
Do you think Padlet has enhanced collaboration and communication among your peers in classes?	0.00%	3.92%	0.00%	<b>49.02%</b>	21.57%
Do you think Padlet has helped you remember what you've learned about the topic?	0.00%	3.92%	<b>50.98%</b>	29.41%	15.69%
Do you think that using Padlet helps you understand and remember important ideas about the subject?	0.00%	5.88%	31.37%	<b>49.02%</b>	13.73%
In your opinion, has Padlet made the subject more engaging and interesting for you?	1.96%	0.00%	0.00%	<b>52.94%</b>	25.49%
Does Padlet allow for a more engaging and dynamic learning experience that helps you understand the topic better?	0.00%	0.00%	27.45%	<b>52.94%</b>	19.61%

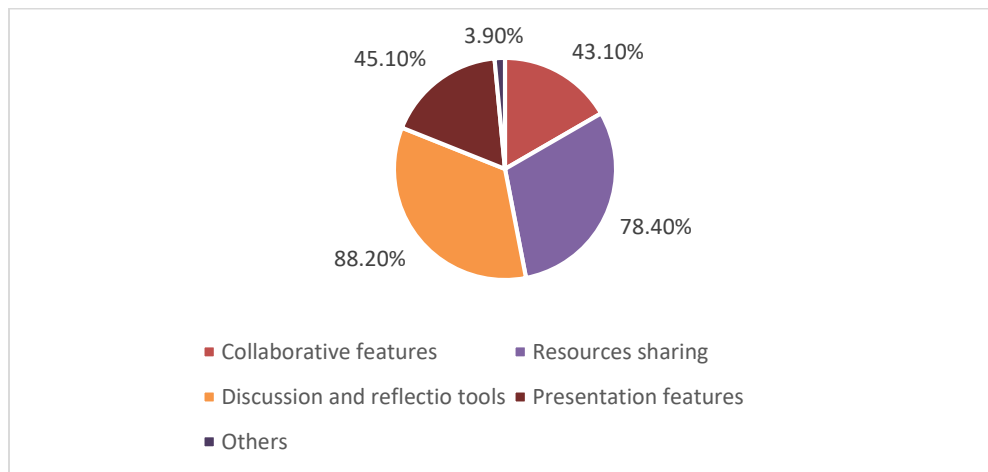
Technology in classrooms has sparked interest in its impact on student learning. This research evaluates Padlet, a digital tool assessed by students for instructional purposes. Students were asked to rate Padlet on several aspects: its comfort level, impact on class comprehension, role in promoting collaboration and communication among peers, effectiveness in memory retention, contribution to understanding important subject concepts, influence on subject engagement, and its role in providing a dynamic learning experience. The ratings were based on a 5-point Likert scale, where 1 indicated "Not at all," 2 meant "Slightly," 3 represented "Moderately," 4 signified "Very much," and 5 denoted "Extremely." This study analyses students' opinions on Padlet's influence on their education across these dimensions.

Based on Table 1 above, over half of the participants reported feeling at ease using Padlet. A

significant proportion of respondents, 39.22%, claimed to be 'very comfortable' with Padlet, and an additional 33.33% also rated their comfort level as 'very comfortable.' These results indicate that the participants were comfortable and familiar with the platform. When asked about the impact of Padlet on their understanding of the topics presented, a large majority of respondents (47.06%) stated that Padlet had a substantial influence on their comprehension. Furthermore, 41.18% of participants noted a moderate influence, highlighting Padlet's role in enhancing their understanding of the course content.

Regarding Padlet's impact on student cooperation and communication, 49.02% of participants believed it significantly improved these aspects. Additionally, 21.57% reported a significant improvement due to using Padlet, demonstrating its effectiveness in supporting collaborative learning environments. Padlet was rated somewhat successful in aiding respondents (50.98%) with recalling the concepts they had studied, while 29.41% found it extremely helpful. However, 15.69% of respondents considered it very useful, underscoring Padlet's notable contribution to memory retention support.

Respondents were asked about the impact of Padlet on their comprehension and retention of key topic concepts. A substantial 49.02% of respondents felt that Padlet made a significant contribution in this area, while 31.37% noted a modest influence. When asked how Padlet affected their level of involvement with the subject matter, most respondents (52.94%) reported that Padlet made a considerable difference. Furthermore, 25.49% of respondents described its influence as extreme, indicating that Padlet effectively increases engagement with the subject. Regarding Padlet's overall impact on the educational process, a large majority (52.94%) said it made the process more dynamic and interesting. Additionally, 19.61% of respondents reported that Padlet had an exceptional influence, demonstrating its potential to enhance the learning experience significantly.

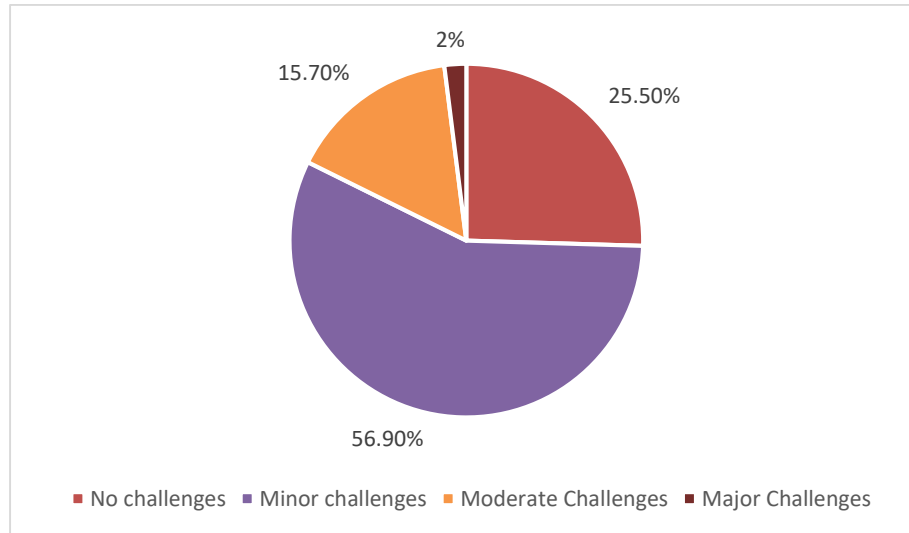


**Figure 4.** Key beneficial features of Padlet for learning.

Figure 4 shows that students find Padlet's discussion and reflection tools most beneficial for learning, with 88.2% highlighting their value. This underscores the platform's role in promoting interactive learning. 78.4% of students also highly valued resource sharing, also highly valued resource sharing, emphasising the importance of easy access to information. The collaborative



features are appreciated by 43.1% of respondents, and the presentation features are valued by 45.1%, further demonstrating Padlet's utility in group work and information delivery. A small number of students (3.9%) cited other benefits, indicating the varied ways Padlet can be used in education.



**Figure 5.** Challenges in Padlet usage in learning.

Despite the positive aspects, some students encountered challenges while using Padlet, as shown in Figure 5. A majority (56.9%) reported facing minor challenges, indicating areas where improvements could be made. Meanwhile, 25.5% did not experience any difficulties, and 15.7% encountered moderate challenges. Only a small fraction (2.0%) reported major challenges. This suggests that while Padlet is generally user-friendly, there are specific areas where enhancements could be beneficial.

#### 4 DISCUSSION

The research findings specifically highlight Padlet's significant value as a teaching tool, demonstrating its widespread use among students and its impact on various aspects of the learning process. Most respondents used Padlet at least once weekly, underscoring its frequent use and importance in their daily academic activities. This widespread usage indicates that Padlet has been integrated into students' daily study routines, enhancing learning, providing equal opportunities, boosting confidence, and improving students' communicative abilities (Alabbad & Bin Huwamel, 2020). Furthermore, the varied comfort levels expressed by students genuinely reflect their differing degrees of familiarity and ease of use with Padlet. Although many respondents reported a high degree of comfort with the tool, some indicated moderate comfort, suggesting room for improvement in the user experience. These results highlight the need for better user interfaces and additional support from instructors to enhance students' comfort and competence with Padlet. The findings also reveal how Padlet influences comprehension, teamwork, memory, engagement, and overall learning processes. Remarkably, a significant proportion of students reported notable improvements in understanding the material and fostering teamwork and communication via

Padlet. This demonstrates its contribution to developing collaborative and interactive learning environments, crucial for enhancing understanding and information retention.

Additionally, cooperative learning has been shown to improve memory, reduce errors, and motivate learners (An & Danh, 2021), as evidenced by using Padlet in the findings. Responses to the final part of the questionnaire about using Padlet in classes revealed a range of experiences and suggestions. Several students found Padlet beneficial for discussions, resource sharing, presentations, and as a platform for reflection or feedback on assignments and class topics. Some highlighted the need for more precise instructions, engaging prompts, and increased use of visual elements for a more effective and enjoyable learning experience. Challenges mentioned included confusion with multiple posts and limitations in collaborative editing. While some expressed satisfaction with Padlet's current use, others suggested enhancing picture features, incorporating more interactive elements, and providing opportunities for reflection after classes. Suggestions also included making questions more engaging, promoting Padlet's benefits to peers and lecturers, and using it regularly for better understanding. The responses underscored both the positive aspects of Padlet in learning and areas for improvement, emphasising the need for clearer instructions, interactive features, and enhanced collaborative capabilities.

Additionally, Padlet has catalysed students' increased interest and involvement in their courses, significantly improving their overall learning experience. Padlet encourages students to engage fun and meaningfully, stimulating interest and involving both social and academic elements—key facets of student engagement critical for enhancing learning development (Ali, 2021). These findings highlight Padlet's ability to boost student interest and engagement, two essential components of successful learning outcomes.

While Padlet has demonstrated many beneficial effects, the study also identified some minor issues that some students encountered when using the platform. This suggests that to address these difficulties, Padlet's usability needs to be continuously improved. One common challenge is the potential for information overload, as multiple student contributions can quickly clutter the Padlet board, making it difficult for instructors and students to navigate and extract relevant content. Additionally, there may be concerns about the organisation of discussions, with threads becoming complicated and hard to follow, which can hinder the overall learning experience. To address these challenges, instructors can implement several strategies to enhance the effective use of Padlet. Firstly, they can establish clear guidelines for posting, encouraging students to provide concise and relevant contributions. Instructors should also periodically review and moderate the Padlet board to ensure content quality and organisation. Furthermore, incorporating designated discussion periods and prompting students to engage with each other's posts can foster a more interactive and focused learning environment. By proactively managing content and promoting active participation, instructors can optimise the use of Padlet for improved collaborative learning experiences.

Overall, the study's findings underscore Padlet's important role as a vital teaching resource, highlighting its significance in enhancing the learning process and overall student experience. Identifying minor issues in the study points to areas for development and emphasises the need for ongoing improvements to maximise Padlet's potential in enhancing learning environments.

Overall, Padlet shows excellent promise as a tool that can significantly enhance students' instruction quality. The research demonstrates Padlet's usefulness as a teaching tool in higher education and highlights its importance in students' learning experiences. The findings reveal that Padlet improves students' content knowledge, cooperation, memory, engagement, and overall learning experiences. Many students reported better comprehension, teamwork, and involvement with Padlet usage. These findings illustrate Padlet's ability to create dynamic, collaborative learning environments that enhance understanding and retention. The survey also highlighted minor issues with Padlet for some students, suggesting opportunities for user experience improvements. Addressing these issues can enhance Padlet's educational value and facilitate its integration into various learning contexts. According to the study, Padlet enhances student learning by creating interactive, engaging, and collaborative educational environments. The findings also indicate that Padlet significantly impacts and enriches the overall learning experience for students in course teaching. It offers a dynamic and interactive platform that fosters student engagement, collaboration, and critical thinking skills. Research indicates that incorporating such tools into the learning environment positively influences student outcomes by promoting active participation and knowledge retention (Anderson & Putman, 2019; Dabbagh & Kitsantas, 2012). Padlet's ability to overcome geographical barriers and facilitate effective collaboration between students and instructors is a notable benefit. For instance, it allows for real-time collaboration, promoting group learning and enhancing the exchange of ideas (Bower, 2017). This virtual collaboration aligns with contemporary pedagogical trends that emphasise the importance of social constructivism in fostering more profound understanding and learning (Garrison & Cleveland-Innes, 2005).

Moreover, research by Mayer and Moreno (2003) suggests that interactive and visually appealing educational materials or tools contribute to increased engagement and interest, positively impacting learning outcomes. Tools like Padlet, with their user-friendly interfaces and multimedia features, cater to diverse learners' needs, making education more accessible and adaptable to individual needs (Mayer, 2014). In conclusion, integrating educational tools like Padlet in higher education has proven instrumental in enhancing student engagement, collaboration, and learning outcomes. The research highlights the positive impact of the tool on students' learning, which is critical for further enriching the higher education experience.

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## **REFERENCES**

- Ahmed, A. M., Almuniem, A. A., & Almabhouh, A. A. (2016). The Current Use of Web 2.0 Tools in University Teaching from the Perspective of Faculty Members at the College of Education. *International Journal of Instruction*, 9(1), 179-194. <https://doi.org/10.12973/iji.2016.9114a>.
- Alabbad, A. M., & Bin Huwamel, H. S. (2020). The Effect of Using Padlet as a Vocabulary Knowledge Enhancement Application on Saudi EFL Female Learners, and Their Attitudes toward

Its Value in Learning. <https://doi.org/10.31235/osf.io/fgcru>

Ali, A. (2021). Using Padlet as a pedagogical tool. *Journal of Learning Development in Higher Education*, 22, 1-5. <https://doi.org/10.47408/jldhe.vi22.799>

Ân, N. N., & Danh, N.D. (2021). The reality of Planning in management to innovate English teaching methods – a case study at People's Police Universities. *Ho Chi Minh City University of Education Journal of Science*, 18(11), 2085-2096. [https://doi.org/10.54607/hcmue.js.18.11.3190\(2021\)](https://doi.org/10.54607/hcmue.js.18.11.3190(2021))

Anderson, S., & Putman, R. (2019). Special education teachers' experience, confidence, beliefs, and knowledge about integrating technology. *Journal of Special Education Technology*, 35(1), 37–50. <https://doi.org/10.1177/0162643419836409>

Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. *The International Review of Research in Open and Distributed Learning*, 12(3), 80–97. <https://doi.org/10.19173/irrodl.v12i3.890>

Ardini, S. N., & Marlinda, M. (2023). Enhancing writing report texts using Padlet website: The perceptions. *Journal of Languages and Language Teaching*, 11(4), 923-932. <https://doi.org/10.33394/jollt.v11i4.8316>

Arouri, Y. M., Hamaidi, D. A., Al-Kaabi, A., Al Attiyah, A. A., & ElKhouly, M. M. (2023). Undergraduate students' perceptions on the use of Padlet as an educational tool for an academic engagement: Qualitative study. *International Journal of Emerging Technologies in Learning*, 18(10), 86–106. <https://doi.org/10.3991/ijet.v18i10.38771>

Beltrán-Martín, I. (2019). Using Padlet for Collaborative Learning. 5th International Conference on Higher Education Advances, 1-8. <https://doi.org/10.4995/head19.2019.9188>.

Bower, M. (2017). Design of technology-enhanced learning: Integrating research and practice. Emerald Publishing Limited.

Bruff, D., Fisher, D., & McEwen, K. E. (2013). Teaching with Classroom Response Systems: Creating Active Learning Environments. John Wiley & Sons.

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organisational Research Methods*, 4(1), 62–83. <https://doi.org/10.1177/10944281014100>

Creswell, J.W. (2005). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (2nd ed.). New Jersey: Merrill Prentice Hall.

Creswell, J.W. (2012). Educational research planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Boston, MA, USA: Pearson.

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-

regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education*, 15(1), 3-8. <https://doi.org/10.1016/J.Iheduc.2011.06.002>

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *The American Journal of Distance Education*, 19(3), 133-148. [https://doi.org/10.1207/s15389286ajde1903\\_2](https://doi.org/10.1207/s15389286ajde1903_2)

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A Review. *Sustainable Operations and Computers*, 3, 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>

Li, N. (2022). How Technology Promotes Educational Change: Studies of Virtual Learning Environment in Higher Education. <https://doi.org/10.13140/RG.2.2.20426.24006>

Mayer, R. E. (2014). Introduction to multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 1–24). Cambridge University Press. <https://doi.org/10.1017/CBO9781139547369.002>

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, 38(1), 43-52. [https://doi.org/10.1207/S15326985EP3801\\_6](https://doi.org/10.1207/S15326985EP3801_6)

Ramadhani, A. S., Dewi, U., Syahnaz, M., & Kihwele, J. E. (2023). The effectiveness of using Padlet in collaborative writing based on students' perceptions. *Child Education Journal*, 5(1), 36–48. <https://doi.org/10.33086/cej.v5i1.3767>

Sim, E. U. H. (2018) Perception of Research Culture among Undergraduate Students in a Malaysian Public University. *Catalyst*, 18, 30-36. ISSN 2408-137X

Singh, M. N. (2021). Inroad of digital technology in education: Age of Digital Classroom. *Higher Education for the Future*, 8(1), 20–30. <https://doi.org/10.1177/2347631120980272>

Shuker, M.-A., & Burton, R. (2021). Educational Technology Review: Bringing people and ideas together with 'padlet.' *Journal of Applied Learning & Teaching*, 4(2), 121-124. <https://doi.org/10.37074/jalt.2021.4.2.9>

Johnson, D. W., & Johnson, R. T. (2019). Cooperative Learning: The Foundation for Active Learning. IntechOpen. <https://doi.org/10.5772/intechopen.81086>

Walker, R. J. (2014). Seeing ourselves through technology: How we use selfies, blogs and wearable devices to see and shape ourselves. Houndmills, UK: Palgrave Macmillan.

Zainuddin, N. M. M., Azmi, N. F. M., Yusoff, R. C. M., Shariff, S. A., & Hassan, W. A. W. (2020). Enhancing classroom engagement through Padlet as a learning tool: A case study. *International Journal of Innovative Computing*, 10(1), 47-57.