Exploring Collaborative Learning in Multimodal Writing: A Study on Student Experiences Using Canva

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ABSTRACT

Technology integration in education has become increasingly important, particularly in enhancing collaborative learning and multimodal writing. Platforms like Canva, which allow students to combine text with visual elements, are seen as valuable tools for fostering creativity and improving communication in collaborative projects. However, there is limited research on student experiences using such platforms in collaborative writing tasks, especially in EFL writing classroom. This study aims to explore students' experiences and perceptions of collaborative learning through multimodal writing using Canva, focusing on its impact on writing quality and digital literacy. A qualitative case study was conducted with 36 English Language Education program undergraduate students. Data were collected through semi-structured interviews and reflective journals. The findings reveal that Canva facilitated effective collaboration, improved writing quality, and enhanced creativity by allowing students to integrate graphic elements into their compositions. However, challenges such as technical issues, limited digital skills, and communication barriers were also identified. Despite these obstacles, students employed strategies like peer support, regular check-ins, and using alternative communication platforms to overcome difficulties. The study highlights the importance of providing digital literacy training and ensuring access to technology in educational settings. These findings suggest that platforms like Canva can significantly improve collaborative learning and digital literacy, offering valuable insights for educators seeking to integrate technology into their teaching practices.

I. Introduction

With the growing integration of technology, the use of multimodal writing in combination with collaborative learning is becoming highly relevant in higher education. Collaborative learning, in the context of higher education, is included in a class where students actively participate and work in groups, which helps enhance learning in multiple subjects which as shown by various studies. As stated by Holflod, Collaborative Learning improves participation levels but also enables students to become members of communities who can solve challenging problems through the efforts of many people [1]. Regarding writing, the approach allows students to discuss important concepts to the extent that they can give valuable comments to their peers, which deepens the learning process and enhances critical thinking [2], [3].

English education is one of the most modernized disciplines today, perhaps the only goal remaining is coming up with new and effective teaching strategies. There is still exploration needed on how modern technology helps in adding collaboration in writing projects, which includes tools

like Canva. Digital platforms greatly aid in the development of digital literacy, which is one of the most important competencies in education nowadays. Digital literacy includes the ability to create, evaluate, and share information in different formats or media [4]. For example, Canva proves to be a versatile tool that helps students create visually captivating graphics, which are accompanied by text, and thus embody the fundamental principles of multimodal writing [5]. This is especially true given the most recent changes in teaching, which emphasize the need for our advancement. Multimodal literacy, which means a complete mastery of communication, entails the integration of visual and digital elements alongside the text.

The digital divide has been recognized as a barrier for learners who wish to participate or excel within an institution. As Purnama et al. noted, the growth of the internet has changed education and research, and also the greater access to equipment like computers and multimedia technologies. In addition, access to the internet affects fundamental aspects of societies such as economics, education, and even gives one better job opportunities than non-internet countries [6], [7]. Digital technologies are used in multimedia presentations, including the use of images, moving images (video), graphics, and sound, which are all integrated into a single work that enhances communication, such as curricula guided by capitalistic principles meant for the globalized economy [8]. Multimedia includes all forms of drawing, painting, photography, silkscreen printmaking, sculpture, and metallic processing, which focuses on education geared towards developing global capitalism [1]. These elements of art, along with composition, incorporate new approaches to thinking and fresh ideas in the creation of works, therefore broadening the scope of how differently they can be understood [9].

The research on multimodal pedagogy has shown the educational benefits of multimodal composition. However, there is a lack of literature on collaborative learning in this regard and the use of technology at the graduate level [10], [11]. As Zhai pointed out, the shift in literacy instruction during the pandemic has highlighted that there is not much effort being made to teach and incorporate digital literacy into the curriculum, especially into the communication-dependent subjects like English education [12]. Research on the utilization of Canva in English as a Foreign Language (EFL) writing classes has been emerging but remains relatively sparse, especially regarding collaborative writing contexts. In a study conducted by Andriyanti et al. reported that the integration of the Canva application into writing classes significantly improved students' writing skills at SMP Muhammadiyah Imogiri Yogyakarta [13]. However, this research primarily centers on individual writing improvements rather than examining collaborative writing efforts, which is critical given the advancements in cooperative learning pedagogies. In the context of descriptive writing, research conducted by Hadi et al. reinforced that Canva can significantly assist learners in improving their writing capabilities [14]. However, they did not explore whether the advancements were attributed to individual or collaborative efforts among students. The preliminary findings from existing studies suggest that Canva has the potential to be an effective tool for enhancing both individual and collaborative writing; however, a more focused inquiry specific to collaborative writing in EFL contexts is needed to illuminate this further. This gives us a chance to explore how collaborative projects like writing in Canva can improve students' writing skills and digital literacy [15], [16]. It is noted that research in these areas is needed now, as there is an increase in the use of online learning after the pandemic in a bid to provide flexible learning options [1], [17].

Through the lens of Canva as a platform, this research aims to uncover the patterns of student collaboration, how students use multiple modes of communication, and student outcomes from multimodal collaborative writing. The use of collaborative learning in written communication receives additional support from the myriad ways students appreciate deep engagement with content, as evidenced by the positive results recorded in educational settings that have embraced such methodologies [18], [19]. Concerning examining how collaborative processes influence the writing experience and the development of skills, this study has the potential to enhance practical and theoretical frameworks in the discourse of higher education writing, considering the evidence

that educators need to understand how tools like Canva can be used for sustained student engagement and achievement [20], [21].

Two key areas where this research gap fills the literature on the importance of student engagement with collaborative learning concerning multimodal writing are in its integration and understanding. The value of understanding digital collaborative writing in education is important to inform educational practice and institutional frameworks aimed at preparing students for contemporary workforce demands, thus fortifying the value of this scholarly endeavor [1], [22], [23]. This research aims to enrich the existing scholarship, but also to provide foundational strategies for practical implementation in educational frameworks to help students transition from education to employment ecosystems as skilled communicators in a globalized, technology-oriented society [8], [24].

As previously stated, this research addresses a gap in understanding how collaborative learning enhanced by multimodal writing, such as on educational platforms like Canva, enriches the experience of students in post-secondary institutions. This gap stems from the fact that although collaborative learning is widely used and acknowledged as effective in a traditional learning setup, there is a lack of detailed research showing how it applies to multimodal writing. In addition, this study tries to answer the following questions: What are students' experiences and perceptions of undertaking collaborative writing projects using Canva? What barriers do students encounter in the course of collaboration in multimodal tasks, and what strategies do they employ to overcome these barriers in developing their writing and digital literacy skills? This research seeks to enhance understanding of instructional strategies that harness the power of technology to support collaborative writing so that students can more deeply understand contemporary forms of literacy.

II. Method

This qualitative case study seeks to analyze students' experiences with collaborative multimodal composing using the Canva application in the "Pedagogy of Writing" course of the English Language Education program at a higher education institution. The work was completed within one academic semester, so there is sufficient opportunity to observe and analyze the interactions and collaborations among students during the writing projects [25]. The research involved a sample of 36 undergraduate students taking the course, all of whom will participate in the study. We will use a purposive sampling strategy to ensure that participants selected concerning collaborative multimodal writing have experience related to the study and therefore add value to the information collected [26].

The data was gathered through semi-structured interviews and students' reflective journals kept during the course [27]. Focused semi-structured interviews enable an examination of a participant's lived reality and subjective views, the interview topic related to students' experiences and perceptions of undertaking collaborative writing project using canva as well as the barriers the students encounter during the process. Reflective journals allow students to reflect on the themes that arise from their interactions during cooperative writing. These journals reflect the students' levels of engagement and interactions within the projects, capturing their thought processes, the challenges encountered, and the skills they believe were acquired as they progressed through the writing activities.

Research participants were provided with informed consent and complete all instruments assigned to them at specified times throughout the semester to track progress on an individual and collective basis. These data were analysed using thematic analysis, which entails coding and classification of the data according to themes most relevant to the students' experiences with collaborative writing using Canva [28]. This approach allows understanding of the phenomenon of student collaboration concerning their self-identified challenges and experiences, and the degree to which they engaged multimodal writing tools in their learning process.

III. Results and Discussion

According to the research findings, students' writing and digital literacy skills improve when they use the Canva platform for collaborative multimodal writing assignments. In writing assignments with Canva, 36 students who took part in the study showed good teamwork by generating multimodal compositions with text, pictures, and other visual components.

A. Benefits of Canva for Collaborative Learning

After working together with Canva, students noted increases in the caliber and originality of their writing. They also had a deeper comprehension of the subjects they worked on as a result of actively participating in group discussions and getting peer feedback.

Table 1. Benefits of Canva for Collaborative Learning

Primary Themes	Excerpts
Collaboration and Team Involvement	"Canva made collaboration easier. We could work together in one file, share ideas and content quickly." "Every team member could contribute creatively. We were able to discuss ideas directly and update content."
Technology Adaptation and Initial Learning	"At first, I felt a bit confused because I wasn't familiar with the features of Canva. But after trying, I started feeling more comfortable with the tools available." "Although there were initial challenges, I learned gradually through experience and help from more experienced friends."
Improvement in Writing Quality and Creativity	"Using Canva helped me structure my writing better and make it more engaging. The graphic elements also made my ideas clearer." "Canva allowed me to combine text with images and diagrams, enriching the final piece and making it easier to understand."
Communication and Digital Learning	"Canva enabled us to communicate directly through comments and collaborative features. This made discussions smoother and more focused." "I feel that using Canva improved my digital skills because I learned to use graphic design tools, which are useful in learning."

Students reported that Canva streamlined collaboration because they could all work on one document, making idea and content sharing quick. This platform promoted creativity since all team members could actively participate, discussions became more focused, and much quicker inputs were given and incorporated. A few students expressed that they found some of the features of Canva confusing, but with time and guidance from other classmates, they were able to navigate the system through trial and error and learn to use the tools. This adaptation process enabled them to enhance their digital skills.

Additionally, students discovered that Canva assists in organizing their work, helping to make the final product more interesting. The addition of images and diagrams not only bolstered their graphic compositions but also made their ideas clearer, which improved the quality of their writing. Most of the students were able to communicate through comments, which further encouraged direct communication among group members. Students also reported improvement in the use of technology after learning to use the graphic design tools, which supported their writing and learning. In summary, students were able to collaborate more effectively, foster creativity, and improve digital skills all through the use of Canva.

Moreover, students found that using Canva helped them structure their writing more effectively, making their work more engaging. The integration of graphic elements, such as images

and diagrams, enriched their compositions and made their ideas clearer, ultimately improving the overall quality of their writing. Canva's collaborative features, including direct communication through comments, facilitated smoother and more focused discussions among team members

B. Issues and Challenges

The findings outlined the issues and challenges that students experienced while working on their collaborative writing project on Canva. For instance, one of the design file access challenges solved by periodic reminders to refresh the page was defined as a technical barrier. The team's solution to those technical barriers was pouring more effort into communicating through messages and regular check-in meetings to ensure that everyone was clear on the objectives

Table 2. Issues and Challenges

Primary Themes	Excerpts
Technical Barriers and Collaborative Solutions	"We had some technical issues, like one person couldn't access the design file at first. But we kept reminding each other to refresh the page, and eventually, the issue was resolved."
	"To solve the technical problems, we communicated more intensively through messages and set regular check-ins to ensure everyone was on track."
Digital Skill Limitations and Self-Learning	"I felt that my digital skills were somewhat limited, which made it harder to use all the features of Canva effectively. However, I learned bit by bit throughout the project."
	"I searched for online tutorials and asked my more experienced teammates for help. I also practiced using Canva regularly to improve my skills."
Communication and Coordination Barriers in the Team	"There were challenges in coordinating because of different time zones, and sometimes, it was hard to explain ideas clearly through text, which added confusion."
	"We had to arrange online meetings and used WhatsApp for quicker and more direct communication to solve coordination issues."
Strategies to Improve Writing and Digital Literacy	"I had difficulty writing while also considering the visual elements, and I felt my digital literacy still needed a lot of improvement."
	"I increased my writing practice and followed digital literacy courses to improve my understanding of the digital tools we were using."

The students had some basic digital skills, which proved to impede fully leveraging all the features available on Canva. Students, however, readily resolved this problem by consulting more knowledgeable colleagues, attending online instructional sessions, and through practice to enhance their skills. The students also encountered restrictions on coherent text conveying for team collaboration as a result of time zones. To counter those challenges, the students scheduled meetings and utilized WhatsApp for easier communication.

Students noted that although writing alongside integrating visuals was challenging, they aimed to sharpen both their writing and digital literacy skills. They improved their understanding of the tools associated with their work, which increased their writing practice and digital literacy course enrollment, and ultimately mastered guidelines that would enable them to use Canva more effectively in future projects.

This study's results corroborate prior work regarding the positive impact that technology and collaborative learning have on engagement, creativity, and skills development for learners. It has increasingly been proven that collaborative learning enhances not only engagement but also problem-solving and critical thinking skills [29]. During the research, students were able to use the Canva application effectively to create multimodal compositions that blended text with graphic elements. Such compositions are of a higher value because learners can freely and creatively

express themselves, thus proving the ideas presented [30] regarding the importance of the modern educational paradigm shifts that focus on Multimodal Approaches. These changes are not mere fads; they are fundamental alterations in the methods of knowledge articulation that pave the way for more vibrant ideas.

This research also recognized some barriers students faced in group work activities. Some of these barriers included skill gaps, communication breakdowns, and technical issues. These barriers align with literature on the digital divide that highlights how inadequate access to digital resources and insufficient digital skills dramatically limit technology use in educational settings [31]. For example, students commented on technical problems such as accessing shared files and working on them together, which are common in collaborative work done through computers [32]. Additionally, the inability to fully use Canva's functions corroborated concerns raised by Olaniyi et al. (2024) that students' digital competencies are misaligned with the requirements of modern educational settings.

This study determined that time zone differences and the difficulty participants have expressing their thoughts in writing were major obstacles to communication and coordination, confirming the findings of Bonato et al. (2023) about challenges in projects with remote collaborators. The available digital tools dictate a prompt need to shift one's attention, which may cause stress to the students if the situation precludes real-time communication. In this case, participants mitigated the problems by strategizing and attending to issues, such as booking online sessions and sending messages via WhatsApp. These strategies suggest, as Adewumi & Oladele (2023) assert, that remote teamwork's challenges require timely, efficient, and collaborative responses, regardless of distance.

Exploring these challenges further highlights the deficiencies most educational institutions experience in using technology for collaboration. As Khalil (2023) discussed, training and development programs do have value. Students with higher digital literacy levels tend to participate and engage with others more in digital environments. This means that particular training designed for modern learning practices, as well as tools and collaboration techniques used in contemporary learning environments, are crucial for teaching initiatives. Digital inclusion is equally important; educational institutions need to strive towards removing these access barriers and ensuring that students from different socioeconomic backgrounds can fully engage with technology-enhanced learning [36].

In the future, other areas of research could investigate the long-term consequences of digital skill acquisition, particularly in writing and communication, on students' academic and career objectives. Understanding the impact of continued interaction with certain digital applications like Canva on the development of these skills could help determine their effectiveness and inform education policy professionals about potential changes needed to strengthen the curriculum. Moreover, as educational technology continues to evolve, understanding the impact of collaborative, multimodal writing projects on student engagement and overall performance is equally important as figuring out how to mitigate the obstacles associated with these projects so that learners of all levels can fully benefit from them.

In terms of communication and coordination, this study found that time zones and difficulties expounding concepts through written communication were barriers to collaboration. These complications are in line with the work of Bonato et al. (2023), who remarked that remote collaboration poses unique challenges, especially with the physical separation of the team members. The distribution of the team members across different time zones makes it more difficult to plan meetings and collaborative work times. These issues not only create lags in the decision-making processes but also impact the intra-team relations by reducing the chances of receiving instant feedback and engaging actively in discussions. To tackle these challenges, students from the study adopted several techniques such as arranging online meetings during collaborative hours and using tools that promote interaction through synchronous communication. Such techniques are in line with the arguments put forth by Donati et al. (2021), which emphasize that effective communication and collaboration in real-time are necessary to address the challenges of remote work.

In addition, effective interaction and relationship development among team members are enhanced using communication resources like video conferences and messaging applications. It cultivates a spirit of teamwork and collaboration that might otherwise be negatively affected by distance in remote settings. For example, the ability to share screens or edit documents collaboratively can augment visual communication, which aids in the explanation of intricate concepts. In light of this, educational institutions should focus on implementing educational workshops that develop students' digital literacy and technical skills, as well as their ability to use cooperative platforms and other digital resources.

Equitable distribution of digital resources and instruments is another important aspect that requires attention. Increasing access helps to address the digital divide gap region target regions, enabling all learners to participate in enhanced technological learning regardless of economic disadvantage. This gap is important because many students belonging to low socio-economic groups may not have access to technology and digital tools. The information gained from this study highlights the need for further educational institutional support as educators strive to keep up with changes to traditional teaching methods.

Looking ahead, additional investigation may explore the impacts that the development of digital skills has on students' writing and communication abilities concerning their long-term academic and career prospects. Observing how students' digital literacy skills develop over time, especially concerning collaborative activities with technology, has the potential to provide critical evidence on the skills' relevance to their career development. With the growing prevalence of remote work across sectors, understanding the nexus of digital literacy and collaboration will become necessary for student preparation in the working world. The pandemic has altered many facets of professional relationships and communication, which reminds us that teams need solutions customized for remote work [11], [38].

In light of these circumstances, addressing the Adaptable Communicative Team Protocols (ACTP) could be a cornerstone in changing educational paradigms. Communication-focused action research could be directed at meeting the learning and operational goals of virtual teams. Work in remote educational settings might focus on the impact of team culture, team roles, as well as the technology used on the students' interactions, aiming toward the active intellectual participation of a greater number of students in collaborative activities.

With the changing paradigms in education technology, the need for regular assessment and modification is becoming more vital. Solving challenges associated with remote collaboration and with the development of students' digital skills requires school leaders to adapt modern approaches. Students must be prepared to operate in and positively contribute to a world that is ever-evolving in its technological landscape. Educational Institutions have the tools to equip students to be adept, flexible, and creative problem-solvers.

While this study provides valuable insights, it has several limitations. Firstly, this analysis was limited to one class within a single academic program, which might not capture the varying experiences of learners from different fields. Hopefully, along with this lecture, students will also develop skills related to project work. Hopefully, this would enable students to see the project from a cross-disciplinary perspective, further resulting in enhanced understanding of students' needs across disciplines. Moreover, a sample that consists of only 36 students seems to represent a very small population. Another shortcoming is the use of qualitative data sourced from interviews as well as reflective journals, which are arguably subjective personal opinions and independent interpretations about the analyzed subject matter. The subject of the course could be further analyzed by using a bigger sample that is more relevant to the topics of discourse, while using both qualitative and quantitative approaches. Furthermore, investigating the enduring impact of the projects on students' digital literacy skills would significantly aid in enhancing digital educational approaches in higher learning institutions.

IV. Conclusion

This study examined the effectiveness of the Canva platform in collaborative multimodal writing projects regarding students' writing and digital literacy skills. The findings show that students were able to collaborate, create, and communicate in a more sophisticated manner, which, in turn, boosted their creative outputs. With the platform's help, students were able to integrate text and graphics in a manner that made their compositions more appealing and coherent. The platform also fostered enhanced idea expression, greater digital literacy, and more effortless navigation of the tools provided by Canva.

Nonetheless, the study drew attention to some issues, including technologically related challenges with the platform, deficient digital skills, and nonverbal communication difficulties within remote teams. Even within these challenges, students displayed ingenuity and perseverance by employing goal-oriented strategies like layout check-ins accompanied by peer support for effective collaboration, leading to the use of other platforms for communication and resultant improvement of collaboration and teamwork.

The findings of this particular study highlight the need for more advanced training in digital literacy, including more accessible technological resources within school systems. These efforts could enable all students to take advantage of technology-augmented learning experiences, thus aiding in closing the gaps associated with the digital divide. Subsequent studies need to concentrate on the impacts of exposure to collaborative multimodal projects on students' skills and career pathways in the long term, as well as examine additional strategies to enhance the application of technology in the higher education teaching framework.

Canva serves as one of the instructional components in the course and assists in advanced digital skills development, active participation, collaborative learning, and creativity, all of which this study observes. Understanding how to integrate educational technology effectively into the teaching and learning process will become critical to the students' future success in a digitally driven society, as these technologies continue to transform education.

References

[1]   K. Holflod, 'Playful Learning and Boundary-Crossing Collaboration in Higher Education: A Narrative and Synthesising Review', *J. Furth. High. Educ.*, vol. 47, no. 4, pp. 465–480, 2022, doi: 10.1080/0309877x.2022.2142101.

[2]   K. Zhampeissova, I. Kosareva, and U. Borisova, 'Collaborative Mobile Learning With Smartphones in Higher Education', *Int. J. Interact. Mob. Technol.*, vol. 14, no. 21, p. 4, 2020, doi: 10.3991/ijim.v14i21.18461.

[3]   C. Ren and Q. Zheng, 'Learning Analytics in Education: A Social Network-Based Approach for Analyzing the Interaction and Influence of Collaborative Learning Communities', *Int. J. Emerg. Technol. Learn.*, vol. 18, no. 21, pp. 51–65, 2023, doi: 10.3991/ijet.v18i21.44691.

[4]   A. Arono, S. Syahriman, N. Nadrah, A. S. Villia, and E. Susanti, 'Comparative Study of Digital Literacy in Language Learning Among Indonesian Language Education and English Language Education Students in the New Normal Era', 2021, doi: 10.4108/eai.16-10-2020.2305230.

[5]   T. Quraishi, 'Empowering Students Through Digital Literacy: A Case Study of Successful Integration in a Higher Education Curriculum', *J. Digit. Learn. Distance Educ.*, vol. 2, no. 8, pp. 667–681, 2024, doi: 10.56778/jdlde.v2i8.208.

[6]   S. Purnama, M. Ulfah, I. Machali, A. Wibowo, and B. S. Narmaditya, 'Does Digital Literacy Influence Students' Online Risk? Evidence From Covid-19', *Heliyon*, vol. 7, no. 6, p. e07406, 2021, doi: 10.1016/j.heliyon.2021.e07406.

[7]   L. Susanty, 'Critical Analysis of the Research on Digital Literacy', *Education*, vol. 2, no. 1, pp. 12–25, 2024, doi: 10.61194/education.v2i1.149.

[8]   M. Kurni and K. Saritha, 'Applying Collaborative Learning for Enhancing the Teaching-Learning Process in Online Learning Through Social Media', *Int. J. Emerg. Technol.*

Learn., vol. 16, no. 16, p. 251, 2021, doi: 10.3991/ijet.v16i16.23207.

[9]   I. R. Mega, Y. Yuanita, A. Arsisari, and W. A. Ulfah, 'Learners' Digital Literacy in the Online Learning During Covid-19', *English Rev. J. English Educ.*, vol. 10, no. 2, pp. 699–706, 2022, doi: 10.25134/erjee.v10i2.6314.

[10]   X. Zhai, L. Cunyi, and A. B. Razali, 'Utilization of Online Fan-Fiction to Improve English Literacy Skills Among EFL Undergraduate Students', *Int. J. Acad. Res. Progress. Educ. Dev.*, vol. 10, no. 4, 2021, doi: 10.6007/ijarped/v10-i4/11678.

[11]   E. Peter, V. Rosmayanti, and M. Yahrif, 'Exploring students' learning strategies in reading comprehension class', *J. Sci.*, vol. 12, no. 01, pp. 46–54, 2023.

[12]   K. Krismadinata and W. Susanti, 'Comparison of Collaborative Learning Models to Improve Programming Competence', *Int. J. Online Biomed. Eng.*, vol. 17, no. 10, pp. 48–58, 2021, doi: 10.3991/ijoe.v17i10.24865.

[13]   F. Andriyanti, D. Pratiwi, and D. D. Yunda, 'Improving Students Writing Skills Through Canva Application at SMP Muhammadiyah Imogiri Yogyakarta', *Int. J. Contemp. Stud. Educ.*, vol. 2, no. 2, pp. 119–126, 2023, doi: 10.56855/ijcse.v2i2.416.

[14]   M. S. Hadi, L. Izzah, and Q. Paulia, 'Teaching Writing Through Canva Application', *J. Lang. Lang. Teach.*, vol. 9, no. 2, p. 228, 2021, doi: 10.33394/jollt.v9i2.3533.

[15]   M. Li and Z. Yu, 'Teachers' Satisfaction, Role, and Digital Literacy During the COVID-19 Pandemic', *Sustainability*, vol. 14, no. 3, p. 1121, 2022, doi: 10.3390/su14031121.

[16]   G. P. Yustika and S. Iswati, 'Digital Literacy in Formal Online Education: A Short Review', *Din. Pendidik.*, vol. 15, no. 1, pp. 66–76, 2020, doi: 10.15294/dp.v15i1.23779.

[17]   W. Marisa and E. Djulia, 'The Relationship of Digital Literacy to Students' Cognitive Ability in Ecology Course', *J. Pelita Pendidik.*, vol. 10, no. 2, 2022, doi: 10.24114/jpp.v10i2.26774.

[18]   O. O. Adewumi and E. Oladele, 'E-Skills and Digital Literacy: An Investigation Into the Perceived Competencies of Distance Learning Students in the University of Lagos', *Niu HMS*, vol. 8, no. 4, pp. 147–161, 2023, doi: 10.58709/niujhu.v8i4.1739.

[19]   D. F. Muntu, O. Y. Yuliana, and Z. J. H. Tarigan, 'The Influence of Digital Literacy on Learning Effectiveness Through Classroom Management', *Petra Int. J. Bus. Stud.*, vol. 6, no. 1, pp. 42–52, 2023, doi: 10.9744/petraijbs.6.1.42-52.

[20]   K. B. Kalapala and P. Patel, 'A Systematic Review on Digital Literacy Using Machine Learning Approaches', *Int Res J Adv Engg MGT*, vol. 2, no. 11, pp. 3304–3311, 2024, doi: 10.47392/irjaem.2024.0488.

[21]   A. A. Alzubi, 'Examining the Effect of a Collaborative Learning Intervention on EFL Students English Learning and Social Interaction', *J. Pedagog. Res.*, 2024, doi: 10.33902/jpr.202425541.

[22]   Y. Wang and Q. Wang, 'A Student Grouping Method for Massive Online Collaborative Learning', *Int. J. Emerg. Technol. Learn.*, vol. 17, no. 03, pp. 18–33, 2022, doi: 10.3991/ijet.v17i03.29429.

[23]   V. Rosmayanti and B. M. Sabillah, 'The Application of eclectic method in teaching young learners in X1 English course in Makassar', in *International Conference on Education, Science, Art and Technology*, 2017, pp. 223–231.

[24]   A. Blilat and A. Ibriz, 'Design and Implementation of P2P Based Mobile App for Collaborative Learning in Higher Education', *Int. J. Interact. Mob. Technol.*, vol. 14, no. 07, p. 115, 2020, doi: 10.3991/ijim.v14i07.13167.

[25]   R. D. Poth, 'Effective Professional Development on AI'. 2023.

[26]   M. Q. Patton, *Qualitative Evaluation and Research Methods*. Newbury Park, London, New Delhi: Sage Publications, 1990.

[27]   C. Wilson, *Semi-structured interview*, 1st ed. Morgan Kaufmann, 2014. doi: 10.1016/b978-0-12-410393-1.00002-8.

[28]   V. Braun and V. Clarke, 'Using thematic analysis in psychology', *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, 2006, doi: 10.1191/1478088706qp063oa.

[29]   L. Rowe, 'Educating for the modern world: a report review', *J. Work. Manag.*, vol. 11, no. 1, pp. 5–16, 2019, doi: 10.1108/JWAM-06-2019-0014.

[30]   K. Seltzer, 'Performing Ideologies: Fostering Raciolinguistic Literacies Through Role-Play

in a High School English Classroom', *J. Adolesc. Adult Lit.*, vol. 63, no. 2, pp. 147–155, 2019, doi: 10.1002/jaal.966.

[31]   Y. Assefa, M. M. Gebremeskel, B. T. Moges, S. A. Tilwani, and Y. A. Azmera, 'Rethinking the Digital Divide And associated Educational In(equity) in Higher Education in the Context Of developing Countries: The Social Justice Perspective', *Int. J. Inf. Learn. Technol.*, vol. 42, no. 1, pp. 15–32, 2024, doi: 10.1108/ijilt-03-2024-0058.

[32]   M. Deiniatur and B. Y. Cahyono, 'Digital Literacy Practices of Novice English as a Foreign Language Teacher in Writing Research Articles for Publication', *J. Educ. Learn.*, vol. 18, no. 1, pp. 165–172, 2024, doi: 10.11591/edulearn.v18i1.20899.

[33]   O. O. Olaniyi, J. C. Ugonnia, F. G. Olaniyi, A. T. Arigbabu, and C. S. Adigwe, 'Digital Collaborative Tools, Strategic Communication, and Social Capital: Unveiling the Impact of Digital Transformation on Organizational Dynamics', *Asian J. Res. Comput. Sci.*, vol. 17, no. 5, pp. 140–156, 2024, doi: 10.9734/ajrcos/2024/v17i5444.

[34]   M. Bonato *et al.*, 'Failure of Digital Device Performance in Monitoring Physical Exercise in a Pilot Study in Sedentary Persons With HIV', *Sensors*, vol. 23, no. 23, p. 9461, 2023, doi: 10.3390/s23239461.

[35]   N. I. A. B. A. Khalil, 'Digital Transformation of Teacher Education by Bridging Digital Divide Between Teacher Educators and Prospective Teachers', *Jcte*, vol. 4, 2023, doi: 10.58444/jcte.v4i.208.

[36]   O. A. Alismaiel, J. Cifuentes-Faura, and W. M. Al-Rahmi, 'Online Learning, Mobile Learning, and Social Media Technologies: An Empirical Study on Constructivism Theory During the COVID-19 Pandemic', *Sustainability*, vol. 14, no. 18, p. 11134, 2022, doi: 10.3390/su141811134.

[37]   S. Donati, G. Viola, F. Toscano, and S. Zappalà, 'Not All Remote Workers Are Similar: Technology Acceptance, Remote Work Beliefs, and Wellbeing of Remote Workers During the Second Wave of the COVID-19 Pandemic', *Int. J. Environ. Res. Public Health*, vol. 18, no. 22, p. 12095, 2021, doi: 10.3390/ijerph182212095.

[38]   M. Maurer, N. Bach, and S. Oertel, 'Forced to Go Virtual. Working-From-Home Arrangements and Their Effect on Team Communication During COVID-19 Lockdown', *Ger. J. Hum. Resour. Manag. Zeitschrift Für Pers.*, vol. 36, no. 3, pp. 238–269, 2022, doi: 10.1177/23970022221083698.