

The Effectiveness of Mobile Collaborative Learning on Students' Writing Performance by Implementing Magnet Summary Strategy

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Abstract

The purpose of the study was to examine the effectiveness of using Mobile Collaborative Learning (MCL) and Magnet Summary Strategy (MSS) on students' writing performance and their perceptions towards these strategies. This study utilized a pre-test and post-test control group quasi-experimental design. The results of the paired sample t-test revealed a statistically significant difference between the average pre-test score of 45.8000, indicating a lower level of knowledge among participants before the intervention, and the average post-test score of 68.2800, indicating a substantial improvement in knowledge following the interventions. The intervention used MCL and MSS to help students summarize and organize information, which resulted in improved writing performance. moreover, the significance level of 2-tailed test was less than 5% demonstrating that the difference in the pre-test and post-test scores was statistically meaningful. Thus, it is improbable that the variance in scores happened merely by chance, indicating that the intervention had considerable impact on the participants' knowledge. The results also showed that the implementation of MCL and MSS helped students to improve their social skills. They appreciated the opportunity to collaborate and communicate with their peers, which helped them to develop their interpersonal skills and learn from each other. Moreover, the implementation of MCL and MSS resulted in a sense of group success when working on group activities, which contributed to a positive learning experience. Overall, the study suggests that using MCL and MSS can be an effective approach to improve students' writing performance and their social skills.

Keywords: *mobile collaborative learning, writing performance, magnet summary strategy*

INTRODUCTION

The widespread availability of mobile technology has given a rise to a new form of learning known as mobile learning, which has been gaining popularity in the field of education (Dreyer & Nel, 2003; García-gómez & Garc, 2020). Mobile Collaborative Learning (MCL) is a form of mobile learning that involves students working together to learn and solve problems using mobile devices. Collaborative learning has been shown to promote critical thinking, communication, and teamwork skills among students, making it an effective pedagogical approach (Cankaya & Yunkul, 2018; Maruf & Anjely, 2020; Mohammad & Khalaf, 2017). In China, research on mobile learning emphasizes the importance of mobile collaborative learning. For example Guo & Huang (2021) suggest that mobile devices can facilitate collaborative learning among students and enhance their engagement and motivation.

In addition, the Magnet Summary Strategy (MSS) is a technique utilized to aid students in organizing their ideas and thoughts, ultimately resulting in an improvement in their writing abilities. Research has shown that MSS is effective in improving writing skills in students at different levels, including elementary, middle, and high school (Dilshad, 2017).

The combination of MCL and MSS has the potential to enhance students' writing performance by providing opportunities for collaboration and improving their writing skills. By using mobile devices, students can engage in collaborative learning anytime, anywhere, and the use of MSS can help them organize their ideas and improve their writing quality. MCL with MSS allows students to work together to construct meaning, and the summary strategy helps them organize their ideas and produce coherent writing. By utilizing MCL and MSS, the goal is to foster a dynamic and cooperative educational setting that facilitates the enhancement of students' writing abilities (Baanqud et al., 2020). The effectiveness of MCL and MSS in improving students' writing performance has been widely researched and discussed. Collaborative learning has been shown to enhance students' motivation, engagement, and critical thinking skills (Baanqud et al., 2020; Sulisworo & Suryani, 2014). Also, it can support collaboration and self-directed learning, as well as enhance creativity and problem-solving skills (Jacobs & Ivone, 2020; Jagušt & Botički, 2019).

Despite the potential benefits of MCL and MSS, their effectiveness in improving students' writing performance is not yet fully understood. Prior research has mainly focused on the potential of MCL for improving learning outcomes rather than specific writing skills (Callaghan, 2018). Meanwhile, research on MSS has been limited scope, with findings that are limited to specific contexts (Kikuchi et al., 2019). Additionally, prior research indicating the efficacy of MCL and MSS in enhancing writing skills has been based on a limited sample size, prompting concerns about the extent to which their results can be applied to broader populations.

Therefore, this study aims to investigate the effectiveness of Mobile Collaborative Learning (MCL) with implementing Magnet Summary Strategy (MSS) on students' writing performance, and to examine their perceptions of MCL with MSS. The objective of this study is to provide insights into the potential barriers to adaptation and the factors that contribute to the successful implementation of MCL with MSS.

The significance of this study rests on the need to improve students' writing abilities, which is a crucial element of education. Writing is an essential skill that students must develop to communicate effectively in various contexts, such as in academic writing, personal communication, and professional communication. Therefore, enhancing students' writing skills through MCL and MSS can have a significant impact on their academic and future careers. Furthermore, the current knowledge regarding the effectiveness of MCL and MSS in improving students' writing performance and their perceptions of this approach. Additionally, this study provided insights into the potential barriers to adaptation and the factors that contribute to successful implementation, which can guide educators in designing and implementing effective MCL with MSS activities in their classrooms.

LITERATURE REVIEW

Mobile Collaborative Learning

Mobile learning represents a new approach to education that unique learning opportunity anywhere and anytime (Gull & Shehzad, 2015; Jacobs & Ivone, 2020). Mobile Collaborative Learning (MCL) is becoming increasingly important in educational environments as a type of mobile learning application (Maruf & Anjely, 2020; Lim, 2017). The use of collaborative learning on mobile devices has increased, highlighting the relationship between these two concepts. The integration of mobile devices for collaborative learning is the next step in the evolution of online collaborative learning, given the increasing importance of mobility in today's society (Al-Ahdal & Alharbi, 2021; Peramunugamage et al., 2022).

The widespread use of wireless and mobile technology today offers immense potential for e-learning, including ubiquity, pervasiveness, personalization, and flexibility, among other factors (Gutiérrez-colón et al., 2020; Chang et al., 2014); (Gregory & Lodge, 2015; Arifin et al., 2022). MCL involves the use of mobile and wireless devices, including smart devices, for advanced computer-based collaboration learning, allowing students to interact informally outside the classroom or under the supervision of a teacher (Jagušt & Botički, 2019; Callaghan, 2018; Barianty et al., 2022). Furthermore, MCL allows for quick and easy access to crucial and significant information that is shared among users, as well as interaction between users that are more varied and that reduce cognitive load throughout the learning process (Ko & Lim, 2022; Ansari & Khan, 2020; Purwantoro et al., 2021).

In a systematic review carried out by Peramunugamage et al., (2022) they examined the use of Mobile Collaborative Learning (MCL) in EFL learning. The review found that MCL was an effective way to enhance learning and promote collaborative among students. It also highlighted the various application of MCL in health professions education, such as using mobile devices for clinical training and continuing education. However, it needs to be noted that the need for further research to fully understand the potential of MCL in health professions education. A separate analysis undertaken by Salas-Rueda et al., (2020) they synthesized the findings of previous studies on Mobile Collaborative Learning (MCL) in STEM education. This study found that MCL was an effective way to enhance learning outcomes in STEM education, specifically concerning the improvement of students' knowledge and skills.

In the EFL context, learners often face challenges in reading and comprehending complex texts, particularly those in academic settings. The Magnet Summary Strategy can be a valuable tool for EFL learners as it helps to simplify complex information and focus on key ideas. This strategy also encouraging students to express themselves using original language and writing style to express their understanding, which helps to develop their writing skills. Furthermore, as EFL learners often struggle with summarizing, this strategy can assist them in summarizing effectively, which is an essential academic skill. Educators should consider incorporating the Magnet Summary Strategy in EFL classes, providing appropriate guidance and practice opportunities to enhance learners' reading and writing abilities.

Magnet Summary Strategy

The Magnet Summary Strategy (MSS) is a reading and writing method that enables learners to simplify their reading on a specific topic to a few key words or phrases (Mohammed, 2019; Lestari, 2019). MSS helps them write a through summary. Through MSS, students can then turn the key ideas into sentences or paragraphs that reflect their own linguistics and stylistic preferences. MSS is an approach that enables learners to rise above the specifics and provide meaningful summaries in their own words. As results, students can use this method to summarize essential information in a logical manner. It teaches students how to put words together into phrases and sentences into paragraphs, as well as how to connect the main idea and important details in a text.

One of the strengths of MSS is that encourages learners to identify the main ideas and key details of a text, which helps them to remember and retain the material more effectively. Marzulina & Zuhri (2019) note that MSS assists learners in condensing and crystallizing text selections, making it easier for them to understand the content. In conclusion, the magnet summary strategy is a useful approach for simplifying complex texts and writing concise summaries. Its strengths lie in its ability to help learners identify the main ideas and key details of a text, and its limitations include difficulties in identifying and expressing important ideas in some types of texts. Therefore, educators should consider in which it is being used to ensure its effectiveness. Additionally, learners should be provided with simple guidance and practice opportunities to help them master this summarization technique.

METHOD

Research Design

For this study, a quasi-experimental design was utilized and two groups of participants were involved; an experimental group and a control group. The prior receiving treatment, both groups underwent a pre-test, and a post-test was conducted after treatment period, which comprised of eight meeting. MSS was implemented through a WhatsApp group in the experimental group, while the control group followed the traditional individual learning method.

Research Setting

The research was carried out at MA Al-Balagh, Lamongan regency, East Java, Indonesia. The academic institution is renowned for its outstanding academic standing and commitment to providing exceptional learning experiences to its enrolled individuals. The school has a diverse student population, which includes students from various backgrounds, cultures, and socio-economic status.

The researchers chose this school as the research setting for several reasons. Firstly, the school has never been a research site for any study with the same title as the present research. Secondly, the location of the school was easy to reach by the researchers. Thirdly, the schools' academic excellent and quality of education make it an ideal location for conducting a study on teaching and learning strategies. Overall, the academic reputation and diverse student population of MA Al-Balagh Lamongan, along with its convenient location, make it an excellent setting for conducting research in the field of education.

Data Collection

The research design used in this study is a quasi-experimental design, which employed two data collection tools: a writing test and a questionnaire. The writing test was designed based on the syllabus that emphasized writing ability and used the descriptive text writing format. The test measured students' writing ability in five categories: content, grammar, organization, vocabulary, and mechanics. The researchers used a rubric adapted from Brown (2007) to assess students' writing production in these five categories. This rubric allowed for an objective and consistent evaluation of the students' writing performance.

Along with the writing test, a closed-ended survey questionnaire was used to collect data about the students' perceptions of their participation in Mobile Collaborative Learning using Magnet Summary Strategy. The survey used a 5-point response scale, from *strongly disagree* to *strongly agree*, and contained 20 items. Its objectives was to collect data on students' beliefs, attitudes, perceptions, values, and intentions regarding the use of MCL in combination with MSS to enhance their writing skills.

Data Analysis

This study employed a quasi-experimental design that administered pre-test and post-test to both the experimental and control groups. The pre-test was given to measure the initial writing skills of the participants before the treatment, while the post-test was conducted to evaluate the effectiveness of Mobile Collaborative Learning using Magnet Summary Strategy on students' writing performance. The pre-test was designed to be similar to the post-test in terms of format and difficulty level, and both tests were based on the syllabus that emphasizes writing ability. The writing test used a rubric assessment adapted from Brown (2007), which classified the five characteristics of writing production into five categories: (1) content; (2) grammar; (3) organization; (4) vocabulary; and (5) mechanics. The results of the pre-test and post-test were analyzed to measure the changes in the writing performance of the participants in the experimental and control groups after receiving the treatment.

Meanwhile, a closed-ended survey questionnaire to obtain data on students' perceptions of their engagement in Mobile Collaborative Learning with Magnet Summary Strategy. The primary aim of the questionnaire was to gather information regarding students' attitudes, beliefs, values, perceptions, and intentions about using MCL with MSS to enhance their writing performance.

The data analysis for this study involves the use of IBM SPSS Statistics version 24. To determine the distinction among the unpaired groups in the post-test control and experiment, the researchers utilized statistical analysis. Additionally, paired sample t-tests were used to determine whether there was improvement in the same group (pre and post-test experiment) after the treatment. The questionnaire responses from the experimental group were analyzed to determine the EFL learners' perceptions towards MCL with MSS. The answers were classified into four scales: *Strongly agree*, *Disagree*, and *Strongly Disagree*. The percentage of students who responded to the questionnaire was calculated after the treatment, the participants in experimental group were asked to complete the questionnaire.

Data Validation and Reliability

To ensure the quality of data collected and accuracy of the research findings, the researchers conducted validity and reliability tests on the research instruments used in this study. To ensure the test's validity, two types of validity were checked, namely content validity and construct validity. Content validity was checked by two experts who evaluated each item's appropriateness in evaluating writing abilities and assessed the test in terms of instructions, topics, timing, content, and content appropriateness. Additionally, the coverage and representativeness of the test were evaluated to ensure that the test content correctly represents the field or domain being tested. While construct validity, on the other hand, was used to determine whether the test is in line with the theories that support the information presented. A grading rubric was used to grade students' descriptive writing tests, and raters were asked to evaluate the instrument test format in terms of instructions, time allotment, topic, content, and rubric.

The reliability of a test is crucial in ensuring that the results are consistent and accurate. After validating the instrument's validity, the next step is to evaluate, its reliability refers to the degree to which scores remain consistent across various testing occasions and raters. To evaluate the reliability of the writing test, two expert raters were asked to assess the rubric and instrument's reliability. The raters evaluated five aspects, including instructions, time allotment, content, and content appropriateness (rubric). The reliability coefficient obtained from the test was in the fair/medium range, indicating that the test results reasonably consistent.

To interpret the reliability coefficient, the researchers used the Guilford rule categorization (1956). According to the categorization, a reliability coefficient ranging from 0.40 to 0.60 is considered fair/medium. Based on this interpretation, the data collection from the writing test was reliable.

RESULTS

The Effectiveness of Mobile Collaborative Learning by Implementing Magnet Summary Strategy (MSS) on Students' Writing Performance

The objectives of the study were to determine whether Mobile Collaborative Learning (MCL) and Magnet Summary Strategy (MSS) can improve students' writing performance. The study utilized a pre-test and post-test control group design, which is a type of quasi-experimental design. Two groups of students were involved in the study, with the experimental groups receiving the MCL and MSS intervention while control group did not receive any treatment.

The study's results were analyzed in two ways: (1) to test the significant improvement on students' performance between the experimental group before and after the intervention, and (2) to test the comparison of post-test in two groups (experimental and control groups).

The data collected from the experimental group were analyzed using a paired sample t-test to determine the effectiveness of the intervention. The results indicated a significant improvement in knowledge among the participants, with the mean pretest scores of 45.8000 increasing to 68.2800 in the post-test. This improvement was substantial, as there was a notable difference between the two scores. Prior to the intervention, the participants' level of knowledge was relatively

low, but after the intervention, there was a remarkable increase in the mean score, suggesting the effectiveness of the intervention.

The standard deviation for the pre-test was 9.12871, which suggests that the scores were quite variable and dispersed across a wide range of values. However, the standard deviation for the post-test was 7.07413, indicating that the scores were more tightly clustered around the mean, and there was less variability in the data. This result reinforces the idea that the intervention had a beneficial effect on the participants' understanding, leading to more uniform scores within the group.

Table 1. Paired samples statistics

Paired samples statistics (pair 1)				
	Mean	N	Std. Deviation	Std. error mean
Pre-test	45.8000	25	9.12871	1.82574
Post-test	68.2800	25	7.07413	1.41483

Furthermore, the value of Sig. (2-tailed) value was below 5%, indicating statistical significance in the difference between the pre-test and post-test scores. This means that it is highly unlikely that the difference in scores occurred by chance alone, and it is much more likely that the intervention had a significant effect on the participants' knowledge. Overall, these results suggest that the intervention was successful in improving the participants' knowledge on the subject matter.

The second analysis was conducted to examine the difference in post-test scores between the experimental and control groups, using an independent samples t-test. The results indicated a statistically significant difference in the post-test scores between the two groups. The obtained t-value was 3.867, which exceeded the critical t-value (1.677) at 48 degrees of freedom, with a p-value less than 0.05. This suggests that the intervention had a positive impact on students' writing performance as measured by the post-test scores. The effect size, measured by Cohen's d, was 0.98 indicating a large effect size, and suggesting that the intervention had a significant impact on students' writing performance compared to the control group.

Table 2. Results of Students' Writing Performance

Group Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Post-test CG	25	60.8800	18.44412	1.28882
Post-test EG	25	68.2800	7.07413	1.41483

In general, the results indicate that implementing Mobile Collaborative Learning and Magnet Summary Strategy was a successful method in enhancing students' writing skills. The results of this study have implication for educators and

instructional designers who are interested in using technology-enhanced collaborative learning strategies to improve students' outcomes in writing.

Students' Perception towards MCL with MSS Implementation

This research also aimed to explore students' perceptions towards the use of Mobile Collaborative Learning (MCL) and Magnet Summary Strategy (MSS) on students' writing performance.

Students expressed their satisfaction with the ease and convenience of using MCL and MSS, highlighting the accessibility and flexibility of accessing learning resources. They also appreciated the ability to interact with their peers and instructors at any time and from anywhere. Also, allowed for quick and easy feedback, which enhanced their learning experience.

In term of awareness on writing focus in learning English using MCL and MSS, the students reported that the MCL and MSS implementation helped them to become more aware the importance of writing focus in learning English. They appreciated the guidance and feedback provided by the teachers, which helped them to identify their strengths and weaknesses and improve their writing skills.

Excerpt 1:

“I used to struggle with writing in English, but after using MCL and MSS, I am more aware of what I need to focus on when writing. The tools helped me to identify my weaknesses and improve them. Now I feel more confident in my writing skills.” (Respondent #.2).

In term of enjoyable in learning writing lesson through MCL and MSS, students reported that they enjoyed the learning process using the MCL and MSS. They found the interactive activities and exercises engaging and stimulating, which made the learning experience more enjoyable. They appreciated the variety of activities, which catered to different learning styles and preferences.

Excerpt 2:

“Learning through MCL and MSS was a lot of fun. The lessons were interactive and engaging, and I never felt bored. The quizzes and games made learning enjoyable, and I looked forward to each lesson.” (Respondent #.8)

In term of increasing social skill, the students reported that the MCL and MSS implementation helped them to improve their social skills. They appreciate the opportunity to collaborate and communicate with their peers, which helped them to develop their interpersonal skills and learn from each other.

Excerpt 3:

“I learned a lot about social skills while working in groups on MCL and MSS. I learned how to communicate more effectively with my peers, and how to work collaboratively towards common goals. These skills are important not just academic success, but also for life.” (Respondent #.22)

In term of group success, students reported that they felt a sense of group success when working on group activities using the MCL and MSS. They valued the chance to collaborate and cooperate towards a shared objective and make a meaningful contribution to the group's achievement.

Excerpt 4:

“Working in groups on MCL and MSS was a great experience. We were able to achieve a lot together, and I felt a sense of pride in our group's success. It was great to see everyone's unique strengths come together to produce great work.” (Respondent #.10).

In term of responsibility on group activities, students mentioned that the MCL and MSS implementation helped them to develop a sense of responsibility towards their group activities. They appreciated the opportunity to take ownership of their learning and contribute to the success of their group.

Excerpt 5:

“Being a part of group on MCL and MSS helped me to take responsibility for my role in the group. I learned how to communicate my needs and ideas effectively, and how to take ownership of my work. This experience helped me to develop important life skills like time management and organization.” (Respondent #.14).

In term of collaborative learning experiences, students reported that the MCL and MSS implementation provided them with collaborative learning experiences. They appreciated the opportunity to work with their peers towards a common goal, share knowledge, and learn from each other.

Excerpt 6:

“Collaborating with my peers on MCL and MSS was a valuable experience. I learned a lot from my classmates, and we were able to help each other in areas where we struggled. It was great to see everyone working together towards a common goal.” (Respondent #.20).

Lastly, in term of encouragement to participate actively in class, students reported that the MCL and MSS implementation encouraged them to participate actively in class. They appreciated the opportunity to share their thoughts and ideas and receive motivated to participate in class activities, which enhanced their learning experience.

Excerpt 7:

“MCL and MSS encourage me to participate more actively in class. The interactive nature of the lessons and the group activities helped me to engage more with the material and with my peers. I felt more confident speaking up in class, and this helped me to get more out my learning experience.” (Respondent #.25).

Overall, students had positive perceptions towards the use of Mobile Collaborative Learning (MCL) and Magnet Summary Strategy (MSS) on their

writing performance. They found it effortless and convenient to reach out to their peers and teachers and access learning materials at their convenience and from any location. They also appreciated the guidance and feedback provided by teachers, which helped them to identify their strengths and weaknesses and improve their writing skills. The students enjoyed the interactive and stimulating learning activities, which catered to different learning styles and preferences. The collaborative learning experiences and group activities helped them to develop their social and interpersonal skills and take ownership of their learning. Moreover, the MCL and MSS implementation encouraged them to participate actively in class, enhancing their overall learning experience.

DISCUSSION

The study revealed that implementing MCL with MSS through a WhatsApp was notably effective in enhancing students' writing skills and perception. The students' writing performance before and after the intervention showed a substantial progress, as indicated by the paired sample t-test. Furthermore, the independent sample t-test demonstrated that the experimental group surpassed the control group in the post-test. These findings align with prior studies that have demonstrated the effectiveness of MCL and collaborative learning in improving students' writing skills.

The current study demonstrated that implementing MCL with MSS had a substantial and positive effect on students' writing skills and perceptions. The results align with previous research that has demonstrated the efficacy of MCL and collaborative learning techniques in improving students' writing abilities (Dilshad, 2017). Moreover, the outcomes of the independent samples t-test in this study support the idea that collaborative learning approaches are more effective than individual learning methods in enhancing students' writing skills, as reported by previous studies (Marzulina & Zuhri, 2019).

One other possible interpretation of the study's results is that the experimental group may have received more resources and attention than the control group, which could have influenced their performance. However, this explanation is improbable since the study employed a randomized control trial design to account for such variables.

This study has some limitations that need to be acknowledged. Firstly, there are some potential limitations to the study design that should be considered. Secondly, the relatively small sample size in this study may restrict the applicability of the findings to a larger population. Another limitation of this study is that self-report measures were employed to evaluate student perceptions, which could be susceptible to response bias. Lastly, it is important to note that this study was carried out in a particular context, and the generalizability of the results to other settings may be limited.

The study has several practical implications for teaching and learning. Teachers can use MCL with MSS and promote collaborative learning activities to enhance students' writing skills and perception. Additionally, teachers can integrate technology into their teaching practices to provide students with an engaging and interactive learning experience. Finally, it is recommended that educational institutions incorporate technology such as MCL into their teaching practices to

enhance students; writing skills and enrich their learning experience. The utilization of MCL and MSS not only enhances students' writing performance but also fosters a collaborative learning environment that cultivates students' social and interpersonal skills.

Moreover, this study adds to the body of literature by presenting proof of the efficacy of MCL and MSS in enhancing students' writing abilities. The use of technology in education is becoming increasingly important, and this study highlights the potential benefits of utilizing MCL and MSS. Hence. It is crucial for schools and institutions to invest in technology and provide training for teachers to effectively use technology in their teaching practices.

CONCLUSION

From the analysis and results, it can be concluded that the use of MCL and MSS has a positive impact on students' writing skills and overall learning experience. The paired sample t-test demonstrated a significant improvement in the experimental group's writing skills and overall learning experience. The paired sample t-test demonstrated as significant improvement in the experimental groups' writing scores from the pre-test to post-test, indicating the effectiveness of intervention. Furthermore, the independent sample t-test confirmed the superiority of the experimental group over the control group in the post-test, thus supporting the efficacy of MCL and MSS.

The study also revealed that students found MCL and MSS easy to use, enjoyable, and helpful in developing their writing skills, increasing their social skills, and promoting group success. Furthermore, collaborative learning experiences and encouragement to participate actively in class were identified as positive outcomes of the intervention.

Overall, the results of this study have significant implication for professionals in the field of language education and for researchers who are exploring ways to enhance language learning through technology. By providing evidence of the effectiveness and positive impact of MCL and MSS on writing skills and learning experiences, this study opens up avenues for future research and encourages the adoption of these tools in language education.

Several opportunities for future research could expand upon the results of this study. Namely: (1) future studies could investigate the impact of MCL with MSS implementation on other language skills, such as speaking or reading. This could provide a more comprehensive understanding of the effectiveness of this approach to language learning, (2) it may be worthwhile to explore the potential benefits of MCL with MSS implementations for learners from different backgrounds, including those with varying levels of proficiency in English or different cultural backgrounds. This could help to identify any specific needs or challenges that arise when implementing this approach with a diverse student population, (3) future research could explore the long-term effects of MCL with MSS implementation on language learning outcomes. This could involve follow-up studies to assess the retention of writing skills over time and investigate any potential transfer effects to other language skills. Finally, it may be beneficial to investigate the optimal conditions for implementation MCL with MSS, such as the

most effective group size or duration of intervention. This could help to inform this approach in real-world educational settings.

REFERENCES

- Al-Ahdal, A. A. M. H., & Alharbi, M. A. (2021). MALL in Collaborative Learning as a Vocabulary-Enhancing Tool for EFL Learners: A Study Across Two Universities in Saudi Arabia. *SAGE Open*, 11(1). <https://doi.org/10.1177/2158244021999062>
- Ansari, J. A. N., & Khan, N. A. (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments*, 7(1). <https://doi.org/10.1186/s40561-020-00118-7>
- Arifin, S., Arifani, Y., Maruf, N., & Helingo, A. (2022). A Case Study of EFL Teacher Scaffolding of an ASD Learner's Shared Reading with a Storybook App. *Journal of Asia TEFL*, 19(4). <https://doi.org/10.18823/asiatefl.2022.19.4.6.1234>
- Baanqud, N. S., Al-Samarraie, H., Alzahrani, A. I., & Alfarraj, O. (2020). Engagement in cloud-supported collaborative learning and student knowledge construction: a modeling study. *International Journal of Educational Technology in Higher Education*, 17(1). <https://doi.org/10.1186/s41239-020-00232-z>
- Barianty, T. N., Arifani, Y., Ma'ruf, N., & Setiawan, S. (2022). L2 ASD Learners' Scaffolding Development after Long Interaction with The Mobile Story-Sharing Application. *Language Related Research*, 13(3). <https://doi.org/10.29252/LRR.13.3.4>
- Callaghan, R. (2018). Developing Mobile Teaching Practice: A Collaborative Exploration Process. *Technology, Knowledge and Learning*, 23(2). <https://doi.org/10.1007/s10758-017-9319-y>
- Cankaya, S., & Yunkul, E. (2018). *Learner Views about Cooperative Learning in Social Learning Networks*. 11(1), 52–63. <https://doi.org/10.5539/ies.v11n1p52>
- Chang, K. E., Lan, Y. J., Chang, C. M., & Sung, Y. T. (2014). *Innovations in Education and Teaching International Mobile - device - supported strategy for Chinese reading comprehension*. October, 37–41. <https://doi.org/10.1080/14703290903525853>
- Dilshad, M. N. (2017). Collaborative Learning Environment. *Archives of Business Research*, 5(10). <https://doi.org/10.14738/abr.510.3781>
- Dreyer, C., & Nel, C. (2003). *Teaching reading strategies and reading comprehension within a technology-enhanced learning environment*. 31, 349–365. [https://doi.org/10.1016/S0346-251X\(03\)00047-2](https://doi.org/10.1016/S0346-251X(03)00047-2)
- García-gómez, A., & Garc, A. (2020). Learning through WhatsApp: students' beliefs, L2 pragmatic development and interpersonal relationships. *Computer Assisted Language Learning*, 0(0), 1–19. <https://doi.org/10.1080/09588221.2020.1799822>

- Gregory, M. S.-J., & Lodge, J. M. (2015). Academic workload: the silent barrier to the implementation of technology-enhanced learning strategies in higher education. *Distance Education*, 36(2), 210–230.
- Gull, F., & Shehzad, S. (2015). Effects of Cooperative Learning on Students' Academic Achievement. *Journal of Education and Learning (EduLearn)*, 9(3), 246. <https://doi.org/10.11591/edulearn.v9i3.2071>
- Guo, C., & Huang, Y. (2021). Effect of mobile devices and software in collaborative learning smart classroom on students' learning motivation. *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3474995.3475000>
- Gutiérrez-colón, M., Frumuselu, A. D., Curell, H., & Gutiérrez-colón, M. (2020). Mobile-assisted Language learning to enhance L2 reading comprehension : a selection of implementation studies between 2012 – 2017. *Interactive Learning Environments*, 0(0), 1–9. <https://doi.org/10.1080/10494820.2020.1813179>
- Jacobs, G. M., & Ivone, F. M. (2020). *Infusing Cooperative Learning in Distance Education*. 24(1), 1–15.
- Jagušt, T., & Botički, I. (2019). Mobile learning system for enabling collaborative and adaptive pedagogies with modular digital learning contents. *Journal of Computers in Education*, 6(3). <https://doi.org/10.1007/s40692-019-00139-3>
- Ko, E. G., & Lim, K. Y. (2022). Promoting English Learning in Secondary Schools: Design-Based Research to Develop a Mobile Application for Collaborative Learning. *Asia-Pacific Education Researcher*, 31(3). <https://doi.org/10.1007/s40299-021-00562-0>
- Lim, S.-G. (2017). Analysis on Constitutes and Contents of Mobile Application for Reading. *Journal of Korean Library and Information Science Society*, 48(1), 397–421.
- Maruf, N., & Anjely, A. M. R. (2020). Utilizing Cooperative Integrated Reading and Composition (CIRC) with mobile Learning to Enhance Students' Reading Comprehension. *British (Jurnal Bahasa Dan Sastra Inggris)*, 9(2), 10–19.
- Marzulina, L., & Zuhri, M. (2019). Magnet Summary Strategy in Descriptive Writing: The Case of Madrasah Students in South Sumatera. *Elite Journal*, 1(1).
- Mohammad, K., & Khalaf, B. (2017). *The Effect of E-mail and WhatsApp on Jordanian EFL Students' Reading Skill*. 8(2), 228–237.
- Peramunugamage, A., Ratnayake, U. W., & Karunanayaka, S. P. (2022). Systematic review on mobile collaborative learning for engineering education. *Journal of Computers in Education*. <https://doi.org/10.1007/s40692-022-00223-1>
- Purwanto, A., Asari, S., & Maruf, N. (2021). The Effectiveness of E-Learning Madrasah in English Teaching and Learning. *BIRCI-Journal*, 4(3).
- Salas-Rueda, R. A., De-La-Cruz-Martínez, G., Alvarado-Zamorano, C., &

- Gamboa-Rodríguez, F. (2020). Mobile devices and Collaborative wall: Media to innovate the teaching learning process on social sciences? *Meta: Avaluacao*, 23(36). <https://doi.org/10.22347/2175-2753v12i36.2626>
- Sulisworo, D., & Suryani, F. (2014). the Effect of Cooperative Learning, Motivation and Information Technology Literacy To Achievement. *International Journal of Learning and Development*, 4(2), 58. <https://doi.org/10.5296/ijld.v4i2.4908>