RESEARCH ARTICLE

# The effect of mobile application to promote learning English for primary school students

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**Abstract:** This study aims to investigate the impact of mobile learning apps on primary school students' motivation and performance in English using Mayer's Cognitive Theory of Multimedia Learning. Monotonous traditional education lowers student motivation, lowering student performance in English. This will also impact their performance in English. Mobile learning applications built on Mayer's Cognitive Theory of Multimedia Learning may be one way to increase students' motivation, which will help them solve problems more effectively and boost their performance. A pre-experimental study design was used, in which one group was examined with a comparison within a single group observed through time in the control group. A primary school's 26-year-five students were the samples discovered through purposive sampling. A questionnaire examined the effectiveness of motivation. In the meantime, students' performance was evaluated using an achievement test. Validity and reliability tests have been conducted on each instrument. To examine the impact of motivation and performance, a Wilcoxon Signed Rank-test is used to compare the mean before and after the intervention. During the intervention, a semi-structured interview was undertaken to learn more about how students perceived Mayer's Cognitive Theory of Multimedia Learning-based mobile learning apps. The data from the interviews were analysed using thematic and coding analysis. As a result, the intervention can improve student performance in primary school English with significant mean changes, supported by the data from encouraging responses from the interview session.

**Keywords:** digital learning, mobile application, primary school

## 1 Introduction

Mobile gadgets have become integral to daily life in our increasingly interconnected world. Everyone, from young children to senior citizens, relies on these devices for various purposes, such as entertainment, communication, information retrieval, and more. As educators, we recognise the potential of mobile technology to revolutionise education (Yazıcı Arıcı et al., 2023). Mobile ID allows seamless access to educational resources. Students can log in from any device, retrieving personalised content tailored to their learning needs. Imagine a student accessing interactive lessons, quizzes, and study materials conveniently available on their mobile device. Traditional textbooks are giving way to dynamic digital content. Videos, simulations, and interactive modules engage students in ways that static print cannot. Visualising complex concepts, conducting virtual experiments, and exploring historical events become more vivid and memorable (Munajah et al., 2023).

The Malaysian Ministry of Education's blueprint (2013–2025) outlines a vision for modernising the educational system. The seventh shift emphasises the strategic use of ICT (Information and Communication Technology) in learning. By integrating mobile technology, we align with this blueprint and prepare students for the challenges of the twenty-first century. This blueprint was planned to start in 2013 and will continue until 2025. The blueprint states 11 vital operational movements to help the country achieve its objective. According to the blueprint, the 7th shift says that using ICT (Information and Communication Technology) in the learning process will improve the learning experience for the students. ICT is growing more significant in our everyday lives, an integral component of our education, and will significantly change the globe in the technology era (Omodara et al., 2017).

## 1.1    Background of the problem

As educators, we face many difficulties today (Barron & Darling-Hammond, 2008). Getting pupils' attention and enthusiasm in their education is a challenge for teachers everywhere. The students are more interested in technology than in academics. Teachers are attempting to integrate technology into the classroom in response to this problem identified in educational institutions. When working with mobile learning solutions, educational technologists frequently find themselves in a position to deal with pragmatists who will rationally argue that the current technology is meeting their needs as well as the needs of their students as well as enthusiasts who will follow a new technological trend for the sake of the technology[3]. In order to meet the needs of the kids, educators, instructional technologists, and educational technologists face enormous challenges.

## 1.2    Problem statement

After our tongue, English has long been a second language in Malaysia. Malay, Mandarin, or Tamil are typically the locals' first languages (Islam, 2011). Teachers work to enhance how they teach youngsters English since we have this kind of problem (Sukmayasa & Sudiana, 2023). Learning resources, teaching methods, and motivation are only a few variables that impact students' learning abilities. Technology is a helpful tool for pupils (Papadakis, 2023). According to (Clemmons, 2010), technology must be a crucial component of the educational process for pupils. So that students can use technology to strengthen their language skills, teachers should model how to integrate technology into the curriculum (Costley, 2021).

Modern methods and tools should be used extensively in the classroom (Susikaran & Phil, 2013) state. Along with educational methodologies, classrooms have undergone fundamental modifications (Athanassopoulos et al., 2023). The way English is taught in classrooms has changed due to technological use. The use of technology has increased productivity. According to (Drayton et al., 2002), computer technology improves learners' accountability by offering a genuine learning experience. Technology in the classroom has the potential to improve not only instruction but also student behaviour (Papadakis et al., 2023). Considering this, technology can help students overcome motivational learning challenges and enhance language acquisition.

## 1.3    Research objectives

(1) To evaluate the effectiveness of the mobile application in primary school students learning English in terms of their performance.
(2) To identify students' perceptions of mobile applications in learning English.

## 1.4    Research questions

(1) What are the effects of the mobile application on primary school students' performance in learning English?
(2) What is the student's perception of mobile applications when learning English?

## 1.5    Research hypothesis

(1) $H_0$ = There was no significant difference in the respondents' performance in learning English for primary school students before and after the mobile application's intervention.
$H_1$ = There is a significant difference in the respondents' performance before and after the mobile application's intervention in learning English for primary school students.

(2) $H_0$ = There is no significant difference in the respondents' motivation to learn English for primary school students before and after the mobile application intervention.
$H_1$ = There is a significant difference between the respondents' motivation before and after the intervention of the mobile application in learning English for primary school students.

## 1.6    Conceptual framework

Richard E. Mayer and others have worked on the cognitive multimedia learning theory (Mayer, 1999). The Cognitive Theory of Multimedia Learning asserts that learning improves when information is presented in text and visual form. Three fundamental presumptions form the foundation of this idea. Dual coding theory (a) describes how information processing occurs through two distinct channels—auditory and visual. (b) The capacity of each channel has a limit. The cognitive load theory is the name of it. (c) Learning is an active process that includes information integration, selection, organisation, and filtering. (see in Figure 1)
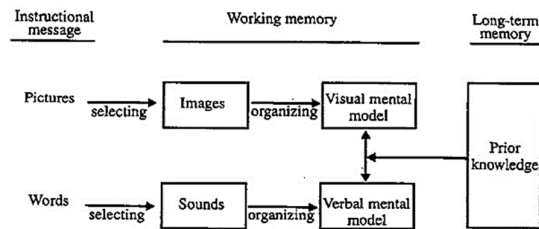
**Figure 1**    Conceptual framework of Richard Mayer's Cognitive Theory of multimedia learning

# 2   Literature review

There is a massive demand for mobile applications in the education sector. The majority of educational institutions are now teaching their students through smartphone apps. The use of mobile devices has increased after the Covid-19 pandemic-related lockdown. Children used to learn at home, and teachers encouraged learning on mobile devices to motivate students to learn properly. In this chapter, the researcher looks at a few studies already conducted in mobile learning applications. The researcher is interested in learning about earlier studies that have been done. Therefore, several keywords include mobile applications in education, English learning, technology in English learning, etc.

## 2.1   The emergence of technology in education

Computers, the internet, and other telecommunications technology are being employed in every aspect of human endeavour, according to (Bandele, 2006). ICT (Information and Communication Technology) use has become increasingly widespread. Due to ICT's widespread adoption, which has sped up teleological, social, political, and economic growth, a network society oriented on ICT has evolved (Yusuf, 2005). Even the field of education has adapted to modern ICT usage. ICT is now essential to everyday learning and teaching. Radio, television, computers, overhead projectors, optical fibres, fax machines, CD-ROM, Internet, electronic notice boards, slides, electronic multimedia, video/VCD machines, and other gadgets were mentioned in (Bandele, 2006). The introduction of mobile language learning

Mobile learning has gained considerable traction as a means of effectively instructing students. The term "mobile-assisted language learning" refers to the use of "mobile technology in language learning, especially in instances where device mobility offers specific advantages" (Kukulska-Hulme, 2012). Portable gadgets, including smartphones, computers, MP3 players, e-book readers, and many more, are included in this mobile-assisted learning (Samala et al.,2023, Kron et al., 2017). Studies on mobile-assisted learning have recently been conducted to demonstrate how quickly it is evolving.

## 2.2   Students and mobile-assisted learning

Mobile devices with internet connectivity, such as smartphones and tablets, are becoming the preferred platform for millennials engaging in various online activities. According to estimates, ownership and penetration rates for the global mobile market will increase. In the year 2025, 5.8 billion subscribers are anticipated. Students use numerous online learning activities. Students are now familiar with online learning and mobile-assisted learning. The Bring Your Device (BYOD) strategy for delivering education has been used in some developed nations. They utilise smartphone apps, 3D programs for the classroom, virtual classroom applications, and online social media (Samala et al.,2023, Kron et al., 2017).

Mobile apps have the potential to significantly improve student performance, particularly in terms of increased "enjoyment, engagement, motivation, focus, and enthusiasm" (Martin & Ertzberger, 2013). In addition, mobile-assisted learning supports "existing constructivist, self-directed, and interactive educational frameworks." This means that it balances the needs of both learners and institutions to provide high-quality learning outcomes at a cheap cost (Rajasingham, 2011). Thanks to learning using cutting-edge technology, students can use this mobile-assisted learning to study wherever they are[16]. Thanks to mobile-assisted learning, students can use cutting-edge teaching strategies and technology in this new environment (Cheung, 2013).

## 2.3   Student motivation and engagement

In order to increase the possibility of students learning 21st-century and educational technology skills, K–12 teachers must consider the need to develop and sustain student involvement

(Ananiadou & Claro, 2009). All educational institutions must keep pupils interested in the material being covered in class. Keeping a student's attention in our class for an extended period can be challenging. The degree to which this is accomplished may significantly affect students' cognitive development and learning capacity[3]. Students learn more and increase their knowledge base the more they participate in the learning process.

Studying how motivation influences student achievement is fascinating since learning involves many intricate factors (Showcase & Bernard, 2010, Giesbers et al., 2013) investigated how the use of online resources impacted students' motivation, engagement, and performance in a facultative summer economics course. The students collaborated to discover answers to six real-world problems as part of the problem-based learning model. Data analysis revealed that more independent motivation was connected to advanced communication technologies.

## 2.4   Students' performance

Mobile technologies have started to play a vital role for teachers and students as they have become more commonly used, thanks to their educational advantages (Zengin et al., 2018). Interactions between students and professors and between students and content can continue outside the classroom (Corbeil & Valdes-Corbeil, 2007).

According to studies by Sarica and Cavus (2009), some teachers still need to be more hesitant to incorporate mobile learning into their lesson plans even though studies have shown its advantages for teaching English as a second or foreign language. Social networking websites have also demonstrated their value in enhancing students' writing and reading skills by encouraging them to use the language they have learned through writing or reading comments and messages (Sarica & Cavus, 2009).

## 2.5   Richard Mayer's Cognitive Theory of multimedia learning

According to Mayer (1999), if we create a multimodal learning medium containing words and graphics, users will learn and retain a subject for a long time. Instead of only the phrase or picture, learning ability is boosted when many media are used. A comprehensive explanation of CTML and its development may be found in Richard Mayer's Multimedia Learning (Mayer, 2009). Managing crucial processes is CTML's second design goal. Students will not be overburdened with information if the content can fully handle the objective. Three tactics are used to do this: segmentation, modality, and pre-training (Theimer, 2019). The meta-analysis of Richard Mayer's Cognitive Theory of Multimedia Learning is presented in Table 1.

**Table 1**    Meta-analysis regarding Richard Mayer Cognitive Theory or multimedia

| Study | Objective | Population | Outcome |
| --- | --- | --- | --- |
| (Samala & Amanda, 2023) | To advocate incorporating Mayer's Cognitive Theory of Multimedia Learning (CTML) with library digital initiatives, especially free educational materials | The population is not stated. | The principle of multimedia learning can be applied to various facets of library operations. |
| (Kulgemeyer, 2018) | This study assessed the advanced communication skills of second-year medical students engaged in a computer simulation (Mpathic-VR) with virtual people or a multimedia computer-based learning module. | Two hundred ten second-year medical students. | Mpathic-VR-assisted information transfer into a more accurate clinical context and advanced communication skills training. |
| (Glahn et al., 205) | Create a structure for good science explication videos. | Students from a German high school are divided into 90 students in one group and 86 students in another. | Students' achievement regarding their advances in conceptual understanding is unaffected by the structure of good explanation videos. However, it ought to have an impact on their advances in declarative knowledge. |
| (Slemmons et al., 2018) | to compare how students' visualisation abilities changed after using mobile augmented reality against traditional learning in an orthographic projection classroom. | Conducted at University Technology Malaysia with 60 students: Thirty students participated in an experiment using mobile augmented reality, while thirty in the control group studied traditionally. | The outcome demonstrated its potential as a tool for spatial visualisation. Due to its affordable production costs, mobile augmented reality is beneficial in educational settings. |
| (Yazıcı Arıcı et al., 2023) | To determine how video length affects student learning in a middle school flipped science class. | One hundred seventy-eight students; 84 females and 94 males of K-12 students. | Results show that while scores immediately after short videos were marginally higher, they did not differ significantly from scores after longer videos. |

# 3    Research methodology

Recent developments in mobile technology have increased the possibilities for offering these services through mobile devices. By extending their educational services to wireless mediums, educational institutions can provide enormous comfort to those off-campus students who only sometimes have time to access internet-equipped computers to obtain essential information from their academic institutions.

## 3.1    Research design

The research design outlined involves a combination of qualitative and quantitative methods to assess the effectiveness of an intervention in a classroom setting. Qualitative data will be gathered through interviews, while quantitative data will be collected through pre-and post-tests and a questionnaire. The researcher plans to employ a pre-experimental design, which means there will not be a control group for comparison. This design allows for the examination of changes before and after the intervention. The pre-test and post-test data will be analysed to determine the success of the intervention, with qualitative insights from interviews used to support the quantitative findings. However, it is acknowledged that pre-experimental designs have limitations, such as their inability to establish solid causal relationships or address complex research questions. Despite these limitations, this approach provides a structured framework for evaluating the impact of the intervention within the confines of the classroom environment.

## 3.2    Research location

The primary school in the state of Johor chosen by the researcher is a cluster and a trust school. This institution's favourable computer lab and strong internet connection influenced the decision. The school will also be pleased to participate in this study by allowing the researcher the necessary time and space. This area was picked since there are more than 100 students there. The researcher will quickly obtain 28 respondents for the study.

## 3.3    Population and research sample

The study's target demographic is the year five pupils from the elementary school. The researcher chose this particular school because it is in a suburb where most students can access technology. The researcher selected 28 students as the sample for this study; this type of sampling is known as purposive sampling. This sampling technique is used since the year 5 English textbook curriculum will be the lesson's focus. The researcher will need help determining the respondents' opinions about the mobile application.

## 3.4    Data collection

Every respondent had a device with them, and the intervention was done in a classroom set up for mobile learning. The lesson on animals is scheduled for two weeks in the Year 5 English Scheme of Work. The respondent conducted the intervention over two weeks with three lessons. Dual language questionnaires and semi-structured interviews were used. This will overcome the language barrier and enable the researcher to acquire accurate results. The researcher will carefully translate the information gathered without altering its true meaning.

## 3.5    Research instrument

In this investigation, two instruments will be employed. The respondents will be given the IMMS questionnaire to gauge their level of motivation. A performance test will be administered both before and following the intervention. The respondents' level of subject knowledge will be thoroughly examined. The researcher will be able to see whether the built mobile application produces good results.

## 3.6    The development of the mobile application

In this section, we delve into the development process of a mobile application designed to enhance English learning for primary school students. We aim to create an effective educational tool by leveraging Mayer's cognitive theory. We opted for MIT App Inventor as our development platform, targeting Android devices and ensuring compatibility with Adobe Animate CC systems. MIT App Inventor is an online coding-based platform that empowers teachers and students to create mobile applications. One significant advantage is real-time monitoring using a connected device during app development, minimising errors and ensuring smoother progress. Our mobile

application is aptly named the 'Endangered Animals Project.' By combining theory-driven design with practical implementation, we strive to create an engaging and effective learning experience for young English learners. (see in Figure 2)
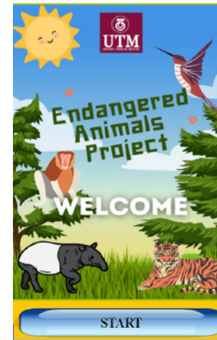


**Figure 2**    The interface of the application

## 3.7    Data analysis

The information gathered from the questionnaire and performance test is rigorously examined. (see in Table 2)

**Table 2**    Methodological overview of research

| Research question | Instruments | Data Analysis |
|---|---|---|
| What are the effects of the mobile application on primary school students' performance in learning English? | Performance test IMMS questionnaire (Keller, 2010) | Descriptive analysis -Minimum value -Maximum value -Mean -Standard Deviation |
| To identify students' perceptions of mobile applications in learning English. | Semi-structured interview | Thematic analysis |

According to the recommendations made in the study by (Slemmons et al., 2018), thematic analysis will be conducted on the raw data gathered from the interview. Table 3 explains the stages of developing the subject they suggested.

**Table 3**    Meta-analysis regarding Richard Mayer's Cognitive Theory of multimedia

| Phases | Stages |
|---|---|
| Initialisation | Reading transcripts and highlighting meaning units. Coding and looking for abstractions in participants' accounts. Writing reflective notes. |
| Construction | Classifying, Comparing, labelling, Translating, transliterating, Defining, and describing. |
| Rectification | Immersion and distancing; Relating themes to established knowledge; Stabilizing. |
| Finalisation | Developing the storyline |

# 4    Results

## 4.1    Motivation

The findings of this quantitative analysis are used to answer research question 1, which is "What are the effects of the mobile application on learning English for primary school students in their performance?". This finding was made using the IMMS (Instructional Materials Motivation Survey) questionnaire. Descriptive and inferential statistics were used to assess the collected data. (see in Table 4)

**Table 4**    Descriptive statistic for pre and post questionnaire

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Pre Questionnaire | 26 | 1.38 | 4.27 | 2.5489 | 0.85651 |
| Post Questionnaire | 26 | 1.08 | 4.92 | 3.7419 | 1.37089 |
| Valid N (listwise) | 26 | | | | |

A non-parametric test (Wilcoxon Signed Ranks Test) is used as inferential statistics to show a significant difference between before and after intervention. The hypothesis for this test is as follows:

Ho = There is no significant difference in the respondents' motivation to learn English for primary school students before and after the mobile application intervention.

H1 = There is a significant difference between the respondents' motivation before and after the intervention of the mobile application in learning English for primary school students. (see in Table 5 and 6)

**Table 5**    Rank statistics for pre and post IMMS questionnaire

|  |  | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
|  | Negative Ranks | $9^a$ | 19.83 | 178.50 |
| Post Questionnaire – | Positive Ranks | $27^b$ | 18.06 | 487.50 |
| Pre Questionnaire | Ties | $0^c$ |  |  |
|  | Total | 36 |  |  |

**Note**: [a] Post Questionnaire < Pre Questionnaire; [b] Post Questionnaire > Pre Questionnaire; [c] Post Questionnaire = Pre Questionnaire.

**Table 6**    Wilcoxon signed rank test based on motivation level of respondent

|  | Post Questionnaire – Pre Questionnaire |
|---|---|
| Z | $-2.428^b$ |
| Asymp. Sig. (2-tailed) | 0.015 |

**Note**: [a] Wilcoxon Signed Ranks Test; [b] Based on negative ranks.

The findings of this study indicate that certain presumptions are held regarding Mayer's Cognitive Theory of Multimedia Learning, which unquestionably affect a student's desire for the English topic and/or related classes. The lowest and maximum values increased from before the intervention to after, as shown by the statistical data above, demonstrating that students' motivation improved due to using digital games for learning.

## 4.2   Performance

The results of this quantitative study are used to answer research question 1, "What are the effects of the mobile application in English language learning for primary school students on their performance?" Descriptive and inferential statistics were used to assess the collected data. (see in Table 7)

**Table 7**    Descriptive Statistics for Pre And Post Performance Tests

|  | N | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Pre-test | 26 | 51.54 | 19.327 | 10 | 80 |
| Post-test | 26 | 79.23 | 21.340 | 40 | 100 |

A non-parametric test (Wilcoxon Signed Ranks Test) is used as inferential statistics to show a significant difference between before and after intervention. The following is the test's proposed hypothesis:

Ho = There was no significant difference in the respondents' performance before and after the mobile application's intervention in learning English for primary school students.

H1 = There is a significant difference in the respondents' performance before and after the mobile application's intervention in learning English for primary school students. (see in Table 8 and Table 9)

**Table 8**    Descriptive statistics for pre And post performance tests

|  | N | Mean Rank | Some of Ranks |
|---|---|---|---|
| Negative Ranks | $0^a$ | 0.00 | 0.00 |
| Positive Ranks | $26^b$ | 13.50 | 351.00 |
| Post-test – Pre-test |  |  |  |
| Ties | $0^c$ |  |  |
| Total | 26 |  |  |

**Note**: [a] Post-test < Pre-test; [b] Post-test > Pre-test; [c] Post-test = Pre-test.

**Table 9**    Respondent's performance based on Wilcoxon Signed Ranks test

|  | Post-test – Pre-test |
|---|---|
| Z | -4.504[b] |
| Asymp. Sig. (2-tailed) | 0.000 |

**Note**: [a] Wilcoxon Signed Ranks Test; [b] Based on negative ranks.

Per Mayer's Cognitive Theory of Multimedia Learning, the results of pre- and post-performance tests demonstrated the effects of mobile applications on the performance characteristics of primary school pupils who use mobile apps while learning English. These results finally demonstrate a good correlation between the motivation and performance of the students studying English and the effects of mobile apps, which aligns with Mayer's theory.

## 4.3    Student's perception of learning based on Mayer's Cognitive Theory of multimedia learning in English using mobile apps

To address research question 2, which is to determine students' perceptions of mobile applications for English learning, the findings of this qualitative study are to be applied. Six students from the respondents who participated in quantitative research are the respondents for this interview. Based on the post-test results, the respondents in this study were determined. The two primary issues developed from the data acquired from the interviews are the Strengths and Benefits of Conducting Intervention and the weaknesses and Problems Encountered When Conducting Intervention. Based on Mayer's cognitive theory of multimedia learning in mathematics, the researcher can pinpoint how primary school students perceive digital game-based learning apps using the two key themes. Below is a display of the significant interview data's themes, subthemes, and coding. (see in Table 10)

**Table 10**    Primary themes, subthemes, and coding for the interview data

| Main theme | Code | Sub-Themes |
|---|---|---|
| Weakness/ Problem faced | W1 | The button press response is not smooth |
|  | W2 | Tablet lagging |
|  | W3 | I need guidance when using it. |
|  | W4 | Some buttons are small |
| Strengths/Benefits | S1 | Remember to learn with apps quickly |
|  | S2 | I work to achieve a better score. |
|  | S3 | Recall more |
|  | S4 | Fun to play and learn |
|  | S5 | It is simpler and easier to understand |
|  | S6 | Animations that catch the attention |
|  | S7 | Attractive audio |

## 5    Discussion

It is clear from the results of the descriptive statistics for the pre-and post-IMMS surveys that students were more motivated after using digital games for learning. The data gathered through the IMMS instrument also showed the effects of digital game-based learning apps for primary school students based on Mayer's Cognitive Theory of Multimedia Learning in English. According to one interviewee (R1), mobile apps throughout the session allowed the respondent to comprehend the subject matter thoroughly. Thus, the effects of mobile apps can be seen in how they motivate and support primary school students' learning processes. The findings of this study indicate that certain presumptions are held regarding Mayer's Cognitive Theory of Multimedia Learning, which unquestionably affect a student's desire for the English topic and/or related classes.

Per Mayer's Cognitive Theory of Multimedia Learning, the results of pre- and post-performance tests demonstrated the effects of mobile applications on the performance characteristics of primary school pupils who use mobile apps while learning English. The findings demonstrate that 24 students, or 92% of the responders, received exceptional, exemplary, or adequate marks (grades A, B, and C). This represents a tremendous improvement from the 27% on the pre-performance exam, the test given before the intervention. With the use of mobile apps, the students were able to enhance their learning practices, which improved their academic performance.

Based on interview data, all six respondents (R1-R6) who participated in the study noted that the tools for learning the English language are incredibly entertaining and exciting. The mobile apps, according to three out of six students (R2, R3, and R4), helped them better understand the content they had to master, which improved their grades. The mobile apps, according to 3 of 6 students (R1, R4, and R5), made retaining the subject they were studying simple. The findings also revealed that the students believed they could quickly grasp the subject matter as they worked on the English-related classes utilising the method above and would advance their professions to the anticipated level.

# 6    Conclusion

From the discussion above, it was clear that several important factors substantially impact how well students learn in any subject or course, including English. These factors often include instructional strategies, instructional materials, performance improvement, and a significant boost in motivation. Accordingly, correct and timely implementation of mobile learning apps will likely impact students' learning in connection to the subject or course of English. The most effective use of mobile apps can have a good effect on the learning accomplishment of the students because many students rightfully view English as a dull and intimidating topic. In conclusion, adopting mobile apps based on Mayer's Cognitive Theory of Multimedia Learning significantly impacts instructional technology for students learning English, ultimately affecting their future learning growth.

Notably, mobile learning apps' correct and timely implementation holds promise for enhancing students' learning experiences, particularly in English language education. When effectively utilised, mobile apps can positively impact students' learning achievements. English, often perceived as a challenging subject, benefits from innovative app integration. The strategic adoption of mobile apps aligns with Mayer's Cognitive Theory of Multimedia Learning, enhancing instructional technology for English learners. The most effective use of mobile apps can mitigate the perception that English is a dull and intimidating topic. By embracing this technological shift, we pave the way for students' future learning growth.

In conclusion, the adoption of mobile apps, guided by cognitive theories, significantly shapes instructional technology for students learning English. This impact reverberates beyond the classroom, influencing their learning journey.

# 7    Limitations and future studies

Twenty-eight fifth-grade children with access to mobile tablets and a computer lab with reliable internet served as the study's responders. The data gathered for this study only reflected a limited sample size from one type of population, which is a drawback. As a result, these findings might be different from nearby primary schools. This investigation was also conducted over two weeks. Some suggestions will help in the project's future enhancement based on the flaws or other destructive features noticed with the mobile apps. Some class members needed to familiarise themselves with the technology, which made utilisation challenging. The conventional mode of teaching is to blame for this issue, so as a solution, educators should embrace digital technologies to reach these children. Additionally, I suggest using a different font size due to some pupils' issues with typing mistakes.

## Conflicts of interest

The authors declare that they have no conflict of interest.

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