



---

## **Enhancing Mathematical Learning: A Comprehensive Review of Mobile Applications, Abacus Training and Student Attitude.**

*Aditya N. Patil<sup>1</sup>, Sanket V. Ghorpade<sup>2</sup>, Aditya G. Nimbalkar<sup>3</sup>, Mithila R. Velhal<sup>4</sup>, Mayur S. Gawade<sup>5</sup>*

Bachelor of Engineering (Electronics and Telecommunication), Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati, India.

[adityapatil687@gmail.com](mailto:adityapatil687@gmail.com), [sanketghorpade2050@gmail.com](mailto:sanketghorpade2050@gmail.com), [rajnimbalkaraditya2002@gmail.com](mailto:rajnimbalkaraditya2002@gmail.com), [velhalmithila20@gmail.com](mailto:velhalmithila20@gmail.com), [mgawade1100@gmail.com](mailto:mgawade1100@gmail.com)

---

### **ABSTRACT:**

This project report presents a mobile application developed using React Native, designed for Abacus students to enhance mathematical problem-solving skills. The app offers a user-friendly interface for practicing a range of Abacus problems, customizable by the number of digits in operands, difficulty levels, and time constraints. A standout feature includes "Flash" exercises for quick practice with instant performance feedback. The visually appealing app provides an engaging learning experience, making it an essential tool for mastering Abacus problem-solving techniques.

Keywords: Mobile Application, React Native, Problem-solving Skills, Customization, Proficiency Levels, Interactive Features, Comprehensive Exercises, Mastery of Abacus Techniques Educational Technology

---

### **1. Introduction:**

The development of mobile applications has witnessed tremendous growth in recent years, providing users with convenient and accessible solutions for various needs. In this context, our project report explores the creation of an innovative mobile application using React Native, with a specific focus on catering to Abacus students aiming to enhance their mathematical proficiency.

The app, aptly named "Abacus," is designed to offer a comprehensive platform for students to practice a wide range of mathematical operations, including addition, subtraction, division, percentages, squares, square roots, cubes, and cube roots. It's main objective is to give users a dynamic and interesting learning experience so they can effectively learn Abacus problems.

In this report, we will delve into the key features of the Abacus app, detailing how it allows users to customize their practice sessions by selecting the number of digits in each operand for mathematical operations. By offering this level of personalization, students can tailor their learning journey to match their individual skill levels and desired challenges.

Furthermore, we will explore how the app's time difficulty settings enable users to test their abilities under various time constraints, providing an opportunity to push their boundaries and strive for continuous improvement. Through "Flash" exercises, students can rapidly practice mathematical operations and receive immediate feedback on their performance, fostering a sense of accomplishment and motivation.

An essential aspect of the Abacus app is its user interface, which has been thoughtfully designed to be visually appealing and user-friendly. By ensuring an intuitive navigation experience, users can focus their attention solely on the mathematical exercises, thereby optimizing their learning outcomes.

Using the help of this project, we hope to demonstrate the technical aspects of developing apps using React Native, including the difficulties encountered during implementation and the solutions used. We'll also talk about the technologies and tools used to make the app's user interface fluid.

In conclusion, the Abacus app represents an exciting endeavour in the domain of educational mobile applications. By catering to the unique needs of Abacus students and offering a customizable and engaging platform, this app strives to become an invaluable tool for enhancing mathematical problem-solving skills. Through this report, we hope to shed light on the development journey and highlight the app's potential in empowering students on their mathematical journey.

## 2. Literature Survey:

**M Kay, Robin. (2020).** [1] This study found that students have positive attitudes towards these apps and experienced improved learning outcomes. However, teachers were neutral about app design but acknowledged their educational value. Notably, teacher gender and teaching strategies significantly influenced student performance, with female teachers and collaborative learning yielding higher scores (Kay, 2020). This research contributes to the understanding of mathematics app effectiveness and the role of teachers in enhancing learning.

**Jadhav, A.K. & Gathoo, Varsha. (2018).** [2] It highlights that mastery over numeracy is fundamental for mathematical literacy. Historically, children with hearing loss have faced challenges in numerical ability and mathematical skills compared to their hearing peers. Language is identified as a crucial factor in accessing mathematical information, and studies show a strong connection between language and mathematical abilities. The research also points out that cognitive development required for numerical ability is closely linked to the development of verbal language. Individuals with hearing loss may lack estimation skills and early numerical concepts due to their hearing impairment and limited language exposure. These findings underscore the significance of addressing numeracy and mathematical skills in children with hearing loss.

**Jarrah, A., Almassri, H., Johnson, J., & Wardat, Y. (2022).** [3] The literature survey in the study by Jarrah, Almassri, Johnson, and Wardat (2022) highlights the challenge of teaching fractions in the United Arab Emirates and the country's ambition to excel in mathematics. It addresses the need to improve students' performance in learning fractions. The study used a quasi-experimental methodology and digital game-based learning (ABACUS) to explore this. The findings showed that students who learned using ABACUS had better test scores than the control group. This shows that teaching fractions through digital game-based learning can be a successful substitute. The study's conclusions could support the incorporation of digital game-based learning in educational settings and have consequences for math teachers and curriculum designers.

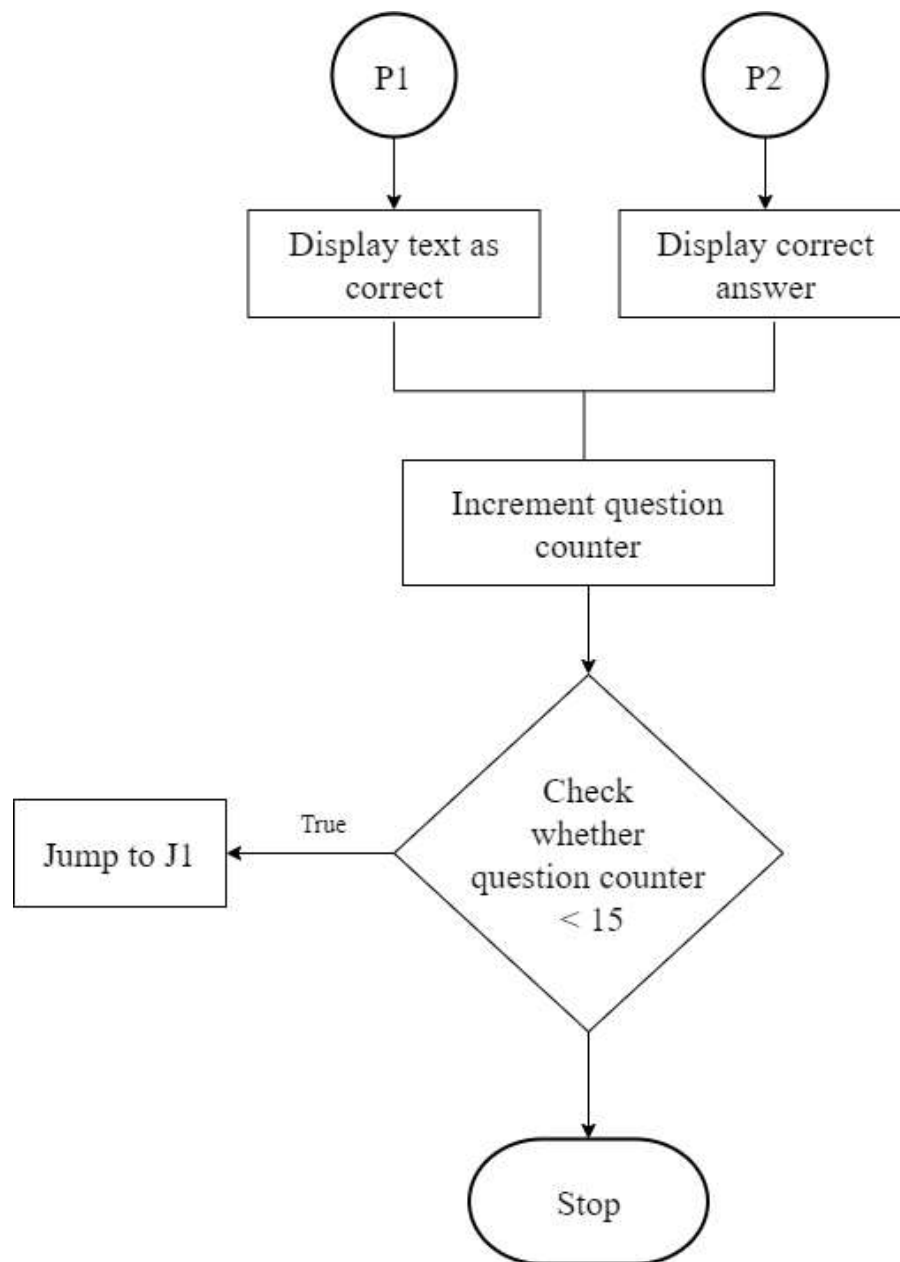
**Fabian, K., Topping, K. J., & Barron, I. G. (2018)** [4] According to student interviews and end-of-activity evaluations, the experimental group had a favorable opinion of the mobile activities. Students' attitudes about mathematics remained largely unchanged, but the control group's level of enjoyment decreased. According to Fabian et al. (2018), the t-test revealed a significant difference in the gain scores between the groups, indicating that the experimental group had made greater gains. The study found that students responded well to the usage of mobile technology in terms of their perceptions and enhanced performance. However, its influence on students' attitudes towards mathematics requires further investigation, suggesting potential areas for future research.

**Laura A. Outhwaite, L. A., Faulder, M., Gulliford, A., & Pitchford, N. J. (2018).** [5] Through contrasting their use with conventional small-group-based arithmetic activities or with standard math practice on its own, the study sought to clarify the effects of these math apps as a kind of high-quality math instruction. The results of a 12-week experiment revealed that both types of app adoption led to significantly higher increases in arithmetic learning when compared to regular math practice. The apps improved arithmetic reasoning and problem-solving abilities by focusing on fundamental facts and ideas. Crucially, there were no appreciable variations between the two ways it was implemented, indicating that it could be used in a well-rounded curriculum. The popularity of these interactive apps, which combine play and direct instruction and are based in instructional psychology, demonstrates their ability to effectively enhance student achievement in arithmetic and efficiently deliver high-quality training.

**Jeremias E. Obina, Joseph B. Gabe, Shery Mae D. Angcon, Bhlyzyr Thryz R. Diaz, Vaneza Joy Y. Largo, Marvin C. Chiva, Iolai G. Balanos. 2022** [6] The findings revealed that students predominantly used calculator apps (80.85%) and perceived math apps as beneficial aids for solving math problems, supplementing teaching, promoting specific lesson learning, and enhancing academic performance. However, the study also indicated that technical issues were a common reason for app usage. Furthermore, the research highlighted that students' reliance on math apps could lead to dependency, laziness, and tiredness, affecting their study habits. Crucially, the study found a strong correlation between study habits and academic achievement for Notre Dame of Midsayap College math students, as well as between the use of math apps and study habits. These results highlight the complex effects of using math apps on students' learning outcomes and behaviors.

**Arbert B. Lanchita, Mark Daniel D. Paler, Eleuterio A. Canoy, Jr. The Use of Math Apps Perceived by Senior High School Students and their Academic Achievement of Spring integrated School. 2019-01-18.** [7] The use of math applications and academic accomplishment among senior high school students at Spring Integrated School were the subjects of a 2019 study by Lanchita, Paler, and Canoy. They collected information on students' opinions on and usage of math apps using a self-made questionnaire. With a p-value of 0.0498, the study, which used a descriptive-correlative methodology, discovered a substantial correlation between academic achievement and the use of math apps. The outcomes are consistent with a prior study conducted by Zhang et al. (2015), which demonstrated a 15% rise in mean scores from the pre-test to the post-test and a noteworthy improvement in students' arithmetic performance following the use of math apps. This implies that the use of math apps enhances academic performance.

**Ijane Guarte Barrientos.(2021)** [8] Research is being done on how math applications affect eighth-grade pupils' arithmetic performance under the new regular education system. Shulman's TPACK framework, which takes into account the relationship between a teacher's comprehension of instructional technology, pedagogical content knowledge (PCK), and topic knowledge, serves as the foundation for this investigation. Pre- and post-tests were used in the quasi-experimental form of the study to assess the pedagogical characteristics and design of math apps. Students' performance in mathematics improved significantly from developing to proficient and advanced stages, according to the analysis, which also showed that the pedagogical and feature design of math apps had a major impact. The study found that pupils' performance in math is greatly impacted by math apps. Based on these results, the study suggests that educators encourage students to use apps and related learning resources to improve their mathematical proficiency, that educational institutions attend to the needs of students in the new normal education setting, and that students use a variety of math apps to improve their mathematical skills (Barrientos, 2021).

**3. Flowcharts:****Fig: Flowchart-1**

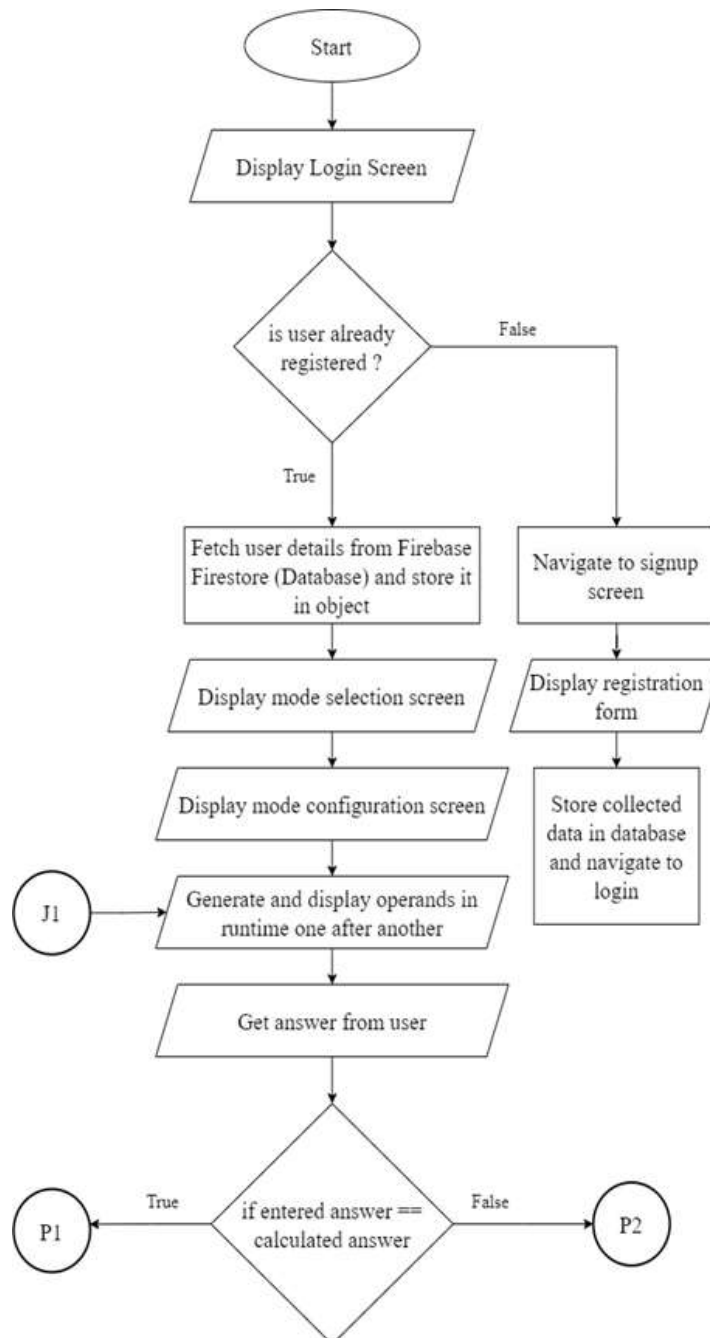


Fig: Flowchart-2

#### 4. Conclusion:

Mobile technologies, Abacus training, and mathematics apps positively impact student performance and attitudes. These technological tools offer innovative pathways for enhancing mathematical learning, but the role of educators remains pivotal. As technology continues to redefine educational paradigms, the interplay between technology and teaching promises to reshape the landscape of mathematics education, offering exciting prospects for the future.

#### 5. References:

- [1] Kay, Robin. (2020). Analysing the use of mathematics apps in elementary school classrooms. Contemporary Educational Researches Journal.
- [2] Jadhav, A.K. & Gathoo, Varsha. (2018). Effect of Abacus Training on Numerical Ability of Students with Hearing Loss. Disability, CBR and Inclusive Development.

- 
- [3] Jarrah, Adeeb & Almassri, Haneen & Johnson, Jason & Wardat, Yousef. (2022). Assessing the impact of digital games-based learning on students' performance in learning fractions using (ABACUS) software application. *Eurasia Journal of Mathematics, Science and Technology Education*.
- [4] Khristin Fabian, Keith J. Topping & Lan G. Barron. 23 February 2018. Using mobile technologies for mathematics: effects on student attitudes and achievement. *Educational Technology Research and Development*.
- [5] Laura A. Outhwaite, Marc Faulder, Anthea Gulliford and Nicola J. Pitchfordcorresponding. 2018 Jun 25. Raising Early Achievement in Math With Interactive Apps: A Randomized Control Trial. *Journal of Educational psychology*.
- [6] Jeremias E. Obina, Joseph B. Gabe, Shery Mae D. Angcon, Bhlyzyr Thryz R. Diaz, Vaneza Joy Y. Largo, Marvin C. Chiva, Iolai G. Balanos. 2022. Math Apps Utilization: Its Perceived Effects To The Academic Performance Of Mathematics Major Students. *European Journal Of Educational Studies*.
- [7] Arbert B. Lanchita, Mark Daniel D. Paler, Eleuterio A. Canoy, Jr. The Use of Math Apps as Perceived by Senior High School Students and their Academic Achievement of Spring integrated School. 2019-01-18. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*.
- [8] Ijane Guarte Barrientos. The Use Of Math Apps And The Mathematics Performance Of Grade 8 Students In New Normal Education. July 2021. *EPRA International Journal of Research and Development (IJRD)*.