



# Mobile Technology: A Contribution in Technological material setting, Fulfill the Learner's need and Achieving the Aims of Teaching Mathematics in Indian context

<sup>1</sup>Marufa Gulnaz , <sup>2</sup>Prof. Jessy Abraham

<sup>1</sup>Research scholar, Department of Teacher's Training and Non-Formal Education, IASE, Faculty of Education Jamia Millia Islamia, New Delhi.

<sup>2</sup>Professor, Department of Teacher's Training and Non-Formal Education, IASE, Faculty of Education Jamia Millia Islamia, New Delhi.

E-mail - <sup>1</sup>marufagulnaz@gmail.com, <sup>2</sup>jabraham@jmi.ac.in

**Abstract:** Mobile technologies have facilitated various approaches in learning platforms, especially in the mathematics field, and made teaching-learning of mathematics easy and enjoyable to some extent. In this article, the writer is discussing several aspects and tried to show how Mobile devices have contributed to the field of mathematics and made helpful in enjoyable teaching and learning of this subject.

Those major perspectives and their minor topics are as; 1. Pertaining to the Technological Material setting 2. Pertaining to the learner 3. Pertaining to meet the aims of teaching Mathematics

Through the picturization of mobile device, its application and screenshot pictures, it is used to tell many words in respect of the use of mobile technology in mathematics education and try to show that mobile technology is also a part of the curriculum through which all the aims of mathematics learning can be achieved.

**Keywords:** Mobile Technology, Technological material-setting, Mathematics, Learners, Teaching Mathematics Learning, Indian context.

## 1. INTRODUCTION:

'Mobile learning' is also known as 'M-Learning'. this is a new introducing way for accessing learning content by the using of 'Mobile phones. Mobile learning is supported by the help of mobile devices which continue accessing the process of learning. This process can be done by using devices like smartphones, laptops, or tablets. We can learn whatever, whenever and wherever we want! we can easily say that it fulfills the need for personalized learning. With the introduction of the mobile in the learning system, the system of education, teaching and learning towards is moving rapidly in the direction of change. (1)

Mobile learning facilitates a path for educational institutions and organizations to cater knowledge and educational materials to students on any platform at the time of requirement. Students use mobile-based applications and tools to complete their works, sending and uploading assignments to the teacher and mates, download course materials and work in online social groups to complete the assigned tasks. (2)

The approaches of Mobile Learning are based on the social constructivist principle of technical education. This theory emphasizes the importance of learning as a dialogue within a socio-cultural context that is largely shaped by learner behavior and the efficient use of knowledge, tools and resources to achieve greater knowledge; Solve problems through dialogue and reflective thinking to link current experience to past knowledge that creates new interpretations.

## 2. MATHEMATICS:

Mathematics is one of the most essential topics in the field of education; where students create their ability of thinking, problem-solving, developing the arithmetical skills and principles of engineering for analysis and induction. and they use the mathematical rules in multiple areas of knowledge such as business, technology, engineering, natural sciences and many other fields. (3) So, we cannot imagine the educational world without having mathematics subject.



### 3. MOBILE LEARNING IN MATHEMATICS:

Mobile technologies have facilitated various approaches to learning. And as far as mathematics is concerned, this technology has also contributed a lot in this field and made teaching-learning of this subject easy and enjoyable to some extent. But the question is “HOW”. Let’s We are discussing the answer to “HOW”. There are several aspects which will describe the above question are given below.

#### 3.1 Pertaining to the Technological Material setting

a) **Usefulness:** The modes of mobile learning is useful for the learner. Mobile facility provides lots of modes of learning mathematics such as internet searching, video clips, e-books blogs, mathematics learning apps, social media, capturing the scenario, recording session, calculator, online classes and many more.



**Picture 1** (*Multiple features of Mobile technology*) showing a single MOBILE contains worldwide-level contents. This single technology solves approximately all the human mathematical problems.

b) **Cost-effectiveness:** Nowadays mobile phones are cost-effective. It can be purchase at a minimal cost. The cost of mobile devices is becoming lower and lower and if compare with the cost of books, the purchasing of mobile phone is easy than books. (4)





Rank	Model	Change in ranking	Price range	Launched in
1	Realme 2 Pro	New entrant	10k-20k	Oct 2018
2	Realme 2	2	5k-10k	Sept 2018
3	Samsung Galaxy A7 2018	25	20k-30k	Sept 2018
4	Honor 8X	New entrant	10k-20k	Oct 2018
5	Vivo V11 Pro	-3	20k-30k	Sept 2018
6	Xiaomi Redmi 6 Pro	-5	10k-20k	Sept 2018
7	Xiaomi Redmi 6A	1	5k-10k	Sept 2018
8	Realme C1	New entrant	5k-10k	Oct 2018
9	OPPO F9 Pro	-6	20k-30k	Aug 2018
10	Xiaomi Redmi Note 5 Pro	0	10k-20k	Feb 2018
11	OnePlus 6T	New entrant	>30k	Oct 2018
12	Xiaomi Mi A2	-3	10k-20k	Aug 2018
13	Samsung Galaxy J8 2018	-7	10k-20k	Jun 2018
14	Motorola One Power	New entrant	10k-20k	Oct 2018
15	Vivo V9	-4	10k-20k	Apr 2018
16	Nokia 6.1 Plus	-11	10k-20k	Aug 2018
17	Xiaomi Redmi 6	-10	5k-10k	Sept 2018
18	OPPO A3s	-5	10k-20k	Jul 2018
19	OPPO A5	-7	10k-20k	Sept 2018
20	Nokia 5.1 Plus	0	10k-20k	Oct 2018

**Note:** The list has been generated on the basis of mobile phones searched by visitors on [www.91mobiles.com](http://www.91mobiles.com) during the month of Oct 2018

**Picture 2** (Price and types of mobile phone available in market) showing the rate of mobile phones. How much cheapest nowadays. And a single Mobile phone do approximately all worlds work.

c) **Easily Availability:** Mobile phone is easily available in the market. Data shows that in 2019, India had approximately 500 million smartphone users. Amidst the global Corona pandemic, smartphones have emerged as a multipurpose tool for the government in various ways. So, India is expected to reach 829 million smartphone users by 2022. This is the only cause of easy availability of this technology in the market and the COVID-19 pandemic situation which has given the chance to use this widely. (5)

d) **Accessibility:** The Accessibility of mobile phones to all is very easy. If Students have any problem, they can't wait for someone, they just hold their smartphone and sort out their problem in seconds. Even if the students are in kindergarten or university level and normal or special as shown by the picture.





**Picture 3** (*Easily accessibility of mobile phone*) and **Picture 4** (*Difference between studying by books and by mobile phone*) discussing about that Usually when we read books, we have to sit properly hold the book on hand and read. If you want to search for something you have to consult another book. The weight of books also an issue in carrying. And if we read on a mobile phone, we can use many ways as our wish. And if having any problem just sort it out on the spot of time. So that it gives hands-on learning.

### 3.2 Pertaining to the learner

a) **Learner-centeredness:** Mobile technology is gradually facilitating and enhancing the interaction of learners through access, discussion and sharing of related information via social networks. This technology brings opportunities for educators to design interactive learning activities and explore the knowledge. This learning system is adaptive to mobile learners, which can provide the right learning content at the right place to the right learners at the time of need.

(6)

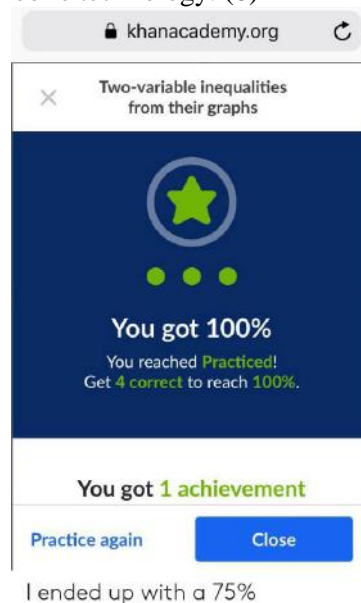


**Picture 5** (*solving mathematical problem in phone*) showing the learning of mathematics whatever students' wants they can find and learn.





b) **Motivation and encouragement:** Learners get motivation and encouraged by the mobile device to be used. The Utilization of mobile devices shows that a direct and significant relationship with students' motivation towards Mathematics. It creates a positive relationship between mobile and students' perceived performance, satisfaction and behavior while students occupied in learning. (7) Students also provide detailed explanations of their problem-solving strategies in mathematics with the help of mobile technology. (8)



**Picture 6:** Screenshot of a page of app was taken by of Khan Academy mathematics learning apps test series in which the students get motivation after giving the correct answer and it also motivating for further test series.

While studying mathematics by mobile application, it reduces the student's anxiety of communication with the teacher, increases the sense of respect for the teacher and provides confidence, support with other students.

c) **Readiness and mental set:** Learners are always ready and mentally prepared to learn through mobile because mobile device presents something new and different in every aspect. While studying mathematics by mobile applications, it reduces the student's fear of conversation with the teacher, increases their sense of respect for the teacher and provides confidence, support with other students. (3)



**Picture 7:** This is the picture of VEDANTA learning app that compete the mindset of society that “for achieving high, you have to learn in high profile institution”. These students qualify India's most tough engineering exam by sitting at their home and learned by their own mobile device.

d) **Learner friendliness:** Mobile technology is such a technology that is verily adopted by students. According to a Nielsen survey of adults with children under the age of 12 in tablet-owning households in the USA, 70% of children share a tablet with family members. (9) The use of mobile technologies is more common at elementary than secondary level. Students like the mobile-based math activities Due to the intervention of mobile learning there is also a slightly positive change in students' enjoyment, self-confidence and values towards mathematics, that's why they fully satisfy with change pedagogy and technology use. (10)



**Picture 8 & Picture 9:** *children studying through technology*

These two pictures show that how children friendly with mobile technology and engage in learning in any environment.

### 3.3 Pertaining to meet the aims of teaching Mathematics

#### a) Utilitarian aim

Mathematics has numerous applications in one's daily life; during shopping, planning, different activities, requiring time calculation, etc. (11)

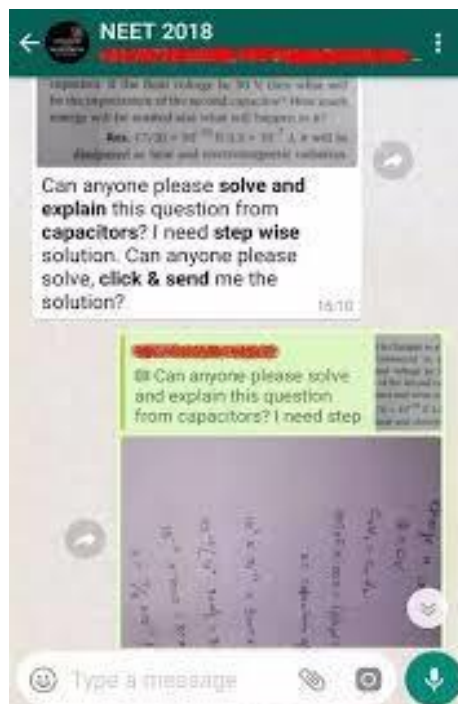


**Picture 10:** *Screenshot of children mathematical mobile app game showing an overview of 'The Mathematics-based game app' in mobile which showing that a boy purchasing food items from shop skill below which solves real-life problems. Children put themselves in place of boy and solve purchasing skill as how many rupees the shopkeeper will return if he paid 100 coins and the cost of food items were 73.5 coins. When students play game and the same applies in their daily life. This exhibit of mobile technology full fill the utilitarian aim of mathematics.*

#### b) Disciplinary aim

Mathematics being discipline having own nature and structure its teaching aim is to develop the characteristics such as accuracy, reasoning, problem-solving skills, truthfulness, patience, etc. (11)  
 When a student faces any problem, he can find a solution by internet searching and YouTube guidance.

Nowadays due to having smart-phone peoples have their own WhatsApp group in which the respective members are joined. So, every class also having a WhatsApp group. If students have any problem, they share in the WhatsApp group. And if someone else able to solve that problem solve it and share in the respective group. Which develops problem-solving skill. And if someone challenges this solution the students trying to defend it. And also show a piece of evidence. Like these in **Picture 11** (*Screenshot of WhatsApp chat of competing group*).



**Picture 11:** Screenshot of WhatsApp chat of competing group

### c) Cultural aim

Mathematics is related to other disciplines like science, engineering medicine, art, music, etc. so mathematics has also cultural value and it has to be preserved.



**Picture 12:** Picture of homepage of mobile screen showing there is lots of social network such as YouTube, Facebook, Twitter, Instagram, LinkedIn, etc. in Mobile through which students share their culture values and also respect other's value.

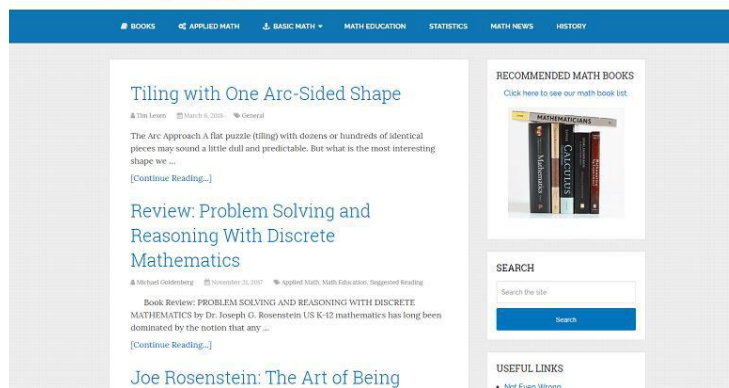


**Picture 13** (Picture of mathematics classroom shared on social media) is showing that the teacher prepared mathematics teaching aid with the help of lyrics. And share it on social media in the sense that others will also get help from it.





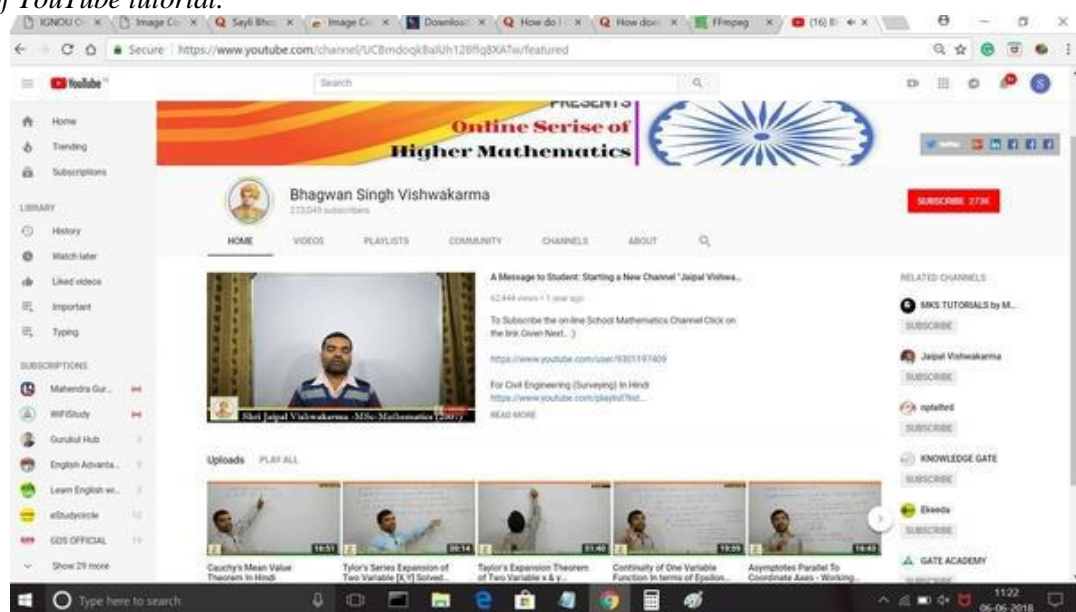
## MATH $\infty$ BLOG



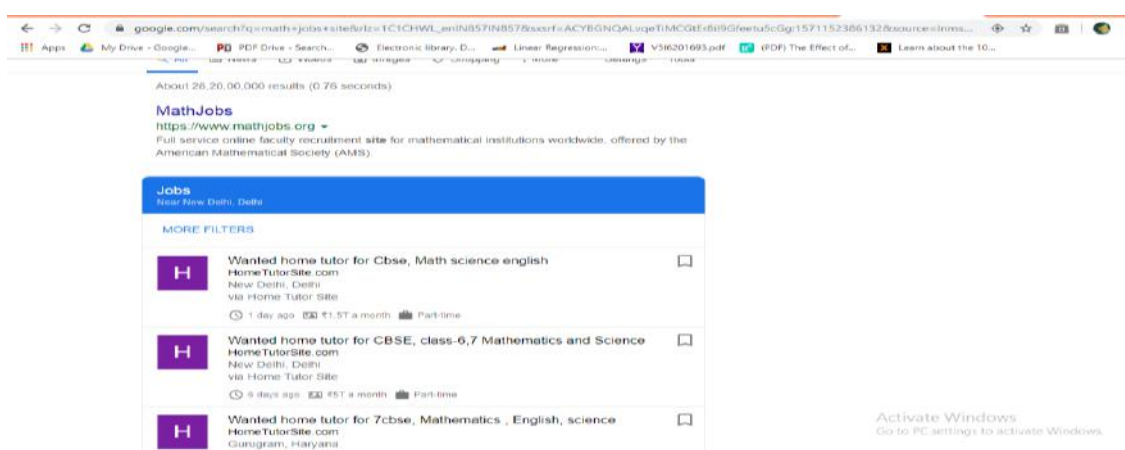
**Picture 14** (a picture taken through a blog) is discussing about If students and teachers do something new or different, they get help by the blog and also post their research on blogs. This consciousness shows how we can preserve cultural value through mathematics and mobile.

### d) Vocational aim

Mathematics education helps individuals to emerge a skilled person and to grow independent to earn their livelihood. There are lots of Mathematics Learning Apps, Teaching Apps, Mathematics YouTube channel, blog post, etc. which is prepared by stakeholders in which they upload video and article papers and earn money. Most of the teachers also share it helping with their students For easily understanding mathematics. As it is showing in **Picture 15**: Screenshot of YouTube tutorial.



**Picture 15:** Screenshot of YouTube tutorial







**Picture 16** (*Screenshot of job portal website*) showing a job notification. There are lots of other websites which provide jobs which meets the specific requirement and specific criteria. And if they subscribe it gets notification regularly.

#### e) Social aim

Mathematics and society are closely related. Mathematics is being extensively employed in planning a developmental program of society. Students have the responsibility to contribute and participate in the development of society.



**Picture 17** (*A picture of Khan academy website page*) Khan Academy is a non-profit educational organization created in 2008 by Salman Khan with the goal of creating a set of online tools that help for educating students for free. First, they made mathematics tutorial video watchable on the Internet and published his content on YouTube. The organization also produces short lessons in the form of videos. Its website also included supplementary practice exercises and materials for educators. All resources are available for free to users of the website. (12) This great step of Khan Academy helping society for educating at free of cost. Many well-known organizations also funding this organization.

Like this other student also serving the society and nation in another way. If society and nation need help related or not related with math. They make an advertisement and share it all social networking site. Messages in WhatsApp chat and make a call with the concerned person if someone willing to contribute contacts the concerned person and contributes to social development.

#### f) Moral aim

As children engage in mathematics learning different moral values unknowingly develop in them. For example, skills like patience, self-effort, etc. grow among children.

If students unable to understand and solve a mathematics problem. He makes help different modes of mobile learning and clarifies his problem. This effort develops self-efforts among student. When students engaged in studying with mobile different capabilities like satisfaction, behavior performance also developed among them. Students are more collaborative and helping other students during mobile learning other than other learning activities. (7)



**Picture 18:** *Students taking interest tapping on tablet*

**Picture 18 is showing about** *Students interest and enjoyment while tapping on tablet* This picture shows how a single technology equates the whole class and making collaborative learning among children. Which develops the moral aim of equating society.

Many organizations which helping to provide technology for students for making powerful in education such as Zaya, a Pearson Affordable Learning Fund portfolio company, implements scalable, affordable technology to increase access to high-quality education and bridge the achievement gap for students in low-income schools. The Pearson Affordable Learning Fund makes significant minority equity investments in for-profit companies to meet the growing demand for affordable education across the developing world.



#### 4. CONCLUSION:

'Mobile Learning' also called as 'M-Learning', is a new way to access learning materials using mobiles devices like Smartphones, laptops or tablets. There are many aspects through which mobile helps in mathematics learning and fulfill its aim which is divided into three aspects that are pertaining to the mobile technology material setting in which a student how can be he/she afford it and use and access the mobile technology. How a mobile device is full filling the criteria of learner and how it attracts the learner. The Third aspect is discussing how a mobile device meets the philosophical aim of mathematics teaching. Such as cultural aim, vocational aim, moral aim, utilitarian aim.

At last, this paper shows that mobile technology is also a part of the curriculum through which all the aims of teaching and learning can be achieved.

#### REFERENCES:

1. <https://www.easy-lms.com>. (..). Retrieved from knowledge-center/lms-knowledge-center/mobile-learning/item10388: <https://www.easy-lms.com>
2. Beal, V. (2019). <https://www.webopedia.com>. Retrieved from TERM/M/mobile-learning-m-learning.html: <https://www.webopedia.com>
3. Al-Takhyneh, & Bahjat. (2018). Attitudes towards Using Mobile Applications in Teaching Mathematics in Open Learning Systems. *Interenational Journal of E-Learning & Distance Education*, 33. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1180063.pdf>
4. Ali, P. S., & Ahmad, P. M. (2015). Scope and Impact of Android application in Education Sector. *ISSN : 2230-9667 Chronicle of the Neville Wadia Institute of Management Studies & Research*. Retrieved from <http://www.nevillewadia.com/images/Cronicle2015/Prof.-Shaikh-Mohammad-Ali15.pdf>
5. (2020). *Contribution of Smart Phones to Digital Governance in India*. A study by India Cellular & Electronics Association.
6. Jeng1, Y.-L., Wu1, T.-T., Huang1, Y.-M., Tan2, Q., & Yang3, S. J. (2010). The Add-on Impact of Mobile Applications in Learning Strategies: A Review. *Educational Technology & Society*, 13(3), 3-13.
7. Maha. Alqahtani, H. M. (2015, october). Mobile Applications' Impact on Student Performance and Satisfaction. *The Turkish Online Journal of Educational Technology*, 14(4), 102-112 . Retrieved from [https://www.researchgate.net/publication/283677110\\_Mobile\\_applications'\\_impact\\_on\\_student\\_performance\\_and\\_satisfaction](https://www.researchgate.net/publication/283677110_Mobile_applications'_impact_on_student_performance_and_satisfaction).
8. Taleba, Z., Ahmadi, A., & Musavi, M. (2015). The effect of m-learning on mathematics learning. *Procedia - Social and Behavioral Sciences*, 83 – 89. doi:<https://doi.org/10.1016/j.sbspro.2015.01.092>
9. Papadakis, S., & Kalogiannakis, M. (2017). Mobile educational applications for children: what educators and parents need to know. *Int. J. Mobile Learning and Organisation*, 11, 256–277. doi:10.1504/IJMLLO.2017.10003925
10. Fabian, K., Topping, K. J., & Barron, I. G. (2018, february 23). Using mobile technologies for mathematics: effects on student attitudes and achievement. *Educational Technology Research and Development*, 66(5), 1119–1139. Retrieved from [https://link.springer.com/article/10.1007/s11423-018-9580-3#:~:text=\(2016\)%20review%20of%20mobile%20learning,studie%20that%20found%20contrary%20results](https://link.springer.com/article/10.1007/s11423-018-9580-3#:~:text=(2016)%20review%20of%20mobile%20learning,studie%20that%20found%20contrary%20results).
11. IGNOU. (..). AIMS AND OBJECTIVES OF teaching - learning mathematics. In IGNOU. Retrieved from <https://egyankosh.ac.in/bitstream/123456789/46785/1/Unit-2.pdf>
12. <https://en.wikipedia.org>. (2019, october). Retrieved from Khan\_Academy: [https://en.wikipedia.org/wiki/Khan\\_Academy](https://en.wikipedia.org/wiki/Khan_Academy)