

# Learning Mathematics Through QR Code on Mobile Devices and Evaluate the Impact on Student Learning Outcomes

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**Abstract** – There is a notion that mathematics is a difficult subject. Simple calculations are difficult without use of mobile or calculator. Tables, fractions, equations, formulae are generally very scary in childhood. Mathematics is the base of logic and a necessary subject to build foundational skills. There are various initiatives taken to make learning math easy for students and one such medium is learning through audio visual medium. Due to the easy availability of technology and tech devices the access to audio-visual content has become much easier than before. Use of QR code on Mobile Devices to access digital content in one such medium. The study deals in understanding use of Mobile Devices to access digital content for learning mathematics and thereby analyze its impact on student test scores.

**Keyword** – Mathematics, Mobile Device, QR code, Maths on Mobile, Teaching and Learning, Self-Learning

## INTRODUCTION

There is a vast pool of information available on internet today. Sometimes due the overwhelming nature of information, it becomes difficult to navigate through the correct information. To pick the right information from the vast knowledge is tricky and time consuming. Recently, to access to the right content, the use of QR codes on Mobile Device is widely observed. QR codes on Mobile Device are widely used to refer information about the product without wasting much time in finding the right content. Similarly, QR codes can also be used by students to access content for learning.

This study is based in ZP Primary School in Siddhewadi, Taluka Tasgaon from Sangali District. It is an example of grade 6 students, who feared mathematics for no reason and hence the need was felt to develop mathematical skills using stress free and enjoyable study method. This was the reason to start **YouTube channel Ajay Kale – Tech Guru**. The objective was to create engaging and easy to understand digital Math content which are linked to QR codes on Mobile Device that could be made easily available to students. The QR codes were pasted in the notebooks of the students for easy access. Through this, students could refer the content as per their need anytime for learning the topic.

### 1) Need and Importance -

#### A) Need -

Mathematics is an important subject at school level. Planning of this study because to acquire deep knowledge about mathematic in primary stage of student for their future. The main aim of this case study is, that teaching- learning process of mathematics subject should be joyful and there is no stress on students while learning this subject. Joyful learning of mathematics from primary level will help students in their future. This need, gave birth to the idea of designing ‘QR – Code’ which can be used through Mobile Device.

#### B) Importance –

While learning Mathematics if there is no stress, students will learn with interest. It will help them in increasing their achievement level. There will be less dropouts of students which happens due to fear of mathematics. It will also help in upgrading quality of students. This is the main reason of this project.

#### 2) Objectives

- a) To understand current level of students in mathematics.
- b) To find blocks in students while learning mathematics.
- c) To make learning process enjoyable and stress free.
- d) To use QR – Code on Mobile Device so that that it will make mathematics easy.

### 3) Method & Procedure –

Concept of E-learning now is available to students in every nook and corner even of a village. Credit of this computer revolution goes to all factors promoting it. ‘**Digital India**’ by Government of India and ‘**Digital School**’ policy of State of Maharashtra, were mainly responsible for this techno friendly revolution. Encouragement from administration and teacher’s initiative has spread this revolution profoundly. This initiative was taken up to use Technology and children’s love and fascination for Mobile. This will help progress in education and to increase student’s level of understanding in Mathematics.

#### 1) Pre & Final Test –

In order to achieve objective 1 and 2 of the project, it was necessary to test student’s level of progress in mathematics. Stage 1 was conducting a **pre-test**. This enabled us to see the level of understanding in Mathematics, among students. Results of this pre-test also helped us to define boundary of our project. Along with pre-test result, we also referred to results of ‘**Periodic Assessment Test (PAT)**’, which helped us in taking proper route of implementing this initiative. Necessary permissions and acknowledgement were sought from ‘Education Department of Government of Maharashtra’ who had conducted this test. These tests are for checking student’s basic achievement level in language and Mathematics.

After implementation of the project a **Final test** was taken at the last stage of the initiative for doing comparative study of both the tests. It was easy to draw conclusion about success of this initiative with the help of both the tests.

## 2. MATHEMATICS TEXTBOOK CAN TALK NOW



[Students watching the video with help of QR Code on Mobile Device]

We choose grade 6 textbook of **mathematics**. We video graphed all every lesson unit wise, with our students, in school. Videography, editing was done on mobile and then we uploaded these videos on our You Tube channel **Ajay Kale- Tech Guru**. In order to make these videos easily available to our students, we prepared QR Codes and stuck those in the textbook unit wise. This helped students to learn at their own pace.

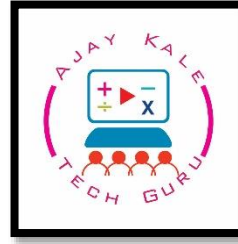
QR Codes made the textbook talk and its impact was seen through the phenomenal increase in student’s level of understanding.

#### 4. Our Video and QR CODE -

Effective use of E- learning. We started ‘Ajay Kale – Tech Guru ’ channel on YouTube. On this channel, I uploaded many Videos related to Math’s.







(Scan above QR code and see )










( Channel logo )

Lesson wise and unit wise videos of grade 6 mathematics textbook, were uploaded on our You Tube channel **Ajay Kale- Tech Guru**. To make these available easily to our students, we prepared QR Codes and stuck them near every unit.

[QR Code - learning mathematics through Mobile Devices]  
Our Videos and their QR Codes





Sr. No	What will you see	QR Code
1	Why is area of a triangle $1/2$ ?	
2	Fraction Greater or smaller	
3	Why is value of $\pi$ $22/7$ or $3.14$ ?	
4	Why number 1 is not a prime or a composite number	



5	Parellal Lines	
6	Value of Dividers	
Sr. No	What will you see	QR Code
7	Table 9 is Fun	
8	How will you prepare tables instantly	
9	What is Triangular Numbers	
10	Questions on Triangular Numbers?	
11	? Why do we divide form left side	

12	Examples of mistakes in Division	
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### Videos of Grade 6 Mathematics and QR code



### Videos of Grade 6 Mathematics and QR code

Sr. No	Name of the Lesson	QR Code
7	Multiplication of Fractions	
8	Division of Fractions	
9	Symmetry	
10	Equations	

11	Ratio and Proportion	
12	Percentage	

**Videos of Grade 6 Mathematics and QR code**

.Sr. No	Name of the Lesson	QR Code
.13	Introduction of Bank	
14	What is simple interest	
15	Triangle and triangle's properties	
16	Roman Numerals	

17	How to write largest number in Roman Numerals	
18	HCF	

### 5. USE OF YOUTUBE AS A MEDIUM –

Impact of social media on people is tremendous. Be it old or young, no one can escape it's impact. Expertise of School students to use this knowledge is known to all. There was an option of uploading these videos on school computer but there was limitation of both, time and duration. School schedule and projects was another problem, therefore we thought we may not be able to achieve our objective to make this initiative successful. Use of QR Code and teaching its technique to students, this facility would not be available 24 hours. Considering all these factors we decided to use You Tube as a medium. Another advantage was there was a backup for all the videos. We could achieve our objective to make these videos available whenever students needed guidance on their favourite tool – Mobile. Use of You Tube, helped us to go beyond boundaries of district and state, which was the great success of this initiative.

### 6. LEARNING MATHEMATICS THROUGH QR CODE ON MOBILE DEVICES MOBILE DEVICE

Use of QR Code in teaching has brought revolution in Education. Books can now talk! Expanded form of QR Code is **Quick Response Code**. It means immediate response. When we want information about a particular unit, if we scan QR Code of that unit, we get information in a moment. The video starts playing and documents are displayed immediately. There is no need to remember details of any website or a link. We get required information just by scanning QR Code and you can watch what you want; this is the highlight of this method. This factor has made it very popular everywhere. Through Diksha App, textbooks can now talk, is a very important event in the education system.

Knowing importance of this technique, convenience to use it and its impact, we decided to use it for making videos in Mathematics. We learnt to create this by using online tutorials and trial and error method and also trained our students to use this technique.

We created QR Code of each lesson and unit in Mathematics and stuck the QR Codes in student's textbooks. It was not necessary for students to remember either the name of our You Tube channel **Ajay Kale- Tech Guru** nor any link for the video. They just had to scan the QR Code and they would be able seek guidance, as and when required. This being available for 24 hours, there was no limitation of time or place. This was the major factor for making it popular. Parents changed their perspective towards this new initiative because they could see these videos on mobile. We received great response from parents for the new initiative. It did not stop here, because our students were trained in the technique of preparing QR Code Mobile Device, they could prepare QR Code for the videos they liked and share those on school's what's app group. QR code is **The Major Factor** in making Mathematics easy!

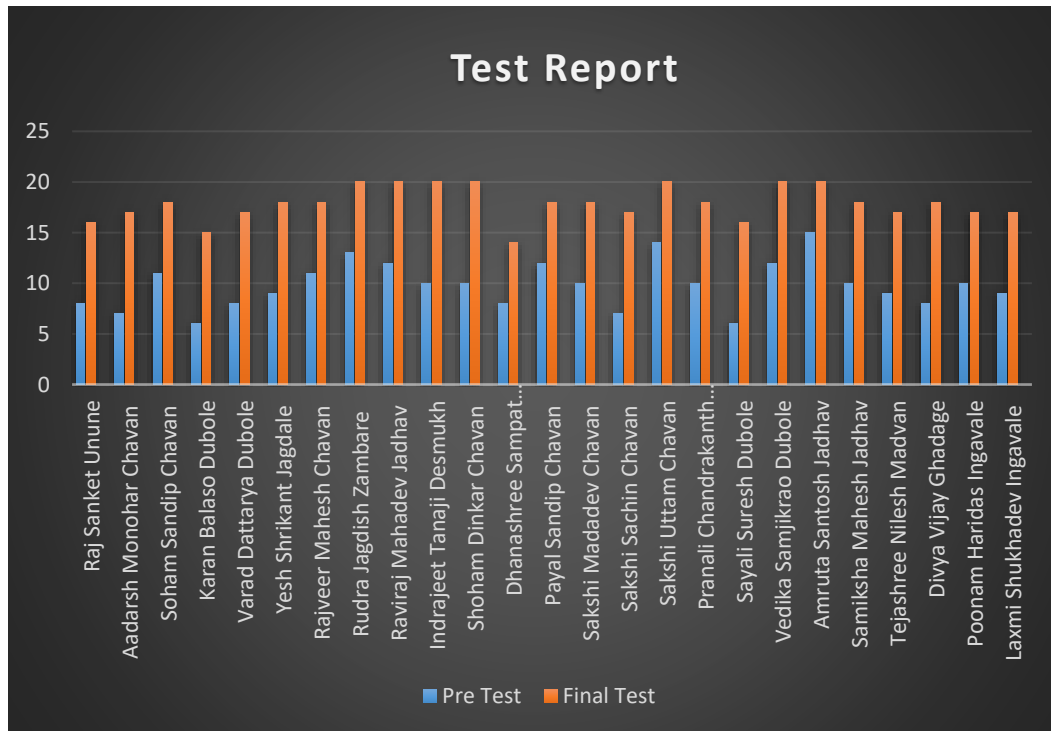
6)Data analysis –

A). learning mathematics through QR code on Mobile Devices –

1. Chart – 1 – Test Marksheet – Grade 6 – 2024 (Pre. Test & Final Test)

Sr. No.	Student Name	Pre. Test	Final Test
01	Raj Sanket Unune	08	16
02	Aadarsh Monohar Chavan	07	17
03	Soham Sandip Chavan	11	18
04	Karan Balaso Dubole	06	15
05	Varad Dattarya Dubole	08	17
06	Yesh Shrikant Jagdale	09	18
07	Rajveer Mahesh Chavan	11	18
08	Rudra Jagdish Zambare	13	20
09	Raviraj Mahadev Jadhav	12	20
10	Indrajeet Tanaji Desmukh	10	20
11	Shoham Dinkar Chavan	10	20
12	Dhanashree Sampat Kambale	08	14
13	Payal Sandip Chavan	12	18
14	Sakshi Madadev Chavan	10	18
15	Sakshi Sachin Chavan	07	17
16	Sakshi Uttam Chavan	14	20
17	Pranali Chandrakanth Dubole	10	18
18	Sayali Suresh Dubole	06	16
19	Vedika Samjakrao Dubole	12	20
20	Amruta Santosh Jadhav	15	20
21	Samiksha Mahesh Jadhav	10	18
22	Tejashree Nilesh Madvan	09	17
23	Divya Vijay Ghadage	08	18
24	Poonam Haridas Ingavale	10	17
25	Laxmi Shukhadev Ingavale	9	17

**2. Chart No- 2 – Qualitative Test Report – (Pre. Test & Final Test)**



**Observation -**

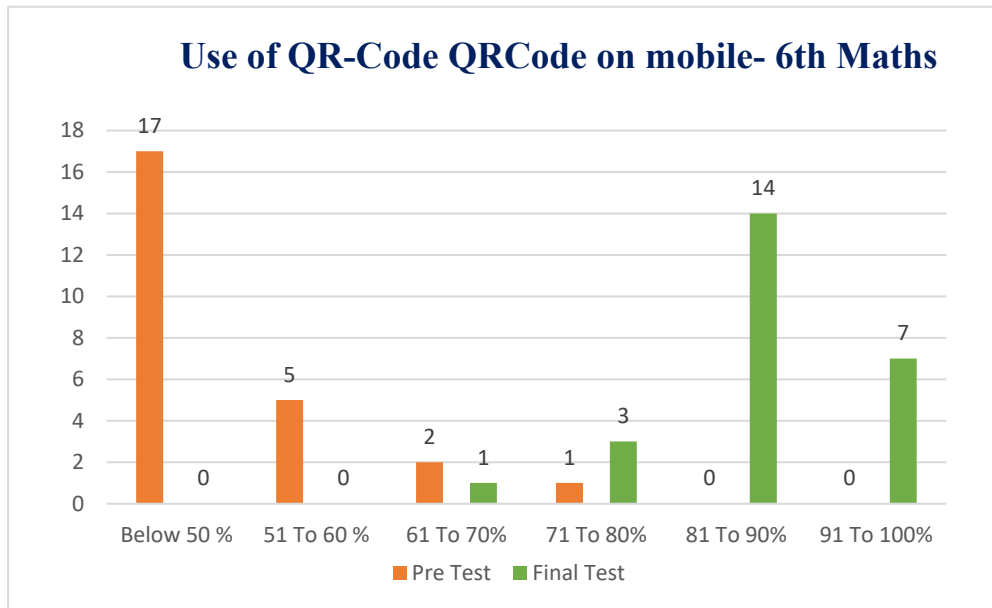
(This graph clearly shows that the effective implementation of learning mathematics through QR Code on mobile device, has brought in positive, qualitative change among all students who attempted tests.)

**3. Chart No- 3 – Statistical Data of the test – (Pre. Test & Final Test)**

**4. Chart No- 4**

Sr. No	Percentage of marks obtained	Pre-Test	Final Test
01	Below 50 %	17	0
02	51 To 60 %	5	0
03	61 To 70%	2	1
04	71 To 80%	1	3
05	81 To 90%	0	14
06	91 To 100%	0	7
	Total	25	25

**Grade 6 - Statistical Graph of tests - (Pre-Test & Final Test)**

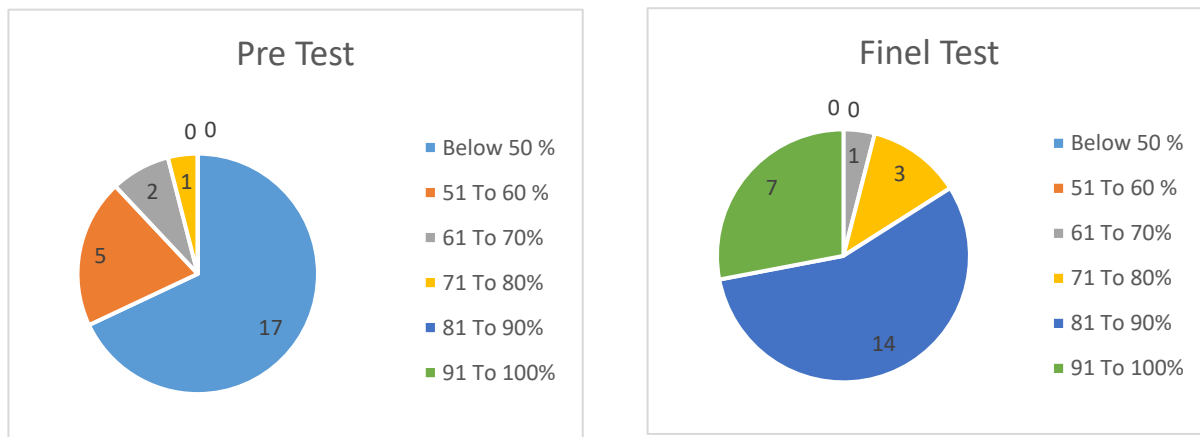


**Observation -**

Chart number 3 and 4 clearly shows that the final test marks have made a remarkable change. Achievement level of students has increased, and every student has secured more than 50% marks. There is no students below 50%.

**5. Chart No- 5**

**Grade 6 - Test Response Graph – (Pre-Test and Final Test)**

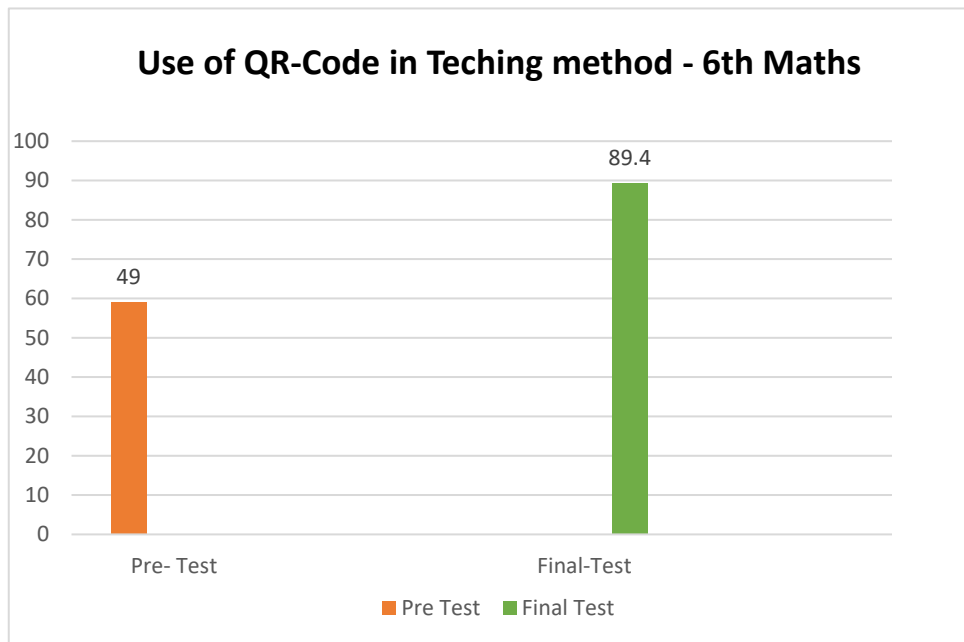


**Observation –**

(Chart No. 5 shows remarkable difference in achievement level of grade 6 students)

## 6. Chart No- 6

Grade 6 - Class Average of Test Result – (Pre-Test and Final Test)

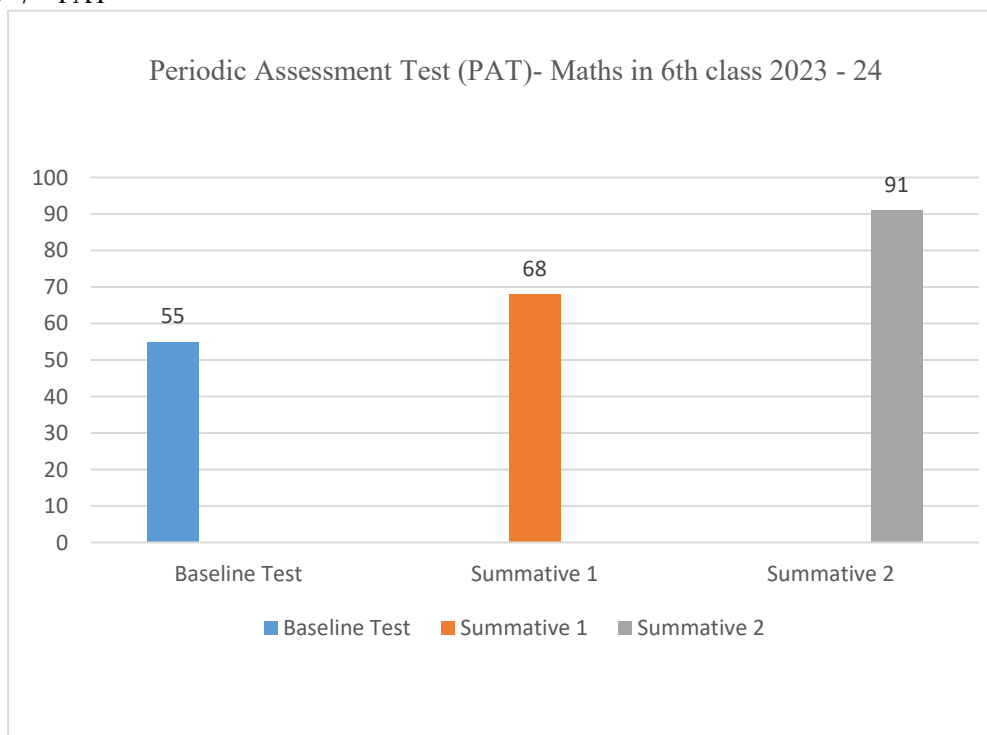


We used graph as a tool, to check if objective number five was achieved. Successful implementation of use of mobiles showed that the pre-test level of competency which was 49% increased phenomenally to 89.4%, which is clearly visible in graph above. This supports our conclusion that our study was successful.

## B) PAT –

We referred to the results of ‘**Periodic Assessment Test (PAT)**’, this helped us to take proper route of implementing this initiative. We had sought permission and taken acknowledgement of ‘Education Department of Maharashtra Government’ which had taken this test. These tests are taken for checking student’s basic achievement level in language and Maths.

### 1. Chart No- 7 – PAT –



(Chart No. 7 shows that the baseline test result of 55% reached 91% after effective implementation of use of QR Code through Mobile device, which was the huge success of the project)

#### 4) Success - learning mathematics through Qr code on Mobile Devices –

1. Student's level of understanding increased.
2. Student's focus during learning increased.
3. Learning process was enjoyable and it was fun.
4. Student's gained confidence to use E-learning material.
5. Audio-visual aids helped students to focus.
6. Fear of Mathematics vanished because units were available for revision anytime by scanning QR Code on Mobile Device. It helped students practice and learn concepts even in case of their absence.
7. It was evident that students liked studying Mathematics.
8. Students started attending school which reflected in quality of learning.

#### 5) Closure –

Success of any task is possible because of its planned implementation and efforts put in 100% with true sincerity. Implementation of this initiative proved that smart phone can be used in this effective way also.

It is not that Technology is good or bad, it depends on the motive behind its usage. Fact that social media has tremendous impact on people, proficiency to use mediums like what app, YouTube and student's attraction towards these mediums is what we used very successfully in this initiative. 'Learning mathematics through QR Code on Mobile Devices' is successful because learning mathematics through this was entertaining and changed students' perspective and attitude towards mathematics. We strongly believe that raise in confidence level of learning mathematics will result in improving its quality.

Our initiative has helped teachers to drive away fear of Mathematics and students feel it's an easy task!

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