Real Time Distance Education Through Mobile Services

Dipankar Mishra and Gurvinder Singh

***Abstract*--** The education sector in all countries is slowly but surely going down in quality. There will be pockets where exceptions will rule. But the recent news of alleged plagiarism in institutes like Harvard and MIT shows that something is definitely wrong in the education sector. May ailments plague the education system, but what hits the education system most is the dropout. Many reasons are behind the dropouts, but with development of technology, the ills that plague the education system can be eradicated to a great extent. This paper attempts to provide a solution to certain ills of the education sector, riding on the robust and still developing mobile network system.

***Keywords*--**distance education, mobile education, education system, 21st century education

I. Introduction

"Education is the most powerful weapon which can be used to change the world. " so said Nelson Mandela, the South African giant. Nothing more can be closer to truth about education. Although education is a basic right in many countries, there are places where it is still a luxury. As per data available upto 2010[1], an estimated 61 million children had no access to education at the primary level, worldwide. Half of these children are in the sub-Saharan[1] region. But this does not take away from the fact that education is not accessible to a large chunk of the population, which is increasing on a daily basis.

As technology developed, it started encompassing all aspects of life. Mobile technology has developed leaps and bounds and its reach has also gone beyond geographical boundaries. It has reached the most inhospitable and inaccessible terrains. It is precisely this technology that this paper attempts to harness for spread of education.

II. Factors affecting education:

Many factors affect the quality of education. The education system is also plagued by school and college dropouts. Financial condition of the families, lack of educational system in the nearby localities, unavailability of trained teachers, good quality teachers, crumbling infrastructure wherever it exists are what are impeding the education system. This condition is more notable in the under developed and developing countries. Prejudice and gender discrimination are also a factor in lack of education.

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III. Present scenario of off-campus education :

There are many institutes, including MIT and Berkley which are offering off campus education. These can broadly be classified into two categories;

(1) Recorded
(2) Real time

In the recorded format, the institutes have their own websites where the video lectures of the professors are uploaded. The students access the website and can watch the videos either on line or download onto their PC's and watch offline. In this method, the method of teaching is passive and one way. There is no way in which the student can interact with the faculty when any doubt occurs.

In the second scenario, the live feed of the professor's classroom teaching is uploaded to the video server on a real time basis. The students logon to the video server either with a user id and password or without it, and are able to watch the live feed. Generally the session is interactive and the students and staff are able to interact with each other.

In the above cases the use of internet is imperative. Any failure in this medium or non availability of this medium renders the content available on the website useless.

Many countries like India have already started a special educational satellite on which many educational institutes are operating their off campus education system. The institutes are connected to their education center through the satellite communication system. The institutes have their special audio video halls where the required infrastructure is available. This system involves a lot of expenditure running into hundred thousand of rupees and the availability of skilled operators for the operation of the devices.

The above methods have various constraints. The biggest hurdle is the availability of the required infrastructure. Many African and Asian countries do not a proper education system. Connectivity in rural heartland is major problem. Power supply is not existent in major African countries and very much a luxury in many Asian countries. Funds are not available for the education sector in many third world countries. Internet connections are either non-existent or intermittent in many countries. Having an audio video facility for satellite communication in rural areas is something that can never be dreamt of in the present scenario.

With the above constraints, the feasibility of employing these methods for rural education in is extremely low.

IV. 3G MOBILE SERVICES

Mobile telephony started primarily as a voice oriented service. As the technology developed, it developed into a full fledged multimedia and data service. As per the data available[2], the amount of multimedia and data service overtook that of voice service in 2010. 3G services which came into effect a couple of years back provide the facility of video telephony[3][4][5] over the mobile network along with data services[6]. Hand sets with camera can be used to deliver video on real time basic between two or more users.

V. THE SETUP

Communication medium, particularly telecommunication medium has developed in leaps and bounds. The telecom handsets that are available in the market have a lot of features and are available at a very low cost. Features like video camera to enable video calling between calling parties are available in the cheapest of the handsets in the markets. Some more innovative handset manufactures are providing basic projector facilities in their handsets. Ostensibly this feature has been provided to enhance the multimedia capability of the handset. It has been developed keeping in mind the fact that the users of the multimedia capabilities of the phone are the youth who have a tendency to watch to watch a lot of video. It is precisely the technology that can be harvested to enhance the penetration of education. Most of the telecom companies provide conference facility amongst subscribers. This feature enables a number of subscribers to simultaneously have a conversation in a group. Such a call is known as a conference call. This facility can also be used to our advantage in the education sector.

VI. REQUIREMENTS FOR THE SETUP.

There is absolutely no requirement of any costly equipment. One needs simply video enabled mobile handsets with facility of projectors in handsets, at least at the remote end. We also require a 3G connection and the facility of conference calling in the mobile connection. That's it.

VII. THE SETUP.

It's a very simple process. Figure 1 indicates the complete setup.

he teacher is the person sitting in some urban location with a video enabled mobile handset. The teacher is placed on a conference video call with the remote villages where the students are present. These remote locations have the projector on their video enabled handsets switched on and video of the teacher being projected on to some wall for better viewing.

The remote location setup is as shown below. It can be either Figure 2 or Figure 3

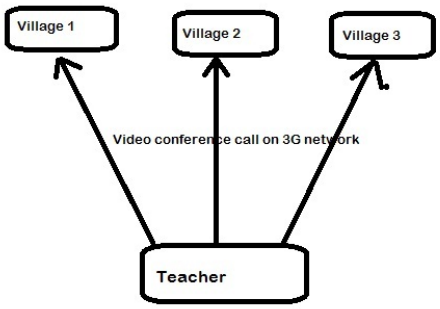

Figure 1

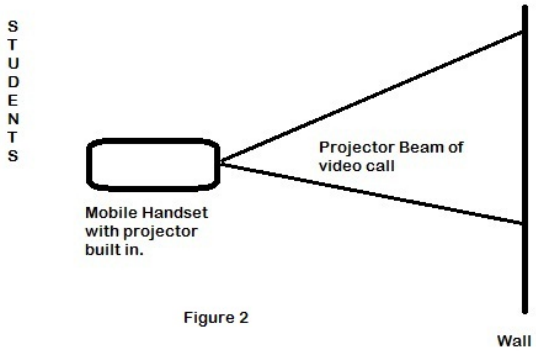

Figure 2

or 

Figure 3

Or it can be something similar to the following (Figure 4)

Figure 4

As can be seen the setup is plain and simple. A white faced wall is the only requirement. The projector beam from the projector in the mobile handset is focused on to the wall. This enables the students to see clearly the presentation of the teacher who is teaching. They will also be able to see the writings on the blackboard.

VIII. Operation of the process.

When the teacher teaches a subject, the teacher and the contents of the blackboard are transmitted over the mobile network to the remote handsets. The video received at the remote handsets are projected on to the wall resulting in a public display of the contents.

The display is similar to that of a classroom presentation where the teacher and the contents of the blackboard are what the students view.

When a student has any questions for the teacher, the mobile camera at that end is focused on the student. This enables the teacher to view the student concerned. The remote location students also get to see the student who has a question for the teacher.

Once the question has been asked, the student then answers the query by verbal reasoning as well as explaining it on the blackboard. This can be seen by the students at all the remote locations.

IX. Cross-questioning of students by the teacher.

Under normal circumstances, a teacher after explaining a topic, will wait for questions from the students to clear their doubts. Once the doubt clearing session is over, the teacher then puts up questions to the students to visualize their understanding of the topic.

This procedure in a normal classroom would have been to ask the students to come down to the blackboard to answer the question asked of them. As this is a virtual setup, the students at the remote locations answer the question on their notebooks. The camera at that end is focused on the concerned student's notebook, enabling the teacher and the other students to view the answer.

Corrections or modifications to the answer provided by the student are then by the teacher at his end which is viewed by the students at all the locations.

X.PRO's and CON's of the system

Like any other system, this system has its own advantages and disadvantages.

Advantages

1. Simplicity. This system is as simple as making a telephone call. Even a child can operate this system
2. No need for any complex system and infrastructure at any end. With two simple mobile handsets, the requirement of complex infrastructure at both ends is nil.
3. Nil setup time. As mobile handsets are used, there is no setup time for the class to start. Classes can be started in a matter of minutes and wound up in minutes.
4. The reach of this setup is enormous. With mobile telephony reaching the interiors of most countries, including some inhospitable terrains, the reach of this system is unmatched. It reaches those places where ironically basic facilities may not be available.
5. All weather reach. This system works in all kinds of weather. Be it harsh winters or extreme summers or extreme rainfall, the system delivers without fail.
6. The most prominent feature of this system is its cost. The cost video calling in India is at INR 1.0/minute or 0.02 USD. An hour of class on this system costs slightly more 1$. Personally, I feel that this cost cannot be challenged by any other system.

With so many pro's , one may feel a little complacent about this system. In-spite of the system having a number of advantages, there are points where the system lags. Let's have an unbiased view of the drawbacks.

1. The duration of the classes on this system is a little short. As the system relies on the batteries of the mobile handsets, the duration of the classes is limited to the duration the batteries provide full power. This duration, when the battery is fully charged, is normally of 2 hrs. Hence the classes per day cannot be held beyond two hours.
2. Video calling is highly dependent on the strength of the signal received from the cell towers. This signal strength can be affected by dense forests, heavy rain and shadow zone. In such case, the video may be jerky or grainy or may not be available at all.
3. Getting the students to the remote location classes involves a lot of managerial skills as hostilities between villages sometime come in the way.
4. Recharging the remote location mobiles for the next day classes may a bit difficult as the power system in the rural areas of the developing countries is woeful.

In-spite of the drawbacks, the advantages outweighs the disadvantages. This system, when compared with the high-tech systems like EDUSAT and INTERNET based options, exceeds in quality and simplicity.

XI. Conclusion

This method of providing a real-time, long distance, centralized education system can help developing countries, to enhance its education system in the rural belt. It can effectively provide quality education to the rural masses. Further with system capable of providing education,

virtually at the door steps of the students, school dropouts can be reduced to a very large extent.

This system can also help in reducing the requirement of teachers for the rural belt to a large extent.

As this system provides centralized education, standardization of education is achieved. Students are provided education in a manner where the delivery is identical in all respect at all locations.

This system is very cost effective. There is no need of any permanent structure, neither is there any requirement of permanent faculty at the remote end. This eliminates costly human resources, which can be effectively utilized elsewhere.

For a developing country, where funds are generally lacking, this method can provide the much needed impetus to the rural education system with a very small drain on the coffers of the government.

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