

# EduPad- A Tablet Based Educational System for Improving Adult Literacy in Rural India

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**Abstract**— The rate of Literacy is an important indicator of a society’s overall human development. The population of India, as in most other developing countries is concentrated in the rural areas. However, the rural areas of India are often at a disadvantage within the Indian Education System. An educational system called EduPad, to reduce the rural adult illiteracy using advancements in technology is proposed here. Such a system can be used to make up for lack of qualified personnel and adequate infrastructure in rural India. The device proposed here is an interactive Tablet, which is capable of teaching multiple languages. We propose to develop interactive educational software which can run on the tablet. The software helps the user to learn to write as well as spell the alphabets. Initially the software teaches alphabets and then moves onto words and sentences.

**Keywords**—tablet, android, literacy, rural, educational

## I. INTRODUCTION

The first census of independent India was held in 1952. The census data showed that of the 356 million people, 298.3 million were illiterates. Thus illiteracy was one of the major obstacles in the development of the nation at that time. Due to the lack of significant improvement in the state of literacy in India, during the late 1980s, the then Prime Minister of India, Mr. Rajiv Gandhi laid the foundation for the National Literacy Mission. Because of this, during the decade 1990-2000 rate of literacy was increased by 13.17%. According to the 2011 census of India, the rate of literacy is 74.64%. However, this literacy rate of India is far short of international standards, which can be seen from Table I.

Most of India’s population is concentrated in the rural parts of the country. According to the 2001 Census of India, 72.22% of the total population of India is in the rural parts of the country. The literacy rate of urban India is 79.9%, while that of rural India is only 58.7% [1]. Thus rural India, where the majority of the population is concentrated has a much lower literacy rate than urban India.

We believe that technology can help in achieving the goal of improving this literacy situation. Bangladesh, another South Asian country, has a similar literacy scenario as that of India. Technology was used to implement a distance education

program to improve the literacy situation in rural Bangladesh [3]. In India too, many projects have been implemented which makes use of technology, in which television sets were used to teach languages with the help of subtitles and also school children were taught English with the help of interactive cell phone games. Still the problem of literacy prevails, especially among the adults of the country. So, the proposed tablet based educational system, called EduPad, can considerably reduce the literacy problem in an interactive way than the conventional class room system.

## II. PROBLEM DEFINITION

India has a total literacy rate of 74.64% [2], male literacy rate of 82.14% and female literacy rate of 65.46% according to the 2011 census. Thus, it can be concluded from Table I and Table II, that the literacy rate is far short of the international standards. The provisional population totals of Census of India 2011 puts the illiterates (aged 7 and above) at 272,950,015. According to the UNESCO’s Education For All (EFA) Global Monitoring Report 2011, India was home to 283,105,000 illiterates (aged 15 and over) in the year 2008, out of the 795,805,000 adult illiterates around the world. Thus India accounts for 35.57 % of the global adult illiterate population (aged 15 and over), making it home to the largest population of illiterates[4]. Thus India should be a major region of focus for any project aiming to improve the global literacy scenario.

TABLE I. COMPARISON OF ADULT LITERACY RATES

COUNTRY/ TERRITORY	ADULT LITERACY RATE(aged 15 years and above)					
	1985-1994			2005-2008		
	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
India	48%	62%	34%	63%	75%	51%
World	76%	82%	69%	83%	88%	79%
Developed Countries	99%	99%	98%	99%	99%	99%

Illiteracy is caused by several factors. Lack of primary education is one of the major causes of illiteracy. Research has shown that the access to primary education depends on the wealth of the family. All else being equal, a child from a household from the highest quintile is 31 percentage points

more likely to be in school than a child from a poor quintile [5]. Another factor influencing the access to primary education in rural areas of India is the land owning pattern. Children of families with small/marginal holdings are often forced to do manual labor, which lead these children to become illiterates. The situation is further aggravated by the fact that the landless poor are the ones belonging to the historically marginalized lower castes and are thus denied the opportunities to a better standard of life.

TABLE II. COMPARISON OF YOUTH LITERACY RATES

YOUTH LITERACY RATE(15-24 years old)						
COUNTRY/ TERRITORY	1985-1994			2005-2008		
	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
India	62%	74%	49%	81%	88%	74%
World	83%	88%	79%	89%	92%	76%
Developed Countries	100%	99%	100%	100%	100%	100%

The tables I and II give a comparison of the adult and Youth literacy rates of India with the rest of the world (source: EFA Global Monitoring Reports). From Table I, we can see that the adult literacy rate in India is only 63%, which is far low when compared with the rest of the world which is 83%. It can be seen from Table II that the youth literacy of India is considerably higher when compared with the adult literacy. This is mainly due to the various projects that have been undertaken by the Government of India and NGOs for improving literacy. Still, a high percentage of the adults in India are illiterate and thus we have to come up with a solution to reduce this problem of illiteracy.

### III. MOTIVATION

Literacy opens doors to opportunities and improved standards of living. It empowers individuals to be active members of the local, national and global community. On the other hand illiteracy traps people in poverty and reduced opportunities.

Around the world, technology based projects for improving literacy has been implemented, such as ICT 4 IE (Information and Communication Technologies for Illiteracy Eradication) in Egypt, which aims at converting literacy study material into simple interactive computer based tutorials designed for both classroom and self study. ICT for Illiteracy Eradication has been met with considerable success. In a similar way EduPad is designed to reduce the problem of adult literacy.

### IV. SYSTEM DESCRIPTIONS

The heart of EduPad is the Android based tablet. A tablet is basically a portable computer which has a touch screen as its primary input and is easy to handle and transport. The traditional Tablet was the Microsoft Tablet PC, which was designed to work for the Microsoft XP Tablet PC edition

operating system. An Android based tablet on the other hand, is one which is designed to work on the Android operating system, developed by Google Inc. Android Tablet is chosen because Android is an open source operating system that supports a wide range of applications. Many Tablet PCs have already been designed to work on the Android platform and are available in the market at reasonable prices. EduPad requires an Android Tablet which has an 8" resistive multi touch screen, a 667MHz processor, 128 MB random access memory and 2GB storage memory. The tablet should have a battery which can give back up of up to 6-7 hours. Apart from the tablet, there has to be additional loud speakers, which will be connected to it. It is more economical to have external loud speakers, than integrated ones which increases the price of tablets. The user will be able to hear the audio through this loud speaker. Such a system has the required specifications for running the software which we have to design for the implementation.

Fig. 1 shows the simple hardware block diagram of EduPad which consists of a tablet and a speaker. We have to develop a software application that can run on the Android Tablet, which will help the user of the tablet to learn. The application will be developed using the Android SDK. SDK is a software development kit that will enable us to create applications for the android platform. The SDK will require Eclipse (a software development environment), JDK (Java Development Kit) and Android Development Tools (ADT) plug-in

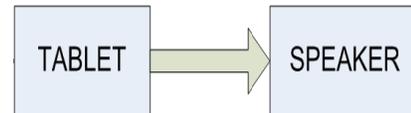


Fig. 1. Hardware block diagram of EduPad.

The Android architecture shown in Fig. 2 consists of a Linux Kernel which contains all the different drivers, such as the display driver, flash memory driver, the audio driver and the power management. There are also different libraries such as SQLite, Libc and OpenGL. The architecture also consists of the Android Runtime, which contains a set of core libraries. Next is the Application Framework, which consists of the Activity Manager, Content Providers, Package Manager and Resource Manager of the operating system. At the top of the architecture is the application software.

### V. ILLUSTRATION

EduPad has to be used in an interactive way so that learning alphabets would be interesting and enjoyable. For this purpose, we propose a software application that can teach the alphabets in an interactive way. This software will contain all the alphabets and also many words and sentences. The software will initially teach the user how alphabets are written. The software first shows a demonstration of how the alphabet is written. Along with this demonstration, the sound of alphabet will be pronounced by the software. After the

demonstration, the software will give the user an opportunity practice writing the alphabet on the tablet using a stylus by tracing over the outline of the alphabet which will be already present on the screen. After finishing one alphabet, the user can move onto the next one. The user can come back to the previous alphabet as well and see the demonstrations over again. In the first phase of the software, alphabets will be taught. In the later phases the user will be able to learn words and sentences. The interface of the EduPad should be the local language. Here an example with Malayalam, the regional language of Kerala, is given.

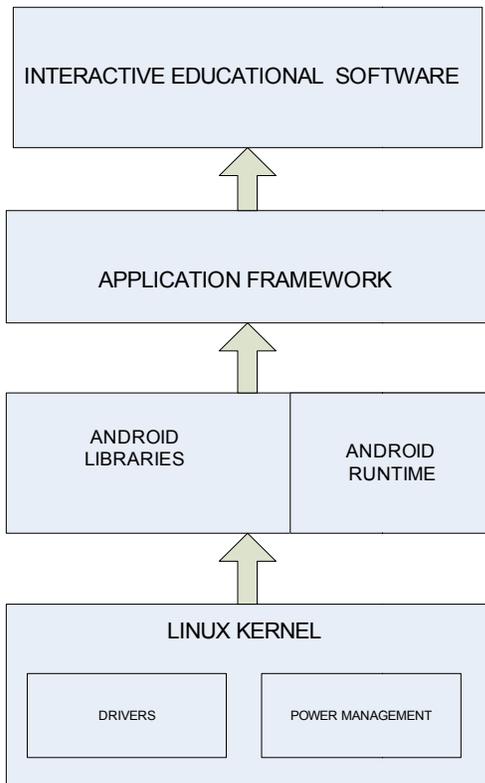


Fig. 2. Illustration of Android architecture in stack form

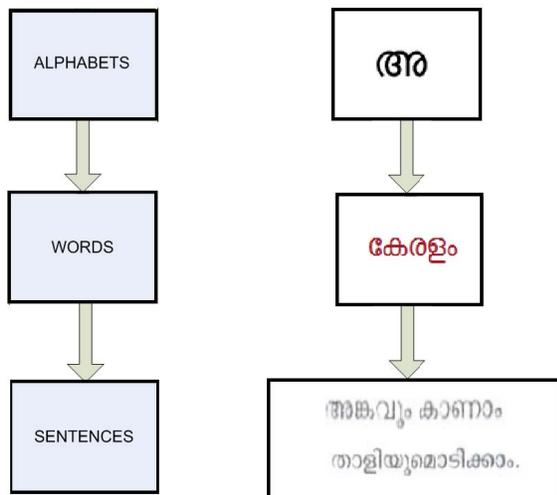


Fig. 3. Different phases of application software

VI. FIELD STUDY

A trip was arranged to Elamplassery to conduct a field study to know about the people and the village in detail. Elamplassery is a remote village in Idukki District of the South Indian State Kerala. The authors Abhiram Soloman, Deepak Dileep and Ananthakrishnan Rajendran visited the village. Elamplassery is a two hour drive from the nearest town Adimaly.

The authors were able to meet the people of Elamplassery and interact with them. The vast majority of the inhabitants of Elamplassery are tribal people or ‘Adivasis’. They primarily depend on manual labour and forest produce for a living. From a survey that we conducted, we were able to see that a majority of the adults (of the age above 30), have not received an education, as it can be seen from Table III, since there were no primary or secondary schools in the region and also due to the lack of awareness of the importance of education. At present, there is a primary school that is run by the State Government.

Table III shows the data that was collected from the survey that we conducted during our visit to Elamplassery. From the survey, we see that most of the adults in the region have not at all received any sort of education. Out of the ten people surveyed (which includes both males and females), only two had received primary education. The rest of the people did not receive any sort of education and were illiterate. Most of the surveyed people were not even aware of their exact ages. The major reason for this illiteracy is due to that unavailability of schools. The primary school in Elamplassery run by the State Government of Kerala, was established not more than fifteen years ago.

TABLE III. LITERACY SURVEY OF ADULTS AT ELAMPLASSERY

S.No	NAME*	GENDER	AGE GROUP**	EDUCATION		LITERACY LEVEL
				Primary	Secondary	
1.	Leela	Female	Adult	No	No	Illiterate
2	Valli	Female	Adult	No	No	Illiterate
3	Sarojini	Female	Adult	No	No	Illiterate
4	Appal	Female	Adult	No	No	Illiterate
5	Raghavan	Male	Adult	Yes	No	Literate
6	Chinnappan	Male	Adult	No	No	Illiterate
7	Nanu	Male	Adult	No	No	Illiterate
8	Kellalaraman	Female	Adult	No	No	Illiterate
9	Thankamma	Female	Adult	Yes	No	Literate
10	Ponnamma	Female	Adult	No	No	Illiterate

Most of the families are involved in making handmade bamboo products such as bags, mats etc. They earn a living by selling these bamboo products. Due to their inability to interact directly with the outside world, a lot of middlemen are involved in taking their product to the market. With the middlemen taking the lion's share of the profits, the tribal people are subjected to high levels of exploitation. If they were literate and had the ability to work with numbers, then the tribal people could have become self-reliant, and wouldn't require middlemen to sell their products.



Fig. 4. A woman at work making Bamboo products

The illiterate people of this region find it difficult to interact with the outside world. They are often hesitant to travel to towns near their villages since they are unable to read and understand places or sign boards. Since these people are isolated from the outside world they are unaware of the importance of education. Thus they fail to educate their children since they are ignorant about the educational opportunities available to them.

While interacting with the people, a mobile application was shown to them which was designed to help small children learn languages and numbers. The people were very much interested to see it and the fact that technology is involved in it really fascinated them and were really curious to use the mobile phone application. From this positive response we believe that they would be enthusiastic to use the EduPad.



Fig. 5. The authors alongside the tribal people of Elamplassery

Supported by various government initiatives, many of the tribal families are able to earn up to \$3 per day. However, illiteracy has resulted in these individuals being unfamiliar with modern banking services and thus has led to a very low

savings rate. Thus literacy can help to integrate them into the modern society.

Since most of the individuals are involved in manual labor or depend on forest produce for their livelihood, traditional literacy programs conflict with their work hours. Thus leads to lower turn out rates in adult literacy programs. This tablet-based system rules out this problem by providing them flexibility in their study hours.

## VII. RELATED WORKS

ICT for Illiteracy Eradication (ICT4IE) program of Egypt is one of the 30 programs under the UNDP (United Nations Development Program) ICT program. It employs technology to create simple and interactive digital content. The program focuses on the women of Egypt who form 70% of the nation's illiterates. The project transforms learning content from illiteracy classes into simpler, more interactive computer-based tutorials. Lessons are designed in such a way that learning activities are embedded into familiar contexts of everyday life and are dramatized using sound and music effects.

A method that was employed in India is the Same Language Subtitling on Television [6]. Here, subtitle in the same language as that of the program displayed on the television is simultaneously displayed on the television. This way, while the audio is being played, the listener can read the subtitle along with the audio, which proved to be an effective method for improvement of literacy. In another method, interactive games for learning are designed, which is mainly focused on children [7]. The main aim of this program is to improve English as a second language for children.

Another project named, "Hole in the Wall" [8] was employed in a slum in New Delhi, where a PC was embedded in a wall. The children of the slum were given unconditional access to the computer. The main focus of this project was on E-literacy.

## VIII. CONCLUSION

India is a country where the problem of adult literacy still prevails. We believe that the EduPad based educational system will help the illiterate people of rural India to become literate through an interactive and enjoyable method without affecting their day to day life. Most of the illiterate people of rural India rely on manual labor for their living and are unable to attend regular study classes. So, the EduPad can be a convenient method for the people of rural India to become literate.

## IX. ACKNOWLEDGMENT

We gratefully thank the Almighty God who gave us strength and health to successfully complete this venture. The authors wish to thank Amrita Vishwa Vidyapeetham, in particular the VLSI lab, for access and JSS Idukki for their support in arranging the field study for completing this venture.

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