SHA GYAAN - A MOBILE APP FOR ENHANCING THE LEARNING CAPABILITY OF CHILDREN WITH HEARING AND SPEECH IMPAIRMENT

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ABSTRACT

It has been observed that people with disability display lower education achievements when compared to normal peer groups. In the world of technology, the learning skill among differently abled students can be enhanced through information technology. People with disabilities have to recognize, understand, navigate and interact with IT so that they can participate equally in the economic and social aspects of society. The technology has been constantly used from mobile phones, to iPads, to laptops and TVs. Mobile devices provide accessibility features, flexibility, portability and customizability for people with disabilities (PwD). As a result of using mobile devices, Mobile Apps have been designed for people with disabilities, which help them connected with the world.

In this paper, survey of various mobile apps were discussed which helps in enhancing the learning skill of PwDs. A special mobile app named **SHA GYAAN** is proposed especially for hearing and speech impaired children. Keeping the needs of students, this mobile application enhances the learning capability of the children between the age group of 3 to 8. This app is intended to facilitate the joyful learning of the children and to evolve and build their learning skills. The major areas covered in this mobile app are Foundation language (Tamil & English), Environmental Science and Mathematics.

Keywords: Persons with Disabilities (PwD), Assistive device, Mobile Application, Information Technology, AAC (Augmentative and Alternative Communication), Hearing and Speech Impairment.

1. INTRODUCTION

Disability is an impairment that may be cognitive, developmental, intellectual, mental, physical, sensory, or some combination of these. It substantially affects a person's life activities and may be present from birth or occur during a person's lifetime. The first ever World report on disability which was produced jointly by WHO and the World Bank, explains that more than a billion people in the world today experience disability [1]. People with disabilities have generally poorer health, lower education achievements, fewer economic opportunities and higher rates of poverty than people without disabilities. To address the issues of lower education achievements and economic opportunities, the use of IT plays a vital role. Accessibility of Internet and other communication technologies became easier after the usage of smart phones by people of all income groups. Mobile devices not only provide a platform for communication but can also assist disability people with their daily tasks. For example, a blind person needs a talking

GPS device (£750), a talking notetaker (£1500), a talking MP3 player (£250), a talking barcode scanner (£100) and many, many more specialist devices [2]. All of that had to be carried around in a backpack, each with its own charger. Smart phones provide all the above functionality in one device and are almost infinitely expandable with each new app or service that comes along.

2. REVIEW OF LITERATURE

There are many mobile apps designed to improve the learning skill of differently abled students in various fields.

2.1 VAAKYA

The picture based Augmentative and Alternative Communication (AAC) app designed for people with speech impairment is Vaakya. This app also helps students affected by autism, cerebral palsy and various other mental and physical conditions. The app is an AAC tool and can be used to practice during rehabilitation. It works as an effective tool for individuals who are unable to read or to communicate, as it depends on images and audio instead of text [3].

2.2 AVAZ

AVAZ app helps the children with learning disabilities. Large number of images is organized in such a way that users find it useful to communicate. The app supports multiple languages, both Indian and European, and users can also add their own 'words' - for example, a picture of your grandmother, along with the word grandma [4].

2.3 FREESPEECH

FreeSpeech, is the extended version of Avaz. FreeSpeech is a learning tool to teach the rules of grammar using semantic map. The app presents words like building blocks which can move them around, and it predicts the words and prompts you to expand the sentences. The words can be assembled into a grammatically correct sentence and helps teach abstract concepts like tenses [5].

2.4 LEARN WITH RUFUS

LEARN WITH RUFUS is an app for young learners and special needs students. This app is mainly

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designed to identify facial expressions and recognizing emotions of others. It also includes the entertaining and many engaging activities to make students active [6].

2.5 MONTESSORI NUMBERS

Montessori Numbers is the mathematical app used for the students to understand the relationship between quantities and the numbers. It builds basic math competencies and introduces numeric order, the decimal system, counting up to 1000, comparing quantities, addition and subtraction. Additionally, it can pronounce numbers for better understanding and memorizing [7].

2.6 PROLOQUO2GO

Proloquo2Go is an AAC solution for students suffering with autism, cerebral palsy and brain injury. The main aim of this app is to give children and adults with speech impediments a voice. The visual vocabulary in the app helps to create sentences for communication. The app is flexible and customizable and allows choosing from a range of realistic accents for children and adults to match their "inner voice" [8].

2.7 VIDEO SCHEDULER

Video Scheduler is a visual schedule app with video model features. It allows creating checklists of steps necessary for achieving the goal or completing the task. This app helps ASD students and for students struggling with time and task management [9].

2.8 SOUNDING OUT MACHINE

The Sounding out Machine app is beneficial for learners who struggle with decoding. It sounds out difficult words and models how to pronounce them syllable by syllable. The students can take a snap of page and this app helps with challenging words in that page. There is also a typing mode, where a student can type in a particularly puzzling word [10].

2.9 SUPERWHY

SuperWhy offers interactive literacy games and engaging activities with words, letters, rhyming and spelling that improve reading and writing skills. Exercises with filling the gaps and choosing an ending to a story help to solve the particular problem.

The review of study shows that there are many apps specially designed for the differently abled students. These apps mainly includes mathematics and English to help them to solve simple problems using arithmetic operation, work with number pattern, simple games to solve day to day calculation, pronouncing the words, grammar, building sentences and so on. These apps were designed to improve the learning skill of children in a particular subject. Hence tutors or parents have to refer various apps to teach different subjects. This limitation has to be reduced in such a way that the four fundamental subjects (Tamil, English, Mathematics and Environmental Science) should be covered in a single mobile app for the benefit of students, parents and tutors [11].

3. PROPOSED STUDY

Parents of differently abled children want to admit their children in reputed school so that the students mingle easily with normal sighted peers. To improve their preschool activities, they should be encouraged to learn new skills in an enjoyable way. Understanding the concern of parents, the proposed study is aimed to design and develop the mobile application "SHA GYAAN" for enhancing the learning capability of the children with disability between the age group of 5 to 8. This app is intended to facilitate the joyful learning for the children and to evolve and build their learning skills. The initiatives taken in this app are:

- To express themselves
- To enable faster communication
- To workout activities with readiness
- To keep the content as close as feasible to local conditions and culture
- To keep the lessons child-friendly and allow them to enjoy learning
- To enable the use of languages in real life situations so that the language introduced is meaningful

The architecture of SHA-GYAAN is designed as in Fig 1. This is an android based app stored in Google Play Store and can be downloaded and accessed in any android smart phone. The scores of different activities taken up by the students will be stored in the local database and can be used to measure the improvement in their learning capability.
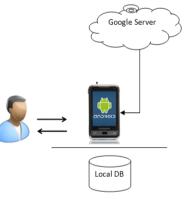

Figure 1 : SHA – GYAAN Architecture

The major areas covered in this mobile app are Foundation language (Tamil & English), Environmental Science and Mathematics.
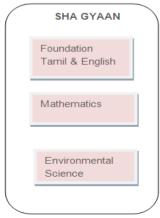

Figure 2: Subjects covered in SHA GYAAN

3.1 FUNDAMENTAL LANGUAGE

The fundamental language is used to teach alphabets and words and the activities in each lesson help language development by developing

- The four skills of listening, speaking, reading and writing through frequent repetition, picture support and gaming activities
- Vocabulary
- Awareness of language structure

This topic teaches alphabets (with vowels and consonants), Word formation, basic grammar, learning the object names with pictures along with the related gaming activities. To make the student to understand the writing pattern, the app provides "Learning by Overwriting" technique. This improves the writing capability of the children in an easy and efficient way. The grammar exercises like singular, plural, nouns, verbs, adjectives and prepositions are designed in a play way method. Innovative activities are included to improve the creative and communication skills of the child.

3.2 MATHEMATICS

Hearing impaired student's performance on problem solving tasks and word problems falls below that of their hearing counterparts [12]. Students who struggle with mathematics learning regardless of their mathematical knowledge prior to starting school exhibit the following characteristics:

- Demonstrate slow or inaccurate recall of basic arithmetic facts;
- Difficulty in representing mathematical concepts mentally;
- Poorly developed number sense; and
- Difficulty in storing information in their working memory.

The American National Council of Teachers of Mathematics has recommended Strategies for students with hearing impairment and their teachers. The learning strategy included technology usage, an approach and attack response to problem solving and use of diagrams, pictures, charts, mental images and dealing with vocabulary issues [13]. Keeping the above strategy in mind, the SHA GYAAN app is enriched by picture sequences, number games, life-oriented mathematics and gaming activities.
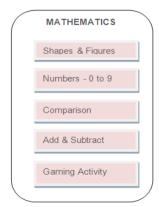

Figure 3: Activities for Mathematics

All these facilitate the learning of shapes, figures, numbers, measurements, patterns and data. The children are enabled to explore the mathematical concepts by touching, seeing, listening, practicing, talking and coloring. The Mathematical exercises given in the app related to the understanding of relationship between numbers and their basic operations provides opportunities for the children to imbibe the concepts and express them.

3.3 ENVIRONMENTAL SCIENCE

Children's appreciation for nature develops at a young age. So, environmental education plays a vital role in the life of kids. They watch and imitate the attitudes and actions of the adults around them towards living things. Science is a part of everyday life and should be learnt through pictorial representation with sounds. The children always enjoy nature around them – Animals, birds, Trees, sky, rain, etc. This category provides activities which are based on their experience in the outside world. The children should be aware that apart from the family members, many people help them in daily life. This app helps them to identify the persons with different jobs and build respect for their work. It includes playful games or forms of visual exercises that will excite the young minds and capture their interest.

4. CONCLUSION

Technology has created a revolution in possibilities for disabled learners. For years, differently-abled students have struggled with their assignments or been shut out of different classes or subjects because schools had accessibility or instructional problems. Assistive Technology is any item, piece of equipment, or product system that is used to increase, maintain, or improve functional capabilities of individuals with disabilities and the future of the educational system is practically determined by the development of technology. The teaching strategies designed in this app facilitate the hearing and speech impaired children to improve their capacity, productivity, and performance. Technology integration in education inspires positive changes in teaching methods. Parents or tutors can organize their time in a way that works for them, and they can easily help the children to gain the knowledge they are interested in. The four skills of listening, reading, writing and speaking can be improved in a better way by taking up the tasks provided in this app. This app gives the joy of learning through fun based activities and enhances the learning capability of children by the way of indianize education. This app is meant to create and offer content that is representative of the Indian ethos, mindset, practices and heritage.

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