Early Childhood Learning Assistive Technologies

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Abstract. *Learning is a fundamental aspect of life, any living organism that fails to learn and adapt to the rules of survival in the current environment risks facing the challenge of extinction as the laws of nature demands survival of the fittest. It is our duty and mandate to provide a conducive learning environment for the young learners to acquire the much treasured knowledge to be good visionary leaders of tomorrow. In this quest Information and Communication Technologies can provide a powerful tool that can be used for the development of assistive technologies for making learning effective and interesting for young learners.*

Keywords: ICT, Learning, Program, Early Childhood Learners

Introduction

Much has been done to make learning easy for the adult learners but little has been done to make learning easier and comfortable for the children in the primary education. This paper proposes the use of ICT technologies to develop an assistive tool for making learning easy and interesting for childhood learners. It involves the creation of a computer based program which can be fed with the content that the teacher wants the students to learn and the content is shown using a projector on a screen and the students take turns to read or solve the exercises using the tool.

ICTs

Information and Communication Technologies. Is the use of computers and computer related equipment for the acquisition, transmission, processing and dissemination of information to simplify human life.

Learning

Is the process of knowledge acquisition. Learning is an integral part of survival, it involves adaptation to new environment, acquiring new knowledge, assimilating the acquired knowledge and putting the knowledge into practical use. Learning can be self driven, situation driven, technology driven or problem driven.

Program

Is a set of computer instructions written in a computer programming language instructing the computer on what to do.

Assistive Technology

Any technology, hardware or software, freeware, commercially off the shelf or custom

developed that helps to aid children in their education.

Early Childhood Learners
Children who are still in primary schools.

PROBLEM STATEMENT
Early childhood learners are subjected to the same old teaching approach of the teacher knows it all, where the teacher has to stand in front every day which becomes monotonous for their effective learning. Children can end up losing focus on what the teacher is teaching if the same approach is used over and over again. Some parents end up engaging private teachers for their children at an extra cost with no guaranteed fruitful results. On the other hand the teachers may also need time to do other written work or administrative work and prepare for the next lessons instead of just standing in front of the students.

AVAILABLE TECHNOLOGIES FOR SUPPORTING LEARNING
Much work has been done to promote the education of adult learners. The following section outlines the ICT technologies which have been successfully implemented for the knowledge acquisition of adult learners;

Moodle
Is a software that has been developed to assist tertiary education lecturers and students to handle their assignments, exercises, tests, home work and research papers. Lecturers will post assignments and work to be done by students and students will work on the assignments and submit the work done online. Learners and lecturers can also hold live interactive group discussions through chatting on the Moodle platform thereby promoting interactivity.

Blackboard
Is a platform which resembles the functionality of Moodle but provides more services. It also supports chatting, group chatting, assignments and homework allocation and submissions online.

Turn-It-In
Is an anti-plagiarism software in the form of a website used for submission of assignments by students globally to enable checking of plagiarism. This is a most widely used software by many institutions of higher learning to help curb would be writers from masquerading as the authors of other original author's ideas.

Other E-Learning Technologies in Virtual and Physical Environments;

1. **Video conferencing**
   These are technologies which facilitate virtual classrooms with learners in geographically dispersed environments. This makes use of high resolution IP-Cameras to capture the classroom activities of the learners and the lecturer in real-time mode. The main advantage of this technique is the support for real-time interactivity and live-scene that it is associated with, also promotes student diversity by eliminating distance barriers. The main challenge is that its success depends on factors like network reliability, bandwidth and camera resolution.

2. **E-Tutors and Learning DVDs**
   Constitutes recorded material in the form of videos which are then played while students are listening. The main advantage is that the technology is cheap. The disadvantage is that the material itself can't learn if there are any changes in technologies the material will always present the same old story over and over.

3. **Test-Engines**
   Software that are used for running tests for students. The main advantage of such software is the ability to randomize questions from a database and mark immediately upon the completion of the exam by the student. This software works well for multiple choice questions, for structured questions the software hasn't been used since structured questions involve the discretion of the marker.

MAIN CHALLENGES OF THESE EXISTING LEARNING TECHNOLOGIES

Most of these ICT solutions are very effective as evidenced by their wide use. The main shortfall is that they emphasize on the matured learner and lacks the assistive approach that is crucial for a childhood learner.

Research On Early Childhood Learning Technologies

Research on assistive technology is not new. Assistive technologies are well known in the area of assisting children with disabilities [1]. They can be used for such children to assist them to learn valuable skills like sharing, taking turns, communication skills, attention span, fine and gross motor skills, self confidence and independence. The most commonly used devices are like switches with battery-operated toys to give infants opportunities to play with them [1].

Van Scoter et al (2001), advocates for the use of technologies like the internet for searching information, communication, meeting friends and finding games, computer games, puzzles, music, videos and maps. Several researchers have advocated for the use of computer games, puzzles and online videos to give students a feel of technology at an early age [2]. The major challenge with this idea is that students will just enjoy the Videos and puzzles at the expense of the curriculum. Most researchers feel that the use of the internet for searching information among children for primary students is not very helpful as they are still young, but for secondary students will be better.

Use of Technology In Early Childhood Learning

Technology in early learning should not be an obsession but an aid for understanding the curriculum. Wardle F, notes that; technology should be integrated into the overall curriculum. He states that, "Use of technology in the early childhood program must not be a goal unto itself: the purpose is not to teach children how to use computers; they can do this as they get older, just as they can learn to drive a car later in their lives." [3]

McManis, L. D et al, also asserts that, "Experiences with technology can pave the way for unprecedented learning opportunities. However, without an education component, technology cannot reach its full potential for supporting children's learning and development." [4]

Dr. Martha Stone Wiske, co-director of the Educational Technology Center at the Harvard Graduate School of Education, also notes that, "One of the enduring difficulties about technology and education is that a lot of people think about the technology first and the education later" [5]

Appropriate use of technology in early childhood learning expands, enriches, supports and extends the curriculum. If technology is not integrated into the curriculum it will be misused and abused leading to negative results. Thus there is need to create a support team that includes people knowledgeable of technology, and people who understand developmentally appropriate practice, use appropriate approved software and integrate the technology into the curriculum for the betterment of the students.

Mandy Galle concludes that, "Computers in the classroom enhance learning. It is important to remember that computers must be used in conjunction with a variety of other materials to get the most benefit from the technology. Choose software that makes sense. Encourage conversation between students at the computer." [6]

Jeff Galinovsky a regional manager for Intel's classmate PC in North America gives the five ways to integrate technology in children's learning as follows;

1. Get the wiggles out – take learning out and beyond the classroom, including using laptops and mobile phones to facilitate multimodal learning
2. Make topics real and applicable
3. Give kids a sense of ownership
4. Facilitate self paced learning
5. Create a safe environment to explore

Negative perceptions on technology in early childhood learning

Some early childhood teachers feel that incorporating technology may end up replacing their skills and eventually rendering them redundant thereby losing their jobs and livelihood. However this is not the case as the technology should be incorporated into the curriculum and is not meant to replace the teacher but a tool that the teacher should use for aiding student understanding and getting better results.

PROPOSED SOLUTION FOR CHILDHOOD LEARNERS

From the above analysis of the available educational technologies, it can be noted that the solutions postulated and implemented so far assist the senior matured learners while relegating the childhood learners to the archaic learning approaches of the teacher knows it all. It is from this perspective that the researcher proposes the use of ICT assistive learning technologies for childhood learners to be integrated in their curriculum.

IMPLEMENTATION OF THE PROPOSED ASSISTIVE TECHNOLOGY

The technology is a software program developed using any Visual programming language for example Visual Studio (C# or VB.NET) or JAVA and uses a database for example Microsoft Access, MS SQL Server or Oracle where information or content on the curriculum is uploaded. The content is updated from time to time in line with curriculum changes thereby overcoming the challenges of E-Tutors and learning DVDs of having static content.

The researcher used a simulated simplified program to determine if the idea of the assistive technology will work effectively. A simple VB.NET program which creates exercises and allow students to practice the exercises was used and tested with five (5) students, at Mophane primary school in Gaborone. The software proved to be very effective as children are interested in games. To them it appeared like a game and they took turns to play while laughing at each other which proved to make the learning funny. After the exercise when the students were asked what they mastered they were found to remember more what they learnt through the game learning approach than through the traditional classroom approach.

The content may be accessed by students through a computer or projector projecting on a wide screen. This can be done by students individually, as a class, in groups, or using role play, the teacher may also lead the learning process but its most ideal when the children take charge of their own learning and the teacher corrects and guides only. This technology is meant to be more of a template where the content of any primary school subject or grade can be uploaded and the students take charge of their learning.

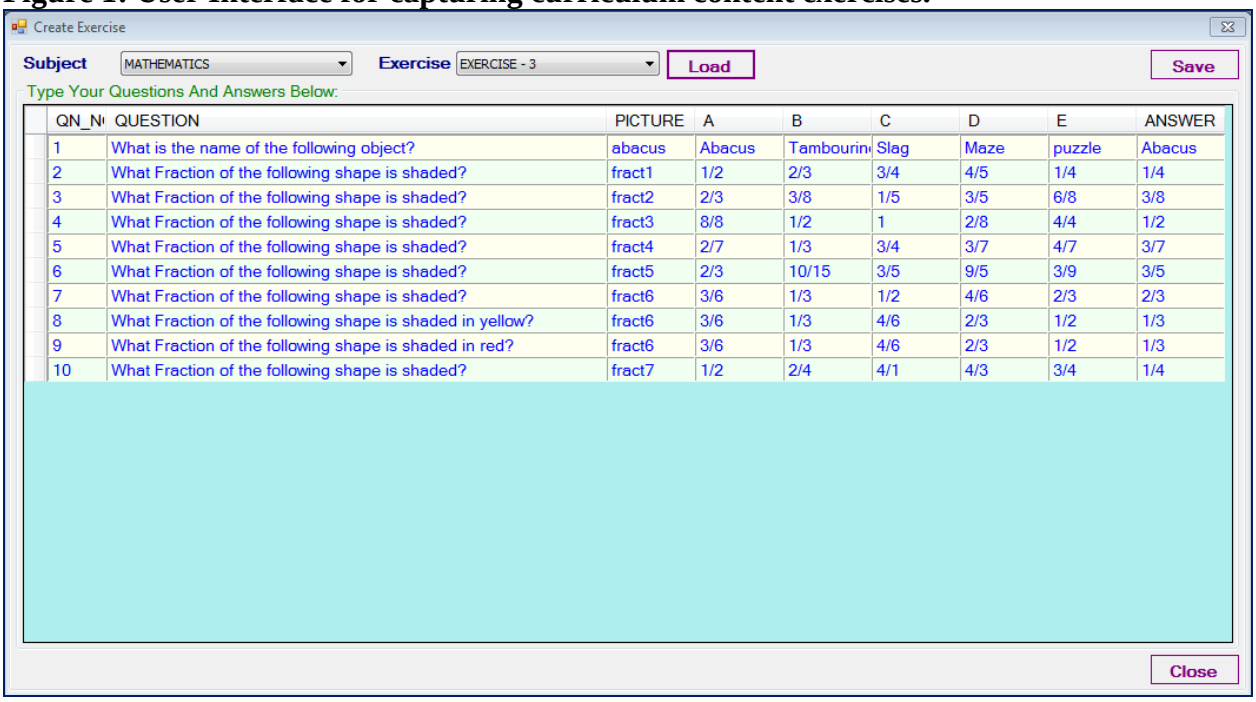
The technology uses voice support to be able to read words, numbers, letters and sentences for the children. A simple example is when the technology can project some words one at a time, prompting the children to read each, then the technology will read the words correctly while the children listen thereby making the children mark for themselves and determine their score. This can be applied in mathematics, English, Science, and any other subject for the children.

Hardware And Software Requirements of the assistive technology

For implementation of the assistive learning technology, the following requirements are needed;

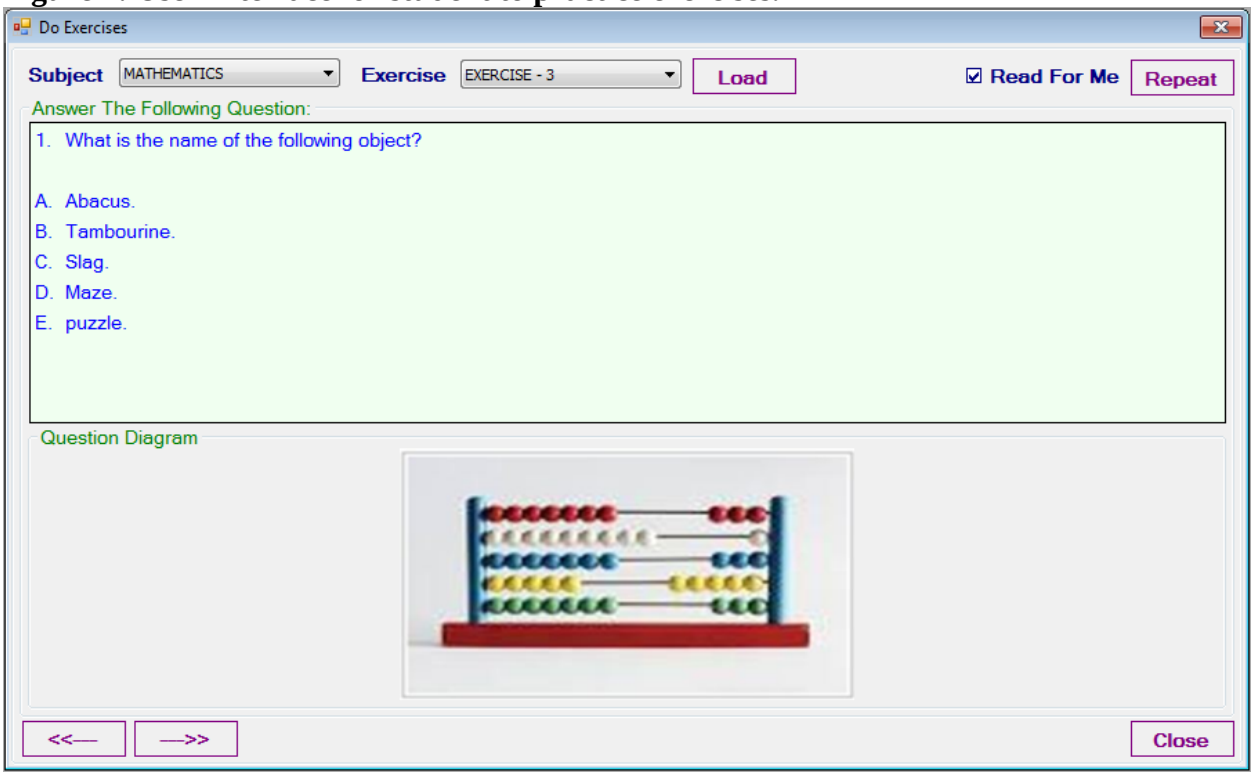
1. Software program for the assistive learning technology.
2. Projector, any resolution.
3. Wide screen for projecting the content or while wall
4. A computer or mobile phone to act as the source of the content.
5. Database Management System software e.g. Microsoft Access, SQL Server or Oracle databases – where the content for learning is uploaded. Access is preferred for its portability.

Figure 1: User Interface for capturing curriculum content exercises.



This menu is used by the teacher to capture and update the curriculum exercises for the students. The teacher selects the SUBJECT then NEW EXERCISE to create a new exercise then Load.

Figure 2: User Interface for student to practice exercises.



This menu is used by students to practice exercises, they select the SUBJECT and the EXERCISE, then click Load, the forward and back buttons are for navigating Exercise questions.

Perceived Advantages Of Implementing The Assistive Technology In Childhood Learning

- Galle M, states that "The use of technology helps children practice skills and better understand concepts. Interactive educational games provide immediate feedback and encouragement to children." [6]
- Elizabeth Ross, states that, "Technology is and will continue to be an integral part of classrooms, workplaces and our everyday life. Using technology helps early learners to communicate, practice life skills, and better understand concepts." [7]
- The technology is more of a template with the right content being uploaded by the teacher which corresponds to the syllabus of the children.
- The technology has voice support which makes it more convenient and interesting for the children, as it can read the questions for them.
- It is suitable for children since it encompasses the visual aids and diagrams which the children are familiar with in their day to day life for example an alphabet with letters and pictures of objects they know and like for example **I**- for **Ice-cream** with a picture of ice-cream, **B**-for **Banana** and its picture, **C**-for **Chocolate** and its picture etc.
- It frees the teacher and gives them time to prepare for the next lesson while the students take charge of their learning.
- It empowers the children with technological know-how at a tender age as they will be learning their curriculum content making it a two in one approach.
- It grooms the children to be confident and develop leadership skills as they do their role play based learning.
- It provides a new style of learning and variety to students making learning interesting, adventurous and funny.
- Can be acquired by parents to assist their children at home during weekends and holidays.

Some Positive Research Findings

1. Kulik's Meta-Analysis Study. Contacted a research on the effectiveness of computer based instruction compared to traditional instruction instruction.[8]
   - On average, students who used computer based instruction scored at the 64th percentile on tests of achievement compared to students in the conditions without computers who scored at the 50th percentile.
   - Students learn more in less time when they receive computer-based instruction.
   - Students like their classes more and develop more positive attitudes when their classes include computer-based instruction.

2. Sivin-Kachala's Review Of the Researches(1998) - Reviewed 219 Researches from 1990-1997 to assess the effect of technology on learning and achievement across all ages.[9]
   - Students in technology rich environments experienced positive effects on achievement in all major subjects.
   - Students in technology rich environments showed increased achievement in preschool through to higher education for both regular and special needs children.
   - Students' attitudes towards learning and their own self-concept improved consistently when computers were used for instruction.

FURTHER WORK

A simulated and simplified program has been used and tested with a small group of students who showed enthusiasm on using the technology. A full-fledged software needs to be developed which will encompass all subjects learnt by children in primary schools and the content for each grade. The software is not a replacement of the teacher in the classroom but an aid that the teacher can use to assist the students to learn on their own and take responsibility.
The teacher is still an integral part of the learning process as they are needed to prepare and continually update the curriculum content in the software technology, and to coach the students and also assess their writing capabilities as the software cannot assess the writing abilities but the aspects like reading and problem solving.

CONCLUSION

Several software technologies have been developed and they are mainly meant to assist the senior learners. This technology is meant to assist the children in primary schools to learn to read and solve problems individually and using role play. The technology also assists the teacher to do other work while the students learn on their own. It can also be used even at home since it encompasses self assessment exercises meant to evaluate the learning progress of the child.

RECOMMENDATION

The software proved to be an effective tool on the trial runs done and as it brings fun in the learning environment, thereby making learning interesting and empowering learners with technological know-how at a tender age. It also grooms their leadership and responsibility traits through role play. From the trial run results the software has been found promising, the author hereby recommends the effective implementation and use of such assistive technologies to promote childhood learning for better visionary and confident leaders of tomorrow, for the betterment of the communities, the nations, the region and the world at large.

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