Creating innovative minds and self learning among the toddlers through e-technology

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Early childhood education has become a requirement among the parents today. Toddlers today spend considerable amount of time outside their home under the care giver. Even at home due to parents being busy with their official work, the child plays with gadgets in their absence. Today a huge matter of concern is that parents are unable to spend sufficient time with their children. As a result there is a growing tendency even among the children below 5 yr to play with e-gadgets. As the child becomes two and half/three years of age, parents are very keen to prepare their children for nursery school admission based on the academic, social, and general knowledge requirements to be fulfilled as criteria for the nursery school admission. Due to easy availability, children today are well exposed to touch screen based mobile e-notebook, e-notepad and mobile phones which offers an effective media for self learning. Though there are few such applications available for ipads, e-tablets and smartphones, but none of them fulfils on teaching the admission criteria based on school syllabus. The main objective of the study was to develop an interactive tool/application for self learning based on the nursery school curriculum in Maharashtra State, India. The effectiveness of the application was tested among 40 toddlers between the age range of 3-5 years of office going parents by giving the tablets for self exploration for about one hour in a three days public exhibition gathering. During that 1 hour time, the parents were asked to allow the children to explore the level one and level two of the application which deals with the Learning through pattern matching, pattern differentiation, body part identification, the concept of colour, shape and number recognition. At the end of 1 hour, a feedback application with a five point questionnaire was provided to the parents specify their level of liking of the Eslate application using a 5-point rating scale. Majority of the parents who participated in the study were extremely satisfied with the simplicity and use of the application resulting in engaging their children in learning something new with the technology available.

Practitioner Summary: The concept and approach of self learning by the toddlers through the developed application ‘e-slate’ found highly successful and further development is on progress for commercial venture to develop it in possible 22 major Indian languages in phases.

Keywords: Children, education, creativity, e-program, touch screen

1. Introduction

Globally, there has been a significant importance entrusted upon pre-school education for children. The important question that arises is what environment should be provided which may help impart in easy pattern recognition and learning. The age 0-5 years is considered as the cognitive and neuro-muscular formative stage of the child [1]. It is a well know fact that access to good-quality care and education leads to a strong foundation of basic cognitive and language skills which leads to a better quality high school education [2]. Early childhood education has become a requirement among the parents today. Today’s urban India has seen a gradual change in the family structure from being in a joint family earlier to a nuclear pattern [3]. The gradual shift in family structure from joint to nuclear families has increased in the number of both parents being busy to fulfill their career opportunities by going to the office leaving their toddler with crèche or in the nursery schools. Toddlers today spend considerable amount of time outside their home under the care giver. Even at home due to parents business, the child plays with gadgets. Today lack of sufficient time to devote for the children by their parents is a matter of concern. As a result there is a growing tendency even among the children below 5 yr to play with e-gadgets. On the other side parents are also very keen to prepare their children for nursery school admission based on the academic, social, and general knowledge requirements to be fulfilled as criteria for the nursery school admission. The educational environment required for preschool education need to be child centric and based on child’s needs [4] for which efficient learning method is helpful which gives the child freedom of making their own choice about what to do, how to do it.
Through this method the children are able to develop their problem solving skills, creativity and communicative skills [5]. Early childhood development includes involvement of several areas of a child’s well-being: physical, social, emotional and mental. There is a series of developmental changes that any child undergoes where the child becomes progressively independent and increasingly learns advance techniques and skills as they get older. However, every child has his/her own speed of learning and each child may reach his/her developmental milestone as his/her own pace of learning [2].

Literatures suggest that children, including toddlers, today are well exposed to touch screen based devices like e-notebook, e-notepad and mobile phones which offers an effective media for self learning [6]. Currently there are few such applications available for ipads, e-tablets and smartphones [7,8,9]. But none of them fulfills on teaching the admission criteria based on school syllabus. Moreover those packages do not indulge on self learning and motivation towards creativity. Children as young as two years old are familiar touch screen devices and learn to access, play with them on their own. Children are highly fascinated by these touch screen devices which help them to explore the device on their own and learn in the process. Simply, the ease with which the child can operate the iPad/touch screen device depends on the design of the Application being accessed [4]. Based on the current situation question, therefore, arises on 1) What will be the simpler way to fulfill the parents requirement in preparing their toddlers for nursery school admission, 2) How to induct the child to learn through fun with special emphasis on opening up their innovative minds for creativity and self learning, 3) How parents can keep track on child’s performance and inclination, 4) Can the same approach be adopted in the schools/creche also? Thus Attempt was made to develop a program/application based on the nursery school level curriculum in Maharashtra, the concept of which may be extended to any other language in India. Our approach was based on the Montessori Method by focusing on the child’s willingness to learn on his own by following the behaviour that a child is highly explorative in nature in self learning which is the finest and easiest possible way to implement early childhood education [9].

The objectives of the study were 1) To develop an interactive tool/application for self learning based on the nursery school curriculum in Maharashtra State, India. 2) Throw challenges among the kids on creativity, 3) A background data logging system, accessible only to the parents/teachers on monitoring child's activity and performance. The current study was to determine how this application would help in basic learning in conjunction to the regular class learning. The children who participated in the study already had an idea of basics of pattern, colours and shapes recognition.

1.1 Methodology

An android based package was developed to fulfill the academic and innovative requirements of the toddlers. As per the nursery school curriculum, a child has to develop his basic knowledge based on 4 level systems; 1) Learning through pattern matching, pattern differentiation and body part identification. 2) The concept of colour, shape and number recognition, 3) Understanding of space and direction and 4), Learning alphabets. Each of these levels has required tutorials followed by test to capture the progress of the child which can be accessed by the teacher or the parent. While the objective of the entire project was to develop complete interactive educational software to develop skill on read, write and speak, the first part of the program has been developed to comply with the level 1 of the academic curriculum. Attempt was also made to motivate the children in terms of creativity and motor skill development by using the system based photography and paint application.

The Initial trial run on android based educational application was installed in four e-notebooks and distributed among the migrating children through NGOS who runs such day care centres in Pune/Mumbai, India. Based on high success, the effectiveness of the application was tested among 40 toddlers between the age range of 3-5 years of office going parents by giving the tablets for about one hour self exploration in a three days public exhibition gathering. During this time the parents were asked to allow the children to explore the level one and level two of the Application which deals with the Learning through pattern matching, pattern differentiation, body part identification, the concept of colour, shape and number recognition as described below.
1.1.1 Pattern matching and Pattern Differentiation application:

The pattern matching application as shown in Figure 1 helps the child to identify same patterns from the given options. The application is designed to teach the child about the concept of similarity/dissimilarity. The pattern differentiation application as shown in Figure 2 helps child to identify difference among the patterns which are given in such a manner that only one object is different among other given options.

![Figure 1. Process of Pattern matching reference image.](image)

![Figure 2. Process of Pattern Differentiation reference images.](image)

1.1.2 Body part identification application:

In this exercise, parts of human body are introduced, where the explanation of the body parts are grouped in three subgroups, head, middle part, lower part.

![Figure 3. Process of Body part identification reference image.](image)
1.1.2 Introduction to Colours application:

In this colour concept development tutorial, the child is introduced to three basic colors (Red, Yellow, Blue) as observed in figure 4 along with black and white colour. This helps the child to understand and identify or match the colour in day to day activities. All the three colours along with black and white, total five in number, are briefly explained with the help of daily life objects. As an example yellow colour reference images are as shown in Figure 5.

![Figure 4 Introduction to colour](image)

![Figure 5 Colour recognition with reference images](image)

1.1.3 Introduction to Shapes application:

This sub-module is aimed at developing the concept of different basic geometric shapes to the toddlers. The shapes were circle, triangle, rectangle, square, etc as observed in Figure 6. The animation tutorial helps the student become aware about basic shapes so that he/she can easily identify them in day to day life. For example the circle shape is explained through circular clock, plate, moon, football and so on.

![Figure 6 Introduction to colour](image)

![Figure 7 Colour recognition with reference images](image)

Both the colour and shape application have an inbuilt, test where the child has to select a particular colour/shape as per the audio instruction given by the recorded voice of the instructor. To assess the impact of the color/shape module, the child has to select one of the colour/shape assessment exercises from the given options as per the audio instruction. When the child clicks on the correct option, the audio instructor gives a positive and encouraging feedback to the child which is followed by the appearance of the next question and when the child selects the wrong option then the audio instructor tells that “This is wrong, try again” and same question appears again until the child does not select the correct answer. This helps the child to correctly learn the proper colour and shape of the objects through repeated trial and error method. Towards the end of the session, there is a provision of a special colour blind test, where the child is asked by the audio instructor to Identify each of Red, Green, Blue and yellow colour line from given two lines. Out of those two lines, one is the coloured line and the other is based on the gray scale value of the respective colour.
This score is not available to the child but to the parents or teacher for their future use. This will help in early detection of colour blindness. The result of this test is directly stored in the database.

1.1.4 Introduction to Numbers application:

In this application, the child is introduced to the concept of Marathi language numbers from 1 to 9. To being with, the number will be shown to the student as seen in figure 8 followed by the quantity of the specific number. For example: Number “1” = “1” Apple, Number “2” = “2” Bananas as shown in figure 8.

![Introduction to numbers with their respective object describing number](image)

2.1 Results and Discussion:

The use of Ipad/touch screens and notepads are very fascinating to young children as the device is highly responsive to touch. The children soon develop mastery as they become familiar with the device through sensory experience. Through trial and error method, the children soon progress from their unfamiliarity to mastery in using the application. The children like the independence of learn by doing the exploration all by themselves [4].

![Child exploring pattern matching application](image)

As observed in Figure 9, children explored the application and enjoyed the all the activities associated with the application. The parents were also able to monitor the toddler’s activity on different time of the day through the data logging system that generates a report of the progress of the child in each respective tutorial. It was observed that the touch screen medium was highly effective to keep the children engaged and learn in the process. As children are highly explorative in nature and they had a fascination for touch screen devices the children were eager to learn. This was the feedback received from the parents and praised for the application. In fact they were in demand of procuring a copy of the Application which is yet to be released. A total no of 40 parents participated in giving the feedback for the e-slate application the results of which are given below:
The 5 feedback questions given to the parents were:

Question 1: Do You Like the Content?
Question 2: Do You Like the Interface?
Question 3: Is It An Use-full Application?
Question 4: Would You Like to Use It?
Question 5: Rate the Application!

![Figure 10](image1.png) Diagrammatic representation of the liking of the content of the Application.

![Figure 11](image2.png) Diagrammatic representation of the liking of the interface of the Application.

It was observed that 57% of the parents found the content of the application extremely satisfying/awesome while 38% of the respondents were satisfied with the content of the application as observed in Figure 10. The major reason being that the parents felt the children were engaged very well to learn and explore more and more in the application. Figure 11 depicts that, 46% of the parents found the interface of the application satisfying while 2% of the respondents were unsatisfied with the interface of the application. 1% of the respondents found the interface terrible which was probably due to the hanging of the application while in use. Hanging of the application lead to the child losing his/her interest in accessing the application which will be overcome by de-bugging the application and the system.

![Figure 12](image3.png) Diagrammatic representation of the Usefulness of the Application.

![Figure 13](image4.png) Diagrammatic representation of the whether the parents would use the Application.

As observed in Figure 12, 65% of the parents found the application extremely useful for educational purpose and in tune with what would be helpful for the children in their future academic interview at the school level for admissions while 2% of the respondents were unsatisfied and expressed the need for the application to be a bit more user friendly with respect to availability of the same application in other languages apart from the present Marathi language as a default audio feedback language. When asked if the parents were willing to use the application in future, 54% of the parents positively responded and said they would like to use the application, while 3% of the respondents were unwilling to use the application as they did not want their children to get addicted to the touch screen devices as observed in Figure 13.
When asked to rate the application, 63% of the respondents found the application awesome, 30% were satisfied with the application while 1% of the respondents were unsatisfied with the application as observed in the Figure 14. Thus on the whole it was a highly appreciated application by the parents of the toddlers.

3.1 Conclusion:
Majority of the parents who participated in the study were extremely satisfied with the simplicity and use of the application resulting in engaging their children in learning something new with the technology available. The whole approach of the application being based on the curriculum of the nursery school was highly appealing to the parents. The colour blindness detection application was also immensely appreciated by the parents as such an option is rarely available for them to detect a pre-existing problem at an early stage of childhood. The concept of tablet/smartphone being an educational media apart from being used only for playing games was highly appealing to the parents of the children. There was a huge demand by the parents for procuring a copy of the Application which is yet to be released. The inbuilt paint application for the purpose of drawing was also helpful as the children could draw images and save them to show them to the parents later through the saved images access in the tablet/smartphone album access. The concept and approach of self learning by the toddlers through the developed application 'e-slate' found highly successful and further development is on progress for commercial venture to develop it in possible 22 major Indian languages in phases.

4.1 Future scope:
The current e-slate application is compatible to the nursery school curriculum which is helpful to prepare the student with pattern, colour, shape, recognition along with alphabets and numerals. In future, approach would be to teach construction of words and sentences through the application. Currently this software interacts /teaches the student only in Marathi language as audio feedback. In future, the approach is to introduce the same application in 22 other regional languages like Hindi, Bengali, Gujarati, etc. besides English. In future, the application can be made more user interactive so that the student remains more and more curious to learn in the process. More chapters like Story book reading, different kinds of symbols, word formation through combination of vowels and consonants, basic mathematics etc. are to be included along with their respective practice test’s for the students intellectual improvement.

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