

## E-LEARNING SYSTEM FOR AUTISTIC CHILDREN

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**ABSTRACT.** In general, children with autism may have with social/emotional relationships problems, problems with communication, trouble with surroundings, consciousness problems and cognitive problems. The purpose this study is to help autistic children learn alphabets in the early levels of learning. With this paper, we hope to propose an e-learning school-base system for autistic children of education ages between 4-6 years. In addition, our system will enable teachers to teach one or more children at the same time.

**Keywords:** autism, autistic, e-learning, ASD, alphabets

### INTRODUCTION

“Autism Spectrum Disorders (ASDs) are a group of neurodevelopment disorders characterized by core deficits in three domains: social interaction, communication, and repetitive or stereotypic behavior.”(Hailpern, 2007). For Children with ASD, it is known that they have strong attractions to objects, pictures and colors ( Hirano, Yeganyan, Marcu, Nguyen, Boyd & Hayes,2010), objects and visual materials are the language that they understand, not words. However, each one of them differs from others in the “object” that he/she is most interested with. Many of specialists people (educators or therapists) in this field pointed that individuals with ASD have strong visual skills but struggle with verbal communication (Frith & Happe, 1994). That is why computer – assisted systems introduced for such children must include the visual materials as part of any learning strategy to develop their learning skills. Actually there is so much that assistive technology can do to help people with autism live functional lives(Elzouki, Fabri & Moore,2007) ; (Charitos, Karadanos, Sereti, Triantafillou, Koukouvinou & Martakos,2000) ; (Konstantinidis, Hitoglou-Antoniadou, Luneski, Bamidis, & Nikolaidou,2009).Also if we consider (Grandin,2002), as he was an autistic child, and gave interesting teaching tips for autistic children. One of the points given by him is, “Many autistic children have problems with motor controls of their hands. Neat handwriting is sometimes very difficult and this can totally frustrate the child. To reduce frustration and help the child enjoy writing is to let him type on the computer. Typing is often much easier”.

Here we are proposing this E-learning school-based system, which is designed for children between the ages of 4-6 years and we hope it can help autism children to develop their learning skills and at the same time to be an assistance tool for teachers in this field by reliance on visual colorful objects introduced by the system in a structured order that autism child need in all his/her activities because it can really improve their conditions and skills (Chang,2006). It is such a system that can give help to teachers to devote their time to a larger number of students and schedule each child’s learning according to the database within the system which includes the medical background of the children as well with the possibility for parents access as well. This is done by using the special password of the child given to

his/her parent to keep track of their child’s learning progress as well as coordinate with school by adding notes to the database of their child.

**RELATED WORKS**

Several studies and attempts had been proposed, within the field of teaching of ASD children, of the use of computers but they are not school-based systems to help teachers with their work to teach simple alphabetic for autism children.

One interesting system tried to improve the intelligibility skills of speech of autistic children through a special interactive e-learning game offering rewards for improvements. (Rahman,2010)

Another system designed courses for Autistic children by using multimedia skills. Courses had independent units with simple audio contents called environmental teaching mode to teach children topics of daily life(Chang,2006).

The Affective Computer-Aided Learning Platform for Children with Autism (ACALPA) , is a platform to enhance teacher-child education process by using interactive emotional avatar . this platform was introduced with several models ,to help children with autism identify and sequence images and emotions by visual expression with the help of an interactive avatar and supervision of teacher or educator (Elzouki, Fabri & Moore,2007)

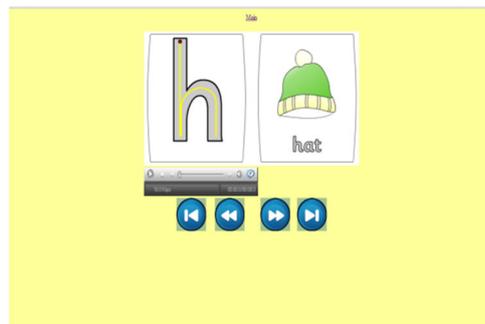
Returning Home , scenario and a pilot phase of project for autism children . This scenario was designed in a simulated environment to address the everyday’s tasks to autism children. This project include the special “MAKATONS” cards for autism children to guide the child for through the simulated virtual environments (Charitos, Karadanos, Sereti, Triantafillou, Koukouvinou & Martakos,2000).

**E-LEARNING SYSTEM FOR AUTISTIC CHILDREN**

E-learning system for autistic children is to help children with ASD of early school age between 4-6 years by way of teaching the alphabets with the help of visual objects or characters in an interactive way. Repeating the sound of letters with their shapes, accompanied by pictures, and giving the children chances to practice writing these letters under the supervision of expert or special teachers who have got to know the level of the children through a background database, will help the ASD children increase the possibility of learning (Konstantinidis, Hitoglou-Antoniadou, Luneski, Bamidis & Nikolaidou, 2009) ; McGee, & Lord, 2001). It will also be a tool for teachers to document each child’s progress in the child’s database.



**Figure 1. E-Learning System Interface.**



**Figure 2. Letter with its appropriate object.**

This system being a school-based system has been designed to be an e-learning assistance tool for teachers as well. A teacher can divide his/her time among three ASD children instead of concentrating only on one child. The system in its present form is divided into three levels to cover the twenty six English alphabets, with eight to nine letters per level so that the

repetitive hearing and writing of each letter can be utilized to its fullest. Also the teacher can show the child being taught, using the system, how each letter can be written by hand. This procedure is to be introduced to the child after the child had recognized the shape of a given letter. The child then uses his/her ability to move forward and backward to display the letters and how they had been written, if he/she wishes to do that.



Figure 3. Teaching handwriting of letters .

No	student ID	student name	Email	Level	Family Description	Teacher Description	Current	Previous
1	1111	1111	111	Level 1	asd	asd	11	11
2	1112	1112	112	Level 1	asd	asd	11	11

Figure 4. A database table containing child's information.

The system has been designed to give a simple test to a child after each level if the teacher wants to do so. This is to enable the teacher to note the child's learning capabilities and improvement and mark them in the child's database. This is to help the child in the event another teacher takes charge the child .

This system is a hopeful tool for parents as well. They have access to the system and can see the progress of their child, plus the ability of adding their own remarks and recommendation, to the database of their child to be considered by teachers.

ASD children will learn more easily and quickly with the aid of this system, because they are not forced right away to draw the letters on a paper as this is a difficult task for them to do so(Elzouki, Fabri & Moore,2007). Instead they just press the corresponding buttons containing the letters they are learning and make them appear on the screen. Seeing them on the screen will then encourage them to proceed on with the learning of other letters and words. By having control over the system, the teachers can then decide on a teaching movie to teach a child a selected behavior.

This procedure is not only entertaining but is helpful in teaching language materials between letters and behaviors. After each level the teacher can give a test, at the teacher's discretion, based on the background knowledge of the child.



Figure 5. Teaching through a behavior movie.

## SYSTEM IMPLEMENTATION

This system has been developed as an E-learning System using Java application with My SQL because of the strength of these two languages in the development of web pages. Browsing through the system, you will see that it consists of two main parts; the first part is for the use of the special teacher while the second and the other parts are to be implemented by the teacher supervisor. To enter the system the teachers must enter user names and predetermined passwords.

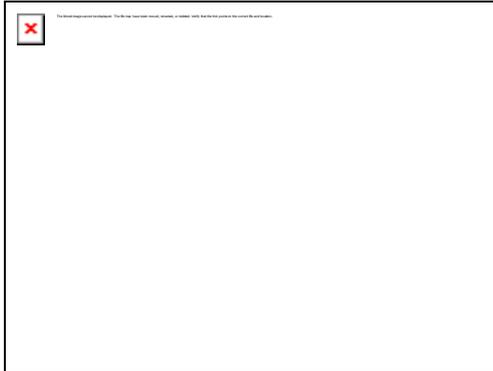


Figure 6. User name and password for teacher.

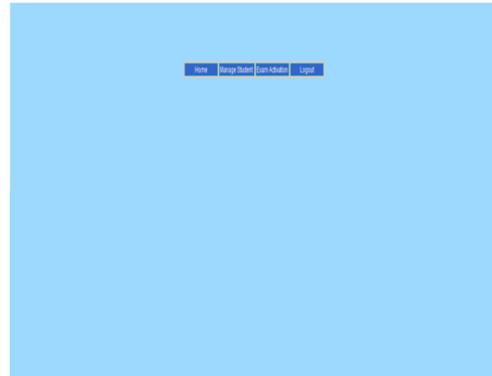


Figure 7. Page of teacher.

The reason for this is that there may be more than a teacher in the class and each teacher may have go through a preplanned page consisting of home, management student, exam, and logout. The management page consists of add, update, delete, and view data.

This exam button is selected by the teacher to determine the test level either for implementation or for entering the results into the database.



Figure 8. Table of data.



Figure 9. Table for exam.

The home page is for the purpose of monitoring the child at home by the teacher or the teacher supervisor of the child's family. To enter, the name of the child and the PIN number is entered. After that the child presses the login button to enter the system.

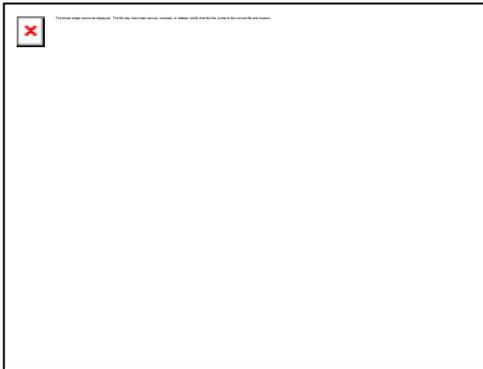


Figure 10. User name and password for student.

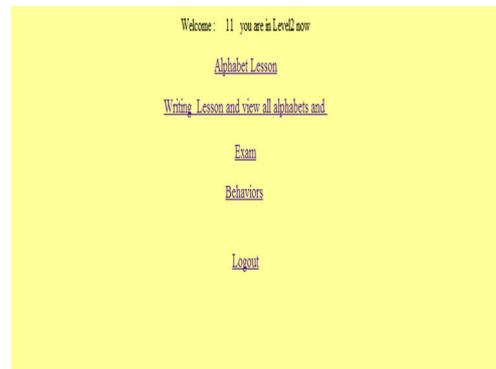


Figure 11. Writing lesson and viewing of alphabets.

This special education programs consists of lessons on the alphabet. The learning letters are divided into three levels. A letter is introduced with a sound and an object or a character. The character and the sound help the child to recognize the letter. This will be helpful during the writing lesson.

In a writing lesson an instruction will open a new letter. It will be spoken and after listening to the sound and viewing the character the child is expected to write the letter. If the answer is correct there will be a voice encouragement. However, if the answer is wrong a voice will request the child to retry writing the letter.

The accompanying test is in four stages. The first stage displays the characters as well as the sounds.

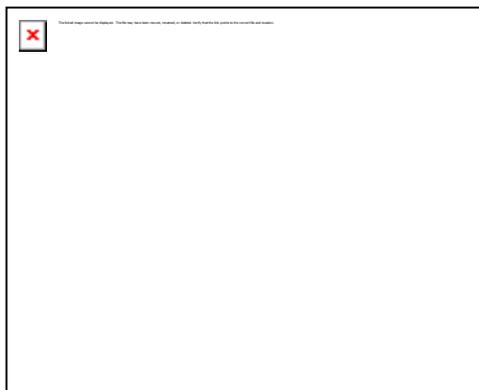


Figure 12. Sound exam.

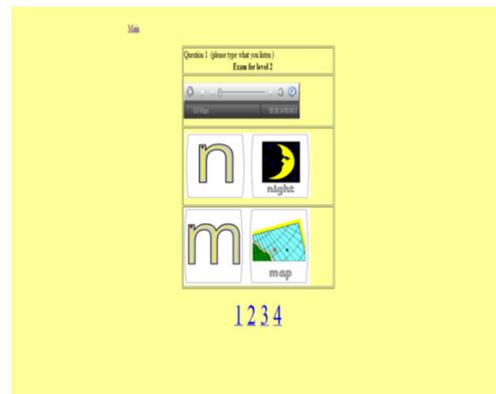


Figure 13. Alphabet exam.

The child will choose the correct letter based on the sound and the character. In the next stage only the sound will be heard. The child is expected to write the particular letter based on the sound. If the child is successful here the child will be automatically transferred to the next level. This transfer will be verified in the database.

In addition to the foregoing, there is the behavior aspect where a video tutorial will guide the child through all aspects of customs and culture of the daily life of children.



**Figure 14. Help With Autism.**



**Figure 15. Computer assist autism children.**

## CONCLUSION AND THE FUTURE

This paper presents an educational system designed for children with special needs. It focuses on the learning of the letters and words. The system can also be used for the teaching of numbers, games and behaviors. These many applications can help autistic children through the elementary school, lead to good results and create opportunities in the future.

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