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Mobile Applications BIUTIS: Let’s Study Vocabulary Learning as a Media for Children with Autism

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Abstract

Autism is a neurodevelopmental disorder that usually appears during the first three years. Autism cannot be cured, but can be reduced by early identification and treatment. This research involves the design and implementation of vocabulary learning application for children with autism on mobile devices based on Android operating system. This is a client server application on the client side where there are learning materials for children to manipulate menu items by using a companion study. The server functions to store the content that can be downloaded at any time as additional learning material. The results on the evaluation of the application showed the majority of the respondents (60%) strongly agreed and 40% agreed that the application can be recommended as a medium of learning for children with autism.

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1. Introduction

Autism is a neurodevelopmental disorder that usually appears during the first three years [1]. Autism can affect anyone who is not dependent on ethnicity, education level, social and economic. Autism is not a new problem, from a variety of evidence, these abnormalities are known to exist since centuries ago [2-5]. In Indonesia, autism itself is

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quite a lot, which in 2004 recorded 475 thousand children with autism. Autism cannot be cured, but can be reduced by early identification and treatment. Many therapies can be used, one of which is speech therapy. Speech therapy is the science which studies the behavior of normal and abnormal communication, which is used to deliver therapeutic or healing process in patients with behavioral disorders, including language skills of communication, speech, sound, smooth rhythm, so that people with behavior disorders of communication are capable of interacting with a natural environment, not impaired psycho-social as well as to increase the optimal life. As for the learning of vocabulary, it is one part of speech therapy [4].

Researches in Asia, Europe and North America have identified a number of individuals with autism prevalence from 0.06% to 1% [3]. Seeing the increasing number of autistic children progressing from year to year, the government through the Ministry of National Education has established the educational development of autism centers in major cities, namely in Jakarta, Semarang, Surabaya, Makassar and in Sumatra. The purpose of the establishment of the center of the development of autism education is to provide specialized services to children with autism, in addition to providing special incentives for public schools that are willing to accept and educate children with special needs, the government is also improving teacher training system, so that teachers have the ability to handle children with disabilities special. Unfortunately, education development center for children with autism only established big city, but children with autism not only consist of the city, even the villagers were also there. This leads to autistic children in the village was untouched.

On the other side of information technology, especially in very remote areas of developing mobile applications, even in 2012 it will grow two-fold. Mobile is no longer a luxury item, but has included the need. Each person even has more than one mobile, also including children. Based on these developments, mobile is expected to be one tool that can be used to help treat children with autism, be it as information for children with autism are organized also as a means of therapy for children with autism.

This research will be done the design and implementation of vocabulary learning application for children with autism on mobile devices based on Android operating system. This is a client server application on the client side where there are learning materials for children and to manipulate menu items by a companion study. The server function to store the content that can be downloaded at any time as additional learning material. The application has a user that is a companion and two children with autism. To operate the menu page there is a separation for a companion and also children with autism in order to avoid changes to the data by child.

2. Autism

2.1. Definitions Autism

Autism comes from the Greek word "autos" meaning self (self) [1]. The word autism was used in the field of psychiatry to show symptoms of withdrawal. Autism was first discovered by Leo Kanner in 1943. Kanner said that autism is a complex developmental disorder involving communication, social interaction and activity of the imagination. Symptoms begin to appear before the child was 3 years old.

As for the Alberta Learning, autism is a lifelong developmental disorder that affects the difficulty of social interaction, communication and behavior [3].

According to the DSM IV (American Psychiatric Association, 1994) that autism is a developmental delay disorders are categorized based on the disruption of social interaction, impaired communication, repetitive behavior and stereotyping [3].

Meanwhile, according to Goldstein in the study, autism is not a disease but a syndrome or symptoms that characterize a degenerative disorder of the bio-psycho-social [4]. Scientist do not yet know clearly the main cause of this syndrome. This defect is a developmental disorder that is permanent and profound. Often these symptoms are accompanied by abnormal behavior such as repetitive movements or unusual obsession of an object or event.

Autism can affect anyone who is not dependent on ethnicity, education level, social and economic. Autism is not a new problem, from a variety of evidence, these abnormalities are known to exist since centuries ago. It's just that the term is relatively new. Estimated at up to 15 years ago, autism is a disorder that is still rare, estimated that only 2-4 people with autism. But now an increasing number of people with autism to approximately 15-20 per 10,000
children. If the number of births per year 4.6 million children in Indonesia, the number of people with autism per year will increase by 0.15% ie 6900 children [9].

2.2. Autism Criteria

ICD-10 (International Classification of Diseases) 1993 and DSM-IV (Diagnostic and Statistical Manual) 1994 to formulate criteria for the diagnosis of infantile autism, its contents are the same and both are currently used throughout the world [2]. Those criteria are:

a. qualitative impairment in social interaction. There must be at least two symptoms of the following symptoms:
   - Not able to establish adequate social interaction
   - Eye contact is less
   - Expression of the face less life
   - The movements are less focused

b. qualitative impairment in communication. There must be at least one symptom of the following symptoms:
   - talk too late or even not at all developed (there is no attempt to compensate for communication in other ways without talking)
   - if you can talk, her speech is not used for communication
   - frequent use of a strange language
   - how to play a less creative, less and less able to mimic the imaginative

c. the existence of a pattern of sustained or repetition in behavior, interests and activities. There must be at least one of the following symptoms:
   - stuck on activities that are routine
   - the existence of strange movements
   - often very impressed on the part of an object

2.3. Types of Therapy

2.3.1. ABA (Applied Behavioral Analysis) or Behavior Therapy

ABA (Applied Behavior Analysis) is applied behavioral sciences to teach and train someone to master a variety of skills in accordance with the standards that exist in society. The use of ABA is not limited to autism, but very widely applied in various fields, ie for example sports, management, education, vocational-skills (eg skills in the education of airline pilots).

The basics have been developed since the ABA began a century ago, and through extensive research and a great deal. ABA for autism was first applied by prof. Ole Ivaar Lovaas (died on August 2, 2010 at the age of 83 years) at UCLA (University of California, Los Angeles) in 1962. Then he published the results in 1967 and various other research publications in subsequent years. The publication of this monumental cause ABA is also known as Lovaas Method [5].

2.3.2. Speech therapy

Speech therapy is the science which studies the behavior of normal and abnormal communication, which is used to deliver therapeutic or healing process in patients with behavioral disorders, including language skills of communication, speech, sound, smooth rhythm, so that people with behavior disorders of communication capable of interacting with a natural environment, not impaired psycho-social as well as to increase the optimal life [5].
2.3.3. Play Therapy

Play is part of childhood, a unique media to facilitate the development of language expression, communication skills, emotional development, social skills, decision-making skills, and cognitive development in children.

The play therapy play therapy defined as a dynamic interpersonal relationship between a child with a therapist trained in play therapy procedures who provides selected play materials and facilitates the development of a relationship that is safe for children to fully express and explore themselves (feelings, thoughts, experiences, and behavior) through the media play [6].

2.3.4 Visual therapy

Many people with autism are visual thinkers, so the method of learning to communicate through images can be done. One way is through Pecs (Picture Exchange Communication). Besides learning via video can also be done either with video modeling, video games or other electronic communication systems. This method can accommodate the excess people with autism in the visual field to be used to build communication and skills [7].

2.3.5 Biomedical therapy

To find out what therapies are often used by parents with autism, Vanessa A. Green et al have conducted a survey via the internet, the survey was conducted for 3 months. Of the 522 parents of children with autism, the average parents reported using seven different therapies. The number of therapies used vary according to age and type of autism. The most widely reported speech therapy, followed by visual schedules, sensory integration and applied behavior analysis [8].

3. Android

In 2005 Google acquired Android Inc., which at that time led by Andy Rubin and Rich Miner, Nick Sears and Chris White. Which was then in the same year began the construction of an intensive Android platform. Later on 12 November 2007 with the Open Handset Alliance (OHA) is an open consortium of mobile devices, Google released the Android SDK, after announcing a week earlier. And his speech was remarkable, almost all of the news media on IT & Programming preach about the release of the Android SDK (Software Development Kit)[10].

Android as an operating system that is currently widely used in cell phones / smartphones have the architecture its own platform. There are four layers in the architecture of Android [10]. They are:

1. Applications and Widgets
2. Application Framework
3. Android + Runtime Libraries
4. Linux Kernel

4. System Design

4.1. Description of System.

Learning application system to be constructed using hardware-based mobile Android 2.1. In general, a parent chaperone or login into an application that comes with the authentication process. Accompanying children entering data in the form: name, photo, along with a picture or a cartoon character and sound (audio / music) are favored by children. Admin also can add or delete categories, images and sounds of the vocabulary will be taught to children. The input image and sound vocabulary is taken from a camera, or recording the results with data download from a server that has been provided. Furthermore companion or parent can exit the application and the child can start learning immediately. On the side of the child, no authentication process to enter the study. Children can begin learning based on the desired category.
4.2. Stages of Design

Design analysis and design of this application follows the Design Research for Science Information System are used as guidelines in conducting the research design of the application. Research flow chart is described as shown in Fig. 1.

The explanation of the design methodology as follows:

a. Problem identification.
Actions conducted by researchers in identifying the problem is:
1. Finding information about the facts on autism that can be from books, journals, and interviews related to the resource.
2. Conducting on-site observation, which went to a school for children with autism, observing autistic child's activity in the open field.
3. Collect and analyze the literature obtained from the internet

b. Define the Solution.
After identification of the facts, observations and interviews with relevant sources of information, then the system needs to be analyzed, which then produces a design specification of the application of learning vocabulary for children with autism. The objectives to be achieved in the production of solutions, namely:
1. Researchers have designed the user interface to facilitate a child with autism in the operation of the application, and also easier for a parent / chaperone for the input data.
2. Researchers must design a website, which will be used to store application content

c. Design and Drafting
In this process do software development and prototyping applications made in terms of construction, model, method, or the results of the form (each broadly defined) or the new nature of the technical resources, social, and / or information

d. Demonstration
In this process to be implemented include the application of the client on android handset. Details of the implementation of the application as a demonstration of the approach to the application. On the server side application uses a CMS, as a medium where the provision contains. Temporary storage for the data using mysql.

e. Evaluation
When the application is completed, the next stage is the process of testing (testing). Previously performed functional testing of the application which is then tested for their autistic children. The results of the test are then evaluated whether the application is consistent with the objectives which can be used by children with autism as a medium of learning vocabulary.
3 Communication
This process will be made on the report documents a finished prototype that will dikonunikasikan about the uses and functions in scientific publications.

4.3. User Specifications

Users of the system is divided into two, namely:
   a. Chaperone or parent. In this application as an assistant manager of the overall content. Companion can add, edit, and delete content, contains an existing one. Companion can also connect to the server to download data.
   b. Children with autism. In this application, an autistic child can do the learning.

4.4. System Specifications

   a. The application does not require internet connection, except when the downloaded file from the server.
   b. GUI of the chaperone or parent is different from the GUI of the child. This is done to anticipate the child from changing the data content.
   c. The application is used by children with emotional level stable.

4.5. Use Case Diagram

   a. Use case for companion. The processes running, as illustrated in Fig. 2, on the use case for the companion are:
      • Add / delete the data of children
      • Add / delete categories
      • Add / delete items
      • Add / edit sound files like a child
      • Add / edit images like a child

   b. Use case for child. The processes occurring in the use case for a child, as illustrated in Fig. 3, are:
      • Select category learning
      • Select item learning
      • Play audio / music enjoyment
5. Results and Discussion

Implementation and application design process of making vocabulary learning for children with autism, conducted several stages.

5.1. Implementation of the database

Database used in the application of learning vocabulary for children with autism that SQLite is stored in the folder / data / data / <nama_package> / <name type> basis of the Android device.

SQLite database name for the application of vocabulary learning for children with autism are "biutis_db.sqlite". Structure of database tables along with the application shown in Table I below.

<table>
<thead>
<tr>
<th>Table Name</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table User</td>
<td>Table to store user data</td>
</tr>
<tr>
<td>Table Category</td>
<td>Table to store the category of learning</td>
</tr>
<tr>
<td>Table Item</td>
<td>Tables for storing data objects that are taught</td>
</tr>
</tbody>
</table>

5.2. Implementation of User Interface

At this stage for the implementation of user interfaces, beginning with the early stages of the splash screen. Then come to the main menu. Fig. 4 - Fig. 6 show the results of the implementation of the interface.
Fig. 4 Structure User Interface applications

Fig. 5 User interface display: menu

Fig. 6 User interface display: learning
6. Conclusion

Has made application vocabulary learning for children with autism using the Android mobile, the method features a picture or a cartoon character your child likes and audio or music that is preferred by children.

Design process based on the analysis of user needs with respect to functional and nonfunctional aspects. Functional aspects associated with features that have been granted, while nonfunctional in touch with the needs of users, ease of operations, and the appearance of the application.

Users were also satisfied with the application and sixty percent of the recommended application can be used as a learning tool for children with autism.

References