

## **Development of Application for Early Intervention Speech Therapy in Children with Intellectual Disability**

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**Abstract:** This study aims to describe the stages of the speech therapy application development process. This research produces an android application product that can be used in early intervention in speech therapy for children with intellectual disabilities. This development research is based on the development method of Gall, et al. (2007), and only carried out up to five stages, namely: 1) Research and information collecting (searching and collecting data), 2) Planning, 3) Develop preliminary form of product, 4) Preliminary field testing, 5) Main product revision. The data collection method in the form of a Likert scale was used in this study. Media validation was carried out by speech therapy content experts and media experts. The validation results from content experts obtained a score with a percentage of 88% and validation from media experts obtained a score of 93%. This indicates a very valid category, and this application is declared feasible and can be used. The results of the implementation for children with intellectual disabilities by giving a questionnaire obtained a percentage of 85%. So it can be concluded that the speech therapy application media is well used.

**Keywords:** Early intervention, speech therapy, intellectual disability, android application

### **INTRODUCTION**

Effective communication is fundamental to human development (Rezkiyani & Aprilia, 2023) and plays a critical role during the formative years of a child's life. Without the ability to communicate clearly, children lose access to many of the educational experiences that will mold them into adults. The situation is frustrating and debilitating for the children involved, and stressful and painful for their families.

Children with intellectual disabilities have a very big challenge to master communication skills because of the limited intelligence they have (Swastika, et al., 2021). The problem is difficulty speaking in pronouncing words clearly, for example the deleted final consonants, missing syllables, and replacement of letter pronunciation (Purbaningrum & Rofiah, 2020). This condition makes it difficult for them to build good social interactions (Yoneda & Miura, 2021; Anggraeni, et al., 2022; Juhanaini, et al., 2022) because they often experience disturbances in the form of loss and distortion of words when speaking. Many children with intellectual disabilities at the high school level are still unable to read and speak clearly, which should that skill have been mastered in elementary school.

In line with the above opinion, there are also results of research by (Soriano & Hustad, 2021) the realization of speech in children with mild, moderate, and severe mental retardation levels, each pronunciation still has shortcomings, and the pronunciation is still not perfect or not in accordance with the rules of Indonesian. For this reason, an early intervention is needed that can assist speech therapy, so that efforts to optimize the language skills of children with intellectual disabilities can be developed.

PPPPTK TK & PLB provide guidelines modul for training language skills for children with intellectual disabilities through language games, (Achyar, 2016). Where through training, practice, providing opportunities, experiences, and providing motivation in fun learning, it is expected to be able to improve the adaptive personal abilities of a intellectual disability, especially in terms of speaking skills. Here are the reasons why language games can improve speaking skills:

First, language games are expected to improve the speaking skills of intellectual disability, especially being able to increase the number of vocabulary, and practice making sentences fluently, clearly and easily understood by others. Situation This learning is expected to attract students' attention to study speak clearly, fluently, and can be understood by others. Second, Language games are expected to be able to develop cognitive aspects. The cognitive aspect in this case is defined as broad knowledge, power, reasoning, creativity, language skills, and memory.

Third, the game is a natural phenomenon that is beneficial for enrich both sides of the brain, the left (logic) and right hemispheres of the brain (emotion). The process of playing will hone children's logic through practice fluency and accuracy of pronunciation, tone and pause in storytelling, the use of simple sentences, as well as the suitability of the content of the conversation with pictures. In addition, the game process will hone children's emotional sharpness, because in the game there are elements of joy, spontaneity, passion for learning, imagination, competitive, emotion, passion, and solidarity. Fourth, the game is seen as an activity that has characteristics based on intrinsic motivation, the perpetrator is free to do choice, process oriented, and fun.

Today's advanced technology makes the use of media developed in various fields, including in the speech therapy, with the aim of improving the quality of education. Ownership of mobile devices has increased in recent times. This is due to the increasingly affordable price of these devices by the public. Based on data at the end of February 2022, mobile devices reached 80.13% of its market share, and 90.66% of android mobile device platforms used in Indonesia (Globalstats, 2022). With this number it should be able to increase the development of supporting assesment tools for users of intellectual disabilities so that they can feel the benefits and can also be used as language games media in early intervention.

Automatic Speech Recognition (ASR) is a technology that enhances human interaction by using the human voice as computer input. (Yu & Deng, 2015) likens ASR as a good bridge to improve interactions between humans and computers. With the development of Internet technology, cloud-computing, and GPUs, ASR can be more easily implemented to replace older computer input devices such as mice and keyboards.

One of the uses of ASR technology was carried out by (Fauzan et al., 2018), namely developing an Android-based Iqro application to learn to pronounce the letters of the Qur'an. In the application, users are asked to pronounce the letters displayed on the smartphone screen. After that a notification will appear whether the pronunciation is correct or not. The test was carried out by looking at the suitability between the spoken letters and the letters displayed. Another research on ASR was carried out by (Shinwani, 2016), namely developing an English voice translator application into android-based Indonesian text using the Hidden Markov Model. In the application, users are asked to say one word in English and then the application will display the translation results in Indonesian in the form of text. Testing is done by looking at the suitability of the words spoken and the translation results.

Based on this description, the author wants to develop a speech therapy application to assess word pronunciation based on an Android application using ASR technology. In this application, the intellectually disability child pronounces a word then the application through voice recognition will provide feedback in the form of a true or false value of the pronunciation

of the word. the following problems exist in this study: (1) What are the stages of the process of developing speech therapy applications for speech therapy for children with intellectual disabilities? (2) How is the feasibility of developing speech therapy applications for speech therapy for children with intellectual disabilities?

## **METHOD**

The model of developing android application as an early intervention speech therapy used is the development model of (Gall et al., 2007) From the selection of the development model, the research step in this development reached the fifth stage, namely the main product revision activity. The purpose of this study is to produce an android application media for early intervention in speech therapy for children with intellectual disabilities in grades three to six in elementary school which is theoretically and empirically feasible. The speech therapy material that will be developed recognizes body parts with ten words, namely: hair, eyes, eyebrows, nose, mouth, ears, hands, fingers, feet, stomach

This study uses several data collection techniques such as: (1) questionnaires, data collection from content experts, design experts and media experts as well as the use of speech therapy applications for limited groups. Observation sheet to collect data on a small trial on the implementation of early intervention for children with intellectual disabilities in implementing speech therapy. The research subjects consisted of children with intellectual disabilities who experienced speech impediments. In a limited trial, the test subjects were five intellectually disabled children who were in grades three to six of elementary school. The data analysis technique used in this research is descriptive quantitative data analysis with percentages.

## **FINDING AND DISCUSSION**

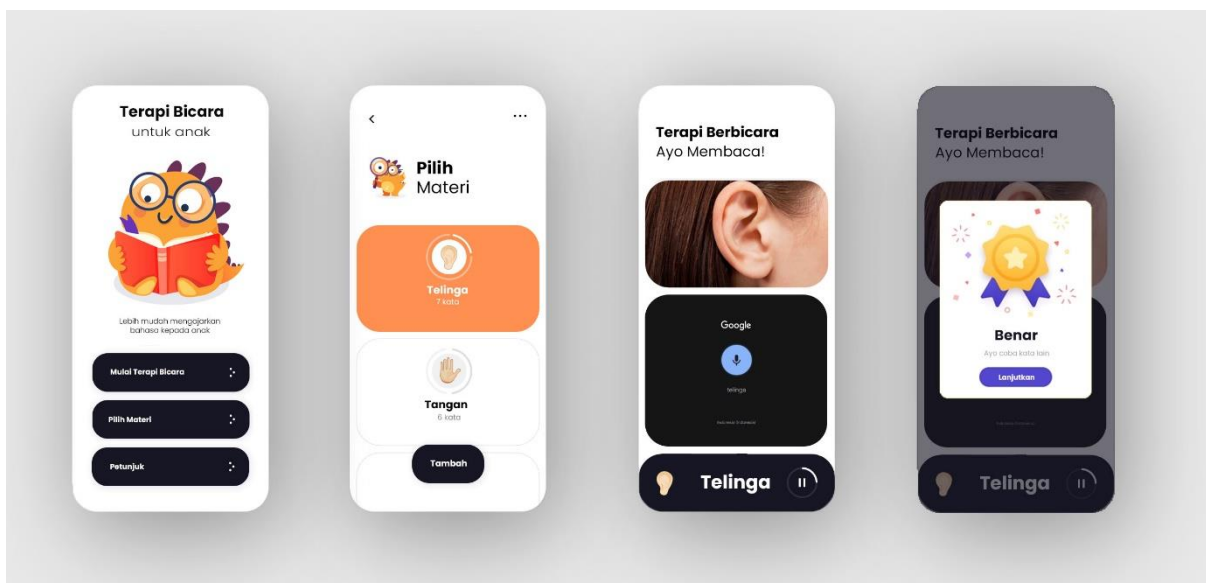
### **Finding(s)**

The final product of this study resulted in the android application as an early intervention media for teachers to provide speech therapy for children with intellectual disabilities accompanied by speech disorder. To produce this speech therapy application, the model research and development by (Gall et al., 2007). Research findings are presented which refer to the following stages.

First, preliminary study and information gathering. Data were searched and collected with members of the research team through a Focus Group Discussion (FGD). Interviews were conducted with five special school teachers who teach grades three to six (as content validators) in the Surabaya area. Data taken regarding the characteristics of appropriate media for children with intellectual disabilities in early intervention in speech therapy. Based on interviews conducted with research subjects, the functional requirements of speech therapy applications that are suitable for children with intellectual disabilities: (1) are thematic learning, (2) displays a visual form that represents the image and name of a theme, one of which is about knowing the body anatomy, (3) there is a navigation button that functions as a controller to assist users in operating speech therapy early intervention applications (4) the appearance of the application is user friendly and attractive, ( 5) speech therapy materials must be related to the experience or knowledge of the child, (6) to help children who have not been able to pronounce words correctly. (7) The teacher can see the results of the vocabulary pronunciation assessment. The teacher also commented that the android application that was developed should stimulate children to want to talk, namely by making events that occur during learning a talking topic.

Furthermore, based on the information and data that has been obtained at the first stage, the researcher conducts the second stage, planning. the appropriate media is planned for children with intellectual disabilities consisting of three contents, namely: material menu, speech

therapy, and instruction menu. For the main design of this study, it was focused on the speech therapy scene as an early intervention content for learning vocabulary pronunciation. By utilizing voice recognition, this application can tell the correct pronunciation of vocabulary and assess whether the pronunciation of children with intellectual disabilities is appropriate. The material menu is the content in this application that allows the teacher to add or replace vocabulary in speech therapy, if the child is able to pronounce the body anatomical vocabulary material, the teacher can change it with other materials such as the name of a plant or fruit, animal, object, color and number. The instructions menu contains practical guidelines for using the application for teachers in providing good and correct early intervention speech therapy. This navigation structure is designed to be simple but has a clear information presentation to enable every teacher to get a better user experience in understanding each material being taught. An illustration example of a child with intellectual disabilities who wants to learn ear vocabulary by only clicking the ear button from speech therapy menu, from that button the child will be taken to a page that contains an image of the ear accompanied by vocabulary forms and simple ear pronounce sounds, and when the child pronounces the ear sound with If the pronunciation is correct, the ear sentence will appear and give feedback a notification if the pronunciation is correct. An example of the results of the developed speech therapy application can be seen in Figure 1.



**Figure 1. speech therapy application user interface design**

Speech therapy application products require validation tests to get the level of feasibility, especially from experts including: (1) content, (2) media, and (3) practicality of speech therapy applications. The results of the feasibility test from the three experts can be observed in table 1.

The name of the app is "Speech Therapy For Intellectual Disability". The purpose of measuring the validity of the speech development application media for intellectual disability is viewed from the aspect of content expert, media experts and design experts. Validation was given by five teachers from grades three to grade six, 2 media experts, and 5 children with intellectual disabilities for practicality tests. This Application was then revised based on suggestions and input from the two validators. This is intended to produce media that are validly tested for feasibility based on the validation of competent experts.

**Table 1. The Result of Feasibility and Practicality Tests**

Validation Category	Eligibility Rate (%)	Information
1. Content expert	88%	The content expert validation instrument consisted of 8 items
2. Media expert	93%	The media expert validation instrument consisted of 20 items
3. Practicality test	85%	The practicality validation instrument consisted of 10 items

The results of data analysis from content experts presented in table 1 show that in terms of material substance with 88% feasibility, media expert validation 93%, and from practicality tests obtained 85% feasibility. This finding can be interpreted that the speech therapy applications is based on 3 aspects of eligibility in the very high eligibility category (Arikunto, 2010). This score indicates that the application of speech therapy is able to provide early intervention in good speech therapy according to the characteristics of children with intellectual disabilities.

### Discussion

The use of interactive multimedia in speech therapy is based on the idea that incorporating fun and playful elements into therapy can make it more engaging for children. By using games, children with intellectual disabilities can practice their speech skills in a more enjoyable and less intimidating environment. The software packages Dr. Speech and VoxGames, as well as other games described in academic research, are designed to help children focus on voice activity, intensity, breathing, tone, and vocalization. These games incorporate speech analysis algorithms that provide real-time feedback to children on these aspects by controlling game characters and objects with their voice.

Additionally, researchers have also developed multimedia games that use Automatic Speech Recognition (ASR) to provide feedback on pronunciation exercises (Saz et al., 2009; Tan et al., 2013). The results of the media expert analysis show that the application of speech therapy has a feasibility level of 93%. This indicates that speech therapy can be used as a tool for early intervention by media experts to help children with intellectual disabilities who have difficulty speaking.

According to Purbaningrum and Rofiah (2020), early intervention media can be anything that can be used to develop potential and abilities, helping children with disabilities grow and develop optimally. The research conducted by Janah (2019) also supports this idea, as it showed a 20% increase in the speech ability of children with intellectual disabilities after early intervention with digital media. The results suggest that early intervention models using digital media are effective in improving speech intelligibility in children with intellectual disabilities. The video-based modeling in these models is particularly helpful in training children to improve their speech clarity and pronunciation of phonemes and words.

Overall, the use of interactive multimedia in speech therapy has proven to be effective in helping early intervention for children with intellectual disabilities who have difficulty speaking. By incorporating fun and playful elements into therapy, children are more likely to engage in the process and make progress in their speech abilities.

## CONCLUSION

Based on research findings, data analysis and theoretical discussion, the conclusions of this study can be drawn as follows: the application for early intervention in speech therapy for children with intellectual disabilities is highly feasible and practical to use. Its implementation has been proven to be able to significantly improve children's speaking ability, as shown by the data analysis and media expert validation results.

However, it is important to note that this study only provides initial evidence for the efficacy of this approach. Further research is needed to validate these findings and explore other aspects of the application's effectiveness.

For future research, it is recommended to expand the scope of the study to a larger sample size and to consider different cultural and linguistic backgrounds. Additionally, researchers can also explore the long-term effects of the application on children's speaking ability, as well as its impact on their overall cognitive development.

It is also recommended to incorporate other speech therapy techniques and approaches into the application, to provide a comprehensive and holistic approach to speech therapy for children with intellectual disabilities. By doing so, this application can further improve its effectiveness and contribute to the improvement of children's speech intelligibility and language development.

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