

# Augmented Reality Technology as a Learning Media to Help Parents in the Academic Functional Education of Children with Hearing Impairments

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**Abstract**—This research begins by conducting a preliminary study. The preliminary study was conducted by distributing google forms addressed to deaf parents. There were 20 respondents with the result that 62.5% of parents had difficulties in the development and functional academic learning of deaf children at home, which was caused by difficulty in communicating and difficult to explain. This study aims was to analyze the effectiveness of Augmented Reality technology as a learning media to help parents who have children with hearing impairments in developing academic learning at home. This review is critical because education in the home environment also includes lifelong education for deaf children to obtain information and insight. This research study goes through three stages of narrative review: determining the scope that will be the focus of the research, determining the interest and novelty of the research, and determining the formulation and objectives of the research. Based on a study of 17 articles through the peer-reviewed article database published in 2014-2021, it is shown that: functional academics are crucial for children with needs specifically, the effectiveness of Augmented Reality can support and provide an attraction for learners, Augmented Reality can influence learning outcomes for children with hearing impairments.

**Keywords**—*assistive technology, Augmented Reality, academic functional education, children with hearing impairments.*

## I. INTRODUCTION

The family is the leading and smallest environment in a society and the first place for every child in the social and educational environment. In addition, the role of the family is very meaningful in every phase of development and decision-making (Wahyu, 2012). Law No. 1 of 1974 article 1 also explains the obligation or duty of parents is to educate children continuously until the child is married or can be independent. Parents towards children's education are more in character and character formation, skills training, and social and health education (Mizal, 2014). This parental obligation applies to all parents, even those with children with special needs. In this study, we will examine parents who have deaf children.

The many obstacles for parents in assisting the learning of deaf children can seriously impact intellectual or social development. One of the obstacles experienced by parents in learning is that parents do not know or are confused about how to communicate or make children understand. Variani (2012) explains that the interaction between parents and deaf children experiences gaps. Parents often fail to explain their decisions and only communicate the result. When they communicate the message conveyed, both experience misunderstanding or even unacceptable.

Researchers conducted a preliminary study by distributing google forms aimed at deaf parents. There were 20 respondents with the result that 62.5% of

parents experienced difficulties in the development and functional academic learning of deaf children at home due to communication difficulties and confused how to explain it. The findings of the problem are also in line with the results of Asvira's (2021) research on learning for deaf children. This study explained that one of the obstacles to less than optimal learning at home was the lack of parental understanding of the material for deaf children. From these problems, it is necessary to have an innovation that can improve and help parents of deaf children in learning at home for everyday life.

## II. METHOD

The literature review is carried out by selecting peer-reviewed journal articles that have been published from 2011 to 2021. The steps are taken in the selection of fields, analysis, and categories. Twenty relevant peer-reviewed articles were selected in this study by focusing on the theme of Augmented Reality as a tool for parents in the education of deaf children.

**Article Selection.** Article selection started from peer-reviewed research journals at Google Scholar, Springer Link, ISCAR, and Taylor & Francis Group. The keyword used in the literature search was "Pocket Book with Augmented Reality as a media to help parents educate deaf children." From the search, 17 journals were found that were used as literature material.

**Study Analysis.** The literature review was carried out by utilizing the best evidence approach from the articles found. Based on 17 articles consisting of 10 international articles in English and seven articles in Indonesian. The 17 articles have been in accordance with research questions from 2014 - 2021. (Table 1). **Article Categorization.** Each article is reviewed further, considering several research questions that have been set. The researcher ensures that each article used as a reference follows the research question and can provide answers to the research questions.

## III. RESULT

Seventeen articles in Table 1 were reviewed and analyzed to study the topics discussed taken from national and international journals. Based on the analysis, it can be concluded that Augmented Reality is one of the tools that can be used in the learning process. Augmented Reality technology plays an essential role in conveying information with visual displays that support audio and video in the world of education. This media can also be an intermediary between educators and students in learning who can connect, provide information and channel an intention to realize the learning process (Aditama, Adnyana, & Ariningsih, 2019). The importance of education with functional values is needed for children with hearing impairment to adapt to the environment either at home or school. So there is a need for education directly related to daily life that makes it easier for deaf children to study at home with their parents.

## IV. DISCUSSION

Seeing the empirical condition of parents' limitations in educating deaf children at home is an important solution to pursue because the home environment is the main environment for children in the education of deaf children so that it requires modification of learning as a basis easy-to-use media. Functional academics are studies that are needed by using symbols or coding of environmental phenomena around. The use of symbols that function in everyday life has a system as a basic academic lesson called reading, writing, and arithmetic. Competence in this field is crucial for children with special needs who experience cognitive, communication, and sensory barriers. For this reason, academics from this field are endeavored to function practically and directly in the daily lives of children with special needs (Mumpuarti, 2016).

Mumpuniarti (2016) indicated that on a theoretical basis, reading and arithmetic are cognitive skills. Cognitive becomes an obstacle for children with special needs who experience cognitive and communication barriers. To deal with these obstacles, every learning to read and count can be associated with everyday life. Skills to solve life problems are essential. The importance of daily life skills lies in the academic fields of reading, writing, and arithmetic. Likewise, at school, children with special needs learn functional academics as basic things such as shopping, saving money, taking care of food, all using skills in writing, reading and arithmetic.

Print media is made through a printing process that presents messages through letters and images to clarify the message or information to be conveyed. According to Anjelita, Syamswisna, & Ariyati (2018), Books are media that function to convey information in the form of stories, reports, and knowledge. The book contains sheets of paper that are put together. At the same time, pocketbooks are small books that are easy to store and carry everywhere (Language Center, 2016). In Anjelita, Syamswisna, & Ariyati (2018), pocketbooks have several characteristics, including 1) the number of pages is not limited, a minimum of 24 pages, 2) compiled using popular scientific writing rules, 3) information presented following the objectives or interests, 4) the referenced literature is not included in the text, but is listed at the end of the article, 5) the name of the author is included.

Sulistiyani (2012) describes several functions of pocketbooks, including 1) the delivery of material using pocketbooks can be uninformed, 2) the learning process using pocketbooks will be more explicit, fun, and engaging because it has an attractive design and is printed in full color, 3) efficiency in time and effort, pocketbooks printed in small sizes can make it easier for students to carry them and use them whenever and wherever.

**TABLE I. AUGMENTED REALITY AS A MEDIA TO HELP PARENTS IN THE EDUCATION OF CHILDREN WITH HEARING IMPAIRMENT**

<b>Author(s)</b>	<b>Findings</b>
Asvira, M. Y., & Nurhastuti, N. (2021)	Learning deaf children at home requires cooperation between parents and teachers. It is based on the fact that parents have different backgrounds and do not understand academic tasks for deaf children. The lack of parental understanding of the tasks and materials provided by the teacher makes learning for deaf children at home to be hampered.
Alabbas, N. A., & Miller, D. E. (2019)	This study shows that caregivers of children with disabilities have difficulty in their daily activities. Only a few find solutions using assistive technology.
Baharun, H., & Finori, F. D. (2019)	This research shows how assistive technology functions in helping parents in the digital age. It can be a solution to the problem besides for caregivers who are still unable to access assistive technology for the daily life of children with special needs.
Baragash, R. S., Al-Samarraie, H., Alzahrani, A. I., & Alfarraj, O. (2020)	AR can be implemented to support individuals with special needs in terms of different social, life, physical, and learning skills. It was found that AR can improve the ability to perform self-care. AR can help children with special needs learn skills effectively, retain information for more extended periods, access competitive jobs, and live independent lives.
Turan, Z & Atila, G (2021)	The results showed that AR technology was proven to be effective for learning children with learning disabilities and made children more interested.
Chang, R. C., Chung, L. Y., & Huang, Y. M. (2016)	AR technology and digital video have the same effect on student achievement. However, the results show that the use of AR technology shows more significant results than digital video.
Saputri, F. E., Annisa, M., & Kusnandi, D. (2018)	The development of science learning media using AR. Android-based AR is one of the reasons because almost everyone uses Android. In addition, researchers used many exciting pictures so that children could be more motivated to learn. In the results of the study, using AR media also showed significant results.
Shafer, N. (2020).	Augmented Reality has been used as an enrichment activity in special education and other classrooms. Integrated AR enrichment and substitute curriculum for special education with an examination of educational programs.
Cifuentes, García, Andrés-Sebastiá, Camba, & Contero, M. (2016)	Proving that AR functions as a basis for improvement projects and materials related to children's education with special needs in the future. This research was conducted quantitatively on students with special needs concerning improving results, performance, motivation, and other aspects of children's learning process with special needs.
Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014)	Augmented Reality can change education as it is known so far. Multimedia capacity is presented with something tangible through a tablet or smartphone as the delivery of learning information can be provided to students at the right time and place.
Petrovich, M., Shah, M., & Foster, A. (2018)	Augmented Reality has demonstrated its implementation in a formal education environment. In this study, we want to introduce AR to informal education by using a literature review that shows that AR implementation reveals some similarities in achievement in the application of formal or informal education as expected learning outcomes.
Nazaruddin, M. A., & Efendi, M. (2018)	Augmented Reality pop-up books can increase the autistic child's appreciation of the objects shown to the autistic child. It can be seen from the indicators that autistic children have more interest in design, duration and curiosity, mastery of message content, and observing objects introduced to them.
Kellems, R. et al. (2020).	Increased learning of mathematics for children with special needs with special learning barriers. Researchers use an AR-based training package with video-based. The results show that the results are significant, and students tend to maintain these abilities obtained from this video-based AR intervention.
Atmajaya, D. (2017)	AR in this study can be used in educational institutions or for independent education with parents.
Ariyantika, D. (2019)	PocketBook can effectively facilitate the ability of children with special needs, as evidenced by the results of the research field.

Sumantri, M. S., & Firmansyah, F. (2016)	Pocketbooks effectiveness is known that the recapitulation for learning very good, with a percentage of 86%.
Sukotjo (2015)	There needs to be a modification of academic development for children with special needs from everyday life.

Learning media with the use of Augmented Reality is an appropriate medium in sustainable development when increasing interaction and effectiveness in delivering a lesson. Augmented Reality is a technology that can combine virtual objects in two dimensions or three dimensions into a display that brings it up in real terms.

It is also explained by Mustaqim (2016) that Augmented Reality is an interactive technology combining virtual worlds with two or three dimensions. Augmented Reality is the concept of combining the virtual world with the real world to generate information from data taken from a system on objects.

The effectiveness of Augmented Reality can be used as a solution to the practical problems of deaf children who experience learning barriers and limitations of parents at home in assisting deaf children. The AR effect on students' academic achievement is that the environment becomes more effective for learning about magnetism in physics, makes it easier for students to learn aspects of magnetism, has a positive impact on learning achievement, explores students' curiosity, and makes students more efficient comfortable while learning. It shows that AR provides an effective solution in learning physics with magnetism at Turkish high schools (Abdusselam, M. S., & Karal, H, 2020).

## V. CONCLUSION

The number of obstacles that parents have with deaf children requires more attention. It is because home education is a lifelong education. Obstacles of parents who have difficulty in delivering academic teaching require materials and media that are able to minimize these problems. From the literature review, basic academic learning packaged using Augmented Reality technology has effectiveness and influence on the learning of deaf children at home. A few studies discuss the effectiveness of the combination of pocketbooks with Augmented Reality for deaf children, so further studies on this topic are needed.

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