

The Innovation of *Maruo's Popup Book* to Help Children with Special Needs in Memorizing Alquran

Risca Amani

Faculty of Science Education
Universitas Negeri Padang, Indonesia

Afdal Luthfi

Faculty of Engineering
Universitas Negeri Padang, Indonesia

Vikri Aflaha Qomari

Faculty of Social Science
Universitas Negeri Padang, Indonesia

Arisul Mahdi

Faculty of Science Education
Universitas Negeri Padang, Indonesia

Sukree Langputeh

Faculty of Social Science and Humanities
Fatoni University, Thailand

Correspondence Address: riscaamani@student.unp.ac.id

Manuscript received 12 Jun. 2021 revised 18 Aug. 2021 accepted 3 Sep. 2021 Date of publication 26 Sep. 2021
Khalifa: Journal of Islamic Education is licensed under a Creative Commons Attribution-Share Alike 4.0 International License.



Abstract

Children with special needs have a particular way of learning which requires media to learn Alquran. This article discussed how a media developed for Alquran learning for children with special needs was created. This study discussed the design of Alquran Learning Media for children with special needs in memorizing Al-Qur'an. Hence, the prototype method was utilized in this study implemented by identifying problems, analyzing user needs, designing products according to user needs, making products that have been planned, validating experts, and product testing. To get an acceptable result, the author collected sources for the literature from the primary ones such as reports, results of previous research, to expert opinions to conduct this learning media. After testing the media, the overall analysis results showed that Mauro's popup book can be used as a medium to help memorize the Alquran for children with special needs, especially children with autistic disorders. In other words, this product can be adopted as a solution for children with special needs to help them in memorizing Alquran.

Keywords: *Prototype, Mauro popup book, media for memorizing Alquran, children with special needs*

Abstrak

Cara belajar anak berkebutuhan khusus mempunyai perbedaan dengan anak normal lainnya, oleh sebab itu perlu dirancang sebuah media yang memudahkan mereka dalam menghafal Alquran. Artikel ini akan mendiskusikan bagaimana penulis mendesain dan membuat sebuah media pembelajaran Alquran untuk anak berkebutuhan khusus sehingga dapat membantu mereka dalam menghafal Alquran. Adapun sebutan nama untuk produk media yang dibuat tersebut adalah pop up

book mauro. Untuk mendesain media tersebut penulis menggunakan metode prototype, metode ini dilaksanakan dengan mengidentifikasi permasalahan, menganalisis keperluan pengguna, merancang produk sesuai keperluan pengguna, membuat produk yang telah direncanakan, melakukan validasi kepada pakar serta pengujian produk. Untuk menghasilkan rancangan produk yang benar, baik dan berkualitas penulis juga melakukan kajian dari berbagai literatur yang bersumber dari teori, pendapat pakar dan hasil penelitian terdahulu. Setelah dilakukan pengujian maka secara keseluruhan hasil analisis menunjukkan bahwa media popup book mauro dapat digunakan sebagai media untuk membantu menghafal Alquran pada anak berkebutuhan khusus, terutama pada anak dengan gangguan autis. Produk yang dihasilkan dapat dijadikan sebagai salah satu solusi media pembelajaran Alquran untuk anak berkebutuhan khusus dalam menghafal Alquran.

Kata kunci: *Prototipe, popup book Mauro, media menghafal Alquran, anak berkebutuhan khusus.*

Introduction

The development of technology and information is currently increasingly sophisticated in various fields of science (Engkizar *et al.*, 2018; Syafril *et al.*, 2020). Technology has improved the standard of living of human beings in which helps to mitigate the distance and the impact of the workforce, This phenomenon also affects the field of education. Technology plays an important role in achieving educational goals more effectively and efficiently, especially, in the development of technology-based learning media. (Aini *et al.*, 2019; Mostafa *et al.*, 2017). In this context, media holds a very significant role in the teaching-learning process (Jamalahdin *et al.*, 2017; Pratama & Azhari, 2020).

Alquran is a holy book that was revealed to the Prophet Muhammad which contains instructions and guidance for humans to achieve happiness in the world and the afterlife in which the teachings are so broad and aimed at people's life (Yamin, 2018). The Qur'an is the basis and guide in seeking knowledge. All fields of knowledge have been found in the Qur'an. Tahfidz learning is a process in which the students are required to memorize the Qur'an. A person who memorizes the Qur'an will provide extraordinary intercession in his life. Allah SWT promises a high degree for memorizing the Qur'an and avoiding the torment of hell-fire (Maduki, 2018; Efendi *et al.*, 2019).

To achieve the learning of tahfidz Qur'an, it is necessary to utilize methods and learning media that are interesting for children, especially in learning tahfidz

(Muyasaroh, & Sutrisno, 2014). There are many methods and media in implementing tahfidz learning. However, it is different from the learning media used for children with special needs. (Krisnawati & Khotimah, 2021). Children with special needs still have the potential to be developed, in other words, this also applies in memorizing Alquran (Jubaedah & Putra, 2019; Solihin, 2020).

Learning media used for children with special needs are adapted to the abilities and limitations of the children. Children with special needs take advantage of their abilities to be developed. Although it has limitations, it does not rule out the possibility that children with special needs are able to memorize the Koran (Jubaedah & Putra, 2019; Solihin, 2020).

Children with special needs are children who experience emotional, intellectual, emotional, behavioral and social disorders and limitations so that they require educational services that are customized to the needs of each child individually (Muyasaroh, & Sutrisno, 2014). According to Marlina (2015) children with special needs are divided into two, namely temporary disabilities and are permanent or long-term disabilities. Children with special needs that are temporary, for example, are children who are affected for a short period of time traumatized by their parents' divorce. While children with special needs that are permanent, for example, are children who experience limitations in vision, hearing, emotion, intellectual, communication, emotional and social. This includes children with autism (Nicolson et al., 2010; Skiada et al., 2014).

Children with autistic disorders are children with complex neurodevelopmental disorders, presenting great heterogeneity with respect to symptoms and traits (Bogdanowicz, 2016). With regard to severity, children with autistic disorder express impairment in many domains such as social interaction, verbal and non-verbal communication, and restricted and repetitive behavior. Regarding cognitive and social abilities, it has been shown that individuals with children with autism show great variability. The spectrum ranges from high-

functioning autism to low-functioning autism associated with learning disorders and disabilities (Andreou & Skrimpa, 2020).

Due to these limitations, children with autistic disorders need education with methods and media that are adapted to the child's limitations and abilities. So that the objectives of learning can be achieved optimally. Then the methods and media used do not make it difficult for children. Therefore, the objectives of learning can be achieved optimally. Then the methods and media will assist the children.

Children with autistic disorders are one of the children with special needs who have limitations in behavior, social interaction, and communication caused by damage to the brain. (Subastia et al., 2017). Although children with autistic disorders have limitations, it does not rule out the possibility that they are able to memorize the Koran (Restendy, 2019). This can be achieved if the learning methods and learning media used are appropriate and in accordance with the needs of the child (Hafni et al., 2020)

Mauro's method is one of the concrete tahfidz learning methods to be applied in learning the Tahfizul Qur'an in children with autistic disorders. The Mauro method is a combination of three methods of memorizing the Qur'an, namely the sima'i, nazhori and muroja'ah methods. The sima'i method is listening, the nazhori method is seeing and the muroja'ah method is repetition. To apply the Mauro Method in learning tahfidz using Mauro learning media with a popup book design.

Learning media that can help children with autistic disorders is using Mauro's popup book. Mauro's popup book is a book with a three-dimensional design that can provide interesting visualizations when the page is opened. In addition, Mauro's popup book was developed by utilizing current technology, namely additional features in the book in the form of audio and visual on the right. So that the process of learning the Alquran is interesting for children. Learning the Alquran is not just being able to memorize it. However, there is a tremendous impact for children with autistic disorders, namely helping the therapy process. Listening to

the recitation of Quranic verses can have a huge physiological change impact (Silvia & Monique, 2017).

Literature Review

Alquran is the holy book of Muslims (Daulay, 2014) which was revealed to the world through revelation from Allah SWT (Jamora, 2017). The Qur'an is used as a life guide for a Muslim in organizing and carrying out the life of the world and the hereafter (Badrudin, 2020). Tahfidz or memorizing the Qur'an is a very noble and commendable act (Ma'shun, 2016). Tahfidz is the word form of haffaza, which comes from the word hafiza-yahfazu which means to memorize. Not only memorizing, tahfidz also means maintaining and supervising. Tahfidz is a process of memorizing the Qur'an so that it can be spoken by heart correctly in certain ways continuously (Hidayah, 2016).

Tahfidz Alquran is a memorizing learning style that follows the sunnah of the Prophet Muhammad, because it refers to his personal experience when he received the first revelation, namely the Qur'an Surah Al-Alaq verses one to five in the Cave of Hira. At that time the Prophet was asked to repeat the reading by the Angel Gabriel. From the story of the Prophet, if we read the Koran by repeating the reading continuously, over time it will become memorized.

According to (Hidayah, 2016) people who memorize the Qur'an will get a very noble position in the world and in the hereafter, form noble character for both the memorizers and others, and increase intelligence. Humans are inherently intelligent. If it is developed and utilized optimally, it will have a great opportunity to live happily physically and mentally. Likewise, if applied to children with autistic disorders.

According to (Senan et al., 2017), children with autism spectrum disorders are children who experience brain development disorders that affect social skills, communication skills, social imagination skills, sensory problems and routines. Children with autism have limited social patterns. This is in line with the opinion (Ismillah, 2020) that children with autistic disorders have difficulty communicating

and interacting with the environment, resulting in communication disorders and difficulty adjusting to the environment.

Children with autistic disorders are children with developmental disorders that occur before the child is three years old. This disorder is characterized by disturbances in social relationships, communication and language skills that are not like children in general and rigid behavior patterns. Children with autistic disorders have an unusual way of learning compared to children in general (Fithri, 2011).

Children with autism have great challenges in social interaction and communication. Children with autism handle information in the brain in a different way than children in general, and learn differently. Children with autism need intensive education so that their development is getting better. So that in the process of applying the learning of the Alquran using methods and media that are in accordance with the children's needs. (Handarini & Hasan, 2019; Hamid et al., 2017).

There are many positive things that can be obtained when memorizing the Alquran. The Koran can help treat children with autistic disorders. besides that it can also help in treating children with autistic disorders. even though just listening to the reading of the Koranic verses will give someone good, even though the reading is not understood (Zulkafli et al., 2018).

Learning media is a component that is interconnected with others in creating a pleasant learning situation (Widodo & Wahyudin, 2018). Utilizing technology as a varied and innovative learning medium. Utilizing technology as a varied and innovative learning medium. To be able to take advantage of information technology, at least three main components are needed, namely hardware, software, and human or brainwave (Mutia et al., 2020).

Popup book as a learning media is a moving book with a three-dimensional design that contains pieces of paper that appear or move when the book is opened and fully folded when the book is closed. Pop up books use various cutting and

folding methods, as well as hidden mechanisms behind and under the page (Ahmadi et al., 2018).

The process of studying the Koran can be assisted by utilizing existing technology, one of which is the use of learning media. The development of science and technology is increasingly helping to encourage efforts to renew and utilize technological results in the learning process, and it is possible that the media must be adapted to the developments and demands of the times (Pito, 2018).

Mauro's pop up book media is the application of learning media used in this study. One of the uses is to correct errors in reading the Koran. This has previously been developed by utilizing an Android-based smartphone in the form of an application called Aqra. The application can detect reading errors in the last 3 surahs of the Alquran.

Algorithms to measure the similarity between sounds are more difficult to do than measuring the similarity between texts. In addition, research for converting voice to text has been done previously in various languages in the world (Nafis & Hossain, 2015). One of them is (Satori et al., 2009) which converts voice into text in Arabic. Therefore, this study uses a text-based similarity approach by first converting from sound to text.

Research on text-based similarity in the Qur'an has previously been carried out by (Engkizar et al., 2018; Istiadi, 2012) in an application to search for Qur'anic verses based on phonetic similarity using indexed trigrams. The results of the data from this study can be used to check the similarity between the correct text and the voice converted from the user's reading.

The Mauro method is a tahfidz learning method for children with autistic disorders. Moreover, Popup book media in general have been widely applied to various learnings. But in the learning of the Koran is still not there. The Mauro method and the Mauro pop up book media are an inseparable unit in the application of this Qur'anic learning.

Mauro's popup book media applied in the Mauro Method is meant to combine the sima'i, nazhori and muroja'ah methods. The uniqueness of this media is that each sheet of the book can make a sound according to the page that is opened and at the end of the page, this popup book is able to record the sound around it. When the child pronounces the wrong reading, then he will give a warning to the user.

The focus of the surah is mainly for the surah Al-Fatihah, Al-Ikhlash, Al-Falaq and An-Nas. These four suras are those that are often heard and used in everyday life. Hence, the surah is the beginning for children with autistic disorders to recite other suras in the Qur'an using Mauro's popup book media.

This Mauro pop up book media was developed by applying elements of technology in it, namely Voice Recognition, Raspberry Pi 4, and Loud speaker. Voice Recognition is a system to identify a person by recognizing the voice of that person. Voice Recognition (voice recognition) or Speech Recognition (speech recognition) is a technique that allows a computer system to receive input in the form of spoken words. Speech Recognition works by converting analog signals into digital signals by an analog to digital converter (ADC) (Aditya et al., 2020). The software system used is Google Voice and Speech API. Voice command data from the user will be captured by the microphone. Most speech recognition tools are still user dependent. This tool can only recognize spoken words based on words that are already stored in the database. So that the tool can understand the commands given by the user so that the system can be controlled (Ritonga et al., 2019).

Raspberry Pi was first released in February 2012 and was developed by the Raspberry Pi Foundation Nonprofit and computer experts from Cambridge University, England (Walingkas et al., 2019). Raspberry Pi 4 is a type of single board for computers. Basically the Raspberry Pi 4 will function as a brain on a device that will receive and process data detected by the microphone against the pronunciation results.

The Raspberry Pi 4 has a dual-band 802.11ac (2.4 GHz & 5 GHz) wifi network, the Raspberry Pi 4 already uses the latest Bluetooth technology, namely Bluetooth 5.0 which has increased in terms of data transfer speeds, reaching 2 Mbps (Bluetooth 4.2 - 1 Mbps), longer data transmission distance up to 200 meters LoS (Bluetooth 4.2 - 50 meters LoS), and optimized for IoT applications. On the Ethernet side, the Raspberry Pi 4 uses full Gigabit Ethernet, so the maximum data rate that can be transferred through this port reaches 1 Gbps.

Loud speakers are electroacoustic devices that convert electrical signals into acoustic signals (Annas, 2017). In this research, we use the Hi-Fi Sound Card HAT type WM8960 as a loudspeaker. Hi-Fi Sound Card HAT is a HAT sound card designed for Raspberry Pi which has low power consumption and supports stereo decoding, playback features (Hi-Fi recording) moreover, it can directly push the speakers to play music. The Hi-Fi Sound Card. HAT component is used to play Quran murrotals, as well as record and detect sounds.

The difference between Mauro's pop up book and the general pop up book is the innovation of technology-based learning media development. The components of the learning media are voice recognition, respiberry pi 4 and loud speaker. Mauro's pop up book is designed in such a way for children with autistic disorders to be more attractive so as to increase children's interest in memorizing and studying the Koran. This research can be used as initial data to develop Qur'anic learning media for children with special needs, especially for children with autistic disorders.

Method

This study uses the prototype method referring to Ma & Harmon (2009); Odom (2016) & Morana et al., (2018); Elkhaira et al., (2020). The design in this study went through several stages, namely i) identifying problems, ii) analyzing user needs, iii) designing products according to user needs, iv) making planned products, v) validating experts and vi) product testing. To produce an accurate product design with good quality, the author also conducts a study of various literatures sourced

from theories, expert opinions and the results of previous research. To collect product assessment data that has been made, the authors conducted tests on children with autistic disorders by reading Surah Al-Fatihah, Al-Ikhlash, Al-Falaq and An-Nas. According to Berlian (2016); Arifin (2018); Ashidiqi et al., (2019); Putri et al., (2020); Kasmar et al., (2019); Syafril et al., (2020); Suherman et al., (2021) media products that have been made using the prototype method should be tested to users, so that researchers can find out and evaluate the products that have been made. The stages of the prototype method carried out during this research are as shown in Figure 1.

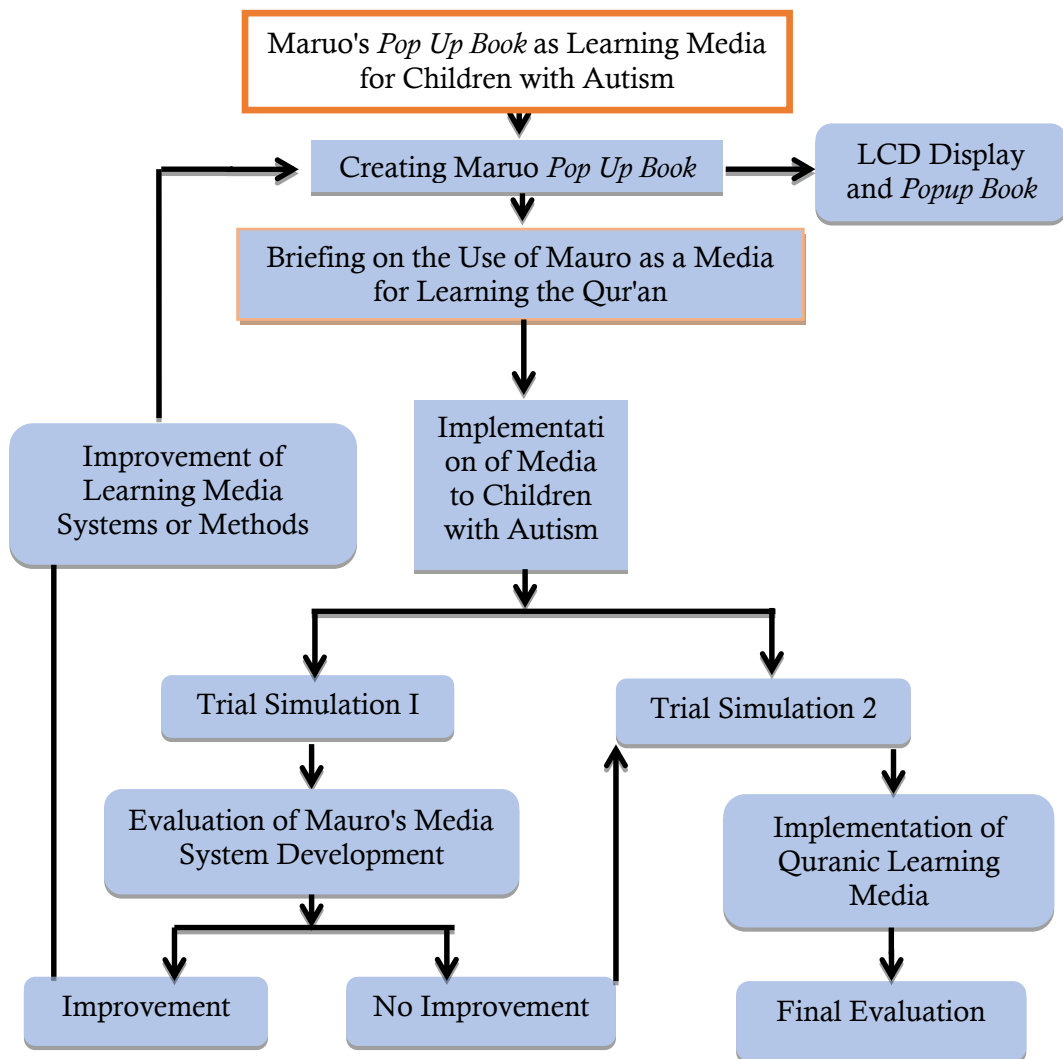


Fig 1. Stages of making media with the prototype method

Findings and Discussions

In the results and discussion section of this article, the author will explain three items from the overall and detailed product that has been produced, i) an explanation of Mauro's Popup Book, ii) the design of Mauro's Popup Book as a medium for memorizing Alquran, iii) the operational steps of the media which has been generated. At the end of each item, the author also discussed various theories, expert opinions and the results of previous research.

PopUp Book Mauro

Mauro is a learning media packaged in the form of a popup book which is equipped with a tool that can attract the attention of its users. Mauro has a concept to make it easier for children to learn and memorize verses of the Koran. It can also make it easier for children who have autistic disorders. Mauro's pop-up book-based media was developed with an audiovisual design to attract children's attention. Media Mauro is made using paper-based materials with a special design and added with audio tools on the right. In the audio there are several electronic components, namely Voice Recognition, Raspberry Pi 4, Loud Speaker, and LCD Display.

The uniqueness of this media is that it can produce the sound of reading verses of the Alquran that we enter into data storage, this popup book is also able to record the sound around it, one example is when a child records sound. The muroja'ah process uses a microphone that functions to record sound then processed by the raspberry pi with the voice recognition method. So that the recorded voice of the child can be listened to again for correction of pronunciation or reading.

In addition, the selection of letters that we will sound in the popup book can be selected via the LCD display located on the left. So that we freely choose the letter that we will play. In the playback of the surah, we can press the button located at the bottom of the LCD display, there are several buttons available including play, pause, next, previous and voice recorder.

Mauro's Popup Book Design as a Media for Learning the Qur'an for Children with Autistic Disorders

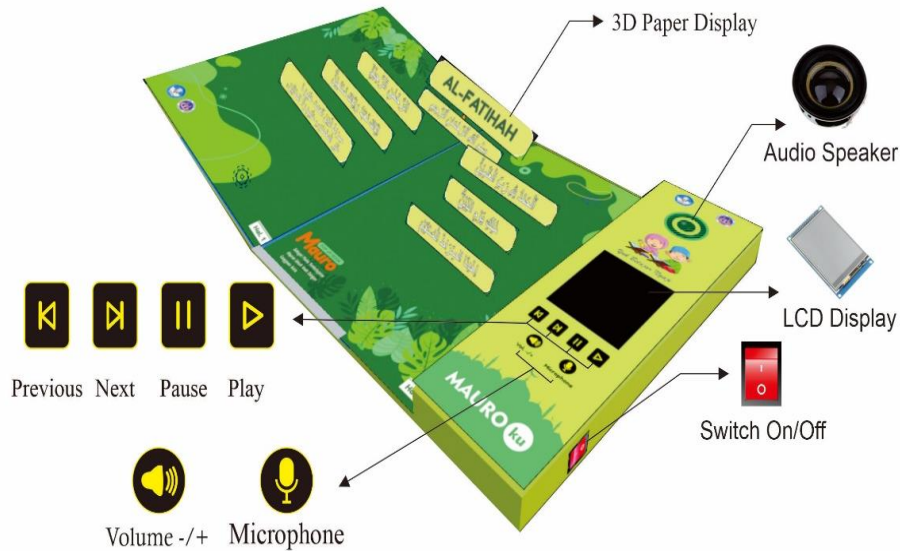


Fig 1. Media prototype of Maruo's Popup Book

In Picture1 is a prototype and design of the popup book media that will be made. This media contains several components and tools that are installed with a neat layout, so that the media looks more attractive and users can easily and comfortably apply it.

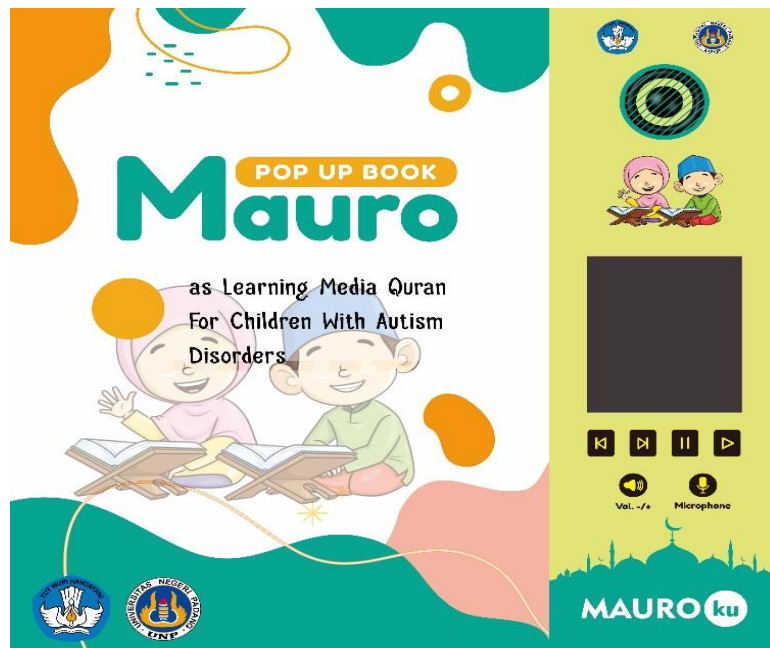


Fig 2. Maruo's Popup book cover

In Picture 2 is a cover display of Mauro's popup book media, both in the form of a popup book display and a sound media display containing an LCD Display, Speaker and voice recorder button (Microphone).



Fig 3. The appearance of Surah Alfatihah in Maruo's Popup Book

In Picture 3 is the display of the verse on a popup book made of paper. When the popup book is opened, the verse display will appear like 3D. On the display of each verse, an LED strip light will be installed which serves as a marker for the verse being played. It also lets users know the verse.



Fig 4. Intial display

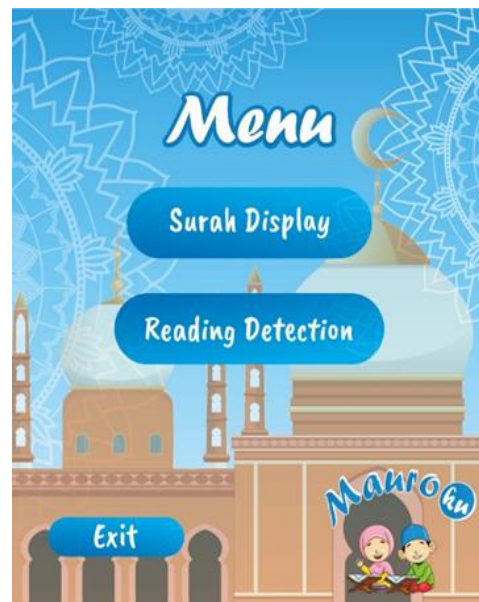


Fig 5. Menu display

In Picture 4 is the initial display on the LCD Display which is located on the right side of the popup book media. Furthermore, in picture 5 is the display of the menu feature where the user can later choose 2 options, including the display of the surah and detection of readings.

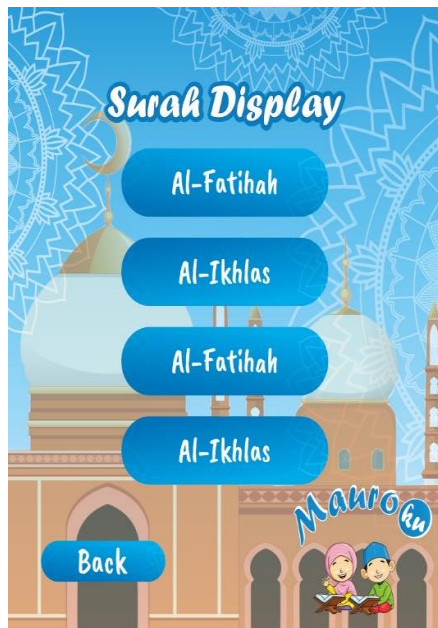


Fig 6. Surah display

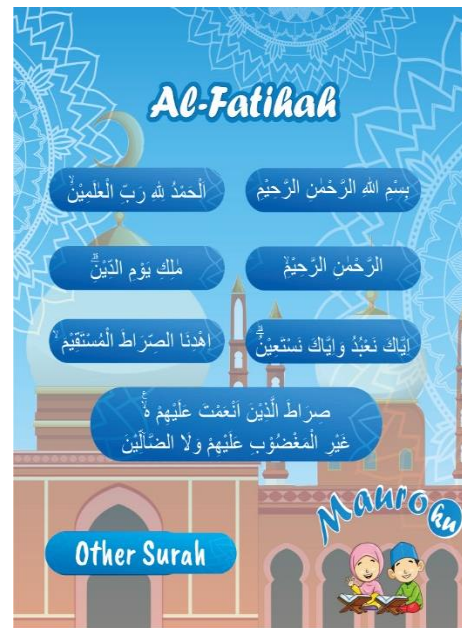


Fig 7. Verses display

In Picture 6 is a view of the surah consisting of 3 letters, namely Al-Fatihah, Al-Ikhlās, Al-Falaq, and An-Nas. Users can choose the surah they want to play randomly and manually. Furthermore, in Picture 7 is a display of the verse presented in the form of Latin letters. In addition to displaying verses on the popup book paper section, users can also view and read verses on the LCD Display. The display of this verse can be selected according to the reading you want to play. In addition, this verse selection can also be played automatically according to the order of the verses.

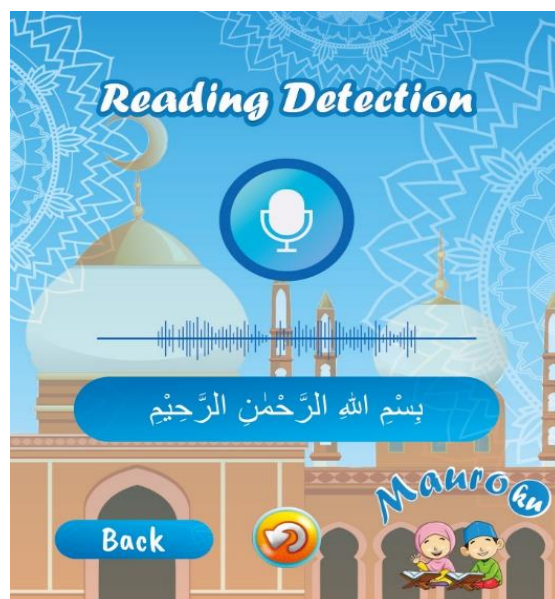


Fig 8. Reading detection display

In picture 8 is a display of reading detection. When the user says or repeats the verse on the microphone, the results of the reading will appear in the blue column. So that users can see the readings according to what they are saying with the Latin verse display. In addition, users can also play back voice recordings that have been previously recorded.

Operational Manual for Using Media

The steps for using the pop up book-based Mauro media are as follows i) open the pop-up book-based Mauro media, ii) press the Switch ON button on the side of the media to turn on the pop-up book-based Mauro media, iii) press the Play button to display the menu that has an LCD Display, iv) select the sura display feature if you want to play murottal and the led strip light in the verse will turn on according to what is being played and there is also a reading detection feature if the user wants to record sound by pressing the microphone button, v) press the back button when you want to change the surah you want to play, vi) press the next button if you want to continue the verse being played, vii) press the Pause button to stop murottal, viii) turn the Volume button to increase and decrease the sound, ix) speakers as loudspeakers from Mauro media.

The appearance of the pop up book is more attractive because of the 3-dimensional elements contained in it (Cahyani et al., 2020). A popup book is a book that has three-dimensional elements that can move and provide a more interesting visualization of the story starting from the display of images that can move when the page is opened. This pop-up book-based Mauro method was developed digitally which can help the memorization and murojaah process. So that the display of media in the form of 3 dimensions has its own charm for children.

Mauro's pop-up book-based media was developed with an audiovisual design to attract children's attention. Media Mauro is made using paper-based materials with a special design and added with audio tools on the right. In the audio there are electronic components, namely Voice Recognition, Raspiberry Pi 4, Loud Speaker, and LCD monitor screen. In line with the research conducted (Lubis, 2017) namely the application of the tasmi' method in memorizing the Qur'an, which is done by listening and listening according to the Mauro method which is applied in the popup book media.

The development of popup book media has been widely developed into digital form. For example, research conducted by (Qi & Buechley, 2010) which combines paper with electronics which is named Electronic Popables. This book integrates traditional popup mechanics with paper-based electronics that is thin, flexible and the result is an artifact that looks and functions like a regular popup book.

In line with Alharbi (2015); An & Carr (2017); Agusti et al., (2018); Annisa et al., (2019) using AIDS audio as a medium in the process of memorizing short suras. The media are in the form of radio, tape recorder/ recording device, cellphone, and language labor in schools. If the murottal Qur'an continues to be listened to, it will be easy and long to be stored in the long-term memory of children with autistic disorders.

Based on this discussion, using popup book-based media is effectively used to improve the ability to recite Surah Al-Fatihah, Al-Ikhlash, Al-Falaq and An-Nas in

children with autistic disorders. Pop up book media can be developed again by using other digital-based media to attract children's attention in the memorization process. Not only focusing on rote memorization, there are also schools that use Quran memorization programs as therapy for children with autistic disorders. This therapy is also known as religious therapy (Fithri, 2011; Syafril et al., 2021).

Conclusion

Using Mauro's pop-up book as a learning medium to help memorize the Alquran for children with autistic disorders as well as being the start for memorizing other suras in the Alquran. Not just memorizing, Alquran can be a religious therapy for children with autistic disorders. Therefore, children with autistic disorders can obtain the benefits of the Alquran, both in this world and in the hereafter.

References

- Aditya, R., Muid, A., & Ristian, U. (2020). *Automatic Speech Recognition Trash Using Pocketsphinx*. 15(1).
- Aryani, R., & Fauziah, P. Y. (2020). Analysis of Parenting Patterns in Efforts to Handle Reading Difficulties in Dyslexic Children. *Journal of Obsession: Journal of Early Childhood Education*, 5(2), 1128-1137.
- Alharbi, M. A. (2015). Reading Strategies, Learning Styles and Reading Comprehension: A Correlation Study. *Journal of Language Teaching & Research*, 6(6).
- Arifin, Z. (2018). Al-Ghazali's Thought of Islamic education and it's relevance with the modern education. *Khalifa Journal of Islamic Education*, 2(1), 1-20. <http://dx.doi.org/10.24036/kjie.v2i1.18>.
- Ashidiqi, M. N. A., Rohmatiah, A., & Rahmah, F. A. (2019). Youtube Free Quran Education As a Source of Islamic Education Learning Materials and Media. *Khalifa: Journal of Islamic Education*, 3(2), 126-141. <http://dx.doi.org/10.24036/kjie.v3i2.27>.
- Agusti, F. A., Zafirah, A., Engkizar, E., Anwar, F., Arifin, Z., & Syafril, S. (2018). The Implantation of Character Values toward Students through Congkak Game for Mathematics Instructional Media. *Jurnal Penelitian Pendidikan*, 35(2). <https://doi.org/10.15294/jpp.v35i2.13947>.
- An, D., & Carr, M. (2017). Learning styles theory fails to explain learning and achievement: Recommendations for alternative approaches. *Personality and Individual Differences*, 116, 410-416.
- Aini, K., Tamuri, A. H., & Syafril, S. (2019). Competency, Attitude and Islamic Teachers' Issue in Using Computer for Learning and Teaching Process.

- Khalifa: Journal of Islamic Education*, 3(1), 17-34.
<http://dx.doi.org/10.24036/kjie.v3i1.20>.
- Ahmadi, F., Fakhrudin, Trimurtini, & Khafidhotul, K. (2018). The Development of Pop-Up Book Media to Improve 4th Grade Students' Learning Outcomes of Civic Education. *Asia Pacific Journal of Contemporary Education and Communication Technology*, 4(1), 42–50.
<https://doi.org/10.25275/apjcectv4i1edu5>.
- Andreou, M., & Skrimpa, V. (2020). Theory of mind deficits and neurophysiological operations in autism spectrum disorders: A review. *Brain Sciences*, 10(6), 1–12. <https://doi.org/10.3390/brainsci10060393>.
- Annas, M. (2017). *Electro-Mechano-Acoustic Study to Know the Characteristics of Woofer Loudspeaker*.
- Annisa, Q., Syah, M., & Hikmawati, F. (2019). Utilization of Audio Aids Media for Memorizing the Qur'an of Autistic Children. *Scientific Karay Wahana Journal*, 3(1), 352–363.
- Badrudin.H, Dr, M. A. (2020). 'Ulumul Qur'an Principles in the Study of the Science of Tafsir Ak-Qur'an. *A-Four*, 203.
- Bogdanowicz, K. M., & Bogdanowicz, M. (2016). “The Good Start Method for English” or how to support development, prevent and treat risk of dyslexia in children learning English as a second language. *Polish Psychological Bulletin*, 47(3), 265-269.
- Cahyani, R. P., Samawi, A., & Maningtya, R. T. (2020). Development of Learning Media Based on Audiovisual Pop Up Books on How to Perform Wudhu for Kindergarten Children in Group B. *Journal of Early Childhood Education*, 11(2), 117–122.
- Daulay, M. R. (2014). The Study Of The Quran Approach By: Muhammad Roihan Daulay. *Journal of Scientific Tariqah*, 01(01), 31–45.
- Engkizar, E., Muliati, I., Rahman, R., & Alfurqan, A. (2018). The Importance of Integrating ICT into Islamic Study Teaching and Learning Process. *Khalifa: Journal of Islamic Education*, 1(2), 148-168.<http://dx.doi.org/10.24036/kjie.v1i2.11>.
- Efendi, E., Alkhaira, S., Mutiaramses, M., Elkhaira, I., & Monlinia, Y. (2019). Developing Islamic Learning Media of Fable Box to Develop Students' Spiritual Quotient. *Khalifa: Journal of Islamic Education*, 3(1), 73-89.
<http://dx.doi.org/10.24036/kjie.v3i1.28>.
- Elkhaira, I., Engkizar, E., Munawir, K., Arifin, Z., Asril, Z., Syafril, S., & Mathew, I. B. D. (2020). Seven Student Motivations for Choosing the Department of Early Childhood Teacher Education in Higher Education. *Al-Athfal: Jurnal Pendidikan Anak*, 6(2), 95-108. <https://doi.org/10.14421/al-athfal.2020.62-01>.
- Engkizar, E., Alfurqan, A., Murniyetti, M., & Muliati, I. (2018). Behavior and Factors Causing Plagiarism among Undergraduate Students in Accomplishing the Coursework on Religion Education Subject. *Khalifa: Journal of Islamic Education*, 1(1), 98-112.<http://dx.doi.org/10.24036/kjie.v1i1.8>.

- Fithri, H. (2011). Religious Therapy as One of An Alternative Ways In Getting Educational Betterment for Children with Autism Spectrum Disorder. *Procedia - Social and Behavioral Sciences*, 29, 1782–1787. <https://doi.org/10.1016/j.sbspro.2011.11.425>.
- Fatahudin, M., Anas, A., & Ahmadi, E. (2019). Sahabat Qur'an (SQ) Parental Control Applications Toward Children's Worship Through Gadget. *Khalifa: Journal of Islamic Education*, 3(2), 154-168. <http://dx.doi.org/10.24036/kjie.v3i2.32>.
- Hidayah, N. (2016). Tahfidz Al-Qur'an Learning Strategy in Educational Institutions. *Ta'allum: Journal of Islamic Education*, 4(1), 63–81. <https://doi.org/10.21274/taalum.2016.4.1.63-81>.
- Hafni, N., Lutfiana, F., & Safitri, E. (2020). Implementation of a Multisensory Method to Improve Reading and Writing of the Koran in Dyslexic and Autistic Children at the Special School of Koranic Youth in Yogyakarta. *at-thullab Journal of Islamic Studies Students*, 2(2).
- Hanum, L. (2014). PAI Learning for Children with Special Needs. *Journal of Islamic Religious Education*, 11(2), 217-236. <https://doi.org/10.14421/jpai.2014.112-05>.
- Handarini, Y., & Hasan, Y. (2019). The Effectiveness of Counting Funnel Learning Media to Improve Learning Outcomes of Simple Addition in Children with Learning Difficulties. *Special Education Research Journal*, 7(1), 258–263.
- Hamid, S. S. A., Admodisastro, N., Kamaruddin, A., Manshor, N., & Ghani, A. A. (2017, April). Informing design of an adaptive learning model for student with dyslexia: a preliminary study. In *Proceedings of the 3rd International Conference on Human-Computer Interaction and User Experience in Indonesia* (pp. 67-75).
- Ismillah, D. (2020). Application of Appied Behavior Analysis of Verbal Behavior (ABA VB) on Expressive Communication of Spectrum Children with Autism. *Journal of Special Education*, 1–7.
- Ilham, M. (2018). The Qur'an as a Source of Epistemology. *Rausyan Fikir: Journal of Usuluddin and Philosophy Studies*, 14(1), 113-130. <https://doi.org/10.24239/rsy.v14i1.324>.
- Jamalahdin, M., Hashemi, S. A., Sosahabi, P., & Berahman, M. (2017). The role of ICT in learning–teaching process. *World Scientific News*, 72, 680-691.
- Jubaedah, S., & Putra, M. Y. (2019). Android-Based Tajweed Learning Media at the Tahfidz Bina Santri Institute. *Human Development Student Journal*, 4(1), 47-58.
- Jamora, A. G. (2017). *Islamic Education in Historical Records*.
- Krisnawati, N. M., & Khotimah, S. H. (2021). Improving Tahfidz Al-Qur'an Learning Through the Talaqqi Method in Early Childhood. *Rides: Tridharma College*, 73(1), 99-107. <https://doi.org/10.36456/wahana.v73i1.3181>.
- Kasmar, I. F., Amnda, V., Mutathahirin, M., Maulida, A., Sari, W. W., Putra, S., ... & Engkizar, E. (2019). The Concepts of Mudarris, Mu'allim, Murabbi,

- Mursyid, Muaddib in Islamic Education. *Khalifa Journal of Islamic Education*, 3(2), 107-125. <http://dx.doi.org/10.24036/kjie.v3i2.26>.
- Lubis, M. H. (2017). The Effectiveness of Learning Tahfizhil Al-Qur'an in Improving the Memorization of Students at the Islamic Center of North Sumatra. *Journal of ANSIRU PAI*, 1(2), 67–73.
- Ma'shun, A. (2016). *Learning Tahfidz Al Qur'an at Tahfidz Al Qur'an Islamic Boarding School Darul Quro Sidareja*.
- Muyasaroh, M., & Sutrisno, S. (2014). Development of CIPP Evaluation Instruments in the Tahfiz Al-Qur'an Learning Program at Islamic Boarding Schools. *Journal of Educational Research and Evaluation*, 18(2), 215-233.
- Masduki, Y. (2018). I Psychological implications for memorizing the Qur'an. Medina-Te: *Journal of Islamic Studies*, 14(1), 18-35. <https://doi.org/10.19109/medinate.v14i1.2362>.
- Marlina. (2015). *Assessment of Children with Special Needs Psychoeducational Approach*. UNP Press.
- Morana, S., Scheid, M., Gau, M., Benke, I., vom Brocke, J., Fettke, P., & Maedche, A. (2018). Research prototype: The design canvas in MyDesignProcess. com. In *13th International Conference on Design Science Research in Information Systems and Technology, held in Chennai, India: Springer*.
- Maskur, A. (2018). Learning Tahfidz Qur'an in Early Childhood. IQ (Science of the Qur'an): *Journal of Islamic Education*, 1(02), 188-198. <https://doi.org/10.37542/iq.v1i02.15>.
- Ma, Y., & Harmon, S. W. (2009). A case study of design-based research for creating a vision prototype of a technology-based innovative learning environment. *Journal of Interactive Learning Research*, 20(1), 75-93.
- Mostafa, J., Hashemi, S. A., Sosahabi, P., & Berahman, M. (2017). The role of ICT in learning–teaching process. *World Scientific News*, 72, 467-478.
- Mutia, L., Gimin, G., & Mahdum, M. (2020). Development of Blog-Based Audio Visual Learning Media to Improve Student Learning Interests in Money and Banking Topic. *Journal of Educational Sciences*, 4(2), 436. <https://doi.org/10.31258/jes.4.2.p.436-448>.
- Nicolson, R. I., Fawcett, A. J., Brookes, R. L., & Needle, J. (2010). Procedural learning and dyslexia. *Dyslexia*, 16(3), 194-212.
- Odom, W., Wakkary, R., Lim, Y. K., Desjardins, A., Hengeveld, B., & Banks, R. (2016, May). From research prototype to research product. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 2549-2561).
- Pito, A. H. (2018). Learning Media in the Perspective of the Qur'an. *Andragogy: Journal of Educational and Religious Technical Training*, 6(2), 97–117. <https://doi.org/10.36052/andragogi.v6i2.59>.
- Pratama, A. B., & Azhari, M. F. (2020). Designing a Mobile Application Based on Gamification Method to Increase Muslims Reading Interest. *Khalifa: Journal of Islamic Education*, 4(1), 63-78. <http://dx.doi.org/10.24036/kjie.v4i1.35>.
- Putra, A. E., Rukun, K., Irfan, D., Engkizar, E., Wirdati, W., Munawir, K., Usmi, F., & @Ramli, A. J. (2020). Designing and Developing Artificial Intelligence

- Applications Troubleshooting Computers as Learning Aids. *Asian Social Science and Humanities Research Journal (ASHREJ)*, 2(1), 38-44. <https://doi.org/10.37698/ashrej.v2i1.22>.
- Putri, I. C., Damri, D., Engkizar, E., Asril, Z., & Efendi, E. (2020). The Use of Android Game to Improve Impaired Hearing Student Vocabulary Mastery. *Journal of Research and Educational Research Evaluation*, 9(2), 85-93. <https://doi.org/10.15294/jere.v9i2.44744>.
- Qi, J., & Buechley, L. (2010). *Electronic popables*. 121. <https://doi.org/10.1145/1709886.1709909>.
- Ritonga, M. R., Fadillah, N., & Fitria, L. (2019). Household Electronic Equipment Control System Through Wireless Fidelity Media Using Real Time Voice Recognition. *InfoTekJar (National Journal of Informatics and Network Technology)*, 3(2), 1–7. <https://doi.org/10.30743/infotekjar.v3i2.905>.
- Restendy, S. (2019). Learning and Communication Model for Children with Speech Deaf Disabilities at the Extraordinary Al Quran Education Park (Tpqlb) Spirit of Indonesian Da'wah Tulungagung. *Journal of Communications Islamika: Journal of Communication Science and Islamic Studies*, 6(1), 58-74.
- Satori, H., Hiyassat, H., Harti, M., & Chenfour, N. (2009). Investigation Arabic speech recognition using CMU Sphinx system. *International Arab Journal of Information Technology*, 6(2), 186–190.
- Senan, N., Azizah, W., Ab, W., & Othman, M. F. (2017). *Embedding Repetition (Takrir) Technique in Developing Memorizing Mobile Application for Autism Children*. 00076, 1–11. <https://doi.org/10.1051/mateconf/201713500076>.
- Silvia, & Monique, R. (2017). The Effectiveness of Classical Music and Therapy Murotal Qur ' an on the Developme Nt of Cognitive Autistic Children in Special School for Autistic Garegeh Bukittinggi. *Journal of Engineering and Health Scinces*, 27, 1–14.
- Syafril, S., Yaumas, N. E., Engkizar, E., Jaafar, A., & Arifin, Z. (2021). Sustainable Development: Learning the Quran Using the Tartil Method. *Al-Ta lim Journal*, 28(1), 1-8.
- Subastia, M., Fadhillah, C., Wahyuningtyas, D. S., Sholichah, Z., & Maulida, R. A. (2017). Metode Bismillah Metode Belajar Alquran Untuk Anak Tuna Rungu. *Jurnal Tarbiyatuna*, 8(2), 118-122.
- Syazwani Zulkafli, N., Abdul Majid, L., & Ishak, H. (2018). Medical Innovation Through Al-Quran Therapy Against Autism Children. *Al-Turath Journal*, 3(2), 40–45. <http://spaj.ukm.my/jalturath/index.php/jalturath/article/viewFile/77/75>.
- Syafril, S., Asril, Z., Engkizar, E., Zafirah, A., Agusti, F. A., & Sugiharta, I. (2021, February). Designing prototype model of virtual geometry in mathematics learning using augmented reality. In *Journal of Physics: Conference Series* (Vol. 1796, No. 1, p. 012035). IOP Publishing. <https://doi.org/10.1088/1742-6596/1796/1/012035>.
- Shihab, M. Q. (2008). *Lentera Al-Quran: Kisah dan Hikmah Kehidupan*. Mizan Pustaka.

- Suherman, S., A. Zafirah, F. A. Agusti, R. P. Sandra, Engkizar, Engkizar., Efendi, Efendi. (2021). "Encouraging Students' Active Learning Activities through the Implementation of MASTER Learning Model Based on Mind Mapping Techniques." In *Journal of Physics: Conference Series*, vol. 1940, no. 1, p. 012094. IOP Publishing. <https://doi.org/10.1088/1742-6596/1940/1/012094>.
- Skiada, R., Soroniati, E., Gardeli, A., & Zissis, D. (2014). EasyLexia: A mobile application for children with learning difficulties. *Procedia Computer Science*, 27, 218-228.
- Solihin, R. (2020). Development of Tahfidz Al-Quran Interactive Learning Media in Elementary Schools. *Asy-Syukriyyah Journal*, 21(02), 154-163. <https://doi.org/10.36769/asy.v21i02.108>.
- Syafril, S., Aini, N. R., Netriwati, N., Pahrudin, A., & Yaumas, N. E., Engkizar, E (2020). Spirit of Mathematics Critical Thinking Skills (CTS). *JPhCS*, 1467(1), 012069. <https://doi.org/10.1088/1742-6596/1467/1/012069>.
- Syafril, S., Latifah, S., Engkizar, E., Damri, D., Asril, Z., & Yaumas, N. E. (2021, February). Hybrid learning on problem-solving abilities in physics learning: A literature review. In *Journal of Physics: Conference Series* (Vol. 1796, No. 1, p. 012021). IOP Publishing. <https://doi.org/10.1088/1742-6596/1796/1/012021>.
- Syafril, S., Latifah, S., Engkizar, E., Damri, D., Asril, Z., & Yaumas, N. E. (2021, February). Hybrid learning on problem-solving abilities in physics learning: A literature review. In *Journal of Physics: Conference Series* (Vol. 1796, No. 1, p. 012021). IOP Publishing.
- Walingkas, I. S., Najooan, M. E. I., Sugiarto, B. A., Elektro, T., Sam, U., Manado, R., & Manado, J. K. B. (2019). The Combination of Ultrasonic Sensors With a Raspberry Pi Mini Computer As A Wheel Robot Guide. *Journal of Electrical and Computer Engineering*, 8(3), 121-132.
- Widodo, S., & Wahyudin. (2018). Selection of Learning Media Mathematics for Junior School Students. *Turkish Online Journal of Educational Technology - TOJET*, 17(1), 154-160. <http://www.tojet.net/>.
- Zafirah, A., Agusti, F. A., Engkizar, E., Anwar, F., Alvi, A. F., & Ernawati, E. (2018). Instilling character values in students through arrogant games as a learning medium. *Journal of Character Education*, 8(1). <https://doi.org/10.21831/jpk.v8i1.21678>.