Proceedings of the 3rd International Conference on Physics and Physics Education (ICONPHYEDU)
Departement of Physics Education, Universitas Islam Negeri Mataram, Indonesia
15th October 2024 *Available online at https://proceeding.uinmataram.ac.id/index.php/iconphyedu*
E-ISSN: XXX-XXX

Development of Guided Inquiry-Based Learning Tools to Train Early Childhood Critical Thinking Skills

Sunandar Azma'ul Hadi[1*], Sopiyah[2]
[1]Universitas Islam Negeri Mataram
[2]RA Al Madinatul Islamiyah Rumeneng Lombok Timur

Corresponding author: sunandar@uinmataram.ac.id

ABSTRACT

This study aims to develop a guided inquiry-based learning device to train critical thinking skills in early childhood. The learning devices developed are in the form of daily learning plans (RPPH), magazines and critical thinking skills observation sheets. This learning device was developed using the Four-D development model, namely design, define, develop, and disseminate. The learning devices that have been prepared were then validated by two validators with results showing Very Valid. The magazine obtained an average validation value of 3.59. RPPH obtained a validation value of 3.64. While the critical thinking skills observation sheet obtained a validation value of 3.55. Data collection techniques in this study used observation, expert validation, and documentation. Observation was used to collect data on students' critical thinking skills, validation was used to collect data related to the value of the developed learning device, while documentation was used to collect information needed in this study. Based on the results shown in this study, it can be concluded that the guided inquiry-based learning device developed is valid and effective for training critical thinking skills in early childhood which is one of the significant skills that children must have from an early age.

KEYWORDS: Learning Tools, guided inquiry, critical thinking skills, early childhood

1 INTRODUCTION

Early Childhood Education is an important initiative that aims to foster and develop children's potential from birth to the age of six. Through various specially designed educational stimuli, early childhood education plays a crucial role in supporting children's physical and mental growth. This effort not only facilitates holistic development but also prepares them to enter the next level of education with optimal readiness. In this context, early childhood education becomes a solid foundation for children's future, forming character, skills, and knowledge that will support them in their life journey and further education (S.A Hadi, et al. 2021).

Early childhood education plays a very important role in forming the foundation of children's skills and character. At this stage, children begin to develop critical thinking skills, which are essential to face challenges in a changing world. Yunita, et al. (2019) in their research revealed that children will improve their critical thinking skills when asked to observe concrete objects. However, in practice, much teaching at the early childhood education level is still oriented towards an instructional approach, where children tend to act as passive recipients of information. This results in a lack of opportunities for them to practice critical and independent thinking. In line with this. Reswari (2021) stated that children in her class tend to

only listen and receive information without going through the activities of observing, analyzing and concluding the children's activities carried out at the end of learning. So that this causes cognitive abilities, especially children's critical thinking skills, to be less stimulated optimally.

Similar problems also occur in Raudatul Atfhal Al-Madinatul Islamiyah. The results of observations conducted in this study indicate that the teaching and learning process, especially on materials with themes that are identical to several science experiments, is only presented using conventional methods such as lectures and games. Such conditions are one of the causes of teachers' difficulty in training critical thinking skills that are greatly needed by students at their age. As is known, critical thinking skills are one of the foundations of thinking so that children can make the right decisions based on the information they have. This skill is very appropriate to be trained at a golden age such as early childhood.

One approach that has proven effective in improving critical thinking skills is the guided inquiry-based learning method. This approach encourages students to ask questions, explore, and find answers through the investigation process. By implementing guided inquiry, teachers can provide the necessary guidance to help children direct their questions and explorations, while still providing space for children's creativity and curiosity. The guided inquiry-based learning method presented in interesting teaching media can be used to stimulate critical thinking skills in early childhood students. Hadi, et al. (2021) in their research proved that learning devices developed based on guided inquiry are effective and practical to use to improve critical thinking skills in early childhood children.

In this context, the development of learning tools that support guided inquiry methods becomes very relevant. The right learning tools can facilitate deeper interaction and exploration, while helping children understand abstract concepts in a concrete and fun way. In addition, learning tools must also be designed by considering aspects of child development, so that they are in accordance with the needs and characteristics of early childhood. Umbaryati (2016) stated that learning tools such as student worksheets are a means to help and facilitate teaching and learning activities so that effective interactions are formed between students and educators, can improve student learning activities and achievements.

Based on the data presented, this study aims to develop a guided inquiry-based learning tool specifically designed to train critical thinking skills in early childhood. It is hoped that the results of this study will not only contribute to the development of effective learning tools, but also provide support to teachers in implementing more innovative and interesting learning methods. With this approach, it is hoped that children will not only gain knowledge, but also hone critical thinking skills that will be useful for them in the future. This research has the potential to be a step forward in creating a more holistic and competitive learning experience for future generations.

2 METHOD

In this study, we applied a quantitative approach with a focus on the type of development research. The main objective of this study is to produce innovative products that can improve the learning experience. The products produced include guided inquiry-based teaching materials, which consist of several important components, namely daily learning implementation plans, interactive magazines for early childhood with capillarity material, and tests of students' critical thinking skills. Through this approach, it is expected to provide a significant contribution to the development of more effective and interesting learning methods.

The learning device was developed using the Four-D model, namely design, define, develop, and disseminate. The Four-D development model was then adapted by Ibrahim into 4P, namely definition, design, development, and counseling (Ibrahim, 2002). The development of learning devices in this study only took place in three stages, namely the definition, design and development stages. The counseling stage was not carried out by the researcher due to limited resources. The design of the development of teaching materials can be seen in Figure 1.

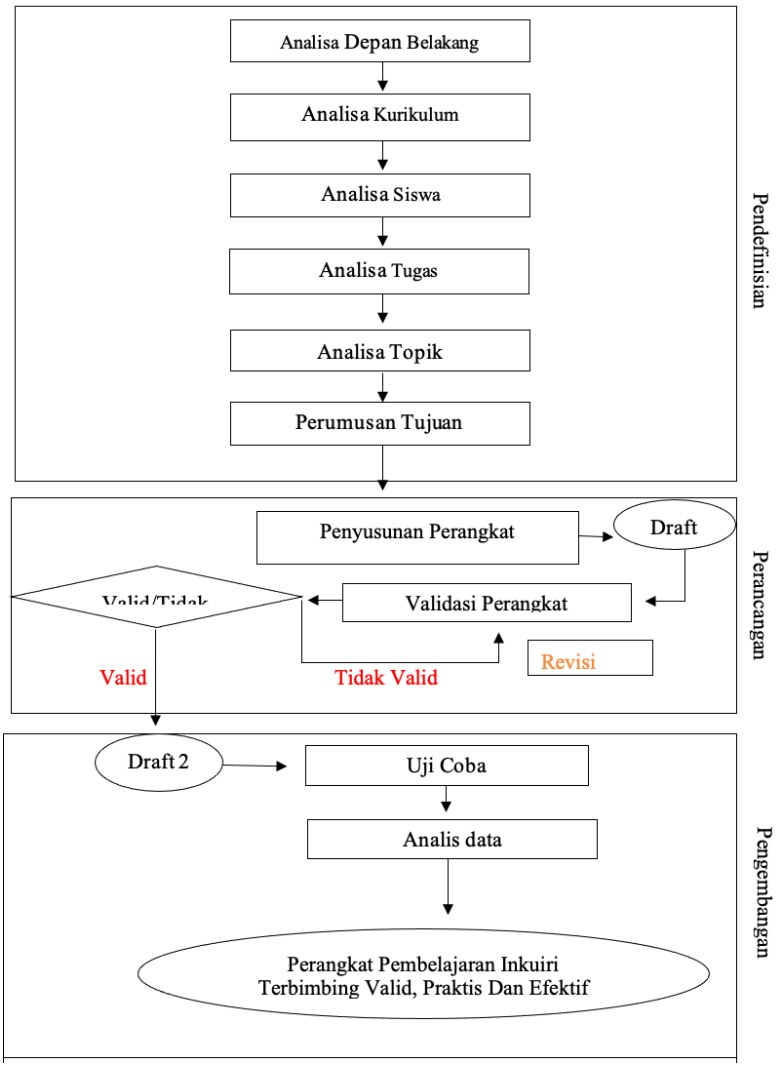

Figure 1. 4P Development Model

Guided inquiry-based learning tools were developed by including several indicators of critical thinking skills which can be seen in Table 1.

Table 1. Indicators of Students' Critical Thinking Skills

No	Critical Thinking Skills Indicators	Description	Objective
1.	Make decision	Make experimental steps according to the instructions in the magazine	Students are given instructions contained in the magazine and are able to carry out the experimental steps using instructions in the form of pictures contained in the magazine.
2.	Analyze	Analyzing evidence when conducting experiments	Students are able to analyze the results of experiments/trials conducted.

No	Critical Thinking Skills Indicators	Description	Objective
3.	Evaluate	Evaluating experimental results	Students are able to evaluate the results of experiments
4.	Conclude	Able to draw conclusions	Drawing up a comprehensive conclusion from the results of the experiment

The data in this study were then collected using observation, documentation and validation techniques. Observation is a technique for collecting data by observing every ongoing event and recording it with an observation tool about the things to be observed or researched. Observations are made during the learning process. The observation sheet in this study was used to observe the learning process using a guided inquiry-based learning model. The aspects observed include the implementation of learning by teachers starting from initial activities, core activities, and closing activities. The observation sheet was prepared by the researcher and filled in by two observers, namely the first observer and the second observer.

The developed learning device was validated by two validators using a validation sheet. This validation sheet aims to see whether the learning device that was compiled is valid or not. The researcher used two validators. The first validator aims to validate the content and the second validator to validate the accuracy of the language.

The data obtained regarding the validation of learning devices consisting of daily learning implementation plans, magazines, and students' critical thinking skills tests. The data obtained were then analyzed by averaging the scores obtained from both validators. The average value obtained from the validator is used to determine the quality of the device developed. The values obtained from the validator can be interpreted according to the criteria listed in Table 2.

Table 2. Learning device criteria based on validator values

Value interval	Criteria
>3,6	Very Valid
2,8 – 3,6	Valid
1,9 – 2,7	Invalid
1,0 – 1,8	Totally Invalid

(Adapted from Ratumanan & Laurens, 2006)

The reliability of the learning device was further analyzed using the percentage of agreement formula by Emmer and Millet, the instrument is said to be reliable if it has a percentage of agreement ≥75%.

$$percentage\ of\ agreement = \left(1 - \frac{A-B}{B+A}\right) X\ 100\%$$

Information:
A: The frequency of behavioral aspects observed by observers who give low frequencies.
B: The frequency of behavioral aspects observed by observers who give high frequencies.

3 RESULT AND DISCUSSION

In this study, we developed a guided inquiry-based learning device specifically designed to train critical thinking skills in early childhood. The theme raised, namely Water, Air, and Fire, with the

subtheme of the Law of Capillarity, was chosen because of its ability to encourage in-depth experimentation and exploration in the learning process. This theme proved to be very relevant and appropriate for creating an interesting and interactive learning experience. The validation results of the developed learning device showed significant potential in improving children's critical thinking skills. The following are the validation results obtained:

Magazine Validation

The magazine contains images that present data using guided inquiry stages. This aims to make it easier for students to understand existing problems and find their own solutions. This magazine was validated by two experts and the results of the magazine validation are presented in Figure 2. This magazine was declared valid and reliable for application in the learning process. This is in line with Farida Rohayani's findings in 2018 that inquiry learning is a form of active learning, where progress is assessed by how children develop experimental skills and analyze the knowledge they have. This inquiry learning requires children to actively seek their own knowledge, but in the learning process, teachers are still required to monitor and guide children in the learning process.

The developed magazine contains images using guided inquiry stages. This aims to make it easier for students to understand existing problems and find their own solutions. The results of the magazine validation can be seen in Figure 2.

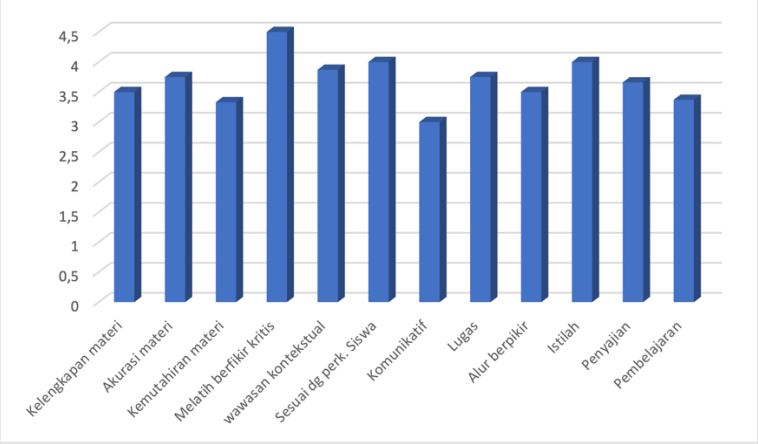

Figure 2. Average Magazine Validation Results

Based on Figure 2, the developed magazine shows results with valid and very valid criteria. 10 of the 31 assessment criteria received validation scores with very valid criteria and 21 assessment criteria received validation scores with valid criteria. The percentage of agreement value of the magazine is 96% which indicates a reliable magazine.

Early childhood magazines are specifically designed to meet the information and entertainment needs of children who are in the early stages of development. With bright colors, attractive illustrations, and easy-to-understand content, this magazine aims to train children's critical thinking skills. Magazines or other teaching media developed based on guided inquiry learning models can be used to train critical thinking skills. Latifah, et al. (2020) support this statement stating that teaching media such as e-modules can be used to improve students' critical thinking skills.

Figure 3. Some parts of a magazine page

The content in this magazine includes short stories containing moral values, drawing activities, educational games, and interesting facts about nature, science, or culture. Each page is designed to invite children to interact, such as through simple puzzles, mazes, or quizzes that can improve critical thinking and problem-solving skills. Content containing science learning can trigger students' learning motivation. Munawaroh (2017) in her research stated that science learning activities that involve children in simple experiments can increase the learning motivation of early-age students.

Validation of Daily Learning Implementation Plan

The daily lesson plan contains a scenario of the learning process, from the opening to the closing. The daily lesson plan contains strategies used to achieve the desired basic competencies. The results of the validation of the daily lesson plan are presented in Figure 4. Based on Figure 4, the daily lesson plan is declared valid and reliable to be implemented in the learning process with a score of 3.5 on the language criteria, 3.16 on the format, and 3.73 on the content. The learning activities planned in the daily lesson plan are in accordance with the syntax of the guided inquiry learning model, namely: (1) identification and formulation of problems, (2) formulation of hypotheses, (3) data collection, (4) data interpretation, and (5) drawing conclusions (Riduwan, 2010). Learning activities using the inquiry learning model to improve critical thinking skills are a scenario in the RPPH. This is supported by research conducted by Ni Made Ayu Suryaningsih, et al. (2016) namely the application of guided inquiry learning based on games in increasing the creativity of early childhood with the results of the study of guided inquiry learning methods based on games in cycle I there was an increase in children's creativity to 54.54%. And increased again in cycle II to 86.36%. So it can be concluded that the application of guided inquiry learning methods based on games can increase the creativity of early childhood.

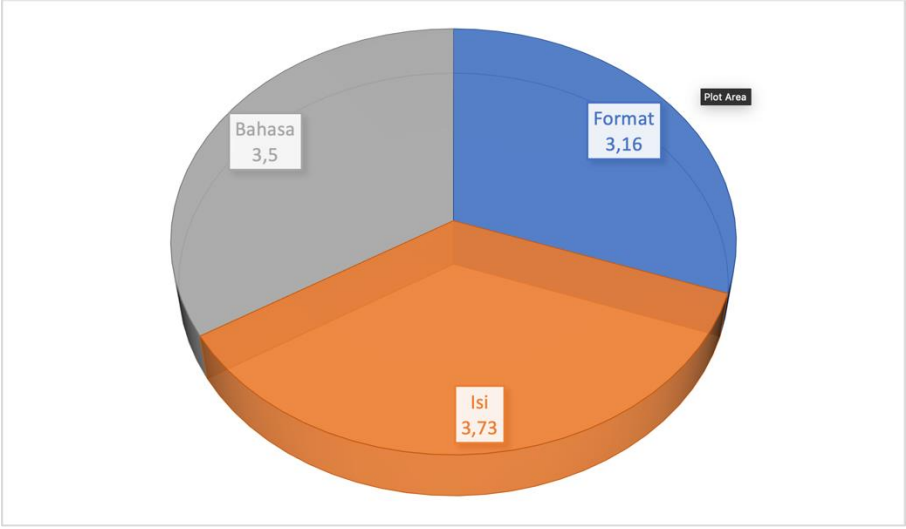

Figure 4. Results of Validation of Daily Learning Implementation Plan

Based on Figure 4, it shows that the daily learning implementation plan is declared valid and reliable with a reliability percentage of 96%. This daily learning implementation plan is prepared as a guideline for teachers in implementing guided inquiry-based learning. The magazine that has been developed will be implemented according to the plan stated in the learning plan.

The learning plan contains the level of development achievement, indicators to be achieved, materials to be studied, learning methods, learning steps, learning media, and learning resources and assessments. Kumisi (2019) in his research stated that teachers must be able to act as designers in designing learning that occurs in the classroom and is scenario in the learning plan.

Validation of Critical Thinking Skills Test

Critical thinking skills with four indicators were measured using posttest and pretest tests using four indicators of critical thinking skills. Indicators of critical thinking skills in this study include: (1) making decisions to compile steps for problem-solving experiments, (2) conducting analysis, (3) conducting evaluations, and (4) compiling conclusions. These indicators were adapted from Ennis (Ennis, 1991). These indicators are integrated into the syntax of the learning model used, so that this tool is effective for training children's critical thinking skills. The instruments that have been prepared before being used to measure students' critical thinking skills, first go through a validity test stage. The results of the validity test state that the critical thinking skills observation sheet instrument is declared valid and reliable to be used as a measuring tool for students' critical thinking skills with a percentage agreement value of 97%. The results of the validation of the critical thinking skills test can be seen in Figure 5.

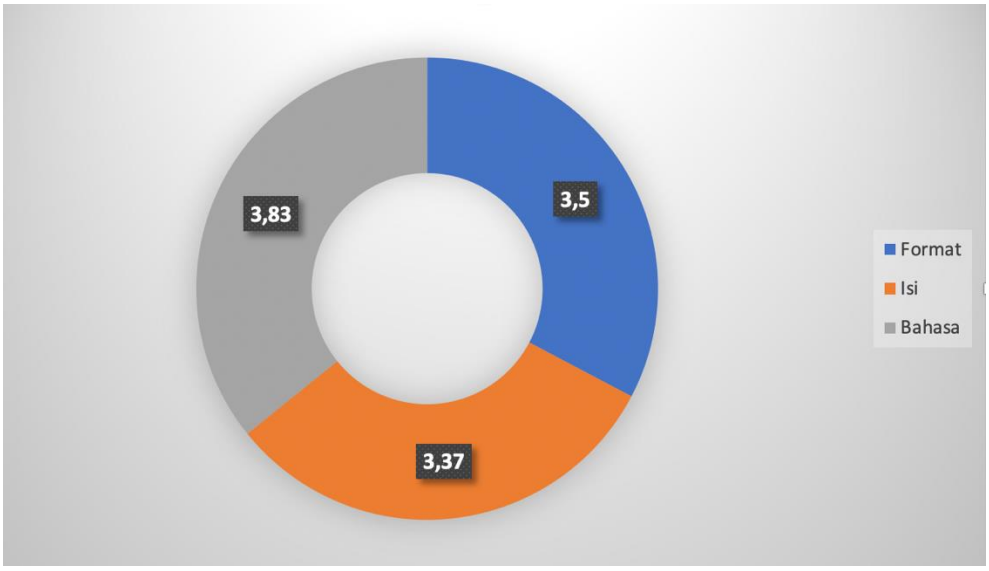

Figure 5. Results of validation of critical thinking skills test

In general, this learning device is declared feasible to use. The overall device validation results can be seen in Figure 6.

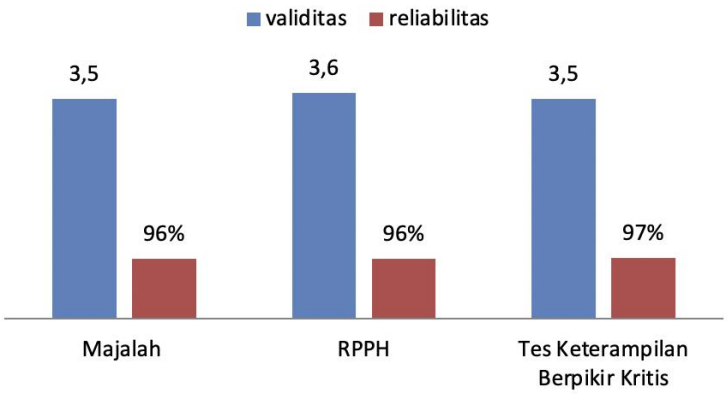

Figure 6. Validation Results of the Developed Learning Devices

4 CONCLUSION

Based on the results of the assessment conducted by two validators, the learning device developed based on guided inquiry in this study was declared effective for training critical thinking skills of early childhood, especially on the subject of capillary law. The learning device developed in this study consisted of a magazine with a validity value of 3.5 and a percentage of agreement of 96%. The daily learning implementation plan has a validity value of 3.6 and a reliability value of 96%. While the critical thinking skills test has a validation value of 3.5 with a percentage of agreement of 97%. These data indicate that the learning device developed is declared valid and reliable.

REFERENCES

Ennis, R.H. (1991). *Critical Thinking: A Streamlined Conception.* Teaching Philosopy. University Of Lillionis.

Farida Rohayani. (2013) *Model Pembelajaran Inkuiri untuk Pendidikan Anak Usia Dini.* Golden Age Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini. Vol. 3 No. 1 Maret.

Hadi, S. A. U., Azmi, K., & Rosida, S. A. (2021). Melatih keterampilan berpikir kritis anak usia dini melalui penerapan model pembelajaran inkuiri terbimbing. *Schemata: Jurnal Pasca Sarjana IAIN Mataram*, *10*(2), 151-162.

Ibrahim, M. (2002). *Pengembangan Perangkat Pembelajaran.* Modul-Bio-C-06 Direktorat Sekolah Lanjutan Tingkat Pertama Direktorat Jenderal Pendidikan Dasar dan Menengah Departemen Pendidikan Nasional.

Kumisi, R. (2019). UPAYA MENINGKATKAN KOMPETENSI GURU DALAM MENYUSUN RENCANA PROGRAM PEMBELAJARAN HARIAN MELALUI BIMBINGAN BERKELANJUTAN DI TK NEGERI PEMBINA KECAMATAN KOTA BARAT KOTA GORONTALO. pdf. *Ideas: Jurnal Pendidikan, Sosial, dan Budaya*, *5*(2), 237-254.

Latifah, N., Ashari, A., & Kurniawan, E. S. (2020). Pengembangan e-modul fisika untuk meningkatkan kemampuan berpikir kritis peserta didik. *Jurnal Inovasi Pendidikan Sains (JIPS)*, *1*(1), 1-7.

Munawaroh, H. (2017). Pelaksanaan pembelajaran sains anak di RA perwanida wonosobo. *SPEKTRA: Jurnal Kajian Pendidikan Sains*, *3*(2), 169-176.

Ratumanan, T.G. dan Laurens. (2006). *Evaluasi Hasil Belajar yang Relevan dengan Kurikulum Berbasis Kompetensi.* Surabaya: Unesa UneversityPress.

Reswari, A. (2021). Efektivitas Pembelajaran Berbasis Steam Terhadap Kemampuan Berpikir Kritis (Hots) Anak Usia 5-6 Tahun. *JCE (Journal of Childhood Education)*, *5*(1), 1-10.

Riduwan. (2010). *Skala Pengukuran Variabel-Variabel Penelitian.* Bandung: Alfabeta.

Umbaryati, U. (2016, February). Pentingnya LKPD pada pendekatan scientific pembelajaran matematika. In *PRISMA, prosiding seminar nasional matematika* (pp. 217-225).
Yunita, H., Meilanie, S. M., & Fahrurrozi, F. (2019). Meningkatkan Kemampuan Berpikir Kritis melalui Pendekatan Saintifik. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *3*(2), 425-432.

BIOGRAPHIES OF AUTHORS

Sunandar Azma'ul Hadi, M.Pd. is a Lecturer at the Faculty of Tarbiyah and Teacher Training in the Physics Education Study Program. His field of study is Science Education with a Concentration in Biology. His research has focused on the field of science education and the development of teaching media.
Email: sunandar@uinmataram.ac.id

Saopiyah S.Pd. is a teacher at Raudathul Athfal Al-Madinatul Islamiyah Rumeneng East Lombok. Her field of study is Early Childhood Islamic Education. She focuses on developing teaching media for early childhood.