



Development of Aquarium Weather Diorama Media (Aquaca) for Understanding Science Concepts in Elementary School

Azila Pebri Rika Zuliani^{1*}; Suci Perwita Sari²; Ismail Saleh Nasution³

^{1,2,3}School Teacher Education, Universitas Muhammadiyah Sumatera Utara, Indonesia

^{1*}Corresponding Email: Pebriazila@gmail.com, Phone Number: 0813 xxxx xxxx

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Abstract: This research aims to develop learning media using Aquaca Diorama Media (weather aquarium). The AQUACA diorama uses aquarium glass, bright colors, and attractive images. The use of learning media in the learning process is expected to increase student participation in presenting and interpreting teaching material more excitingly. This research uses an R&D (research and development) approach. The development model that will be used in this research to develop learning media is the Borg and Gall model. The results were researched on developing R&D (Research and Development) for educational aquaca diorama media in learning. This is proven by the excellent response from students who have witnessed and practiced directly the water cycle process using diorama aquaca (Weather Aquarium) media. This media can increase students' focus on the material being presented. Of course, students will more easily understand the essence of the learning being delivered.

Abstrak: Penelitian ini bertujuan untuk mengembangkan media pembelajaran dengan menggunakan media Diorama Aquaca (aquarium cuaca). Diorama AQUACA di desain dengan menggunakan kaca aquarium dan menggunakan warna-warna cerah serta gambar yang menarik. Penggunaan media pembelajaran dalam proses belajar diharapkan mampu meningkatkan partisipasi siswa dalam menyajikan serta menginterpretasikan materi ajar dengan cara yang lebih menarik. Penelitian ini menggunakan pendekatan R&D (*research and development*). Model pengembangan yang akan digunakan dalam penelitian ini untuk mengembangkan media pembelajaran adalah model *Borg and Gall*. Adapun hasil penelitian yang didapat penelitian pengembangan R&D (*Research and Development*) media diorama aquaca edektif dalam pembelajaran. Hal ini terbukti dengan adanya respons yang baik dari siswa yang telah menyaksikan dan mempraktikkan secara langsung proses siklus air dengan media diorama aquaca (Aquarium Cuaca). Penggunaan media ini dapat dimanfaatkan agar meningkatkan fokus siswa terhadap materi yang disampaikan dan tentunya siswa lebih mudah memahami inti pembelajaran yang disampaikan.

A. Introduction

Education is the process of shaping personality and developing the potential possessed by students (Hamzah et al., 2017; Ana, 2016). Primary education serves as the initial stage of education aimed at preparing quality human resources, thereby influencing the success of subsequent levels (Sudarsana, 2015). According to Permendikbud No. 57 of 2014 regarding the 2013 Curriculum for Primary Schools Article 5 paragraph (1) (Marlina, 2020), there are two general subjects in Indonesian primary schools. Group A comprises Religion and Character Education, Pancasila and Civic Education, Indonesian Language, Mathematics, Natural Sciences, and Social Sciences. Group B includes cultural arts and crafts, physical education, sports and health, and local content (Faizi, 2023; Shunhaji, 2019).

Based on the Minister of National Education Regulation No. 22 of 2006 concerning the Content Standards for Basic and Secondary Education Units, one of the mandatory subjects for students is natural sciences (Kuswandi et al., 2022). Consistent with this, the BSNP (in Sayekti et al., 2019) states that Natural Sciences is a subject related to systematically discovering knowledge about nature. Science is a systematic collection of theories, and its implementation is usually limited to phenomena that arise and develop through scientific procedures (Faizi, 2023).

The National Education Standards Agency explains the scope of science learning at the primary school level, which includes "Living creatures and learning processes, covering humans, animals, plants, and their interactions with areas and health; Objects or materials, their properties and uses including liquids, solids, and gases; Energy and its changes including force, sound, heat, magnets, electricity, light, and simple machines; and Earth and the universe including soil, nature, the solar system, and other celestial objects." In the 2013 Curriculum, the Basic Competence includes analyzing the water cycle and its impact on events on Earth and the continuity of living beings (Faizi, 2023; Wedyawati et al., 2019).

One of the topics in the Natural Sciences subject at primary school is the water cycle, taught and studied in grade 5 under Theme 8, "Lingkungan Sahabat Kita" Subtheme 1 Learning 2, with Basic Competence (Yanti & Huda, 2023). This involves analyzing the water cycle and its impact on events on Earth and the continuity of living beings. It also involves creating a project on the water cycle scheme based on information from various sources. The water cycle, or hydrological cycle, is the water movement from the Earth's surface to the atmosphere and back again, occurring continuously and maintaining a constant state in certain areas.

According to Sumiati (in Rahmatunnisa et al., 2022), using learning media in the learning process is expected to increase student participation in presenting and interpreting teaching materials more engagingly. Such learning media can include visual aids like dioramas and posters. The advantage of diorama media is that it helps students become more creative in expressing objects and provides a view of the actual object, presenting it concretely and avoiding verbalism (Yanti & Huda, 2023). This medium has the potential and benefits of turning abstract images into reality. Therefore, the chosen learning medium is the diorama. A diorama is a three-dimensional realistic medium. A wildlife park diorama is

a three-dimensional medium resembling a park filled with various animals. Dioramas can provide direct learning experiences, making it easier to understand the material, making students more enthusiastic and excited about learning, and creating a more exciting and enjoyable learning atmosphere, thus helping students stay focused on the lesson delivered by the teacher (Rahmatunnisa et al., 2022).

Diorama media is very suitable for primary school students as it aligns with their characteristics: enjoying playing, moving energetically, and engaging in direct activities together. It also fits the characteristics of Natural Sciences learning at primary schools, which emphasize direct learning experiences for students. This aligns with the opinion that using diorama media in learning will foster enthusiasm and interest in Natural Sciences subjects, involving students in understanding the material. This research and development are consistent with previous studies that developed diorama media, as seen in the study titled "Development of the Diorama Aquaca (Weather Aquarium) Media for Understanding the Concept of Natural Sciences on the Rain Formation Process for Third Grade Students at SDN Margahayu XIX." The results of this study indicate that the diorama media was declared practical and feasible by validators. Students learning outcomes also improved after learning using the Aquaca (Weather Aquarium) diorama media (Rahmatunnisa et al., 2022).

The Aquaca diorama uses an aquarium and bright colors with attractive images. This diorama features miniatures and other supporting characters, with a distinctive landscape background that helps students visualize the natural environment where the rain formation process occurs in real life. Primary education spans from grades 1 to 6. This study conducted research on Natural Sciences material in grade 5, focusing on the "rain formation process" (Yanti & Huda, 2023).

From the above explanation, this study aims to provide learning media that can offer direct learning experiences to students, stimulating their curiosity, interest, and involvement in Natural Sciences learning without coercion, thereby positively influencing their interest in Natural Sciences subjects.

B. Method

The researcher will use the R&D (Research and Development) approach. Research and Development (R&D) is a research approach used to produce and test a specific product's effectiveness. The use of the R&D approach in this research is because the study will result in a product in the form of learning media for grade 5 (Rahmatunnisa et al., 2022).

The development model used in this research to develop the learning media is the Borg and Gall model. The development of the Borg and Gall model can be seen in the image below.

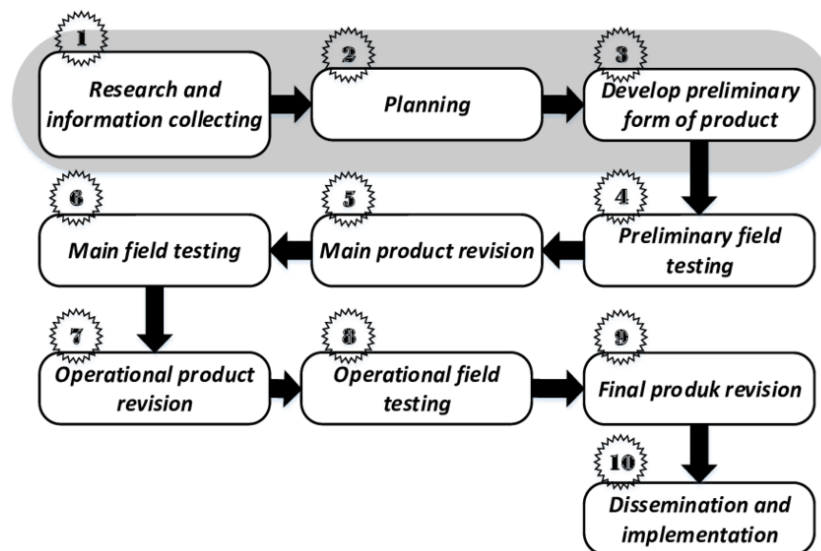


Figure 1. Model Borg and Gall

In the ten stages of the model developed by Borg and Gall, the researcher will only implement six stages due to limitations in cost and time. The stages to be carried out in this research, adopting the Research and Development (R&D) stages from Borg and Gall, are 1) Potential and Problems, 2) Collecting Data/Information, 3) Product Design, 4) Design Validation, 5) Design Revision, 6) Product Testing.

C. Result and Discussion

Result

The development from this research has resulted in an AQUACA Diorama media for the Natural Sciences subject in elementary school, specifically for the water cycle, taught and studied in grade 5 under Theme 8, "Proses Terjadinya Siklus Air." Based on the research and development conducted following Borg and Gall's research procedures, which consist of 10 steps, the process is as follows:

1. Potential and Problems: The problem identified in the field is that students need help understanding the material and feel bored during Natural Sciences lessons, leading to passive participation in the learning process. Educators have yet to use media that engage students—however, the potential lies in the school's adequate facilities. The determination in this stage involves identifying the best needs for conducting this research for all stakeholders in the school. The initial potential was obtained through interviews or information gathering with the homeroom teacher of grade 5 at SD Muhammadiyah 01 Medan, initials NH. After information gathering and observation, the next step is analyzing the collected information. All information was used to create a needs analysis questionnaire for students.
2. Collecting Data/Information: Information related to teaching materials or supporting media was gathered. All collected data/information is intended to plan the product's

design for development during the learning process. This process requires collaboration between the homeroom teacher and the researcher. It aims to understand the students' characteristics so that the product design aligns with the student's characteristics in the class. The researcher used the following sources as references:

Table 1. References

No	Book Title	Author
11	Ilmu Pengetahuan alam dan sosial	Amalia Fitri Ghaniem, Anggayudha A. Rasa Ati H. Oktora, Miranda Yasella (Ghaniem et al., 2021)
2	IPA Untuk kelas 5 SD	Wiwik Winarti, Joko Winarto, Widha Sunarno (Winarti et al., 2009)
3	Ilmu Pengetahuan Alam untuk SD dan MI Kelas V	Heri Sulistyanto, Edy Wiyono (Sulistyanto & Wijono, 2008)

The product design process aims to develop the previously planned product design. The design of the AQUACA Diorama media is handmade and made using simple materials. Materials used for designing the AQUACA diorama include glass, foam, glue, scissors, colored ink, origami paper, cotton, and additional materials for aquarium decoration. The development stages of the pre-designed diorama media are as follows:

1. Preparation of materials for making the media.
2. Providing the aquarium.
3. Creating an illustration of the water cycle process by adding miniature trees, rocks, and synthetic grass.
4. Creating a diorama ecosystem depicting the water cycle process, including illustrations of the sun, clouds, and land edges, and filling it with adequate water. This process also determines the suitability of the AQUACA Diorama as a learning medium for achieving the learning objectives.

After completing the first stage (Potential and Problems) and the second stage (Collecting Data/Information), the next step is designing the product. Once the product design is completed, experts assess it. This expert assessment ensures that the developed product meets the desired objectives. The design validation for this learning module was tested by expert validators, including three subject matter experts, two media experts, and one language expert. The subject matter experts evaluated three aspects: content feasibility, graphical feasibility, and language feasibility. The results of the validation test by subject matter experts are presented in Figure 2.

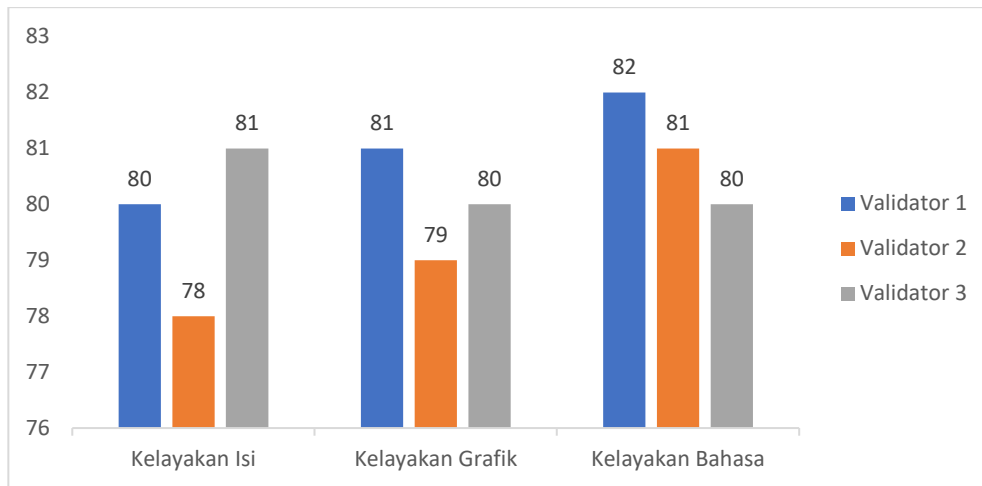


Figure 2. Results of Validation by Subject Matter Experts

Based on Figure 2, the results obtained from the validation by subject matter experts show an average of 81%, categorized as "Feasible." In the media validation by the second validator, the media developed was deemed to have met the criteria, thus progressing the subject matter validation to the next validator. In the research by [Zakiy et al \(2018\)](#), it is stated that the validation results by subject matter experts received an average score of 3.67, categorized as valid. This is consistent with previous research indicating that the developed product is categorized as valid or feasible. The results of the media expert validation are presented in Figure 3.

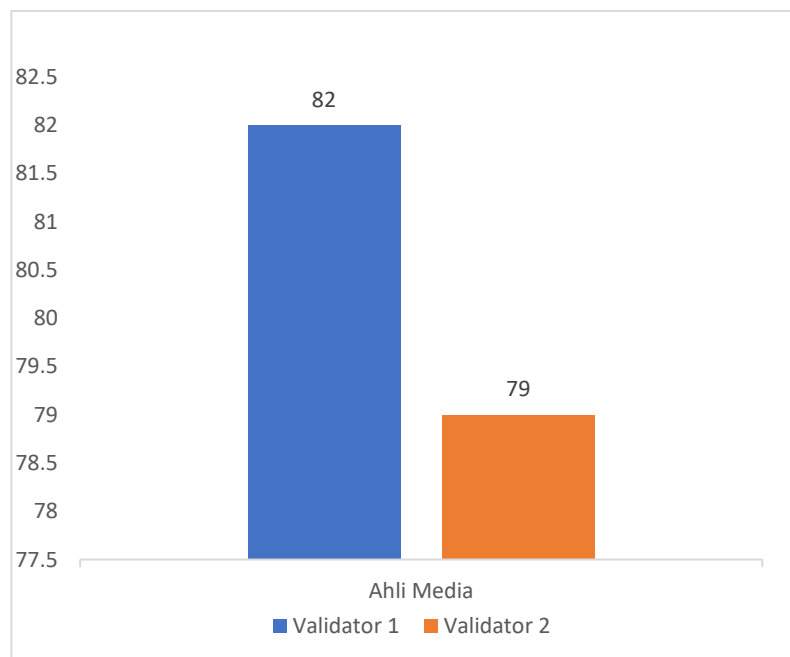


Figure 3. Results of Validation by Media Experts

Based on Figure 3, the validation results by media experts show a percentage of 82%. The validation by the second media expert validator received a percentage of 79%. Therefore, the average percentage of media expert validation is 80.5%, categorized as "Highly Feasible." This is supported by previous research that also obtained feasible criteria in the media expert validation results (Nelawati et al., 2018; Pratami et al., 2018; Pradipta & Hernawati, 2015). The results of the language expert validation are presented in Figure 4.

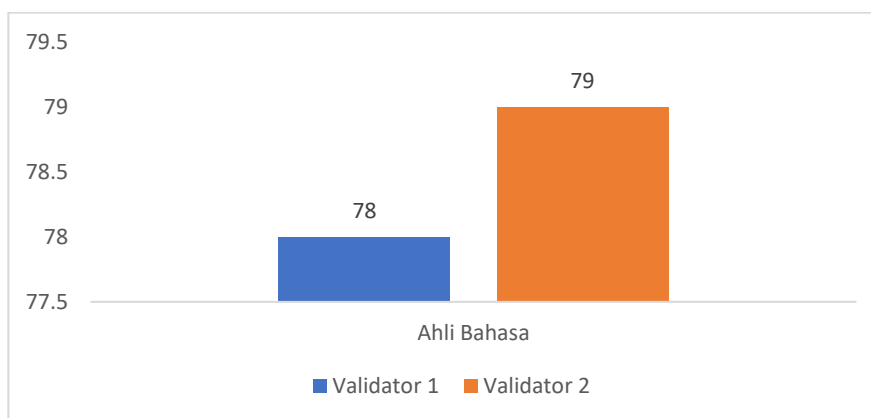


Figure 4. Results of Validation by Language Experts

Based on Figure 4, the validation results by language experts for the AQUACA Diorama learning media in the Natural Sciences subject for elementary school, specifically for the water cycle taught and studied in grade 5 under Theme 8 "Proses Terjadinya Siklus Air," show an average percentage of 78.5%, categorized as "Highly Feasible." Previous research also supports this, indicating that the developed media received a feasible rating (Sukri et al., 2017; Prasetya, 2012; Hidayati, 2016). The novelty of this research compared to previous studies is that the AQUACA Diorama learning media in the Natural Sciences subject for elementary school, specifically for the water cycle taught and studied in grade 5 under Theme 8 "Proses Terjadinya Siklus Air," received a highly feasible rating in the validation tests by both media and language experts.

Based on the validation by subject matter experts, media experts, and language experts, the AQUACA Diorama learning media is deemed feasible as a teaching medium in Natural Sciences. Of course, the feasibility of this module is a result of the experts' guidance, input, and suggestions. After the module was validated and revised according to the validators' input and suggestions, it was ready for product testing.

Product testing aims to ensure the learning media's effectiveness based on the students' responses. The response was enthusiasm and interest in the AQUACA Diorama learning media in the Natural Sciences subject for elementary school, specifically for the water cycle taught and studied in grade 5 under Theme 8, "Proses Terjadinya Siklus Air." The results are presented in Table 2.

Table 2. Results of the Attractiveness Test

No	School	Percentage
1	SD Muhammadiyah 01 Medan	80,24%
2	SD Muhammadiyah 18 Medan	81,30%
Average Percentage		80,77%
Criteria		Highly Attractive

Based on Table 2 above, the product testing resulted in an average percentage of 80.77%, categorized as "Highly Attractive." The attractiveness test was conducted in two stages: small-scale product testing and large-scale product testing. The average percentage score in the small-scale product testing was 80.24%, categorized as "Highly Feasible." This is supported by previous research that also received an attractive rating in the tests conducted (Aini et al., 2018; Kurniasari et al., 2018; Sutama et al., 2014).

The novelty of this research compared to previous studies is that the AQUACA Diorama learning media for the Natural Sciences subject in elementary school, specifically for the water cycle taught and studied in grade 5 under Theme 8 "Proses Terjadinya Siklus Air," received a "Highly Attractive" category.

**Figure 5.** Media Display

Discussion

This study focuses on creating the AQUACA Diorama learning media to enhance students' enjoyment and understanding of science concepts. It highlights the importance of interactive media in facilitating teacher-student engagement. The use of AQUACA Diorama learning media in education allows for a fun yet educational approach to learning. Therefore, the development of AQUACA Diorama learning media began.

Observation is an integral part of the research process (Nurfadhillah et al., 2021), serving several purposes: identifying the needs of students and education, understanding students' backgrounds, evaluating the curriculum, and researching educational materials (Nasution, 2017). These observations are crucial in determining students' specific challenges and unique learning needs. The researchers identified a significant need for more effective

educational media, especially for the third thematic learning unit, "objects around me," in the primary education environment. This finding underscores the need for media that help students recognize and understand their environment.

An in-depth background analysis conducted through interviews with educators and administrators at SD Muhammadiyah 01 Medan revealed that students generally have below-average knowledge. These insights led to the development the AQUACA Diorama learning media tailored to address this educational gap.

In evaluating the curriculum, this study involved interviews with educators at SD Muhammadiyah 01 Medan, revealing the implementation of the 2013 curriculum. The investigation into educational resources highlighted gaps in students' understanding of direct physical objects. This study uses AQUACA Diorama learning media as a pedagogical tool to address this (Kisma et al., 2020).

After completing the Borg and Gall stages, this research established guidelines regarding access parameters for each educational activity (Ibrahim et al., 2023). The synthesis of empirical data and review of the theoretical framework concluded that alphabet word card media is an effective and appropriate means to enhance students' understanding of science learning.

An important observation from this study is the need to improve communication with students' families. The research identified a tendency for students to forget the material they had learned when returning to school, highlighting the importance of parental involvement in the learning process. Moving forward, this study advocates for more proactive engagement with the student's home environment to reinforce the educational interventions initiated at school. Collaborative efforts between educators and parents are expected to foster a more sustainable and impactful educational experience for students.

D. Conclusion

The conclusion drawn from this R&D (Research and Development) study is that the AQUACA diorama media is effective in learning. This is evidenced by the positive responses from students who have witnessed and practiced the water cycle process using the AQUACA diorama (Weather Aquarium) media. Using the AQUACA diorama (Weather Aquarium) media can increase students' focus on the material presented and make it easier to understand the lessons' core.

From the previous discussion, it can be concluded that this research produced a learning media called AQUACA Diorama for the Natural Sciences subject in elementary school, specifically on the water cycle taught and studied in grade V under Theme 8, "Proses Terjadinya Siklus Air." The feasibility test results evaluated by experts show it as feasible, by media experts as highly feasible, and by language experts as highly feasible. In product testing, it received the "Highly Attractive" criterion in small-scale trials. In large-scale product testing, it received the "Highly Attractive" criterion.

The conclusion suggests that the AQUACA Diorama learning media for the Natural Sciences subject in elementary school, specifically on the water cycle taught and studied in

grade V under Theme 8, "Proses Terjadinya Siklus Air," can be developed with broader material. Further development is needed for other materials to motivate and actively increase students' interest in learning during the learning process.

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