

CHAPTER III

METHODOLOGY

3.1 Research Design

This study employs the Research and Development (R&D) method in developing the product. R&D is a research method aimed at producing a specific product and testing its feasibility and effectiveness. According to Sugiyono (2019), R&D is used to develop and validate products to ensure they meet users' needs.

This study adopts the development model proposed by Borg and Gall (1989), which consists of several systematic stages, including identifying potential problems, collecting data, designing the initial product, conducting validation and revision, testing the product, and producing the final version.

The use of this method is also supported by previous research conducted by Salsabila Ghina Annaifah (2025) in her undergraduate thesis entitled "Pembuatan Buku 'Shiro & Chiko di Negeri Kotoba' sebagai Media Pembelajaran Bahasa Jepang yang Menyenangkan untuk Anak Usia 6–8 Tahun", which shows that the R&D approach is effective in developing book-based learning media that are engaging and suitable for children.

This method is chosen because it provides structured stages in the product development process, starting from needs analysis, planning, initial product creation, to product testing. Therefore, the resulting product is expected to have good quality and be relevant to learners' needs.

3.2 Research Model (R&D Stages)

In developing the product, the researcher employed the Research and Development (R&D) method by adopting the development model proposed by Borg and Gall, as cited in Sugiyono (2019). This model consists of ten systematic stages, beginning with research and information gathering and ending with the dissemination and implementation of the final product.

The selection of this model is based on the research needs, which involve a step-by-step process in developing learning media, starting from design, product

creation, testing, to evaluation and refinement. By applying this model, the product developed is expected to have high quality and align with users' needs.

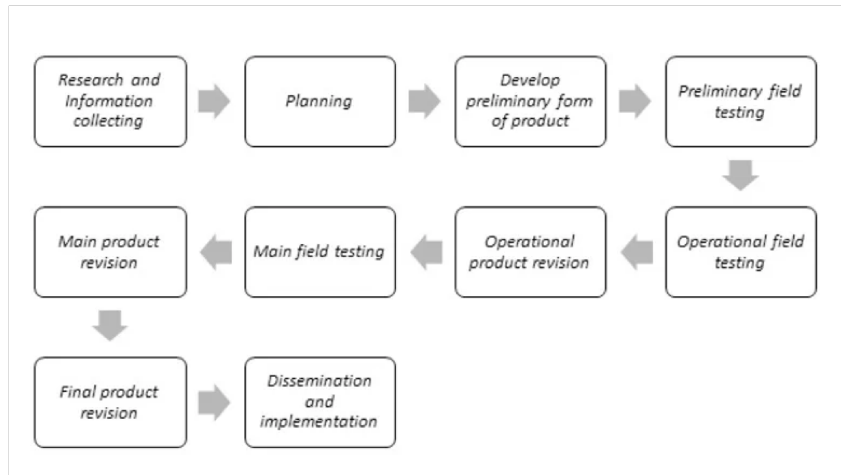


Figure 3. 1 Research and Development Flow by Borg and Gall

3.2.1 Research and Information Collecting

In this study, the researcher employed the Research and Development (R&D) method based on the development model proposed by Borg and Gall as cited in Sugiyono (2019). This model consists of ten systematic development stages, beginning with research and information gathering and ending with the dissemination and implementation of the product.

The selection of this model was based on the needs of the study, which involved a step-by-step process of developing instructional media, including planning, product creation, testing, evaluation, and product refinement. By applying this model, the resulting product is expected to be of high quality and to meet the needs of its users.

3.2.2 Planning

The step following data collection was the planning stage. At this stage, the researcher formulated the research problem, established the research objectives, and systematically designed the product development process. The planning focused on developing a learning medium in the form of a book integrated with audio and sensory play activities. The researcher also selected

vocabulary materials appropriate to children's developmental levels and organized the book's content structure progressively. In addition, plans were made regarding how audio would be used to support pronunciation and how sensory play activities would be implemented in each learning section. Therefore, this stage served as the foundation for producing a well-directed product that met users' needs.

3.2.3 Preliminary Product Development

After completing the planning stage, the researcher continued by developing the product based on the collected data. At this stage, the researcher created the book's storyline and determined the characters that would appear in the story. The storyline was written using simple, interesting, and educational language that could be easily understood by children.

Next, the researcher worked with an illustrator to transform the storyline into visual illustrations. During this process, the researcher and illustrator adjusted the language and visual elements to ensure they were clear, informative, and suitable for children. The characters, backgrounds, colors, and word choices were carefully selected to make the book visually appealing and encourage children's interest in reading while introducing English vocabulary related to objects and activities found in a garden. An example of the initial product draft can be seen in Figure 3.2.

Daftar Isi Visual (Hal. 3)	
- Konsep daftar isi menggunakan jalur petualangan berbentuk labirin sederhana (path) yang menghubungkan setiap bab. Jalur dibuat menyerupai jalan setapak di kebun. - Di sepanjang jalur tersebut, terdapat ikon kecil sebagai penanda tiap bab, yaitu: - Mumu melambaikan tangan → Introduction / Let's Start! BAB 1: Huruf A-Z dengan buah → ABC with Mumu BAB 2: Keranjang kebun + hewan kecil → Everything in the Garden BAB 3: Palet warna + buah → Colors Around Us BAB 4: Keranjang buah bernomor → Let's Count! BAB 5: Tangan menyentuh buah (seperti sedang melakukan sensory play) → Fun Challenge & Sensory Play - Medali atau bintang → Mini Certificate - Mumu melambaikan tangan / pelukan → Goodbye & See You! - Setiap ikon dilengkapi nomor halaman untuk memudahkan navigasi. - Alur jalur dibuat mengalir dari awal hingga akhir, sehingga anak dapat mengikuti perjalanan belajar bersama Mumu secara bertahap seperti sebuah petualangan.	

Figure 3. 2 Example of the initial product draft

After the initial product draft was completed, it was validated by an expert to assess its feasibility. The validation covered several aspects, including the content and storyline, language use, visual appearance, and other relevant elements of the product. The feedback and suggestions from the validator were used to improve the product. As a result, a revised product design was produced that met the required standards and was suitable for use by the target users.

3.2.4 Preliminary Field Testing (Expert Validation)

At this stage, the developed product was tested to assess its feasibility. Expert validation was conducted by involving experts or practitioners with relevant experience to evaluate the quality of the product. The validation process involved experts who had competence in the related field.

The purpose of this stage was to ensure that the product met the required standards and functioned as intended. Various aspects of the product were evaluated, including its content, language, visual design, audio integration, and sensory play activities. The feedback and suggestions provided by the validators were used to identify areas for improvement and revise the product. Through this process, the researcher ensured that the product was feasible and appropriate for use according to its intended purpose.

3.2.5 Main Product Revision

Based on the results of the preliminary field testing conducted by the validator, the researcher obtained feedback regarding the sensory play aspect of *Mumu's Garden Adventure*. The validation process was carried out using a product validation form, which was completed by the validator to assess various aspects of the product, including the content, visual design, audio integration, and sensory play activities. Through this validation form, the validator provided comments and suggestions for product improvement.

In response to this feedback, the researcher revised the product by changing the original design, in which sensory play activities were included on each page, into a single main sensory play activity placed at the end of the book. This revision was made to reduce the book's thickness, improve its practicality, and maintain the function of sensory play as an interactive and enjoyable learning activity for children.

The revised product resulted in a more compact and user-friendly book while still supporting English vocabulary learning through the integration of visual media, audio, and sensory play activities that were appropriate for young children's characteristics and learning needs.

3.2.6 Main Field Testing (Advanced Expert Validation)

After the product had been revised based on the feedback and suggestions obtained during the preliminary field testing stage, the researcher conducted a second expert validation of *Mumu's Garden Adventure*. This stage aimed to evaluate the quality of the product after the revisions and to ensure that the improvements made were in accordance with the validator's previous recommendations.

The second expert validation was carried out by asking the validator to review the revised product, particularly the aspects that had been modified. The evaluation was conducted using a product validation form that covered several aspects, including the content, design, audio, and sensory play activities. During this stage, the validator assessed whether the revisions had been implemented appropriately and provided an overall evaluation of the product.

The results of the second expert validation were used to determine whether the product met the required criteria and was ready to be used as an English vocabulary learning for children aged 4–6 years or whether further revisions were needed.

3.2.7 Operational Product Revision

Based on the results of the second expert validation, the researcher received feedback regarding the audio component of *Mumu's Garden Adventure*. The validator suggested using Artificial Intelligence (AI)-based Text-to-Speech (TTS) technology to improve the quality of the audio pronunciation. This recommendation was given because AI-generated voices can provide pronunciation that is closer to that of native speakers and help ensure greater accuracy in vocabulary pronunciation.

In response to this suggestion, the researcher revised the audio component of the product. The audio recordings, which were initially recorded manually by the researcher, were replaced with AI-generated Text-to-Speech audio. This revision was intended to improve pronunciation quality, provide a more accurate model for children, and reduce the possibility of pronunciation errors.

After the revision, the audio component provided clearer and more consistent pronunciation of English vocabulary. As a result, the product was better able to support children's vocabulary learning through accurate audio input that closely resembled native-speaker pronunciation.

3.2.8 Operational Field Testing

The operational field testing stage was conducted to evaluate the quality and usability of *Mumu's Garden Adventure* as a sensory play-based English learning medium for children aged 4–6 years. This stage was carried out after the product had undergone operational revisions based on feedback and suggestions from the validator. During this stage, the product was introduced to potential users to obtain their evaluations regarding its overall quality and effectiveness.

The participants in the operational field testing were 11 teachers from TK Karangturi, who were selected as potential users of the learning media. Data were collected online through Google Forms containing an evaluation instrument that assessed several aspects of the product, including its design, content, audio, and sensory play activities. The instrument was developed

based on indicators that were aligned with the objectives of the product development.

The evaluation used a four-point Likert scale consisting of 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), and 4 (Strongly Agree). This scale was used to measure the respondents' level of agreement with each assessment indicator. In addition to providing quantitative ratings, respondents were also given the opportunity to provide comments and suggestions for further product improvement.

The data obtained from the operational field testing were analyzed by calculating the mean score of each aspect to determine the overall quality of the product. The results of the analysis were then used as the basis for making final revisions before the product proceeded to the dissemination and implementation stage.

3.2.9 Final Product Revision

The final product revision stage was carried out based on the feedback and suggestions obtained from the operational field testing. This stage aimed to improve and refine the product before proceeding to the dissemination and implementation stage.

The feedback provided by the teachers of TK Karangturi was collected through the evaluation instrument and comment section in the Google Form. The researcher reviewed the suggestions and made necessary improvements to the product to enhance its overall quality and usability. Revisions were made to ensure that the content, design, audio, and sensory play activities were appropriate for the learning needs and characteristics of children aged 4–6 years.

After the final revision stage, *Mumu's Garden Adventure* was considered ready for use as a sensory play-based English learning medium for young children and proceeded to the dissemination and implementation stage.

3.2.10 Dissemination and Implementation

The dissemination and implementation stage was conducted on a limited scale at TK Karangturi. The final product, *Mumu's Garden Adventure*, was introduced to teachers as the intended users of the learning media to obtain their responses and evaluations regarding the product.

Dissemination was carried out within a limited scope because the focus of this study was on the development and evaluation of the product. Therefore, large-scale implementation in different educational institutions was not conducted and may be considered for future research.

3.3 Budget Details

In the process of developing the learning media, the researcher requires a certain budget to support the production of the product. The costs include design needs, book production, and materials for sensory play activities, which are an important part of the product innovation.

In addition, there is a cost for illustration services, which play an important role in creating visuals that are attractive and suitable for children. The use of sensory play materials is also an essential component to support the interactive aspect of the developed learning media.

The budget details of this study are presented as follows:

No	Type of Expense	Quantity	Unit Price	Total Price
1	Illustrator Service (design & revision)	1 package	Rp 2,500,000	Rp 2,500,000
2	Book Printing	3 books	Rp 254,333	Rp 763,000

3	UHU Glue	1 pcs	Rp 10,058	Rp 10,058
4	Pipe Cleaners	1 pack	Rp 8,495	Rp 8,495
5	Embossed Synthetic Leather	1 pack	Rp 47,658	Rp 47,658
6	Shirt Button	36 pcs	Rp 6,455	Rp 6,455
7	Velcro	1 pack	Rp 7,966	Rp 7,966
8	Velboa	4 pcs	Rp 18,174	Rp 18,174
9	Artificial Seeds	1 pack	Rp 5,013	Rp 5,013
Total	Rp 3,366,819			

Table 3. 1 Cost Breakdown of Product Development