



Hikmatul Fadillah¹⁾, Nurdin Amin²⁾, Samsul Kamal³⁾, Elita Agustina⁴⁾, Riri Rahmadani Putri⁵⁾

The Suitability of the Textbook Insect Interactions on Cultivated Plants as a Learning Resource for the Animal Ecology Course

¹⁻⁵⁾Biology Education, Ar-Raniry State Islamic University, Banda Aceh, Indonesia.

Email:
220207032@student.ar-raniry.ac.id.

Article Info

Keywords: *Textbook; Animal Ecology; Suitability; Insects; Cultivated Plants.*

Abstract

The availability of learning resources is a crucial aspect in supporting the Animal Ecology course within the Biology Education Study Program at UIN Ar-Raniry Banda Aceh. However, there is still a need to develop supplementary teaching materials that specifically address the interactions between insects and crops cultivated by the local community, reflecting local environmental conditions. This study aimed to develop a textbook on insect-crop interactions in Limpok as a supplementary resource for the Animal Ecology course and to assess the feasibility of the developed textbook. A mixed-methods approach was employed, utilizing the Research and Development (R&D) method based on the 3D model (Define, Design, Develop). Data collection during the development phase involved observation and documentation, while feasibility testing was conducted using validation sheets completed by subject matter experts and media experts. The study resulted in a textbook containing information on insect interactions with crops cultivated by the Limpok community, integrated with Islamic values as a distinctive feature of the product. Validation results showed a score of 79.93% (classified as "feasible") from subject matter experts and 90.5% (classified as "highly feasible") from media experts. Based on these results, the textbook is deemed suitable for use as a supplementary resource for the Animal Ecology course.



INTRODUCTION

Biology is the branch of science that examines living organisms, along with the various mechanisms and life processes occurring within them (Ramadansur et al., 2022). A key area of study within biology is ecology the science addressing the interrelationships between organisms and their environment, as well as the various forms of interaction that constitute an ecosystem. Biology instruction becomes more effective when the concepts being studied are linked to the students' immediate environment, as this fosters a deeper and more meaningful understanding. According to Khanifah et al. (2021), utilizing the environment as a learning resource allows students to observe biological objects and phenomena firsthand, thereby making the learning process contextual and more relevant to real-life situations.

Animal ecology is a field of study within biology that examines the relationships between animals and their environments, including the interactions occurring among organisms and between organisms and environmental factors. Understanding these relationships is crucial for university students, as the study of ecology is not limited to theoretical concepts but can also be explored through the observation of ecological phenomena in the surrounding environment. Instruction that directly integrates course material with environmental conditions helps students grasp ecological concepts in a more contextual manner and relate them to everyday life events (Intany et al., 2024).

One significant type of ecological relationship in the study of animal ecology is the interaction between insects and plants. These interactions encompass various forms of relationships, such as insects utilizing plants as food sources or habitats, as well as their roles within food webs (Dofuor et al., 2024). The presence of insects on plants demonstrates inter-organismal connections within an ecosystem relationships that can be directly observed through phenomena in the surrounding environment (Jasmi et al., 2025). Interactions between insects and cultivated plants serve as valuable subjects for study, bridging animal ecology concepts with real-world ecological phenomena.

Understanding the relationship between insects and plants requires learning resources that convey concepts in a structured, contextual, and accessible manner for students. Utilizing objects found in the immediate environment as learning resources helps students link ecological concepts to directly observable biological phenomena. Textbooks are one such learning medium that supports this process; their content can be systematically organized to align with learning objectives and supplemented with relevant information and documentation regarding the subjects involved (Sinaga et al., 2021). Developing a textbook on insect-plant interactions offers an alternative learning resource that helps students grasp animal ecology concepts in a more contextual, applicable, and meaningful way (Unaenah et al., 2021).

Current conditions in Animal Ecology instruction indicate that existing learning resources do not specifically address the insect diversity found in crops cultivated by the local community in the Limpok area of Aceh Besar. This highlights a need for

learning resources that are more contextual and relevant to the students' immediate environment. A lack of information regarding local subjects can limit students' opportunities to connect the ecological concepts they study with biological phenomena observed in their surroundings. Instruction that leverages local resources can enhance scientific thinking, observational skills, and conceptual understanding, as students interact directly with objects in their own environment (Lubis & Mardiana, 2025).

Previous research demonstrates that the surrounding environment and local subjects offer significant potential as learning resources for developing biology instructional materials. Sinaga et al. (2021) explain that textbook development can be tailored to learning needs, resulting in material that is systematic, relevant, and aligned with learning objectives. Prayitno and Hidayati (2024) developed a biology textbook integrating STEM education and Project-Based Learning (PjBL) using local subjects as the focus of study, while Kasmiyati et al. (2025) indicate that there is still considerable scope for further developing instructional materials that utilize local resources to improve the quality of learning. Additionally, other studies have developed learning resources related to ecology and insects; however, these studies differ from the present research in terms of the subjects examined, the types of learning resources developed, and the environmental contexts involved.

A review of prior research indicates an opportunity to develop learning resources specifically addressing the interactions between insects and crops cultivated by the Limpok community, while taking into account the local environmental characteristics of the area. Data regarding insect species diversity, the specific crops involved in these interactions, and the ecological relationships present in the Limpok community environment have not yet been extensively developed into textbooks to serve as supplementary references for Animal Ecology courses. This research focuses on developing a textbook on insect-crop interactions in the Limpok community, integrating Islamic values as a key characteristic of the product. This development aims to produce a learning resource that effectively links Animal Ecology concepts, local environmental potential, and Islamic values within a contextual and meaningful instructional material.

Three primary aspects must be considered when determining learning content: relevance, consistency, and adequacy. Relevance concerns the alignment between the presented material and the competencies students are expected to achieve; thus, the content must support the attainment of competency standards and basic competencies. Furthermore, the visual appeal of the instructional media design plays a crucial role in capturing attention and boosting student motivation during the learning process. The initial appearance of the material influences user perception; therefore, elements such as cover design, color selection, layout, and formatting must be harmoniously designed to create a resource that is both engaging and user-friendly (Syafi'i & Rapi, 2022).

Data regarding interactions between insects and cultivated plants can serve as a source of information for developing contextual teaching materials. Information concerning species diversity and the roles insects play in relation to plants can be compiled into a textbook, helping students connect Animal Ecology concepts with ecological phenomena found in their local environment. Developing teaching materials based on biological research findings is a common strategy for creating learning resources that meet educational needs, involving a feasibility assessment process based on expert validation (Azzahra et al., 2024).

Linking course material to the surrounding environment can make the student learning experience more meaningful and relevant. Luthifah and Zulyusri (2024) demonstrate that the development of contextual teaching materials plays a vital role in biology education, as the content can be connected to real-world phenomena close to the students' lives. This approach is particularly relevant for the Animal Ecology course, which examines organisms and their reciprocal relationships with the environment. By featuring biological subjects found in the local environment within the teaching materials, students can more easily bridge ecological concepts with their own direct observations.

Developing a research-based textbook offers a solution to the limited availability of contextually relevant learning resources. Data obtained from identifying insects found on cultivated crops can be organized into information that aligns closely with students' learning environments covering aspects such as classification, morphological characteristics, habitats, ecological roles, species composition, and diversity levels. The resulting textbook can serve not only to support classroom instruction but also as a guide for laboratory practicals and field observations. Utilizing such real-world learning resources provides students with opportunities to gain more practical and meaningful learning experiences.

Accordingly, this study aims to develop a textbook on insect-crop interactions to serve as a supplementary reference for the Animal Ecology course and to assess the textbook's feasibility based on validation by subject matter and media experts. The developed textbook is expected to serve as a valuable resource that helps students understand animal ecology concepts within a more contextual framework.

RESEARCH METHODS

This study employs a mixed-methods approach a research method that combines qualitative and quantitative approaches within a single study to obtain more comprehensive data. According to Samsu (2021), the mixed-methods approach integrates qualitative and quantitative research, enabling a deeper understanding while simultaneously yielding data that supports the research findings. This study utilizes a sequential exploratory design, a research design conducted in a specific sequence: the qualitative phase is carried out first, followed by the quantitative phase.

A qualitative approach was employed in the initial stage to gather data on the types of insects found on crops cultivated by the local community in the Limpok area,

Aceh Besar. This data was obtained through the observation and documentation of insects present on the community's crops. The findings from these observations subsequently served as the basis for developing a textbook on insect-crop interactions for the Animal Ecology course.

Product development in this study followed the Research and Development (R&D) method using the 3D model, comprising the stages of Define, Design, and Develop. The application of this model aimed to produce a textbook grounded in research on insects found on community crops in the Limpok area, Aceh Besar, thereby serving as a supplementary reference for the Animal Ecology course. Preliminary information was gathered through direct observation of insects on the community's crops, and these findings were then used to formulate the textbook's content.

The research was conducted through the three stages of the 3D model, namely:

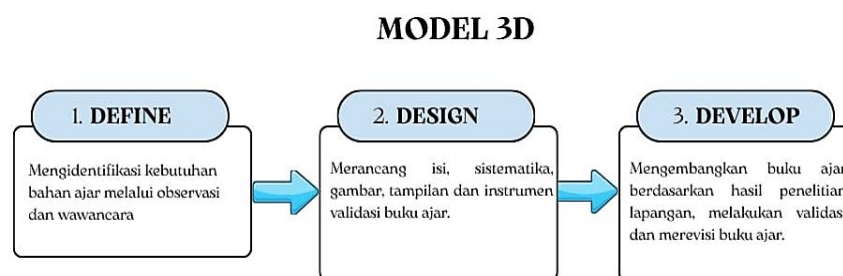


Figure 1. 3D Model Development Scheme

The quantitative phase was conducted to determine the feasibility level of the textbook through validation by subject matter and media experts. Quantitative data were derived from assessment scores recorded on validation sheets. According to Sugiyono (2019), quantitative data data in numerical form can be used to obtain an overview of the measurement results regarding a research object. In this study, the validation scores were subsequently calculated as percentages to determine the textbook's feasibility level based on established criteria.

Data collection techniques refer to the methods employed to gather data or information at the research site. The techniques used in this study included interviews, observation, and validation. Interviews and observation were conducted to identify needs in the field, utilizing interview guide sheets and observation sheets as instruments. Meanwhile, validation was the process undertaken to verify and ensure that the data obtained were accurate and appropriate.

This validation process involved four expert validators, comprising subject matter experts and media experts. The instrument used to validate the textbook was a questionnaire containing statements related to the product being developed. This activity was conducted to assess the product's suitability. The validation instrument employed a Likert scale (Rensis Likert, 1932) with a scoring range of 1 to 5, a higher

score indicates a higher level of product suitability. The scoring guidelines for the textbook validation instrument are presented below.

Table 1. Scoring Guidelines for the Textbook Validation Instrument

Score	Assessment Criteria
1	Highly Unsuitable
2	Unsuitable
3	Moderately Suitable
4	Suitable
5	Highly Suitable

The assessment of the suitability of the Animal Ecology textbook titled *Insects on Community-Cultivated Plants in the Limpok Plantation Area* was conducted by four lecturers with diverse areas of expertise. The group comprised media and subject matter experts from the Biology Education Department of the Faculty of Education and Teacher Training at Ar-Raniry State Islamic University, Banda Aceh. The data obtained from these expert assessments were then calculated using the following formula:

$$X_i = \frac{\sum S}{S_{max}} \times 100\%$$

The definitions of the symbols used in the calculation are as follows: (X_i) represents the feasibility value for a specific aspect of the questionnaire, ($\sum S$) indicates the total score obtained, and (S_{max}) denotes the maximum score. Once the validation value is obtained, the result is compared against the validity criteria for educational products.

Table 2. Eligibility Categories Based on Criteria

No.	Score in percent (%)	Eligibility Category
1	< 21%	Highly unsuitable
2	21%-40%	Unsuitable
3	41%-60%	Moderately suitable
4	61%-80%	Suitable
5	81%-100%	Highly suitable

Referring to table 2, the range of eligibility percentages is grouped as follows: a value <21% is considered very unfeasible, then 21%-40% is categorized as not feasible, while 41%-60% is classified as quite feasible. The range of 61%-80% is categorized as feasible and 81%-100% is categorized as very feasible. This grouping is the basis for determining the appropriateness category for textbooks based on the validator's assessment.

RESULTS AND DISCUSSION

A textbook on insect-crop interactions in the Limpok community was developed based on direct observations of insects found on crops cultivated by

residents in the Limpok area of Aceh Besar. These observations aimed to identify the insect species present on the crops and the nature of the interactions occurring between the insects and the plants. The resulting observational data and documentation served as the information source for compiling the textbook's content. Utilizing the local environment as a learning resource provided an opportunity to link concepts studied in the Animal Ecology course with real-world conditions found in the community.

The observations revealed the presence of insects on various crops cultivated by the community. The presence of insects on these plants demonstrates the relationship between organisms and their environment. Such interactions constitute a crucial aspect of Animal Ecology, as they illustrate the relationships between living organisms within a specific environment. The collected data were identified and organized according to the specific crops and the types of interactions observed. Consequently, the textbook's content is derived not only from theoretical explanations but is also substantiated by observations of local environmental conditions. The research data were subsequently developed into textbook material, ensuring alignment between the observational findings and concepts of Animal Ecology. The material was organized systematically to enable students to understand the relationships among insects, cultivated plants, and the environment. The presentation includes photographic documentation of the observations, making the subjects easier to identify and comprehend. The use of field photographs is a key feature of the book, as it provides a realistic depiction of the subjects found in the local environment of the Limpok community.

The development of the textbook followed three stages: Define, Design, and Develop. The Define stage involved identifying learning resource needs and determining content that aligns with the learning objectives of Animal Ecology. The findings indicated a need for additional learning resources that could link ecological concepts with subjects found in the local environment. This insight served as the basis for selecting the interactions between insects and the Limpok community's cultivated plants as the core subject matter for the textbook.

The design phase involves structuring the content and organization of the textbook based on observational findings. During this stage, the arrangement of material, presentation of illustrations, language style, and other supporting elements are determined. The content is organized to progress from an introduction to insects and cultivated plants and the interactions observed between them to their connections with concepts of animal ecology. The textbook also incorporates Islamic values as a distinctive feature of the developed product. This integration is achieved by linking the material regarding the existence of living organisms and their interrelationships with relevant verses from the Qur'an.

One verse suitable for inclusion in the textbook is Surah An-Nahl (16), verses 10–11, which describes the water sent down by Allah and the vegetation produced from it. The translation of the verse can be presented in the book as follows: It is He who sends down rain from the sky for you; from it comes drink, and from it [grows]

vegetation upon which you pasture [your livestock]. He causes to grow for you thereby the crops, olives, date palms, grapevines, and of all the fruits. Indeed, in that is a sign for a people who give thought.

(QS. An-Nahl [16]: 10–11).

The verse is linked to the textbook content because plants are part of the environment where various interactions with other organisms including insects take place. The presence of insects on plants illustrates the relationships between living things within an ecosystem. By presenting this verse, students not only learn about insect-plant interactions through the lens of Animal Ecology but also gain an understanding of plants and other living beings as part of Allah SWT's creation, characterized by order and utility for life.

This integration of Islamic values is not treated as standalone material but is instead linked to the concepts under discussion. Consequently, Islamic values become an integral part of the textbook's content and a distinctive feature of the developed product. Such integration aligns with the educational context of Islamic higher education, as biology instruction can foster scientific understanding while simultaneously encouraging students to care for the environment and the living creatures around them.

The textbook is designed to cover material on animal ecology, insect interactions, insect characteristics and classification, the cultivated plants under study, and research findings regarding insects found on mustard greens, lettuce, eggplant, celery, and water spinach. The content was developed to align with the book's purpose as a supplementary reference for the animal ecology course. The outcomes of the design phase were subsequently translated into an outline and a preliminary layout for the textbook. Presented below is the sketch or outline of the insect textbook, developed based on direct field research findings:

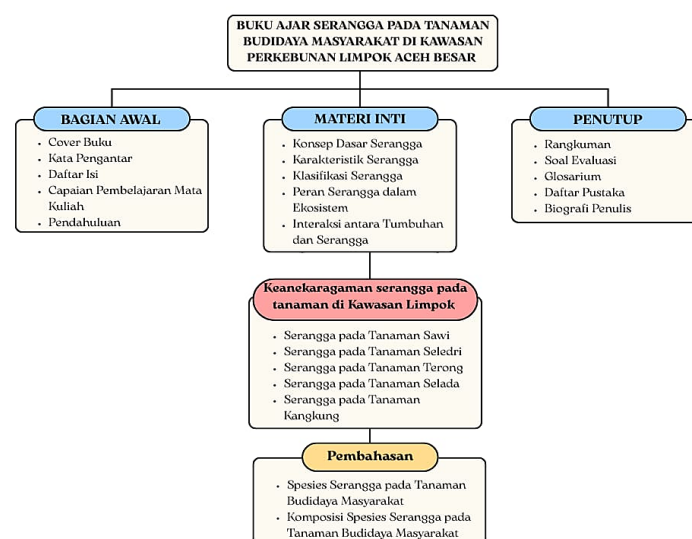


Figure 2. Textbook Sketch

The Develop stage involved transforming the design into a finished textbook. The drafted product was reviewed and refined prior to a feasibility assessment. The

final output is a textbook focusing on insect interactions with cultivated plants in the Limpok community; it incorporates field research findings, Animal Ecology content, visual documentation of the subjects, and the integration of Islamic values. This textbook was developed as a supplementary resource to assist students in understanding organism interaction concepts through subjects found in their immediate environment.

Development results indicate that the local environment can serve as a contextual learning resource. Utilizing subjects familiar to the community helps bridge the gap between conceptual material and real-world conditions. Furthermore, the integration of Islamic values lends a unique character to the textbook; the product not only presents information on insect-plant interactions but also links the study of ecology with Islamic principles. Thus, the developed textbook is distinguished by its use of Limpok's local potential and the integration of Islamic values into the Animal Ecology curriculum.

Conceptually, a textbook is an instructional resource systematically organized in alignment with the curriculum to support the achievement of learning objectives. Its content goes beyond mere subject matter; it is structured systematically to facilitate students' comprehension of the concepts being studied (Meilan Arsanti, 2022). Below are the cover and interior pages of the textbook following revisions made in response to feedback from expert validator lecturers:



Cover Buku

Isi Buku

Figure 3. Cover and interior view of the insect textbook.

Figure 3 shows the layout of the textbook following revisions based on recommendations from expert validators. The cover displays the title alongside images of the plants and insects serving as the subject matter, thereby providing an overview of the book's contents. Meanwhile, the main body of the textbook presents material on insect interactions with cultivated plants, incorporating illustrations, research result tables, and data presented in graphical format. This layout is designed to help readers understand the material in a more systematic and engaging manner.

Suitability of the Textbook According to Subject Matter Experts

The assessment of the textbook's quality was based on the review findings of subject matter experts. This process aimed to evaluate the product's suitability across several dimensions: the alignment of content with learning outcomes, conceptual accuracy, content adequacy, language usage, and presentation techniques. Data regarding the experts' assessment of the textbook titled *Insects on Community-Cultivated Crops in the Limpok Plantation Area, Aceh Besar* and intended as a learning resource for the Animal Ecology course are presented in Figure 4.

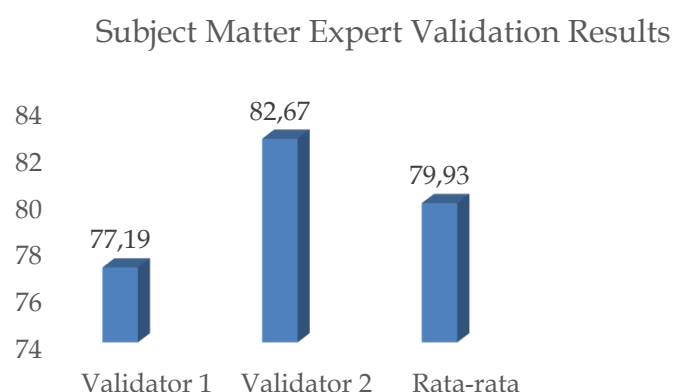


Figure 4. Graph of Subject Matter Expert Validation Results

The data presented in the graph in Figure 4 indicates the product's feasibility scores based on subject matter expert validation: Validator 1 assigned a score of 77.19%, while Validator 2 assigned 82.67%. Averaging these assessments yields a score of 79.93%, placing the product in the "feasible" category. These results demonstrate that the developed textbook on insects associated with cultivated crops meets feasibility criteria regarding content and is suitable for use as supplementary teaching material for the Animal Ecology course.

The subject matter experts offered several suggestions to refine the textbook, including listing the Course Learning Outcomes (CPMK), correcting erroneous terminology, aligning the content with research findings, and adding a discussion on plant-insect interactions. These recommendations served as the basis for refining the textbook. Improvements were made to the content and presentation to better align with learning outcomes, research findings, and the needs of students studying animal ecology.

In the development of teaching materials, expert validation serves to assess whether the product meets established standards. This evaluation covers the feasibility of content, presentation, language, and graphic design, ensuring the product is suitable for instructional use prior to field testing (Maulidia & Hudaidah, 2023). Consequently, the subject matter experts' evaluations provided the foundation for revisions aimed at enhancing the quality of the textbook.

The assessment results indicate that the textbook content supports the learning objectives and is relevant to the subject matter of Animal Ecology. However, the

validator proposed several improvements, particularly regarding the depth of the discussion, the presentation of research data, and the alignment of certain illustrations with the textual content. These revisions are expected to enhance the quality of the book, ensure the completeness of information, and facilitate student understanding.

These findings are supported by research conducted by Ernata et al. (2023) on the development of a research textbook for sports education. In that study, the subject matter expert assessment yielded a score of 95.8%, placing it in the "highly feasible" category. These results confirm that expert review serves as a valid method for assessing both the suitability and feasibility of the content prior to the book's use in instruction. Similar findings were reported by Purnomo et al. (2024) regarding the development of a textbook-based learning resource; the content validation for that product reached 95%, also classifying it as highly feasible. Both studies demonstrate that content validation is a crucial step in ensuring that the book's content meets learning needs and is practically applicable.

Overall, the developed textbook achieved a feasibility score of 77.19%, placing it in the "feasible" category according to the subject matter experts. The product can serve as a supplementary reference for the Animal Ecology course, provided that the revisions recommended by the validator are completed first. This score indicates that the standards for content feasibility have been met, although certain sections require refinement to ensure a more comprehensive presentation that aligns with research findings.

Feasibility of Textbooks According to Media Experts

A feasibility test was conducted after the development of the textbook was completed. This test aimed to determine the product's suitability for use as a supplementary reference in the Animal Ecology course. Evaluations were carried out using validation sheets provided to subject matter experts and media experts. Assessments from the four validators were used to evaluate the quality of the textbook regarding both its content and media aspects. The validation data consisting of scores were then analyzed using a feasibility percentage based on the established analysis technique.

Media experts assessed the quality of the textbook by considering several components: appearance, design, readability, presentation style, illustration quality, and practical usability. The results of these assessments were used to determine the media's suitability. Details regarding the media expert validation of the textbook which focuses on insects found on community-cultivated crops in the Limpok plantation area, Aceh Besar are presented in Figure 5 below.

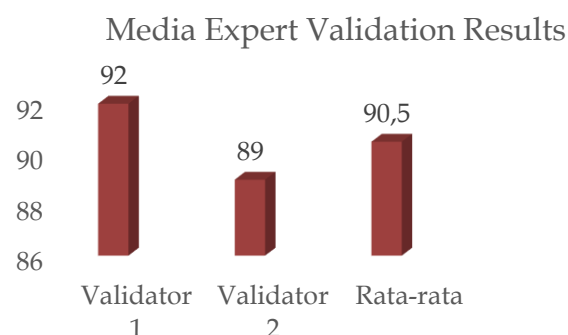


Figure 5. Graph of Media Expert Validation Results

Data in Figure 5 shows that validation results from two subject matter experts yielded scores of 92% from Validator 1 and 88% from Validator 2. Based on these results, an average score of 90% was obtained, placing it in the "highly feasible" category. This achievement indicates that the media meets feasibility standards, allowing the product to serve as a supplementary reference for the animal ecology course. Media experts also highlighted several strengths, including an attractive visual design, an organized layout, easily understandable illustrations, and highly readable font sizes. These elements enable the textbook to effectively support the learning process.

Media experts offered suggestions for improvement, such as correcting the name formatting on the cover, replacing the cover design with an actual research photograph, including direct observation results, and revising tables. These suggestions were incorporated into the product refinement process. The feedback served as a basis for improving the book to ensure its appearance and presentation were better suited for use as instructional material. Feedback from the validators was subsequently used to refine the product. Improvements were made to enhance the textbook's quality regarding both appearance and presentation resulting in a product that is more engaging, easier to understand, and effective as a supplementary reference for animal ecology studies.

Purnomo et al. (2024) explain that textbook development must consider media feasibility particularly visual quality and presentation style to ensure optimal product utilization during learning activities. The components evaluated included appearance, readability, delivery techniques, and the alignment of the design with the subject matter. This assessment was conducted to gauge the quality of the textbook prior to its implementation in the learning process.

The findings of Natalia et al. (2023) reinforce this perspective through the development of electronic learning materials based on Science-Technology Literacy (STL). The product achieved a media expert validation score of 82%, placing it in the "highly valid" category. This result indicates that the product meets the media suitability requirements for use in learning activities; consequently, the media expert

assessment serves as a foundational step in verifying the product's readiness before its implementation with students.

The summary of media expert assessments classifies the resulting textbook as highly suitable, with a score of 90.5%. Accordingly, the product has the potential to serve as a supplementary resource for the Animal Ecology course. This score also confirms that the media meets the necessary standards regarding visual elements, content substance, and delivery techniques, thereby justifying its use in the learning process.

Conclusion

The development of the textbook *Insect Interactions on Cultivated Plants in the Limpok Plantation Area, Aceh Besar* employed the R&D method using the 3D model (Define, Design, and Develop). The textbook leverages the local environment and incorporates Islamic values as a distinctive feature. By presenting subjects familiar to the students' surroundings, the textbook adopts a contextual approach, thereby fostering more meaningful learning in animal ecology. Feasibility test results yielded a score of 79.93% from subject matter experts (categorized as "feasible") and 90.5% from media experts (categorized as "highly feasible"). These data confirm the textbook's suitability as a supplementary reference for the animal ecology course.

REFERENCE

- Akhmadi. (2022). Development of Learning Videos with a Multi-Representation Approach to Absolute Value Material for Class X. *Journal of Mathematics and Mathematics Education*. Vol. 11. No. 1.
- Arsanti, Meilan. (2022). Development of Teaching Materials for the Creative Writing Course Incorporating Religious Character Education Values for Students of the Indonesian Language and Literature Education (PBSI) Study Program, FKIP, UNISSULA. **Kredo Journal**. Vol. 1. No. 2.
- Azzahra, Yolanda Putri, et al. (2025). Development of a Project-Based Learning (PjBL) Textbook on Plant Tissue Culture to Enhance Science Process Skills among Biology Students. *Journal of Biology Education*. Vol. 10. No. 1.
- Djaya, Luciana. (2022). Diversity of Predators and Parasitoids of Insect Pests of Ciplukan (*Physalis peruviana* L.) Plants in the Generative Phase in Kadakajaya Village, Tanjungsari District, Sumedang Regency. *Journal of Agriculture*. Vol. 33. No. 2.
- Ernata, Yusvidha. (2023). Development of Teaching Materials for Educational Research: An Analysis Based on Content and Media Expert Validation. *Journal of Social Sciences and Education (IJSIP)*. Vol. 7. No. 2.
- Gifari, Al. (2025). Recognizing and Understanding Basic Mathematical Concepts in Multiplication and Division. *Journal of Psychology and Education*. Vol. 1. No. 3.

- Hartati, Tri Asih Wahyu & Herman Kusdianto. (2021). Development of Teaching Materials for the Instructional Design and Strategy Course. *Journal of Education*. Vol. 4. No. 2.
- Indrasaswari Suhri, Andi Gita Maulidyah, et al. (2024). *Animal Ecology*. Purbalingga: Eureka Media Aksara.
- Intany, Narinda. (2024). Contextual Learning Accompanied by Concept Maps to Develop Students' Analytical Thinking Skills on the Topic of Environmental Pollution. *Journal of Biology Education*. Vol. 5. No. 3.
- Jasmi, Riski Andrian. 2025. Identification of Insect Types Based on Ecological Roles in the Rice Field Ecosystem of Juhut Village, Pandeglang Regency. *Journal of Biology Education and Science*. Vol. 6. No. 2.
- Kasmiyati. (2025). Literature Review: Innovation in Ecosystem Teaching Materials Using a Local Potential Approach as a Solution to Improve Motivation and Learning Outcomes. *Journal of Biology Education*. Vol. 13. No. 1.
- Lubis, Retnita Ernayani & Tri Astuti Mardiana. (2025). Project-Based Learning Using Local Potential Learning Resources: An Effort to Enhance Student Independence and Creativity. *Journal of Teacher Training and Education*. Vol. 2. No. 1.
- Luthifah, H., & Zulyuri, Z. (2024). Needs Analysis for Developing a Contextual E-Booklet on Viruses and Their Roles as Electronic Biology Learning Media for Phase E at SMA Negeri 1 Guguk District. *Journal of Biological Education and Science*. Vol. 5. No. 2.
- Maulida, Yuriza & Hudaiah. (2023). Development of Canva-Based Learning Media for the Home Learning Portal for History Subjects in Class XI of SMA Negeri 2 Palembang. *Jurnal Jendela Pendidikan*. Vol. 3. No. 1.
- Muhfahroyin, & Santoso, H. (2024). Context-Oriented Constructivist Project-Based Learning to Enhance the Professional-Prophetic Character of Biology Education Students. *Journal of Biology Education*. Vol. 9. No. 1.
- Natalia, Inka Ardiani Giri. (2023). Development of STL (Science Technology Literacy) Based E-Book Teaching Materials to Strengthen Science Literacy among 5th-Grade Students at SDN Winong 01, Madiun Regency. *Scientific Journal of Elementary Madrasah Education*. Vol. 7, No. 4.
- Purnomo, Triatmo Joko. (2024). Development of Physical Fitness Learning Media in the Form of Textbooks and Interactive Multimedia for 10th-Grade Students (Phase E) at Ma'had Darul Hikmah, MAN 1 Malang City. *Indonesian Physical Education Center Journal*. Vol. 8, No. 1.
- Sanjaya, Muhammad Doni & Inawati. (2022). Development of Teaching Materials for the Speaking Skills Development Course. *Bindo Literature Journal*. Vol. 3, No. 2.
- Sinaga, T. (2021). Development of General Biology Teaching Materials as a Learning Resource for Student Handbooks. *Pelita Pendidikan Journal*. Vol. 8, No. 3.
- Syafi'i, Ahmad & Muh, Rapi. (2022). Development of Learning Media: Applying Models in Learning Media Development. *Journal of Education*. Vol. 14, No. 1.

- Dofuor, A. K. (2024). Plant-Insect Interactions under Agroecosystem: An Overview of Ecological Implications for Future Research. *Cogent Food & Agriculture*. Vol. 10, No. 1.
- Ramadansur, R., Eriyanti, R. W., & Hudha, A. M. (2023). The Effect of the Contextual Teaching and Learning Model on Improving Concept Comprehension Skills among Biology Students. *Journal of Biology Education*. Vol. 10, No. 2.