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Development of Non-Text Book on Flora and Fauna Diversity in the Mangrove Ecotourism Area, Karang Gading Wildlife Reserve, North Sumatra

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Abstract

This type of research is R & D (Research and Development) which aims to produce a certain product that requires previous trials (Semiawan, 2007) with a 4-D model that has been developed by Thiagarajan. This research developed a Non-Text Book on Flora and Fauna Diversity in Ecotourism Areas, Kab. Langkat Timur, North Sumatra, and researched the Mangrove Ecotourism Development Area, Karang Gading Wildlife Reserve, North Sumatra, using literature. This research was carried out with the aim of: (1) The feasibility of the contents of the non-text book Flora and Fauna Diversity in the North Sumatra Mangrove Ecotourism Development Area according to material expert validation received very feasible criteria with an average percentage of 83.33%; (2) The feasibility of the contents of the book Diversity of Flora and Fauna in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra, according to design expert validation, received very appropriate criteria with an average percentage of 82.70%; (3) The appropriateness of the contents of the non-text book, Flora and Fauna Diversity in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra, according to the validation of language experts, received very appropriate criteria with an average percentage of 83.33%; (4) The utilization of the book "Diversity of Flora and Fauna in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra" in the ecotourism development of the same area can be considered moderately effective, as shown by an N-Gain value of 0.5.

Keywords: *Development of Non-Text Books; Diversity of Flora and Fauna; Mangrove Ecotourism Area; Non-Text Books, North Sumatra*

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INTRODUCTION

Biodiversity encompasses the genetic diversity, various species of plants, animals, and microorganisms, as well as the ecosystems and ecological processes in which they exist (Sutoyo, 2010). Biodiversity can be defined as the encompassing diversity of all living organisms on our planet, encompassing variations in genetic makeup, species composition, and ecological communities at different levels (Rohman et al., 2021). Biodiversity can be categorized into three distinct groups, namely 1). organisms diversity encompasses the entire range of organisms found on Earth, which includes bacteria and protists. 2) Biodiversity refers to the range of genetic variation seen within a single species. 3) Community diversity refers to the variety of various biological communities and their interactions with their specific physical settings, also known as ecosystems (Sunarmi, 2014).

Acording Batta et al., (2022) asserts that all biodiversity-level organisms are vital to human survival due to their economic and ecological importance. Flora and fauna in forest ecosystems provide food, shelter, medicine, and more. Indonesia has the second-highest biodiversity after Brazil, according to National Geographic Indonesia, 2019 (Setiawan, 2022). Indonesia covers 9 million km^2 between two oceans and two continents with 17,500 islands and 95,181 km of coastline. Despite its 1.3% land area, Indonesia is a megabiodiversity country because to its geography (Kusmana, 2015). Retnowati et al., (2019); Setiawan (2022) reported 31,750 plant species in Indonesia in 2017, with 25,000 flowering. About 15,000 Indonesian plants have medical characteristics, but only 7,000 are employed as raw materials.

According to Supriatna (2018); Sunarmi (2014) the many life benefits of biodiversity are dwindling. This is caused by urbanisation, deforestation, agricultural growth, and other human activities. Indonesia faces issues in biodiversity management, usage, conservation, knowledge, and policy,. The global biodiversity conservation principles are save, research, and use; holistic and comprehensive; and study. These three concepts should protect species without compromising advantages. Learn and study species diversity, habitats, communities, ecosystems, behaviour, and ecology. This makes biological resource use sustainable and meets human desires to live in harmony with nature. Biology education emphasises scientific attitudes and process abilities for direct learning (Subudi, 2021). General scientific study material competence. Biology involves scientific effort and comprehending and applying principles. Thus, learning innovations can dispel the idea that biology is hard, thick, memorization-heavy, and dull (Jayawardana & Sugiarti, 2020).

To help kids understand biodiversity, teach it intellectually and invite them to see it. Students must understand its roots and practical applications to comprehend, analyse, and apply factual, conceptual, and procedural information according to curricular requirements (Sunarmi, 2014). Biology students still learn about biodiversity and ecosystems through lectures. This discourages pupils from solving problems critically if biodiversity reduces locally or internationally. Final semester simulation results show students' poor learning outcomes. With a KKM of 70, 17% of students scored above 75, 26% scored 70-75, and 57% did not meet the KKM level. This does not give students meaningful experiences or strengthen their science process abilities in solving local, national, and global concerns relating to this content.

Hadi & Ainy (2020) observed that despite ecological education, students don't grasp conservation activities in their daily lives. Initial data suggest 69.2% of students and 59.6% of the class are unaware with mangrove ecosystem flora and fauna. Only 19 of 52 students answered mangrove flora and fauna questions on the student requirements analysis questionnaire. This education's major purpose, environmental protection, depends on students' biodiversity knowledge. Students' comprehension and daily conservation efforts were positively correlated (T = 0.018, r = 0.220). Students' conservation enthusiasm is also valuable. In central Medan is Namira Private High School. The school's neighbourhood is low-biodiversity. Instructors struggle to teach mangrove biodiversity. Field research on mangrove biodiversity is expensive and time-consuming. Mangrove biodiversity can be learned via literature. The reading book should include illustrations and information about mangrove habitats and biodiversity. This helps pupils visualise the topic. Practical learning resources help students learn beyond textbooks.

The lack of instructional tools and materials makes learning challenging for senior high school (SMA/K) student. Learning would be difficult without stationery, reading materials (literature notes and other sources), and equipment. Fewer stationery, notes, and books make studying harder. The textbook Namira Medan High School students use briefly discusses mangrove ecology. Flora and fauna include red fruit (*Pandanus Conoideus*) and sandalwood (*Santalum album*). The Javan rhinoceros, anoa, and birds of paradise are examples of fauna. The mangrove ecosystem, with its abundant flora and fauna, is Indonesia's greatest habitat that needs to be studied by students. According the author observation process found 78.8% of students acknowledged that they had trouble locating resources to read literature about the traits of the flora and animals in the mangrove habitat, particularly in North Sumatra. There were no reading materials about the mangrove ecology or the diversity of flora and animals at the Namira High School library in Medan. Thus, 94.2% of the class at the Namira High School library in Medan. From the detailed explanation regarding the background of the problem above, there is a need for research on "Development of a Non-Text Book on Flora and Fauna Diversity in the Mangrove Ecotourism Area, Karang Gading Wildlife Reserve, North Sumatra".

METHOD

This research falls under the category of Research and Development (R&D), with the objective of creating a specific product that necessitates prior experimentation (Okpatrioka, 2023). Utilizing a 4-D model created by Thiagarajan (1974). The outcome of this study is a Non-Text Book that focuses on the diversity of flora and fauna in ecotourism areas in Kab. Langkat Timur, North Sumatra. The research was conducted by utilizing literature studies as a methodological approach. The process of creating a non-textbook on the diversity of flora and fauna in the Karang Gading Mangrove Ecotourism Development Area, located in North Sumatra, was conducted at the Medan State University Postgraduate Program, specifically in the Biology Education study program. The project was also implemented at Namira Private High School. A non-text book on Flora and Fauna Diversity in the Karang Gading

Mangrove Ecotourism Development Area, North Sumatra is intended to supplement the Biodiversity material in Phase E Biology Learning Outcomes in the Merdeka Curriculum's knowledge elements and process skills elements. The book's development follows Thiagarajan (1974) the four-dimensional paradigm: definition, design, development, and distribution. The schematic representation and rationale for the adjustment made to the Thiagarajan (1974) development model are illustrated in Figure 1.

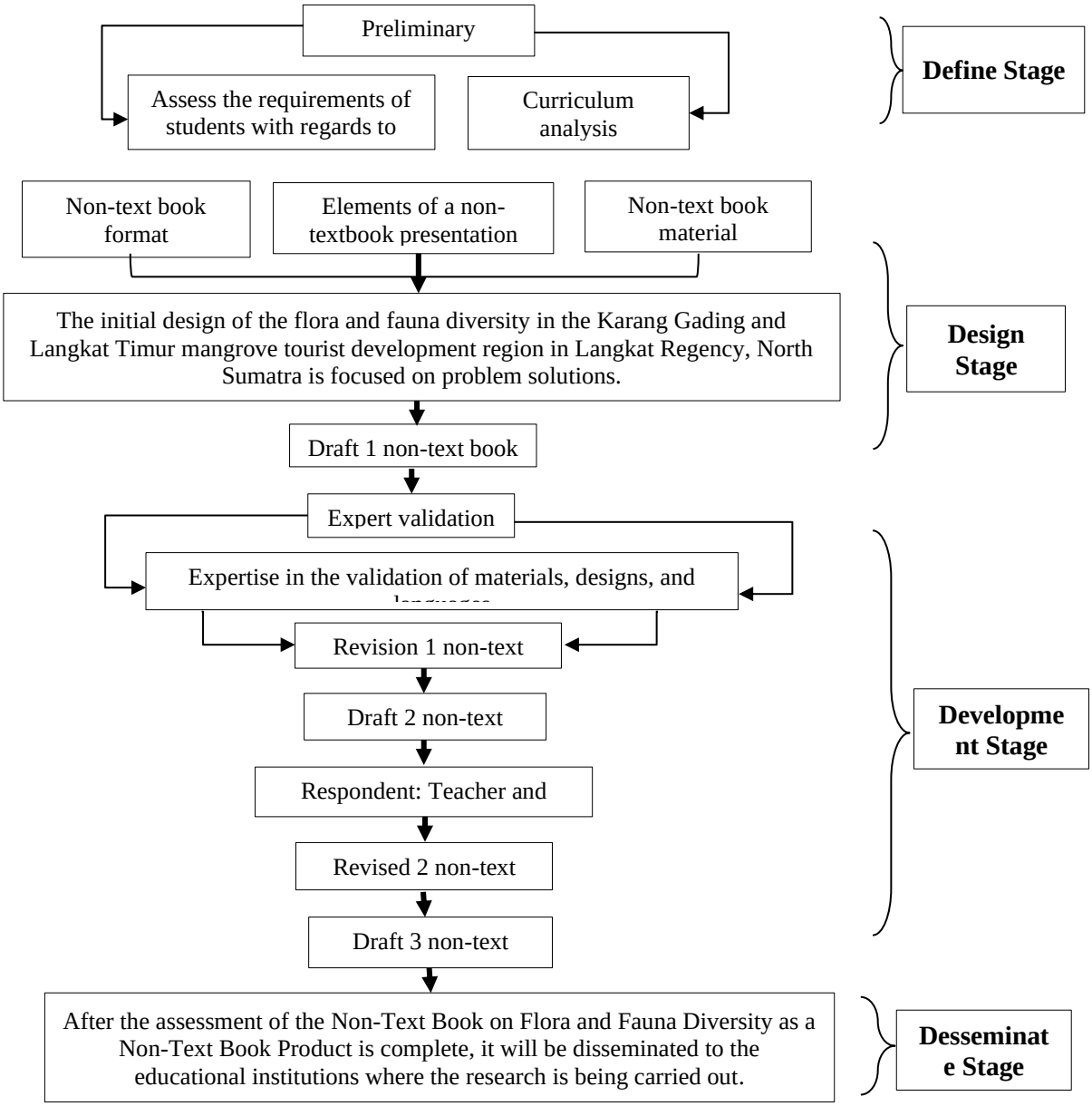

Figure 1. Modification 4-D Model Development Procedure (Four D) (Arkadiantika et al., 2020)

Instruments

The instruments used in developing this non-text book are divided into two, namely instruments for feasibility testing and instruments for testing product effectiveness. The instruments used in the feasibility test use a validation sheet by each

material expert, design expert and language expert which contains input, suggestions and improvements regarding the non-text book being developed, a questionnaire to find out teacher and student responses to the book that has been developed. Meanwhile, the instrument in the effectiveness test is a pretest-posttest sheet to find out what student learning outcomes are after using the non-textbook that has been developed.

Data analysis

Product Feasibility Test

Data analysis involves several steps: categorizing data according to variables and respondent type, tabulating data based on variables from all respondents, presenting data on each studied variable, performing calculations to address the formulation of the problem, and performing calculations to verify the allegations that have been made. The processed data consists of responses to questionnaires administered by material and language experts, design experts, and material and media suitability experts, as well as teachers and students (Sugiyono, 2015). The Likert scale was employed to assess the opinions, perceptions, and attitudes of the participants.. These indicator variables are subsequently utilized as benchmarks when constructing instrument items in the form of queries. The Likert scale utilized to assess the suitability of media is presented in Table 1.

Table 1. Likert Scale Criteria (Sugiyono, 2015)

Criteria	Score
Very good	4
Good	3
Pretty good	2
Not good	1

For each aspect, the outcomes of the calculations are accumulated in the feasibility percentage, using(Arikunto, 2012) formula,

$$\text{Conformity score value} = \frac{Total\ score\ obtained}{total\ score} \times 100$$

The assessment range in this questionnaire uses a score of 1-4 which represents 4 (four) criteria, namely very good, good, quite good and not good. So the range of scores in analyzing the suitability of a book is presented in Table 2.

Table 2. Product Qualification Criteria (Arikunto, 2012)

No.	Score Value Range	Category	Information
1	81-100	Very Worth It	No need to revise
2	61-81	Worthy	No need to revise
3	41-61	Decent enough	Revised
4	21-40	Not worthy	Revised
5	0-20	Very inadequate	Revised

The quantitative descriptive analysis techniques were applied to the collected data, and the results were presented as the distribution of scores on a pre-established

assessment scale. Following this, the researcher will describe and draw conclusions regarding each indicator based on the calculated scores. If the eligibility criteria do not meet the specified score range, the book needs to be revised again. In addition, researchers also use qualitative analysis which is intended to explain the quality of books that have been developed, validated, tested and revised based on suggestions from experts, student responses and responses from biology subject teachers.

Product Effectiveness Test

Effectiveness analysis is aimed at finding out how effective the use of non-text books is in learning at school. The steps in testing the effectiveness of the book are to carry out several quantitative tests as follows:

(a) Normality Test

Prior to conducting additional data analysis, the normality test (multiple-choice test) is employed to ascertain whether or not the data follows a normal distribution. The normality test for this investigation was conducted utilizing SPSS version 23. Once the normality figure was obtained, it was subsequently juxtaposed with the significance value, namely $\alpha = 0.05$. When the value of significance is > 0.05, assuming that the data follows a normal distribution, while the significance value is < 0.05, the data is not normally distributed.

(b) Homogeneity Test

The homogeneity test is conducted to ascertain the homogeneity of two datasets by comparing their variants. The homogeneity test is conducted to assess the similarity of the two datasets by comparing their respective variations, assuming that both datasets follow a normal distribution. The test tool utilizes the SPSS version 23 numerical processing application.

(c) N-Gain

Next, to assess the efficacy of the non-textual books that have been developed, a Normalized gain (N-gain) test is carried out using the following formula.

$$<g> = \frac{Skor\ posttest - Skor\ pretest}{Skor\ ideal - Skor\ Pretest}$$

The interpreted and computed results are utilized to generate a gain index classification <g>. The category of the gain score can be ascertained by considering the gain value. Acording Hake (1998); Sativa et al., (2022) the value points obtained are then analyzed using the criteria in table 3.

Table 3. Criteria for Determining N-gain Values (Sativa et al., 2022)

N gain value	Category
$g > 0.7$	Tall
$0.3 \leq g \leq 0.7$	Currently
$g < 0.3$	Low

RESULTS AND DISCUSSION

Validation Results By Material Experts

The results of validation by material experts can be seen in table 4.

Table 4. Material Expert Validation Results

No.	Assessment Aspects	Score	
		Expert 1	**Expert 2**
1.	The material incorporates verifiable scientific principles, empirical data, and factual information.	3	3
2.	The information stimulates the cognitive and emotional responses of the intended reader, prompting them to embrace novel concepts or explore the content more profoundly.	3	3
3.	The content is up-to-date with advancements in research and technology within the field.	3	3
4.	The material is contextually tailored to align with the specific peculiarities of the scientific field.	4	4
5.	The material has the potential to enhance understanding and proficiency in the 21st century.	3	3
6.	Systematic and cohesive presentation of text and/or images as a unified and flowing train of thought.	3	3
7.	Adapting the display of text and/or visuals to match the reading proficiency and age-related cognitive development of the intended reader.	3	3
8.	The visual representation of images is pertinent and enhances the lucidity of the content.	4	4
9.	The presentation is captivating and innovative, evoking a sense of curiosity and stimulating interest in reading.	4	4
	Total	30	30
	Average (%)	**83.33**	
	Criteria	**Very worthy**	

From the table of material expert validation results above, the average percentage is 83.33%. This means that the non-text book content material is declared Very Suitable to enter the next stage of development. The outcomes of the validation by the design expert are subsequently presented in Table 5.

Table 5. Design Expert Validation Results

No.	Assessment Aspects	Score	
		Expert 1	**Expert 2**
1.	Book Cover Design	14	15
2.	Content/Page Design	13	17
3.	Physical Printed Book	11	16
	Total	38	48
	Percentage (%)	73.08	92.31
	Average (%)	**82.70**	
	Criteria	**Very Worth It**	

The validation results by design expert 1 found a percentage of 73.08% with the Feasible criteria and by design expert 2 the percentage was found to be 92.31% with the Very Feasible criteria. Furthermore, evaluate the process by which language specialists verify the suitability of language in sources other than textbooks. The results of the language specialists' validation are shown in Table 6 below.

Table 6. Linguist Expert Validation Results

No.	Assessment Aspects	Score	
		Expert 1	**Expert 2**
1.	The correct choice of words is appropriate to the target reader, concept and taste values	3.5	3
2.	Writing complies with the General Guidelines for Indonesian Spelling (PUEBI) and Standard Indonesian Grammar	3	3
3.	The language used is communicative and effective	3.5	4
	Total	10	10
	Average (%)	**83.33**	
	Criteria	**Very Worth It**	

The validation results obtained from language experts yielded consistent results, specifically 83.33%, which met the criteria for Very Eligible. Subsequently, the assessment validation form utilized responses from both teachers and students to determine the results. The outcomes of the teacher response evaluation are presented in Table 7.

Table 7. Results of Teacher Response Assessment

No.	Assessment Aspects	Score	
		R1	**R2**
1	Material Contents	22	23
2	Presentation/Design	24	21
3	Language	12	12
	Total Score	58	56
	Percentage Score	**96.67**	**93.33**
	Average Score (%)	**95**	
	Criteria	**Very Worth It**	

From the table 7, it can be seen that the average result of teacher responses assessing the non-textbooks being developed is 95%, which is included in the Very Appropriate criteria. Then the results of the development of this book also require an assessment of responses from students as non-text book users later. The outcomes of the evaluation of the students' responses are presented in Table 8.

Table 8. Student Response Assessment Results

No.	Assessment Aspects	Score	Percentage	Criteria
1	Material Contents	557	89.26	Very Worth It
2	Presentation/Design	558	89.42	Very Worth It
3	Language	279	89.42	Very Worth It
Total Score		1394		
Average Score (%)		89.36		
Category				**Very Worth It**

From the table above, it can be seen that the results of student responses to the non-text books that have been developed are 89.36%, which is included in the Very Eligible criteria. The comparison of the results of teacher and student responses is presented in the bar chart figure 2.

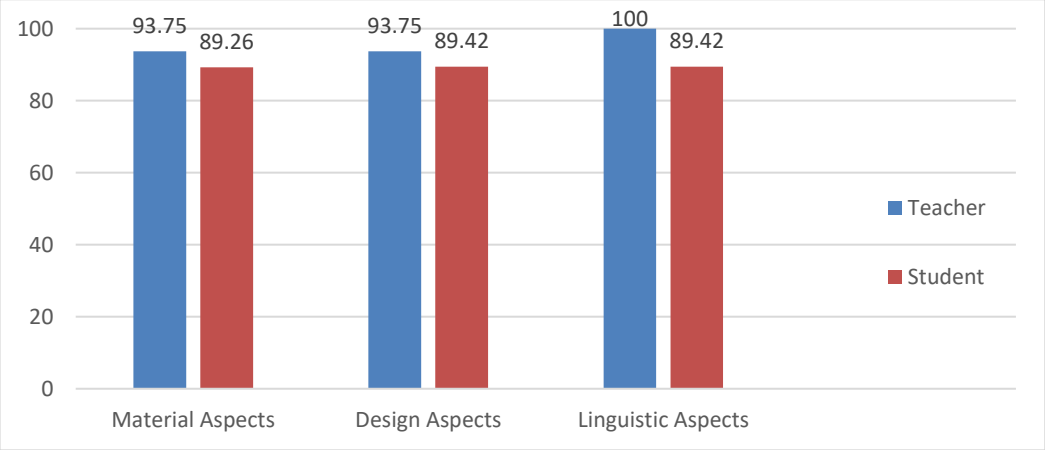

Figure 2. Comparison Diagram of Teacher and Student Responses from Material, Design and Linguistic Aspects to the Non-Text Books Developed

Product Effectiveness Test

To determine the effectiveness of using non-textbooks on students' biology learning outcomes, there are several conditions that must be met. The initial requirement is that student learning outcomes data must be normally distributed and homogeneous.

Normality and Homogeneity Test

The Shapiro Wilk test was employed to assess the normality of the data in this study, with the assistance of SPSS version 23, a statistical data processing application. The Shapiro Wilk test was employed due to the small sample sizes of less than 30 individuals in both the experimental and control classes. The information pertaining to the normality test is presented in Table 9.

Table 9. Data Normality Test Results

Class	Significance Level	Pretest	Posttest	Information
Experiment	0.050	0.568	0.057	Normal
Control	0.050	0.128	0.394	Normal

Based on the table provided, it is evident that the normality test results for the pretest and posttest in both the experimental and control classes, conducted using SPSS version 23, have values higher than the significance value (0.050). This indicates that the data as a whole follows a normal distribution. Subsequently, in order to assess the uniformity or homogeneity of the research data, a homogeneity test was conducted utilizing the Levene test in SPSS version 23. The homogeneity test results are displayed in table 10 below.

Table 10. Data Homogeneity Test Results

Class	Significance Level	Homogeneity Value	Information
Experiment	0.050	0.561	Homogeneous
Control	0.050	0.089	Homogeneous

Based on the table provided, it is evident that the data homogeneity value in both the control class and experimental class exceeds the significance threshold of 0.050. Consequently, the data distribution in this investigation is uniform.

N-Gain Test

The purpose of the N-Gain test is to assess the efficacy of utilizing the non-textbook resource "Flora and Fauna Diversity in the Mangrove Ecotourism Development Area, Karang Gading Wildlife Reserve, North Sumatra" in enhancing student learning results. The N-Gain test involves comparing the N-Gain value between the experimental class and the control class. The data are subsequently classified based on the N-Gain score table to determine the degree of efficacy of utilizing the generated product. The results of the N-Gain Test in this research are displayed in Table 11.

Table 11. N-Gain Test Results

Class	N-Gain Value	Effectiveness Category
Experiment	0.5	Currently
Control	0.06	Low

The table clearly indicates that the N-Gain value in the experimental class is 0.5, whereas the N-Gain value in the control class is 0.06. Subsequently, this number is inputted into the N-Gain (g) calculation criterion, specifically if $g > 0.7$ is included in the High category, $0.3 \leq g \leq 0.7$ is included in the Medium category, and $g < 0.3$ is included in the low category. The N-Gain values obtained from the experimental class fall within the medium category, while the N-Gain values obtained from the control class fall within the low category. From this, it can be inferred that utilizing the non-textbook "Flora and Fauna Diversity in the Mangrove Ecotourism Development Area, Karang Gading Wildlife Reserve, North Sumatra" is efficacious in enhancing students' academic achievements.

CONCLUSION

The conclusions drawn from the research and subsequent debate are as follows, the conclusions of this research are: (1) The feasibility of the contents of the non-text book Flora and Fauna Diversity in the North Sumatra Mangrove Ecotourism Development Area according to material expert validation received very feasible criteria with an average percentage of 83.33%; (2) The feasibility of the contents of the book Diversity of Flora and Fauna in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra, according to design expert validation, received very appropriate criteria with an average percentage of 82.70%; (3) The appropriateness of the contents of the non-text book, Flora and Fauna Diversity in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra, according to the validation of language experts, received very appropriate criteria with an average percentage of 83.33%; (4) The utilization of the book "Diversity of Flora and Fauna in the Karang Gading Mangrove Ecotourism Development Area, North Sumatra" in the ecotourism development of the same area can be considered moderately effective, as shown by an N-Gain value of 0.5.

REFERENCES

Arikunto, S.(2012). *Prosedur Penelitian: Suatu Pendekatan Praktik*, Jakarta, Rineka Cipta. 174 p

Arkadiantika, I., Ramansyah, W., Effindi, M., & Dellia, P. (2020). Pengembangan Media Pembelajaran Virtual Reality Pada Materi Pengenalan Termination Dan Splicing Fiber Optic. *Jurnal Dimensi Pendidikan dan Pembelajaran, 8*(1), 29-36. https://doi.org/10.24269/dpp.v0i0.2298

Batta, K. L. H., Sirojjuddin, S., & Triyoso, A. (2022). Biolearning journal. *Biolearning journal*, *9*(2), 21–25.

Bunga, A. (2013). Cara-Cara Belajar yang Berhasil untuk Siswa SMA dan SMK, *Al-Khawarizmi Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam*, 1(1), 97-116. https://doi.org/10.24256/jpmipa.v1i1.87

Cahyani., Listiana, I., dan Larasati, S. (2020). Motivasi Belajar Siswa SMA pada Pembelajaran Daring di Masa Pandemi Covid-19. *Jurnal Pendidikan Islam*, 3(1), 123-140. https://doi.org/10.37542/iq.v3i01.57

Dewi, N., Kartijono, N., dan Dewi N. (2020) Pengembangan Media Audio-Visual Pembelajaran Materi Keanekaragaman Hayati Indonesia di Sekolah Menengah Atas. *Jurnal Ilmiah Biologi*, 9(1), 87-101. https://doi.org/10.26877/bioma.v9i1.6036

Hadi, N., & Ainy, N. S. (2020). Tingkat Keinginan Siswa Dalam Menerapkan Nilai Konservasi Berdasarkan Pemahaman Pada Materi Ekosistem. Quagga: *Jurnal Pendidikan Dan Biologi*, 12(1), 1-14. https://doi.org/10.25134/quagga.v12i1.2086

Hake, R. R. (1998). Interactive Engagment vs Traditional Methods: A Six Tousandstudent Survey of Mechanics Test Data for Introductory Physics Course. *American Journal of Physics*, 66(1), 1-18.

Jayawardana, H. B. A., & Gita, R. D. S. (2020). Inovasi Pembelajaran Biologi di Era Revolusi Industri 4.0. Prosiding Seminar Nasional Biologi Di Era Pandemi COVID-19, 58–66. http://journal.uin-alauddin.ac.id/index.php/psb/

Kusmana, C., & Hikmat, A. (2015). The Biodiversity of Flora in Indonesia. *Journal of Natural Resources and Environmental Management*, 5(2), 187–198. https://doi.org/10.19081/jpsl.5.2.187

Lorentza Batta, K. H., & Triyoso, A. (2022). Identifikasi Dryopteris Sp Di Lingkungan Universitas Pendidikan Muhammadiyah (Unimuda) Sorong. *Biolearning Journal*, 9(2), 21–25.

Nurfadilah, Z dan Rochintaniawati, D. (2021) Analisis Miskonsepsi Materi Ekosistem Pada Siswa Kelas X, *ISEJ: Indonesian Science Education Journal*, 2(3), 151-157

Okpatrioka. (2023). Research And Development (R&D) Penelitian Yang Inovatif Dalam Pendidikan. *Jurnal Pendidikan, Bahasa Dan Budaya*, 1(1), 86–100. https://doi.org/10.47861/jdan.v1i1.154

Onrizal., (2010)., Perubahan Tutupan Hutan Mangrove di Pantai Timur Sumatera Utara Periode 1977-2006. *Jurnal Biologi Indonesia*, 6(2), 163-172

Poedjirahajoe, E. (2019). *Ekosistem Mangrove Karakteristik, Fungsi dan Dinamikanya*. Yogyakarta. Gosyen Publishing. Page: 50–53

Prasetyo, A. (2021). *Menteri LHK: 600 Ribu Ha Hutan Mangrove Sudah Rusak*. Mediaindonesia. https://mediaindonesia.com/humaniora/435959/menteri-lhk-600-ribu-ha-hutan-mangrove-sudah-rusak

Ramena, G., Wuisang, C., dan Siregar, F., (2020), Pengaruh Aktivitas Masyarakat Terhadap Ekosistem Mangrove di Kecamatan Mananggu, *Jurnal Spasial*, 7(3), 343-351

Ridhwan, M., (2012), Tingkat Keanekaragaman Hayati dan Pemanfaatannya di Indonesia, *Jurnal Biology Education*, 1(1), 1-4

Rohman, N. A., Qohar, I. A., Tria Puspita, N., Harianto, S. P., Djoko Winarno, G., & Dewi, B. S. (2021). Analisis Keanekaragaman Fauna Study Kasus Pada 24 (Dua Puluh Empat) Taman Nasional Di Indonesia Fauna Diversity Analysis Case Study on 24 National Parks in Indonesian. *JOPFE Journal*, *1*(2), 1–10. https://doi.org/10.23960/jopfe.v1i2

Sativa, H., Wiyono, K., & Marlina, L. (2022b). Pengembangan E-Learning Materi Usaha Dan Pesawat Sederhana Untuk Meningkatkan Keterampilan Berfikir Kreatif Siswa SMP E-learning Development on Work and Simple Machines to Enhance Creative Thinking Skills of Middle School Students. *JIFP (Jurnal Ilmu Fisika Dan Pembelajarannya)*, 6(1), 11–19. https://doi.org/10.19109/jifp.v6i1.10745

Setiawan, A. (2022). Keanekaragaman Hayati Indonesia: Masalah dan Upaya Konservasinya. *Indonesian Journal of Conservation*, *11*(1), 13–21. https://doi.org/10.15294/ijc.v11i1.34532

Subudi, K. I. (2021). Peningkatan Aktivitas dan Hasil Belajar Biologi Sebagai Dampak Penerapan Model Pembelajaran Kooperatif Tipe Group Investigation. *Journal of Education Action Research*, 5(1), 17–25. https://doi.org/10.23887/jear.v5i1.32131

Sudibyo, M., Lubis, K., Nurwihastuti, D., Sihite, O. (2021). Ekowisata Mangrove sebagai Media Pembelajaran Konservasi Lingkungan, *Seminar Nasional Biologi dan Pembelajarannya Ke-7*, Jurusan Biologi, FMIPAUniversitas Negeri Medan, pp 33-38

Sugiyono. (2015). *Penelitian Kuantitatif Kualitatif Dan R&D*. Alfabeta. 80 p

Sunarmi, Sunarmi. (2014). Melestarikan Keanekaragaman Hayati Melalui Pembelajaran Di Luar Kelas Dan Tugas Yang Menantang. *Jurnal Pendidikan Biologi Universitas Negeri Malang*, 6(1), 38-49

Sutoyo. (2010). Keanekaragaman Hayati Indonesia Suatu Tinjauan : Masalah dan Pemecahannya Sutoyo. *Buana Sains*, *10*(2), 101–106. https://doi.org/10.33366/bs.v10i2.199

Suyadi., Naroli, I., dan Sitepu, A., (2021). Karakteristik Vegetasi Mangrove dan Pemanfaatannya: Studi Kasus di Seram Timur, Maluku, *Jurnal Kelautan dan Perikanan Terapan*, 4 (1), 37-45

Thiagarajan, Sivasailam; And Others. (1974). Instructional Development for Training Teachers of Exceptional Children: A Sourcebook. Indiana Univ., Bloomington. Center for Innovation In. (Mc).

Trianto., 2007, *Model-Model Pembelajaran Inovatif Beroirentasi Konstruktivistik*, Jakarta, Prestasi Pustaka. 82 p

Yunanda, I., Susilo, H., & Ghofur, A. (2019). Identifikasi Konsep Materi Keanekaragaman Hayati Dan Protista Pada Siswa Kelas X Di Jawa Timur. *Prosiding Seminar Nasional Dan Workshop Biologi-IPA Dan Pembelajarannya Ke-4*, 288–295. https://www.researchgate.net/publication/346966116

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