Integración del aprendizaje basado en la naturaleza y el aprendizaje al aire libre mediante libros electrónicos interactivos para mejorar los conocimientos de inglés y el compromiso físico de los estudiantes

Integrating nature-based and outdoor learning through interactive e-books to enhance english skills and physical engagement in students

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Abstract

Introduction: Nature-based and outdoor learning approaches have shown promising results in enhancing English language skills and student engagement. These methods allow students to explore and interact directly with their environment. Interactive e-books have shown promise in enhancing English language skills across various educational levels.
Objective: The research aims to determine the effectiveness of interactive e-books integrating nature-based and outdoor learning to improve students' English skills and physical engagement.
Methodology: This is descriptive quantitative research. The data collection techniques are interviews, questionnaires, and tests.
Results: Based on the analysis, the integrated interactive e-book based on nature-based learning and local wisdom is valid and can be used in the learning process. The average value for each aspect is 4.2, which indicates that the e-book is valid. Discussion: The results of hypothesis testing and gain scores show that students in the experimental class who learned using the integrated interactive e-book based on nature-based learning and local wisdom experienced a more significant increase in learning outcomes than students in the control class. The average student score in the experimental class was 70%, a high category, while the average student score in the control class was 50%, a medium category.
Conclusions: So, it can be concluded that integrated interactive e-books based on nature-based learning and local wisdom in English learning effectively increase students' English skills.

Keywords

Nature-based learning, outdoor learning, interactive e-book, english skills, physical engagement.

Resumen

Introducción: Los métodos de aprendizaje basados en la naturaleza y al aire libre han demostrado resultados prometedores en la mejora de las competencias en lengua inglesa y el compromiso de los alumnos. Estos métodos permiten a los estudiantes explorar e interactuar directamente con su entorno. Los libros electrónicos interactivos han demostrado ser prometedores para mejorar el dominio del inglés en distintos niveles educativos.
Objetivo: La investigación pretende determinar la eficacia de los libros electrónicos interactivos que integran el aprendizaje basado en la naturaleza y al aire libre para mejorar los conocimientos de inglés y el compromiso físico de los estudiantes.
Metodología: Se trata de una investigación cuantitativa descriptiva. Las técnicas de recogida de datos son entrevistas, cuestionarios y tests.
Resultados: Según el análisis, el libro electrónico interactivo integrado basado en el aprendizaje basado en la naturaleza y la sabiduría local es válido y puede utilizarse en el proceso de aprendizaje. El valor medio de cada aspecto es de 4,2, lo que indica que el libro electrónico es válido.
Discusión: Los resultados de las pruebas de hipótesis y las puntuaciones de ganancia muestran que los alumnos de la clase experimental que aprendieron utilizando el libro electrónico interactivo integrado basado en el aprendizaje basado en la naturaleza y la sabiduría local experimentaron un aumento más significativo de los resultados del aprendizaje que los alumnos de la clase de control. La puntuación media de los alumnos de la clase experimental fue del 70%, una categoría alta, mientras que la puntuación media de los alumnos de la clase de control fue del 50%, una categoría media.
Conclusiones: Por lo tanto, se puede concluir que los libros electrónicos interactivos integrados basados en el aprendizaje basado en la naturaleza y la sabiduría local en el aprendizaje del inglés aumentan eficazmente las habilidades de inglés de los estudiantes.

Palabras clave

Aprendizaje basado en la naturaleza, aprendizaje al aire libre, libro electrónico interactivo, conocimientos de inglés, compromiso físico

Introduction

English is a compulsory subject to be studied, starting in junior high school, senior high school, vocational high school, and up to college. At the high school level, English is tested nationally, making it a must to be mastered by everyone. Besides, English is an international language because most countries in the world use It. There are four skill competencies in learning English: reading, speaking, writing, and listening (Eom, 2024; Yessenbekova, 2024). Reading aims to help students understand various meanings in written texts when learning English. Then, speaking seeks to allow students to express multiple meanings through various oral texts, text structures, and specific linguistics. As for writing, it aims for students to convey various meanings of written texts with communicative purposes. Listening aims for students to understand the meanings of various oral texts with communicative purposes, text structures, and specific linguistics (Almusharraf, 2024; Khramchenko, 2023).

Many students still need help expressing their ideas using English; the difficulties can come from individuals, such as language patterns and frequent use of regional languages. Factors influencing these difficulties are teaching techniques determining students' interests, creativity, learning outcomes, and teacher competence (Baracheta, 2024; Kuhon, 2020; Taye & Mengesha, 2024). Some challenges and obstacles in learning English, especially in mastering listening skill competencies, still need to be mastered by students (Almusharraf, 2024; Holmes-Henderson & Wright, 2023; Lionardo & Thamrin, 2023). It can be seen from the results of the first semester English exam and the needs analysis that the four English skill competencies, speaking and listening, are challenging to master. Mastery of English language skills, especially in the receptive skill aspect, namely speaking and listening, is essential because this competency requires creativity and supporting facilities such as language laboratories, tape recorders, headsets, cassettes, and learning CDs.

In several previous studies, receptive skills can be improved by practicing listening because most human communication activities start with listening (Almusharraf, 2024; Prahaladaiah & Andrew Thomas, 2024). People who engage in English listening activities daily will have better English listening proficiency. This is indicated by an increase in other skills, such as speaking skills by 30%, 15% reading, and 10% writing. This finding also proves that foreign language listening activities positively correlate with foreign language proficiency.

The emergence of the Internet in education brings new hope. The Internet has also been used to build educational networks (Moore et al., 2011; Sasmita, 2020). Learning by utilizing the Internet continued to grow rapidly until the term e-learning emerged in the 1970s. With e-learning, the learning process is expected to improve student learning outcomes (Moore et al., 2011; Selvam & Veeran, 2024). Students are also accustomed to using computers and the internet; some even bring laptops to school, so it would be better if this were directed at the learning process; students are also more enthusiastic in the learning process using computers and the internet (Legramante et al., 2022, 2023). Technology and social experiences can improve students' learning outcomes in language learning (Li et al., 2024; J. Lim et al., 2021).

Many learning management systems manage e-learning websites. One of these learning management systems (LMS) is Moodle; most people involved in the e-learning field, especially those from the fields of education, psychology, and computer science, know Moodle. Moodle is an abbreviation for a modular object-oriented dynamic learning environment (Muangbangyung & Srisawasdi, 2023; Tawafak et al., 2023). Moodle is a name for a complete application program that can change a learning media into a web form (Korać et al., 2022; Morze et al., 2024). There are four strong reasons, including the fact that the first reason is free and open source; Moodle is an open-source LMS so that everyone can modify it according to the institution's needs. The second reason, based on educational philosophy, is that Moodle is built based on direct experience in the field with a background in academic science. So, Moodle can transfer almost all conventional educational needs through online learning. The third reason is that they have a large community and share. The Moodle user community is part of an organization www.moodle.org. Every Moodle user can share the benefits and obstacles of using Moodle. The fourth reason is the small size and maximum capability.

Develop multimedia for e-learning with content in text, illustrations, graphics, animations, and compositions per the material presented. Evaluate the quality of the product in terms of both material and media. Items that need to be considered in assessing e-learning are visibility, aesthetics, course

management, interactivity, flexibility, consistency, reducing redundancy, error prevention, functionality, feedback and help, memorability, efficiency, and accessibility (Hsieh et al., 2015; B. C.-Y. Lim et al., 2020).

Several aspects of the assessment criteria in terms of the relevance of the material and the suitability of the learning material with the achievement of competency standards and essential competencies through the syllabus through several indicators are as follows: (1) suitability with the syllabus; (2) clarity of competency; (3) relevance of the material to learning objectives; (4) truth of the material; (5) completeness of the material; (6) writing of the material; (7) sequence and clarity of the material; (8) level of difficulty; (9) depth of the material; (10) ease of application and examples; and (11) relevance of tasks to the material (Ridho et al., 2021; Sari, 2018; Zain et al., 2016).

The criteria used to assess aspects of the material include four aspects: suitability of the material, ease of delivery, quality of the content, and quality of exercises and tests. The aspects assessed by users include 15 aspects, namely, clarity of instructions for using e-learning, clarity of learning objectives, clarity of material descriptions, readability of text or writing, clarity of audio, giving examples, giving exercises, giving evaluations, clarity of instructions for doing tests, relevance of the material to the evaluation/quiz, student feedback on, clarity of language, video display, freedom to choose menus, increasing interest (Saddhono et al., 2020; Saripudin et al., 2022; Yang et al., 2021).

Method

This research is descriptive quantitative research that begins with product development according to the Borg and Gall design. Several stages are carried out until the product is declared feasible and can be used in the learning process for effectiveness testing.

Participants

The sample in this study was 90 students, who were determined using the purposive sampling technique.

Procedure

Data collection was carried out in three ways, namely questionnaires, interviews and tests. Questionnaires were filled in by experts and students. Experts assess the feasibility and reliability of interactive e-books while students conduct product readability tests. Tests are used to test the effectiveness of interactive e-books when used in the learning process.

Data analysis

Validity was analyzed by 4 expert. Researchers gave the grids and instrument items along with the scoring rubric to the validators to get input. Based on the input from the experts, the developed module was then revised. The assessment was carried out using a Likert scale with the criteria shown in Table 1. The data obtained were then analyzed using SPSS, and the results were explained descriptively.

Table 1. Criteria for Assessment of Instrument Items by Validators

Score	Description
1	Invalid
2	Less valid
3	Valid Enough
4	Valid

Results

Validation Results

The first stage is stage validation. At this stage, the Integrated Moodle-Based Interactive E-Book in English learning has been developed and validated by an English lecturer with criteria of minimum education of S3 and experience teaching five years. Integrated Moodle-Based Interactive E-Book in English learning was obtained based on the media, materials, and language validation. Three aspects of

evaluation towards Integrated Interactive E-Book have been developed: feasibility content, eligibility language, and eligibility presentation using the Likert scale, namely with the criteria 5= very good, 4= good, 3= sufficient good, 2= less good, and 1= not good. Evaluation of Integrated Interactive E-Book based on nature-based learning and Local Wisdom conducted by English lecturers as an expert validator from aspect eligibility content, eligibility language, and eligibility presentation.

Content Validity

Table 2 shows assessment results for an integrated interactive e-book based on nature-based learning and local wisdom. The aspect eligibility contents consist of 7 evaluation components.

Table 2. The content validity results

No.	Component Aspect Content Eligibility	Opinion Respondent to teaching materials		
		A (n = 2)	B (n = 20)	Average
1.	Coverage of material	4.00	4.05	4.03
2.	Accuracy of material	4.25	4.08	4.17
3.	Up-to-date	4.50	4.03	4.27
4.	Contain outlook productivity	4.13	4.26	4.20
5.	Stimulate curiosity	4.00	3.93	3.97
6.	Develop skills life (*life skills*)	4.38	4.16	4.27
7.	Develop outlook Indonesian and contextual	4.50	4.23	4.37
	Average	4.26	4.12	4.19

n: number of respondents

Based on Table 2, there are seven components of assessment on aspects eligibility content, namely The average coverage of the material is 4.03 which is valid, meaning worthy and unnecessary revised; the accuracy of the material has an average of 4.17 which is valid, meaning worthy and unnecessary revised; update has an average of 4.27 is very valid, meaning it is very feasible and does not need to be revised; contains outlook productivity having an average of 4.20 is valid, meaning worthy and unnecessary revised; stimulated curiosity has an average of 3.97 *which* is valid, meaning worthy and unnecessary revised; developed skills life skills have an average of 4.27 which is very valid, meaning *it* is very feasible and does not need to be revised; developed outlook Indonesian and contextual having an average of 4.37 is valid, meaning worthy and unnecessary revised.

Based on the results evaluation of the integrated interactive e-book based on nature-based learning and local wisdom, which have developed in aspects of eligibility, in a way overall has an average of 4.19 is valid, meaning that the integrated interactive e-book based on nature-based learning and local wisdom that has been developed is worth using and not necessary revised.

Language Validity

Assessment results towards an integrated interactive e-book based on nature-based learning and local wisdom regarding aspect eligibility language consisting of 7 components evaluation, as seen in Table 3.

Table 3. Language validity results

No.	Component Aspect Language Eligibility	Opinion Respondent to teaching materials		
		A (n = 2)	B (n= 20)	Average
1.	In accordance with developments participant educate	4.00	4.40	4.20
2.	Communicative	4.50	4.33	4.42
3.	Dialogic and Interactive	4.00	4.23	4.12
4.	Straightforward	4.00	4.13	4.07
5.	Coherence and sequence flow of thought	4.50	4.35	4.43
6.	Conformity with correct Indonesian language rules	4.25	4.18	4.22
7.	Use terms and symbols/emblems	4.25	4.08	4.17
	Average	4.23	4.25	4.24

n: number validator and respondents

Based on Table 3, there are seven components. Assessment on aspects eligibility language, namely by developments participant educate having an average of 4.20 is valid, meaning worthy and unnecessary revised; communicative having an average of 4.42 is very valid, meaning it is very feasible and does not need to be revised; dialogic and interactive having an average of 4.12 is valid, meaning worthy and unnecessary revised; straightforward has an average of 4.07 is valid, meaning worthy and unnecessary

revised; coherence and sequence channel think having an average of 4.43 is very valid, meaning it is very feasible and does not need to be revised; conformity with correct Indonesian language rules has an average of 4.22 is very valid, meaning it is very worthy and does not need to be revised; usage terms and symbols/emblems having an average of 4.17 is valid, meaning worthy and unnecessary revised. Based on the results evaluation towards aspects eligibility Language, an overall average of 4.24 is very valid, meaning that the integrated interactive e-book based on nature-based learning and local wisdom, which have developed in English learning in aspects eligibility language, is perfectly viable and unnecessary revised.

Aspects of Eligibility Presentation

Table 4. shows the assessment results for an integrated interactive e-book based on nature-based learning and local wisdom. The eligibility presentation consists of three evaluation components.

Table 4. Validity results of presentation aspect

No.	Component Aspect Eligibility Presentation	Opinion Respondent to teaching materials		
		A (n = 2)	B (n= 20)	Average
1.	Presentation techniques	4.25	4.34	4.30
2.	Supporters presentation of material	4.67	4.32	4.50
3.	Presentation learning	4.50	4.48	4.49
	Average	4.41	4.39	4.40

n: number of validators and respondents

Based on Table 4, there are three components of assessment on aspects eligibility content, namely technique presentation having an average of 4.30 is very valid, meaning it is very feasible and does not need to be revised; supporter The presentation of the material has an average of 4.50 which is very valid, meaning it is very appropriate and does not need to be revised. Presentation learning with an average of 4.49 is very valid, meaning it is feasible and does not need to be revised. The evaluation results of the integrated interactive e-book based on nature-based learning and local wisdom, which have developed in aspects of eligibility presentation in a way that has an average of 4.40 overall, are very valid. This means that the integrated interactive e-book based on nature-based learning and local wisdom in aspects of eligibility is very suitable for use and does not need to be revised.

Overall, Table 5 shows the results of evaluating the integrated interactive e-book based on nature-based learning and local wisdom in English learning materials conducted by English lecturers as an expert validator, consisting of content validity, language validity, and eligibility presentation.

Table 5. The overall aspect result

No.	Aspect Evaluation	Opinion Respondent to teaching materials		
		A (n = 2)	B (n= 20)	Average
1.	Content validity	4.26	4.12	4.19
2.	Language validity	4.23	4.25	4.24
3.	Eligibility Presentation	4.41	4.39	4.40
	Average Total	4.30	4.25	4.28

Normality Test

A normality test is conducted to determine whether the data is normally distributed. Normality test conducted on *pretest*, *posttest*, gain and motivation data student use technique *Kolmogorov-Smirnov SPSS 21 For Windows Test*. Data stated normally distributed if mark probability or sig. > 0.05. Results of the normality test of student data in the experimental and control classes are shown in Table 6.

Table 6. Normality Test Results

Class	Data	Sig.	A	Information
Experiment	Pretest	0.161	0.05	Data is normally distributed
	Posttest	0.072	0.05	Data is normally distributed
	Gains	0.812	0.05	Data is normally distributed
	Motivation	0.130	0.05	Data is normally distributed
Control	Pretest	0.219	0.05	Data is normally distributed
	Posttest	0.273	0.05	Data is normally distributed
	Gains	0.304	0.05	Data is normally distributed
	Motivation	0.074	0.05	Data is normally distributed

Based on Table 6. it can be seen that overall data (*pretest*, *posttest*, gain, and student motivation) are normally distributed with values significance > α (0.05).

Homogeneity Test

A homogeneity test was conducted to determine whether the two group samples had the same initial ability. The homogeneity test was done using *Levene's Test* using *SPSS 21 for Windows* program help. The homogeneity test was conducted on the experimental and control groups' pretest. Data are stated to have the same variance if marked by probability or sig. > 0.05. Test results Data homogeneity can be seen in Table 7.

Table 7. Results of Pretest Data Homogeneity Test

Data	Sig.	A	Information
Pretest	0.371	0.05	Homogeneous data

Table 7. shows that the *pretest* data from both classes are research samples from results testing homogeneity with the technique *Levene's Test, which* obtained a sig value> 0.05. Thus, you can conclude that the second group samples (experimental and control classes) came from the same population (homogeneous).

Hypothesis Testing

After the prerequisite data analysis has fulfilled good normality and homogeneity of data, hypothesis testing can be carried out. Testing hypothesis is conducted with a one-tailed t-test party using the *Independent Sample t-test.* The test results hypothesis for each school can be seen in Table 8.

Table 8. Hypothesis test results

Hypothesis	Sig.	α	t_{count}	Conclusion
Student learning outcomes integrated interactive e-Book based on nature-based learning and local wisdom compared to the students learning outcome using textbooks	0,000	0.05	11,881	Ha accepted

Based on Table 8. the significance and value of the t-count can be seen. Ha, accepted if sig. < α (0.05) and $t_{count} > t_{table}$ simultaneously reject Ho. Based on data calculation, they obtained sig. Value (0.000) < α (0.05) and $t_{count} > t_{table}$ (11.881 > 1.97338), which means Ha is accepted, so it can be concluded that there are student learning improvements after using integrated interactive e-book based on nature-based learning and local wisdom compared to the students learning result using textbooks.

Effectiveness of integrated interactive e-book based on nature-based learning and local wisdom

The gain value in experimental and control classes can reveal the effectiveness of integrated interactive e-books based on nature-based learning and local wisdom results.

Table 9. Gain value

College	Experimental Class		Control Class	
	Average Gain	% Gain	Average Gain	% Gain
HKBP Nommensen University, Pematangsiantar	0.69	69%	0.52	52%
Polytechnic Purely Conscious Indonesian Business	0.71	71%	0.48	48%
HKBP Nommensen University	0.70	70%	0.54	54%

Table 9. shows that an integrated interactive e-book based on nature-based learning and local wisdom can enhance students' English skills more significantly than those in the control group who used conventional textbooks.

Discussion

E-book views can be tailored to users' needs, such as size display, sound, and learning videos that you want to put in teaching materials. In the *e-book,* some parts can help lecturers and students in using teaching materials, such as Achievements Learning Writing (CPL), Achievement Course Learning (CPMK), objectives learning, map concepts, videos that are in line with English Learning, assignments for each sub-topic, worksheets Work students, summary, evaluation questions at the end chapters, glossary, and index.

Figure 1. Front View of Interactive E-Book

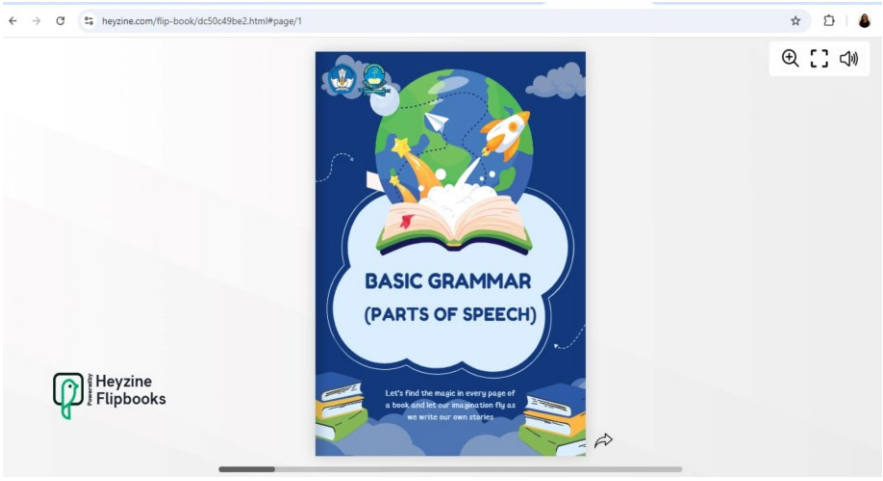
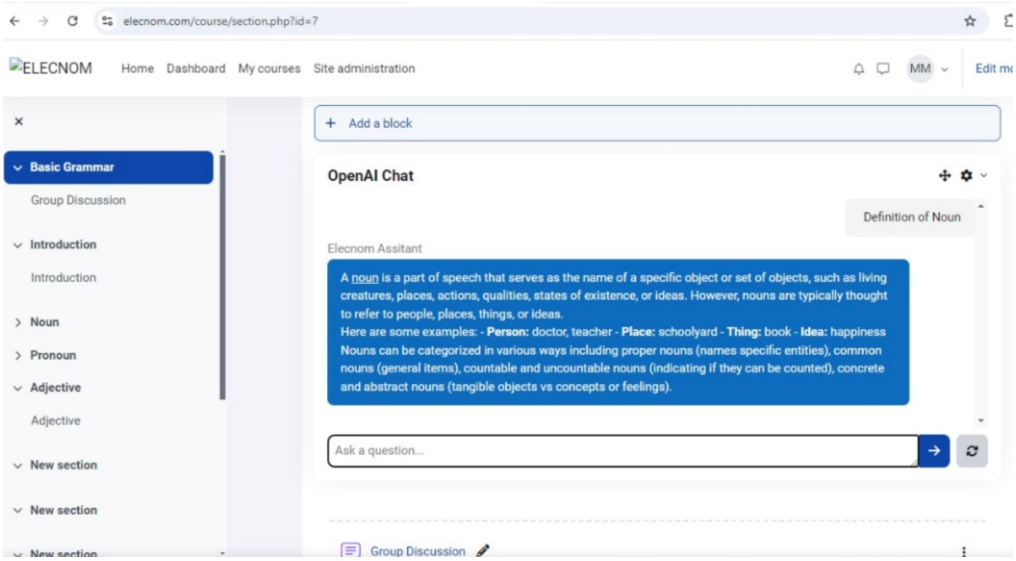


Figure 1. is the E-book front view. View the adjusted to the appearance that we want on integrated interactive e-book based on nature-based learning and local wisdom, which have developed and equipped with CPL, CPMK, and objective learning that can be viewed by pressing the knob *next* or *play* on the section lower appearance *e-book*. The button *next* is used to open page by page from teaching materials according to your wishes, while knob *play* is used to open page by page in a way automatic with just one press.

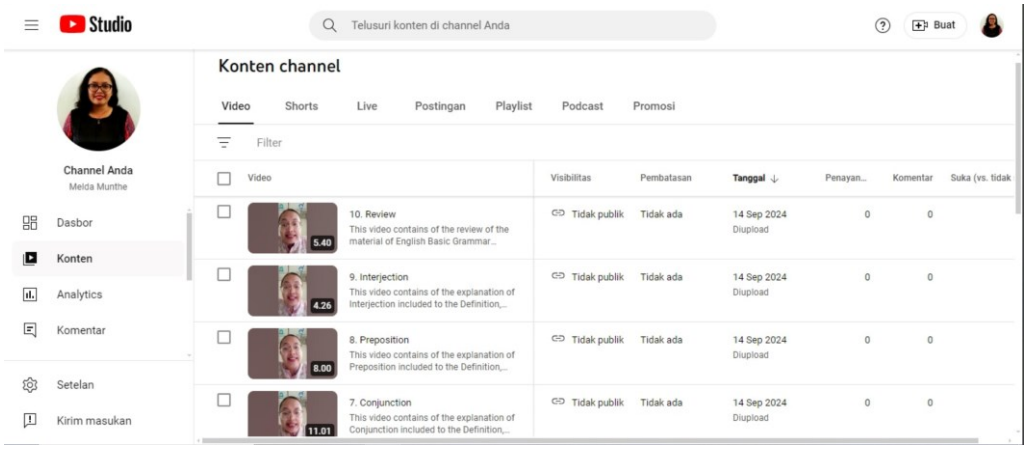
Before studying an e-book, the section at the beginning of the chapter should be equipped with map concepts and images related to the material to be covered. The images are pictures of daily activities so students know the material will be studied. There are lots of life benefits every day. In addition, the section left part of the beginning chapter is equipped with a sequence of sub-materials that will be studied in English learning, which teachers can use to teach English.

Figure 2. Integrated interactive e-book based on nature-based learning and local wisdom



Every page is made interesting with variations of colors so that students don't get bored. Read and Study Integrated Interactive E-Books. The teaching materials are also equipped with videos relevant to the learning material—reaction to make it easier for students to understand the material in the E-book. The videos included in the e-book are simple videos that students can use to understand the material better. In addition, the teaching materials are also equipped with relevant images, such as picture scientists, to improve Power pull students towards E-books. The Integrated Moodle-Interactive E-Book will make it easier for students to study or do assignments independently without carrying books everywhere. In addition, students can also repeat the study of the e-book so that learning becomes more accessible and more enjoyable.

Figure 3. Display of Integrated Interactive E-Book



Under development, this teaching material provides several pictures about, for example, its role. Thus, students can be interested in reading it, and learning chemistry is fun. Motivational words and websites can be visited for an in-depth study of the material. The book's physical form is A4 size, and it is given various colors to make it easier for students to recognize essential concepts.

Evaluation of integrated interactive e-books based on nature-based learning and local wisdom in English learning developed in this research was conducted based on results analysis researcher on E-books on English language learning that are circulating on the market. The shortcomings and proposed material that have yet to be explained in the E-book have been analyzed, improved, and developed so that it becomes an integrated interactive e-book based on nature-based learning and local wisdom. Innovation is also done by combining videos, learning methods and models, and multimedia. This integration is carried out to help students better understand the material presented in the e-book. Integrating learning methods and models makes students more active and motivated in learning processes.

Furthermore, multimedia is integrated inside chemistry teaching materials in *electronic books (e-books) containing* English learning, images, graphics, and videos. Multimedia integration aims to make the students more interested in learning English. So that students can feel the atmosphere of learning differently. This can make it easier for students to study E-books anywhere. The standardization of integrated interactive e-books based on nature-based learning and local wisdom consists of 3 aspects: content validity, language validity, and eligibility presentation. Based on the results, the overall value was 4.26, and it is valid and does not need revision. Using an integrated interactive e-book based on nature-based learning and local wisdom can increase students' ability to master the material compared to using a handbook. Three research samples show that the level of effectiveness in the experimental class is higher compared to the control class.

Based on the calculation of increasing learning results and effectiveness in each university, students' results learning after using integrated interactive e-book based on nature-based learning and local wisdom at HKBP Nommensen University, Pematangsiantar is 69% (medium category), students at the Polytechnic Pure Indonesian Business Consciousness of 71% (high category), and at HKBP Nommensen

University 70% (high category), while those who use handbooks students at HKBP Nommensen University, Pematangsiantar is 52% (medium category), students at the Polytechnic Pure Indonesian Business Consciousness is 48% (moderate category), and at HKBP Nommensen University 54% (medium category). So, it can be concluded that integrated interactive e-books based on nature-based learning and local wisdom in English learning are more effective in increasing students' learning results than handbooks. With the integrated interactive e-book based on nature-based learning and local wisdom in English learning, students can repeat to answer the questions and apply problem-solving so that students can utilize learning time effectively and independently

Conclusions

Based on the analysis, the integrated interactive e-book based on nature-based learning and local wisdom is valid and can be used in the learning process. The average value for each aspect is 4.2, which indicates that the e-book is valid. Furthermore, the results of hypothesis testing and gain scores show that students in the experimental class who learned using the integrated interactive e-book based on nature-based learning and local wisdom experienced a more significant increase in learning outcomes than students in the control class. The average student score in the experimental class was 70%, a high category, while the average student score in the control class was 50%, a medium category.

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