Interactive E-Modules with Cases of Local Wisdom in Learning Animal Diversity to Improve Student Learning Outcomes

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A B S T R A K

E-modul dan sumber belajar lainnya masih terbatas dalam bentuk softcopy dan kemasan film sehingga kurang interaktif. Oleh karena itu, e-modul interaktif sebagai sumber belajar dengan kasus-kasus kearifan lokal untuk memudahkan proses pembelajaran siswa khususnya pada materi Keanekaragaman Hewan sangat diperlukan. Penelitian ini bertujuan untuk menganalisis efektivitas e-modul interaktif disertai kasus kearifan lokal dalam meningkatkan hasil belajar siswa. Penelitian ini merupakan tahap implementasi dalam penelitian dan pengembangan model ADDIE yang dilakukan dengan desain one-group pretest-posttest. Subyek dalam penelitian ini adalah mahasiswa Prodi PGSD yang berjumlah 60 orang. Instrumen dalam penelitian ini adalah tes hasil belajar pada materi pembelajaran Keanekaragaman Hewan. Teknik pengumpulan data dilakukan sebelum pelaksanaan e-modul interaktif (pretest) dan setelah pelaksanaan e-modul interaktif (posttest). Analisis data dilakukan secara deskriptif untuk memperoleh gambaran hasil belajar sebelum dan sesudah penerapan e-modul interaktif dan dilakukan secara inferensial dengan uji t dan N-gain. Hasil penelitian ini menunjukkan bahwa e-modul interaktif dengan kasus kearifan lokal cukup efektif dalam meningkatkan hasil belajar siswa pada mata pelajaran Keanekaragaman Hewan. Implikasi penelitian ini adalah e-modul interaktif dengan kasus kearifan lokal efektif dalam meningkatkan hasil belajar siswa pada materi Keanekaragaman Hewan, menunjukkan potensi penggunaan sumber belajar yang lebih interaktif dalam pembelajaran. Disimpulkan bahwa e-modul interaktif dengan kasus kearifan lokal dapat meningkatkan hasil belajar siswa.

A B S T R A C T

E-modules and other learning resources are still limited in the form of softcopy and film packaging so they are less interactive. Therefore, interactive e-modules as a learning resource with cases of local wisdom to facilitate the student learning process, especially on Animal Diversity material are needed. This study aims to analyze the effectiveness of interactive e-modules accompanied by cases of local wisdom in improving student learning outcomes. This research is the implementation stage in the research and development of the ADDIE model which is carried out with a one-group pretest-posttest design. The subjects in this study were 60 PGSD Study Program students. The instrument in this study is a test of learning outcomes on Animal Diversity learning material. Data collection techniques are carried out before the implementation of interactive e-modules (pretest) and after the implementation of interactive e-modules (posttest). Data analysis was carried out descriptively to obtain an overview of learning outcomes before and after the application of interactive e-modules and was carried out inferentially with t and N-gain tests. The results of this study show that interactive e-modules with cases of local wisdom are quite effective in improving student learning outcomes in the subject of Animal Diversity. The implication of this research is that interactive e-modules with local wisdom cases are effective in improving student learning outcomes on Animal Diversity material, showing the potential for the use of more interactive learning resources in learning. It was concluded that interactive e-modules with cases of local wisdom can improve student learning outcomes.

1. INTRODUCTION

The lecture process in tertiary institutions is carried out oriented towards graduate learning outcomes and course learning achievements both in the aspects of attitude, knowledge, general skills, and specific skills. In terms of the implementation aspect, the lecture process in tertiary institutions which is

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carried out with an independent learning process by students is still constrained by the availability of teaching materials, books, media, modules, and other learning resources (Alnajjar, 2021; Lassoued et al., 2020; Salta et al., 2022). This is evidenced by a preliminary study of 3 lecturers and 30 students in science learning at STAHN Mpu Kuturan Singaraja which expects the learning process to be facilitated by teaching modules that are practical, effective and efficient and display local wisdom. In addition, the results of the analysis of e-modules and other learning resources are currently still limited in the form of softcopy and film packaging, so they are not interactive (Egne, 2022; Lassoued et al., 2020; Selvi, 2022). Even in some learning processes, students try to explore in studying and analyzing learning material independently so that they have not been able to construct knowledge optimally. There are also several science learning processes in tertiary institutions that are still teacher-centered, a learning orientation that does not prioritize process and a discrepancy between planning and the learning process (Alnajjar, 2021; Salta et al., 2022).

In addition, the implementation of learning in tertiary institutions has not been maximized in integrating local and national wisdom in accordance with the mandate of the Minister of Education and Culture Number 3 of 2023 (Ilhami et al., 2019; Setiawan et al., 2017). Even though this integration can be carried out especially in science learning in the form of an approach, development of learning tools, module development, development of teaching materials, and local wisdom values which have a positive impact on learning processes such as learning outcomes and reconstructing scientific concepts (Hidayati et al., 2020; Pujiastuti et al., 2020; Suprapto et al., 2021). Therefore, this integration is very necessary as an effort to contextualize and be grateful for various forms of local wisdom around students (Hastuti et al., 2020; Ramdani et al., 2021). Based on the description of this situation, the effort that needs to be done is to develop interactive e-modules as a learning resource with cases of local wisdom to facilitate the student learning process, especially on Animal Diversity material. The concept of e-module can be examined as a learning resource that is used to stimulate the learning process so that it allows students to study independently (Copriady et al., 2020; Qotimah & Mulyadi, 2022). Furthermore, the interactive form of the module can be observed through students' active efforts to access features and carry out module learning bills (Permatasari et al., 2021; Wulandari et al., 2021). Likewise, the integration of local wisdom can be observed in the module learning content. In the Animal Diversity material, the wisdom that can be integrated is the tumpek pen ceremony, mapepada, and the terms of ceremonial animal species such *as isin tukad, isin pasih, isin carik*, and *gumatat-gumitit* (Alit & Tejawati, 2022; Asmarani, 2020; Yusuf, 2020).

In the development process, this interactive e-module has a very good validity value in terms of content and culture, media, and language aspects. Apart from that, this interactive e-module also has a very good level of practicality for potential users, both lecturers and students. Furthermore, it is necessary to test the instructional impact of implementing this interactive e-module so that a research phase is carried out to analyze the effectiveness of implementing interactive e-modules with cases of local wisdom in improving student learning outcomes in science learning on Animal Diversity material.

2. METHOD

This research is the Implementation stage in the research and development of the ADDIE model (Lietz et al., 2017; Spatioti et al., 2022), which was carried out with a one-group pretest-posttest design according to Table 1.

Table 1. One-Group Pretest-Posttet Design

Pre-test	Treatment	Post-test
O_1	X	O_2

The subjects in this research were 60 PGSD Study Program students at Hindu Religious Colleges in Bali, namely: STAHN Mpu Kuturan Singaraja, UHN I Gusti Bagus Sugriwa, and STKIP Amlapura Hindu Religion. The instrument in this study was a test of learning outcomes on Animal Diversity learning material. Data collection techniques were carried out before implementing the interactive e-module (pretest) and after implementing the interactive e-module (posttest). Data analysis was carried out descriptively to obtain a description of learning outcomes before and after implementing the interactive e-module and carried out inferentially with t-test and N-gain according to the categories in Table 2 to justify the effectiveness of the interactive e-module with local wisdom cases to improve learning outcomes students in animal diversity material.

Table 2. Category Interpretation of N-Gain Effectiveness

Percentage	Interpretation
<40	Inefective
40-55	Less Effective
56-75	Effective Enough
>76	**Effective**

3. RESULT AND DISCUSSION

Result

The implementation stage in this study was carried out by administering a pretest, implementing interactive e-modules on Animal Diversity material, and administering a posttest to all 60 research subjects. In accordance with the results of the data analysis carried out, the results of the pretest and posttest are presented in Figure 1 and their distribution is shown in Table 3, and Table 4.
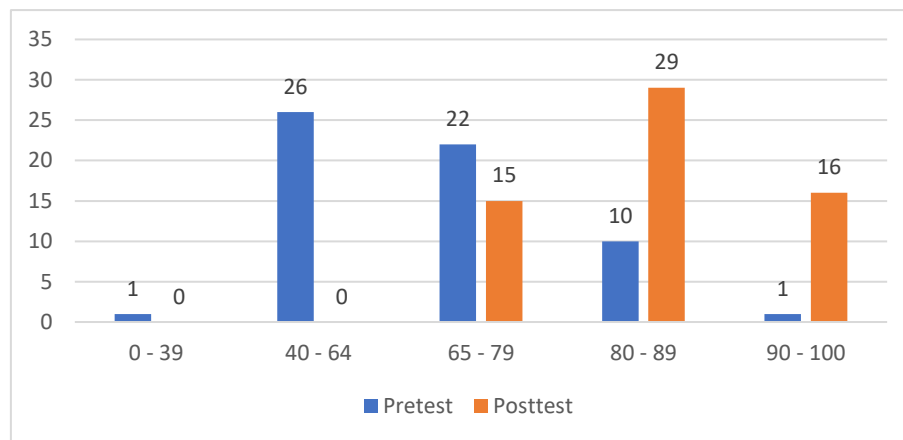

Figure 1. Pretest and Posttest Results of Student Learning Outcomes

Table 3. Distribution of Student Pretest Scores

Interval	f	(%)	Qualification
90 - 100	1	2%	Very High
80 - 89	10	17%	High
65 - 79	22	37%	Currently
40 -64	26	43%	Low
0 - 39	1	2%	Very Low
	60	**100%**	

Table 3 show that 1 student obtained very low qualifications, 26 students obtained low qualifications, 22 students obtained medium qualifications, 10 students obtained high qualifications and 1 person obtained very high qualifications on the results of the pretest. Furthermore, the results of the posttest showed an increase with details of 15 people obtaining medium qualifications, 29 people obtaining high qualifications, and 16 people obtaining very high qualifications according to Table 4.

Table 4. Distribution of Student Posttest Scores

Interval	f	(%)	Qualification
90 - 100	16	27%	Very High
80 - 89	29	48%	High
65 - 79	15	25%	Currently
40 -64	0	0%	Low
0 - 39	0	0%	Very Low
	60	**100%**	

Base on Table 4 on the other hand, according to the results of data analysis, the pretest and posttest mean learning outcomes in Animal Diversity material was 63.67 and 83.42 respectively. This shows that descriptively, students experience an increase in learning outcomes after implementing interactive e-modules with cases of local wisdom. However, t-test and N-gain are needed to justify the level of effectiveness of implementing interactive e-modules in improving student learning outcomes. The following presents the results of the t-test in Table 5.

Table 5. Student Learning Outcomes t-test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Posttest - Pretest	19.750	7.096	0.916	17.917	21.583	21.558	59	0.000

Base on Table 5 in accordance with the results of the t-test above, the value of tcount (21.558) is greater than ttable (2.000) with a significance of 0.000. This means, there are significant differences in student learning outcomes during the pretest and posttest. Furthermore, the results of the implemented N-gain show a value of 56.34 with a fairly good interpretation qualification. These results indicate that interactive e-modules with cases of local wisdom are effective enough to improve student learning outcomes in Animal Diversity material.

Discussion

Interactive e-module with local wisdom cases on Animal Diversity material showing the tumpek cage ceremony, mapepada, and terms of upakara animal types such as *isin tukad, isin pasih, isin carik,* and *gumatat-gumitit* (Alit & Tejawati, 2022; Asmarani, 2020; Yusuf, 2020). This presentation of local wisdom provides students with knowledge and insight that vertebrate and invertebrate animal species are very close to the lives of the surrounding community. This makes it easier for students to remember, understand, and analyze learning material. In addition, this effort can also manifest students' gratitude for the various forms of local wisdom they have. Therefore, the interactive e-module produced in this research has very good validity in terms of content and culture, media and language aspects at the previous research stage (Alenezi, 2020; Krouska et al., 2020; Rahimi & Yadollahi, 2017).

In the implementation process, interactive e-modules with local wisdom cases require providing detailed technical explanations of use to students. This is necessary for time efficiency in the use of interactive e-modules in facilitating the independent learning process (Suyatna, 2020; Wulandari et al., 2021). Evidence of user response from both lecturers and students in using this interactive e-module can be seen from the practical results with very good qualifications at the previous stage. Other evidence of the implementation of this e-module can be seen according to the results of the pretest and posttest average analysis of 63.67 and 83.42, the tcount value (21.558) is greater than ttable (2.000) with a significance of 0.000, and the N-gain value is 56. 34 with quite good interpretation qualifications which shows that interactive e-modules with local wisdom cases are quite effective in improving learning outcomes in Animal Diversity material (Suantara et al., 2023; Winandari et al., 2022).

These results support several relevant studies that have been carried out previously. Previous study presented the results of his research that chemical e-modules on atomic structure material were effective in improving learning outcomes (C. C. A. Dewi et al., 2022; Mufida et al., 2022). Furthermore other study stated that project-based interactive e-modules have a positive impact on learning outcomes (M. S. A. Dewi & Lestari, 2020; Winatha et al., 2018). Likewise other study e-modules based on local wisdom in Satua Bali are effective in improving science learning outcomes (Eliyani et al., 2023; Suantara et al., 2023). There is other research that shows similar results, namely that science e-modules containing online tests are effective in improving learning outcomes (Lestari & Parmiti, 2020; Widiari et al., 2023).

Even so, the interpretation is quite effective in implementing interactive e-modules with cases of local wisdom which has limitations. First, this module only focuses on one of the natural science learning materials, namely Animal Diversity. Second, the implementation of this e-module was carried out over three meetings, where the first meeting was the pretest, the second meeting was the implementation of the e-module on Animal Diversity material, and the third meeting was the posttest (Aufa et al., 2021; Suantara et al., 2023). Therefore, further research is needed to provide familiarization with the process of implementing interactive e-modules in more than one meeting so as to achieve maximum instructional impact.

Apart from that, the interactive e-module produced also does not optimally accommodate culture-based learning forms or models in accordance with the characteristics of e-modules. Therefore, study analysis is needed to construct the relevance of modalities, learning models, e-modules and local wisdom so as to produce a formulation of a form of learning process that is able to accommodate maximum learning outcomes (Apriyanti et al., 2020; Vaportzis et al., 2017). This is proven when the implementation of interactive e-modules still requires offline learning modalities in addition to implementing independent learning online in the use of interactive e-modules. This effort is made to maximize the quality of the process and learning outcomes (Abdullah et al., 2016; Shanks et al., 2017).

The research on interactive e-modules integrating local wisdom into Animal Diversity material carries significant implications for education. By infusing culturally relevant examples, such as the tumpek cage ceremony, these e-modules enhance student engagement and understanding. The observed improvement in learning outcomes underscores the potential of technology-enhanced learning tools in academic achievement. However, limitations such as the narrow focus on a specific subject area and the reliance on offline modalities alongside online learning call for further refinement. Future research should focus on optimizing implementation processes, aligning modalities with learning models and local wisdom, and employing robust methodologies to assess effectiveness. These efforts will contribute to the ongoing evolution of educational technology and pedagogy. In accordance with these results, several efforts to develop further research are needed in the form of submitting recommendations and suggestions. First, it is necessary to get used to the process of implementing interactive e-modules to achieve better learning quality. Second, study analysis is needed to construct the relevance of modalities, learning models, e-modules and local wisdom so as to produce a formulation of a form of learning process that is able to accommodate maximum learning outcomes. Third, a form of quasi-experimental research is needed to provide more detailed effectiveness analysis results in the implementation of interactive e-module product development.

4. CONCLUSION

Based on the results of the data analysis carried out in this research, it can be concluded that the interactive e-module with local wisdom cases is quite effective in improving student learning outcomes on Animal Diversity material. This is evidenced by the average pretest and posttest learning outcomes scores on Animal Diversity material which increased. Apart from that, the t-test results show that the tcount value is greater than ttable with a significance of 0.000 and the N-gain results show a value with a fairly good interpretation qualification.

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