Development of a Digital Module Based on Local Wisdom of Balinese Folklore to Improve the Learning Outcomes of IPAS Students in Grade IV of Elementary School

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Abstract. This development research aims to design and produce a digital module based on Balinese local wisdom of folklore on the ecosystem topic to improve IPAS learning outcomes of fourth-grade elementary school students that is valid, practical, and effective. The development model used in this study is the ADDIE model, which consists of the stages of analysis, design, development, implementation, and evaluation. The validity of the digital module was assessed by media experts and subject-matter experts using the Learning Object Review Instrument (LORI). Furthermore, practicality was evaluated through questionnaires distributed to teachers and students. The effectiveness test employed a pre-experimental design with a one-group pretest–posttest design. IPAS learning outcome data were collected using tests and analyzed using a one-tailed t-test. The results of the study reveal the following findings: (1) The design of the digital module based on Balinese local wisdom of folklore consists of a cover, preface, user guidelines, learning outcomes, learning objectives, concept map, ecosystem material integrated with Balinese folklore containing the values of *Tri Hita Karana* (Parhyangan, Pawongan, and Palemahan), unique fact columns, summaries, instructional videos, practice questions, evaluations, references, and author profile. The module is presented as an interactive digital book developed using the Book Creator application, incorporating text, images, audio, video, and interactive evaluation links. (2) The results of media and material validity tests indicate that the average scores fall into the very valid category. (3) The practicality test results show that the digital module is categorized as very practical based on teacher and student responses. (4) The effectiveness test using a one-tailed t-test shows that the calculated t-value is greater than the t-table value, indicating that the use of the digital module based on Balinese local wisdom of folklore is effective in improving IPAS learning outcomes of fourth-grade elementary school students at SD Saraswati 4 Denpasar.

Keywords: Digital Module, Local Wisdom, Balinese Folklore, IPAS learning outcomes

1   Introduction

The current learning obstacle is that teachers only rely on textbooks and simple picture media, even though classroom infrastructure such as projectors, speakers, and

internet networks are adequate and lack of digital learning media [1]. Teachers lack to develop their potential, so teachers feel that compiling teaching materials is too difficult, complicated, and time-consuming. Teachers underutilize technology despite infrastructure availability because teachers have a variety of difficulties when utilizing assistive technology. Even when resources are available, teachers frequently report low use rates due to a lack of training and familiarity with the technologies [2]. This is what causes a lack of teaching materials that will be given to students so that there is a lack of variation in learning. Even though this digital teaching material is actually very effective for students during the pandemic because it consists of several combinations such as audio, images, sound, and text/writing, then the media used in making this teaching material is also very practical, for example you can use a PC (laptop) or mobile phone [3]. In addition, this situation is supported by the high use of smartphones among students, providing a great opportunity to develop technology that is useful in the learning process at school [4]. In addition to technological skills in using digital modules, understanding and integrating culture into the learning process is crucial to foster engagement and meaningful outcomes [5].

Based on the results of observations, it is known that the distribution of IPAS printed books used in the learning process at the school is still very lacking. Many students do not get IPAS printed books and only rely on materials provided by teachers. Print media in the learning process is also considered less effective because it can cause abstract IPAS material to be difficult for students to understand without clear pictures and explanations from the teacher. The design of innovative technology-based learning media design needs to be done to attract interest and provide students with ease of understanding IPAS material. Based on the results of the questionnaire on the needs and characteristics of students, it is known that 83.3% of students' learning styles are dominant audio-visual. Based on this, the researcher offers the development of technology-based learning media in the form of digital modules on ecosystem materials. So that the material from the digital module presented is not too tedious, the presentation of the material is combined with Balinese folklore. The use of Balinese folklore in the learning process has a very positive impact on children's characters [6].

Local wisdom learning applications, for example, ethnoscience with digitalization, not only present content that integrates local knowledge with science through digital technology, but also provide various activities that support modern learning strategies [7]. This is in line with the opinion of Ria, Rusman, & Nazar (2020) who stated that short stories can be used as a learning medium to increase the attractiveness of students. There is a need for innovation to create digital-based teaching materials that students can access through their devices, so that access to information can be innovative, varied and easily accessible [8]. Digital module of Balinese stories in social studies learning to improve the learning outcomes of grade IV elementary school students. This type of research is R&D with the ADDIE model. The digital module with Balinese folklore ecosystem material in this study will be developed using a book creator application. This application can display interactive e-books that can be flipped over when reading and can insert videos, audio, images, hyperlinks, text, questions, and more. Learning through digital modules with Balinese folklore ecosystem materials is expected to be more flexible and less rigid because it is presented in digital form so that

it makes it easier for students to read it without being bound by time and place. The use of digital modules with Balinese folklore also supports environmental friendliness because it is paperless so that it can increase awareness of environmental sustainability. It is hoped that through the digital module with Balinese folklore, students will be more independent and active in finding alternative sources of information related to their learning needs so that meaningful learning will be created.

The implementation of local wisdom into a learning material is aimed at attracting students' interest and attention in the learning process. Through the implementation of local wisdom related to knowledge of their own region which is integrated with the IPAS ecosystem material, it is hoped that students will be able to increase the enthusiasm for learning, overcome boredom, and increase the sense of nationalism towards their region. Local wisdom is appropriately implemented into the current learning process so that learning does not only lead to the use of technology but also leads to the development of the potential of local character (Parwati, Tegeh, & Mariawan, 2021). Currently, there is not much local wisdom implemented in learning, so it is important to raise a learning that involves local wisdom in it (Pornpimon, Wallapha, & Prayuth, 2014). Based on the results of observations and considerations that have been carried out, it is necessary to develop a digital module based on local wisdom of Balinese folklore learning IPAS on Ecosystem materials. The presentation that has been described encourages researchers to conduct research with

The title "Development of Digital Modules Based on Local Wisdom of Balinese Folklore to Improve the Learning Outcomes of IPAS Students in Grade IV of Elementary School".

2 Method

The research method is research and development with the ADDIE model. The development research plan is carried out within a period of 4 months, namely September-December 2025. The location of the research is the place or object to be held a research. The location of the research is Saraswati 4 Denpasar Elementary School, South Denpasar District, Denpasar City, Bali Province. The object of this research is a digital module based on local wisdom of Balinese folklore which was developed to improve the learning outcomes of grade IV elementary school students. In this development research, there are several research subjects as follows: Experts/experts as validators to assess the validity of media in terms of material content and media design. The validators consist of two expert lecturers and one practitioner (teacher). Practitioners/teachers totaling 5 people as the subject of assessment of the practicality of the developed media. There are 34 students in grade IV A at SD Saraswati 4 Denpasar, divided into 3 students for one-on-one test subjects and 12 students for small group test subjects. The following are the research instruments shown in table 1. Research Instruments

The effectiveness test in this study used a different test, namely a t-test of one from the results of the pretest and posttest between learning before using a digital module based on local wisdom of Balinese folklore and learning after using a digital module based on local wisdom of Balinese folklore. Before conducting a hypothesis test (one tail t-test), it is necessary to carry out a prerequisite test for data analysis consisting of a normality test.

3 Results

3.1 Design Results

The research product produced in this study is a digital module based on local wisdom of Balinese folklore to improve the learning outcomes of IPAS students in grade IV of elementary school. This digital module was developed to support learning for grade IV elementary school students through a narrative approach, multisensory visuals, and digital technology designed with Canva and applied to a flipbook that can be accessed through https://online.fliphtml5.com/sllij/vila/ link.

Figure 1. Module Cover and Usage Guide

Table 1. Research Instruments

Data Type	Collection Method Data	Instrument Shape	Data Source	Instrument Trials
Validity Expert Test Results Learning Media	Non-Tests	Questionnaire	Expert Judges	Validity
Response Test Results Practicality	Non-Tests	Questionnaire	Students and Teachers	Validity
Field Trial Results/ Effectiveness Test	Tests	Options Double	Students	Validity, reliability, differentiation, and difficulty level of the item

Figure 2. Access, Purpose, and Usage Guide

Figure 3. Balinese Local Wisdom and Barcode Access

Based on the figure 3, integrating Balinese folklore into the science ecosystem material is crucial for contextualizing learning, increasing environmental awareness based on local wisdom (such as *Tri Hita Karana* and Subak), and preserving cultural identity. This approach makes science concepts more understandable, engaging, relevant to students' daily lives, and essential role in the education [9], [10]

3.3 Validity Test Results

The validity of the digital module is also strengthened through trials for students on a small and large scale. The results of small-scale trials obtained a feasibility percentage of 98% with the very feasible category, while large-scale trials also showed the same percentage, which was 98%. The high positive response from students shows that digital modules are easy to use, attractive, and help with the understanding of IPAS material. The results of a large-scale trial involving 34 grade IV students of SD Saraswati 4 Denpasar also showed a practicality percentage of 98%. The high positive response of students indicates that digital modules based on Balinese local wisdom can be used effectively in learning without causing significant technical obstacles.

3.3 Prerequisite Test Results

A normality test is carried out to find out whether the data at the *Pretest* and *post-est* distribution normally so that it can be proceeded to parametric analysis. The normality test in this study was carried out using *Shapiro-Wilk*, because the number of samples is less than 50, which is 28 students. The test is carried out with the help of the program *IBM SPSS Statistics*. Decision-making in this test is based on a probability approach with a significance level of $\alpha = 0.05$.

Table 2. Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PRETEST	,153	28	,092	,951	28	,207
POSTTEST	,151	28	,102	,955	28	,263

a. Lilliefors Significance Correction

Based on the results of the normality test using Shapiro-Wilk presented in Table 4.2, it is known that the significance value for the pretest data is 0.207, while the significance value for the posttest data is 0.263. Both significance values are greater than the significance limit of 0.05. This shows that both pretest and posttest data have a normal distribution. Thus, it can be concluded that the assumption of normality in both data groups is met. This condition allows the analysis to continue using a parametric statistical test, i.e. a paired sample t-test, because the data has met the normal distribution requirements.

3.4 Effectiveness Test Results

Based on the calculation results, the results of the paired sample t-test analysis of pre-test and post-test scores are as follows.

Table 3. Pre-Test and Post-Test Calculation Results

Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	PRETEST - POSTTEST	-25,714	8,467	1,600	-28,998	-22,431	-16,070	27	,000

Based on the results of the *paired sample t-test* in Table 4.3, a significance value (*Sig. 2-tailed*) of 0.00 was obtained, which is smaller than the significance limit of 0.05. These results show that there is a very significant difference between students' *pretest* and *posttest* scores. The average *postest* score of students is much higher than the *pretest score*, so the increase that occurs is due to the use of digital modules in the learning process. Thus, H$_0$ was rejected and H$_1$ was accepted, so it can be concluded that the development of digital modules based on local wisdom of Balinese folklore is effective in improving the learning outcomes of IPAS students in grade IV of elementary school.

4 Discussion

Discussion of the Design of Building a Digital Module Based on Balinese Local Wisdom

The design and construction of digital modules based on local wisdom of Balinese folklore in this study was developed as a response to the problems of learning science in grade IV of SD Saraswati 4 Denpasar which tends to be monotonous and teacher-centered. The results of the needs analysis showed that the use of the lecture method

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without the support of interactive media caused low student interest in learning and less optimal understanding of concepts, especially in the material of Theme 3 Ecosystem and Ecosystem Balance. Learning in the region, especially Bali, has many folktales that are told from generation to generation that have positive values, ethics, and moral norms [11]. Of course, these values can be integrated into learning. The development of digital modules with the ADDIE model as an innovative solution that not only presents the material visually and interactively, but also integrates the values of local Balinese wisdom as a learning context that is close to students' lives. IPAS learning that integrates local culture, which is close to students' daily lives, makes a positive contribution to improving the quality of learning. Primary school students, who are still at a concrete operational cognitive level, will more easily accept the content of learning if it is linked to their daily lives [12], [13].

Discussion of the Validity of Digital Modules Based on Balinese Local Wisdom

The validity of digital modules based on local wisdom of Balinese folklore in this study is an important aspect to ensure that the products developed are really suitable for use as a social studies learning medium in grade IV of elementary school. Validity in research and development refers to the level of suitability between the content of the module, learning objectives, characteristics of students, and the demands of the applicable curriculum. The validity of the development product indicates the extent to which the product has met scientific, pedagogical, and technical criteria before being implemented in learning. The validation process of this digital module is carried out through assessments by material experts, media experts, and IPAS learning experts. The results of the validity of the media are in accordance with previous research which states that digital module media is very good to use, efficient, and effective in the learning process to help teachers explain the material and as an alternative in carrying out the learning process. Tested for validity from experts and practitioners get very good qualifications. So that this media is suitable to be applied to the learning process [14] . The results of this study are in line with previous research that stated that the science learning module is valid, practical, and effective based on local cultural values to increase global diversity and religious moderation of students [15]

The integration of Balinese local wisdom, such as the concept of Subak, *Tri Hita Karana*, and Balinese folklore, are considered relevant and contextual by experts. The existence of these local cultural elements strengthens the contextual validity of the module because the learning material is associated with the student's social and cultural environment. Develop digital teaching materials that not only discuss narrative text material, but also act as a means of character education [16]. Learning that integrates local wisdom has high contextual validity because it is able to bridge scientific concepts with the reality of students' lives, thereby increasing understanding and meaningfulness of learning.

Discussion of the Practicality of Digital Modules Based on Balinese Local Wisdom

The practicality of digital modules based on local wisdom of Balinese folklore in this study shows the extent to which the modules developed are easy to use, understand, and apply by teachers and students in the learning process of science science in grade IV of Elementary School. The practicality aspect is an important indicator in research and

development because a valid product is not necessarily practical if it is difficult to operate or does not suit real conditions in the field. The practicality of this digital module was analyzed through the results of small-scale and large-scale trials as well as student response questionnaires. The results of a small-scale trial involving 10 students showed a practicality percentage of 98% with the category of very practical. Students stated that the digital modules are easily accessible, attractive in appearance, and the instructions for use are clear and easy to understand. This shows that the digital module has been designed according to the characteristics of elementary school students who need simple, communicative, and visual learning media. In line with the opinion that attractions, such as letters and pictures, vary according to the characteristics of elementary school students [17].

The results of a large-scale trial involving 34 grade IV students of SD Saraswati 4 Denpasar also showed a practicality percentage of 98%. The high positive response of students indicates that digital modules based on Balinese local wisdom can be used effectively in learning without causing significant technical obstacles. Students can follow the learning flow, understand the material, and work on assignments and evaluations presented in the module. The practicality of learning media is reflected in its ability to be used repeatedly, flexibly, and does not require complex technical skills. From the teacher's side, this digital module is considered practical because it can be directly used as accompanying teaching material without requiring complicated preparation. Digital modules can improve teacher competence [18]. The main strength of digital lies in its ability to seamlessly integrate technology, visualization, and interactivity into the learning process [19].

In addition to ease of use, the practicality of digital modules can also be seen from the flexibility of media that can be used both offline and online by utilizing devices available at school. Digital modules packaged in the form of PowerPoint and flipbooks allow their use through laptops, LCDs, and student gadgets. This flexibility supports social studies learning that is adaptive to technological developments and learning conditions. The integration of Balinese local wisdom in the digital module also contributes to the practicality of using media because students are familiar with the cultural context presented. Balinese folklore about *Tri Hita Karana* make it easier for students to understand the material without the need for complex additional explanations. Balinese folklore often teaches about kindness, loyalty, honesty, hard work, and mutual respect [20], [21]. Based on the results of the trial and user response, it can be concluded that the digital module based on the local wisdom of Balinese folklore has a very high level of practicality. This module is easy to use, flexible, and in accordance with the learning conditions of social studies in elementary schools.

Discussion of the effectiveness of the Digital Module Based on Balinese Local Wisdom

The effectiveness of digital modules based on local wisdom of Balinese folklore in this study refers to the ability of the modules developed in improving the learning outcomes of social studies of grade IV elementary school students. Effectiveness is the main indicator of the success of a product development, because it shows the extent to which the learning objectives that have been formulated can be achieved through the use of the product. Furthermore, the effectiveness test was carried out using the paired sample t-test. The results of the analysis showed a significance value (Sig. 2-tailed) of

0.00 which was smaller than the significance level of 0.05. These results indicate a significant difference between students' pretest and posttest scores after the use of digital modules based on Balinese local wisdom. Thus, the zero hypothesis (H₀) is rejected and the alternative hypothesis (H₁) is accepted, so it can be concluded that the digital modules developed are effective in improving the learning outcomes of social studies students. This is in line with the results of the research that the digital module of IPAS content can prioritize student activities in building their knowledge and creating meaningful learning and ultimately have an impact on improving student learning outcomes [22]. The developed digital module has been declared suitable through expert validity testing, limited trials, and extensive testing. Use of this digital module can improve student and teacher competency [23]. Selecting and classifying digital multimedia as a learning medium requires considering several factors. Mayer's theory discusses how multimedia can influence human cognition by utilizing two dual channels: image and sound. This dual channel involves the ears and eyes, which function optimally when information is received in a balanced manner [23], [24], [25]. Digital modules can make it easier for students to understand the material and are practical to use in learning [26]

The use of technology in the classroom requires teachers to adjust. Teachers and students must use electronic resources. TPACK, or technological pedagogical and content knowledge, is one of the competencies that educators need to master. Teachers that use TPACK can make it easier to give pertinent instruction. One way to incorporate technology into education is through e-modules [27]. The improvement in learning outcomes is inseparable from the characteristics of the digital modules developed. This digital module presents IPAS material visually, contextually, and interactively through the integration of Balinese folklore, Subak concepts, and values *Tri Hita Karana*. The effectiveness of digital modules is also supported by a systematic learning design that is in accordance with the characteristics of elementary school students. The use of simple language, attractive visuals, and the gradual presentation of the material help students understand complex concepts more easily. The easier it is for students to access digital media, the more motivated they will be to use teaching materials [28]. Based on the results of statistical tests and learning analysis, it can be concluded that digital modules based on local wisdom of Balinese folklore are effectively used as social studies learning media in grade IV of elementary school. This effectiveness is shown by a significant increase in student learning outcomes after the use of digital modules. Through digital modules, students can also develop digital literacy and awareness of socio-cultural and environmental awareness, which can increase motivation to learn and support the preservation of these values [29]. Thus, this digital module is not only feasible and practical and is able to make a real contribution in improving the quality of IPAS learning and instilling the values of Balinese local wisdom in students.

5   Conclusion

Based on the results of research and development of digital modules based on local wisdom of Balinese folklore in the subject of Natural and Social Sciences (IPAS) grade IV SD Saraswati 4 Denpasar, it can be concluded that several things are as follows. The design and construction of digital modules based on Balinese local wisdom was developed using the ADDIE model which includes the stages of analysis, design,

development, implementation, and evaluation. The modules are designed in accordance with the learning outcomes of the Independent Curriculum and the characteristics of elementary school students. The integration of Balinese folklore, the concept of Subak, and the value of *Tri Hita Karana* makes the material Ecosystem and Ecosystem Balance more contextual, interesting, and meaningful for students. The interactive visual design and systematic module structure make this digital module function as an independent teaching material that supports IPAS learning. The validity of digital modules based on Balinese local wisdom is in the very feasible category. The results of validation by material experts, media experts, and IPAS learning experts show that the module has met the criteria of content validity, media validity, and pedagogical validity. In addition, the results of small-scale and large-scale trials obtained a feasibility percentage of 98%, which shows that the digital modules are in accordance with the learning objectives, characteristics of the students, and the context of the local Balinese culture. The practicality of digital modules based on Balinese local wisdom is in the category of very practical. The results of small-scale and large-scale trials show a percentage of practicality of 98%. The modules are considered easy to use by students and teachers, have clear instructions for use, and can be accessed with devices available at the school. The flexibility of using modules in the form of PowerPoint and flipbooks supports the implementation of learning both offline and online. The effectiveness of digital modules based on Balinese local wisdom has been proven to be able to improve the learning outcomes of IPAS students in grade IV of elementary school. The results of the paired sample t-test showed a significance value (Sig. 2-tailed) of $0.00 < 0.05$, which indicates a significant difference between the pretest and posttest scores. Thus, the use of digital modules based on Balinese local wisdom is effective in increasing students' understanding of concepts on Ecosystem and Ecosystem Balance materials.

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