JURNAL
Pendidikan Dasar dan Keguruan
Volume 11, No. 1, 2026
P-ISSN: 2527-578X
E-ISSN: 2715-2818
Homepage: https://journal.uiad.ac.id/index.php/JPDK/index

Development Of Tri Hita Karana-Oriented Flipbooks For Science Literacy In Grade Iii Elementary School

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Doi: https://doi.org/10.47435/jpdk.v11i01.4383

Abstract

In order to enhance third-grade students' scientific literacy during science classes, this project aims to develop and assess flipbook resources based on Tri Hita Karana. This research and development (R&D) project employed the ADDIE paradigm, which consists of phases for analysis, design, development, implementation, and evaluation. Third-grade instructors, 39 kids from Cluster V in the Busungbiu District, media specialists, language specialists, and material specialists made up the research subjects. Data was gathered using science literacy assessments, teacher response questionnaires, and validation sheets. For both qualitative and quantitative analysis, Lawshe's validity test (CVR and CVI), practicality percentage analysis, one-sample t-test, and effect size computation were employed. The study found that the flipbook medium was declared valid, with CVI scores of 0.90 for the material aspect, 0.67 for language, and 0.56 for presentation. Although the presentation aspect showed moderate validity compared to the other aspects, the media remained feasible for use after minor revisions and demonstrated very high practicality and effectiveness during field implementation. Additionally, with a 96.43% proportion, this media was deemed extremely practical and useful in enhancing scientific literacy, with an impact size of 1.314 and a significant value of 0.000 (highly effective category). Consequently, Tri Hita Karana-focused flipbooks might be utilized as a cutting-edge scientific teaching aid in primary school settings.

Keywords: flipbook, Tri Hita Karana, science literacy, science, elementary school

1. Introduction

To prepare students for the challenges of the 21st century, basic education is crucial in helping them improve their reading skills, particularly scientific literacy (Lorenza, 2025:410; Tisnawijaya & Kurniati, 2025:102). Scientific literacy now encompasses more than simply mastering concepts; it encompasses the ability to understand scientific phenomena, make fact-based decisions, and demonstrate concern for social and environmental challenges (Purnawati & Yakin, 2025:108; Sparks et al., 2022:1). Because the curriculum places a strong emphasis on critical thinking, problem-solving, and contextual learning that can be applied to students' daily lives, strengthening scientific literacy within the context of elementary school science education is crucial (Nurjanah et al., 2025:35; Parisu et al., 2025:13). According to Lestari et al., (2024:557) and Chang et al., (2023:2467), scientific literacy is crucial for developing students into problem-solvers who can connect scientific ideas with social and environmental realities.

The actual situation shows that literacy skills among elementary school students are still below ideal. According to several studies, many students still struggle to understand basic facts and explain scientific phenomena (Almasri, 2024:980; Sari et al., 2025:1227). Similarly, Safitri & Putra (Safitri &


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P-ISSN: 2527-578X
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Putra, 2022:73) highlight that learning that still focuses on memorizing topics rather than developing scientific process skills and reasoning is usually the cause of the lack of scientific literacy in elementary schools. Observations in Cluster V, Busungbiu Regency, where literacy achievement has declined from good to moderate over the past two years, also demonstrate this situation. Furthermore, students' active involvement in reading, observing, and interpreting scientific knowledge has not developed optimally because the learning process is still dominated by lecture techniques and the use of conventional media. This is made worse by the predominance of lectures in education and the scant usage of tangible materials that aid in idea visualization (Ginting et al., 2025:205).

One element exacerbating this problem is the scarcity of creative learning resources (Ukpai et al., 2024:9). Textbooks that lack adequate visual aids and interactive elements are often used as media (Almelhes, 2024:10). However, according to multimedia learning theory, students' conceptual understanding can be enhanced by the appropriate integration of text and images (Aryani & Lestari, 2025:9; Saluky & Riyanto, 2025:2). Recent research has shown that the use of interactive digital materials such as flipbooks can significantly improve scientific literacy and learning motivation (Meilinda et al., 2024:980). According to Lestari et al. (2023:1634) and Yulianti et al. (2023:1443), creating flipbooks based on scientific literacy is considered highly practical and effective in improving elementary school students' understanding of energy-related subjects. These results suggest that innovations in digital media can offer a different approach to addressing inadequate scientific literacy. Balinese education has unique characteristics that allow for the integration of local wisdom with character development (Nasir et al., 2025:31-51).

The Tri Hita Karana concept is important to integrate into science education because it emphasizes harmonious relationships between humans and God (Parahyangan), fellow humans (Pawongan), and the environment (Palemahan) (Sukmayasa & Mahardika, 2024:46). According to Budhayana (2024:158), Tri Hita Karana functions not only as a cultural philosophy but also as an ethical framework for developing students' ecological and social awareness. In the context of science literacy, the Palemahan principle has a strong conceptual relationship with students' ability to understand environmental phenomena, analyze human interactions with nature, and make responsible decisions regarding environmental sustainability. Through contextual learning activities related to energy conservation, natural resource protection, and environmental cleanliness, students are encouraged to observe scientific phenomena directly in their surroundings and connect scientific concepts with real-life environmental issues. This process supports the development of scientific literacy competencies, particularly explaining phenomena scientifically, interpreting scientific information, and applying science knowledge in daily life. Therefore, the integration of Tri Hita Karana values in science learning is not merely complementary, but serves as a contextual approach that strengthens both character education and scientific literacy development.

To address this challenge, learning innovations are needed that can simultaneously improve scientific literacy and strengthen character values based on local wisdom. Tri Hita Karana-oriented flipbooks were selected as a solution because of their visual, interactive, and contextual characteristics that are appropriate for elementary school students. Through the integration of text, images, animations, videos, and reflective activities, this medium helps students explain scientific phenomena, conduct simple investigations, and connect science concepts with real-life situations (Rahmayani, 2024:632).

The values of Tri Hita Karana were integrated concretely into the science learning materials. The Parahyangan aspect was implemented through reflective activities encouraging students to express gratitude for natural resources and energy provided by God. The Pawongan aspect was reflected in collaborative learning activities, discussions, and group assignments that trained students to respect and help one another during scientific investigations. Meanwhile, the Palemahan aspect was integrated through examples and activities related to environmental conservation, such as saving electrical energy, maintaining cleanliness, and protecting natural resources around students' daily environments. Through these contextual examples, the flipbook not only supports scientific literacy development but also strengthens students' spiritual, social, and environmental awareness.

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Because it theoretically advances the creation of educational materials grounded in scientific literacy and local knowledge and practically addresses the decline in elementary school students' literacy skills, this research is significant and relevant. The purpose of this study was to create and evaluate the feasibility, usability, and effectiveness of Tri Hita Karana-oriented flipbooks for improving scientific literacy in third-grade elementary school science teaching. It is hoped that this research will produce alternative learning innovations that are relevant, contextual, and flexible enough to meet student and curriculum needs.

2. Method

2.1 Type of Research

This study is an R&D (research and development) effort. Before a product is widely used in education, it is produced through R&D techniques and tested for its feasibility and effectiveness (Nazihah et al., 2025:3505; Okpatrioka, 2023:88). The result of this study is a learning aid in the form of a flip book designed for Tri Hita Karana, which is used in science lessons in third-grade elementary schools to help students improve their scientific literacy. The five-stage ADDIE model—Analysis, Design, Development, Implementation, and Evaluation—was used as the development model. Because of its methodical, planned, and adaptable stages, which allow for continuous review at each stage of development, the ADDIE model was chosen (Lai et al., 2024:1; Spatioti et al., 2022:2–3).

2.2 Time and Place of Research

The research was conducted in the 2024/2025 academic year in Cluster V, Busungbiu District, Buleleng Regency. The product was implemented at SD Negeri 1 Sepang and SD Negeri 2 Pucaksari.

2.3 Research Objectives and Subjects

The objective of this project is to develop a learning resource in the form of a flipbook focused on Tri Hita Karana that is reliable, practical, and effective in improving the scientific literacy of third-grade science students.

The research subjects consisted of:

a. Validity test
   1) 2 instrument experts
   2) 2 material experts
   3) 2 media experts
   4) 2 language experts
b. Practicality test
   1) 2 third-grade teachers (of Sepang 1 Elementary School and Pucaksari 2 Elementary School)
   2) 39 third-grade students
c. Effectiveness test

   39 third-grade students of Sepang 1 Elementary School and Pucaksari 2 Elementary School. Because every third-grade student at both schools served as the research sample, the subject selection method for the effectiveness test used a saturated sampling strategy.

2.4 Research Procedure

The research procedure follows the ADDIE model stages as follows (Hidayat & Nizar, 2021:34).

a. Analysis Stage

   This stage includes:
   1) Needs analysis through observation and interviews with teachers.
   2) Curriculum analysis based on the Independent Curriculum Science Learning Outcomes.
   3) Analysis of science literacy indicators.
   4) Analysis of Grade III Science material.
   5) Analysis of research instruments.
b. Design Stage

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This stage includes:

1) Collection of supporting materials (text, images, videos, evaluation questions).
2) Selection of software (Canva, Heyzine, and Quizizz).

Canva was selected because it provides flexible visual design features, attractive educational templates, and easy integration of images, icons, animations, and instructional layouts suitable for elementary school students. Heyzine was chosen as the flipbook engine because it can convert PDF-based learning materials into interactive digital flipbooks with page-flipping effects, embedded multimedia support, mobile accessibility, and easy online sharing through links without requiring application installation. Meanwhile, Quizizz was used to provide interactive evaluation activities and immediate feedback to students through game-based quizzes that support engagement and science literacy assessment.

These three platforms were integrated into a single learning ecosystem. The visual learning materials were first designed using Canva and then exported into PDF format. The PDF files were subsequently converted into interactive flipbooks using Heyzine, allowing students to access digital pages containing text, images, animations, and embedded links. Quizizz links were inserted into the flipbook pages to provide interactive exercises and evaluations. Through this integration, students could learn the materials, interact with multimedia content, and complete assessments seamlessly within one connected digital learning environment.

3) Preparation of media design in the form of flowcharts and storyboards.

c. Development Stage

This stage includes:

1) Creation of the complete flipbook product.
2) Content validity testing by experts using a validation sheet.
3) Product revision based on expert advice and input.

d. Implementation Stage

This product uses a single-group experimental design with only a post-experimental test and is deemed suitable for use with third-grade students. Data on student reactions to the media and learning outcomes are collected at this stage.

e. Evaluation Stage

To refine the product based on the findings of validity, practicality, and effectiveness tests, a comprehensive evaluation is conducted at each stage (formative) and at the end of development (summative).

2.5 Research Data and Instruments

This study includes both qualitative and quantitative data. Teacher and student reactions to the media, as well as professional criticism and recommendations, are sources of qualitative data. Quantitative information was collected from:

a. Expert validation scores
b. Practicality questionnaire scores
c. Science literacy test scores (15 essay questions based on science literacy indicators)

The instruments used include:

a. Expert validation sheet (media, materials, language, instruments)
b. Teacher and student response questionnaires
c. Essay-based science literacy test

Before using the instrument, its validity was checked using the Gregory formula, and its reliability was tested using the KR-20 formula (Ahmad et al., 2024:3212; Ntumi et al., 2023:20).

2.6 Data Collection Techniques

The following data collection methods were used in this study:

a. Observation

This was done to determine media needs and the learning environment.


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b. Interviews

This was conducted to obtain detailed information about the learning needs of teachers and students.

c. Questionnaires

This was used to gather information about the reliability and usability of the media.

d. Tests

This was used to assess students' scientific literacy after exposure to the media.

2.7 Data Analysis Techniques

Both qualitative and quantitative analyses were used in this study's data analysis methods.

a. Qualitative Data Analysis

The analysis was conducted through the following stages:

1) Data collection
2) Data reduction
3) Data presentation in descriptive form
4) Conclusion drawing

Data in the form of expert criticism and suggestions were analyzed descriptively to improve the product.

b. Quantitative Data Analysis

The quantitative analysis included:

1) Media validity testing

Using the Lawshe formula (CVR and CVI).

2) Practicality analysis

Using a Likert scale percentage calculation and categorizing based on the level of practicality.

3) Analysis prerequisite tests
   a) Normality test (Kolmogorov-Smirnov)
   b) Homogeneity of variance test
4) Hypothesis testing

Using a one-sample t-test with IBM SPSS 21.00.

5) Effect size calculation

Using the formula:

$$ES = t\sqrt{\frac{1}{N}}$$

Where:

ES = purity of effectiveness
t = t-test coefficient
N = number of subjects involved

To determine the extent to which the use of flipbook media affects students' scientific literacy skills, the impact size findings were divided into three categories: low, medium, and high effectiveness.

3. Results and Discussion

3.1 Media Validity Test Results

Two specialists, each in the fields of media presentation, material/content, and language, conducted a validity test of the Tri Hita Karana-oriented flipbook media. The Content Validity Index (CVR) for each item and the overall Content Validity Index (CVI) were calculated using Lawshe's formula for validity analysis (Bujang et al., 2025:99; Rathnasabapathy & Subramani, 2022:8). The interpretation of the CVI scores in this study used the following criteria: 0.00–0.49 = low validity, 0.50–0.69 = fair validity, 0.70–0.79 = good validity, and 0.80–1.00 = very good validity.

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a. Validity of the Media Display Aspect

Table 1 displays the results of the CVR and CVI calculations for the media display component.

Table 1. Results of CVR and CVI Calculations for Media Display Aspects

No	Ne	CVR	Decision
1	2	1	Valid
2	2	1	Valid
3	2	1	Valid
4	2	1	Valid
5	1	0	Invalid
6	1	0	Invalid
7	2	1	Valid
8	1	0	Invalid
9	1	0	Invalid
Total		5	
CVI		0,56	

(Source: Data processed by Researcher, 2026)

A CVI value of 0.56 is categorized as fair validity because it falls within the moderate validity range. Based on these findings, most display features, particularly those related to presentation design, user interaction, and usability, meet adequate validity standards and are feasible for use with minor revisions.

b. Validity of Material/Content Aspects

Table 2 displays the results of the CVR and CVI calculations for the material/content component.

Table 2. Results of CVR and CVI Calculations for Material/Content Aspects

No	Ne	CVR	Decision
1	2	1	Valid
2	2	1	Valid
3	2	1	Valid
4	2	1	Valid
5	2	1	Valid
6	2	1	Valid
7	1	0	Invalid
8	2	1	Valid
9	2	1	Valid
10	2	1	Valid
Total		9	
CVI		0,90	

(Source: Data processed by Researcher, 2026)

With a CVI of 0.90, the results are between good and excellent. This result indicates that the content is technically correct, aligns with the CP/TP of Grade III Natural Sciences, and effectively incorporates the values of Tri Hita Karana.

c. Validity of Language Aspects

Table 3 displays the results of the CVR and CVI calculations for the language component.

Table 3 Results of CVR and CVI Calculations for Language Aspects

No	Ne	CVR	Decision
1	2	1	Valid
2	2	1	Valid
3	1	0	Invalid
4	2	1	Valid
5	1	0	Invalid
6	2	1	Valid
7	2	1	Valid

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8	2	1	Valid
9	1	0	Invalid
Total		6	
CVI		0,67	

(Source: Data processed by Researchers, 2026)

A CVI value of 0.67 is categorized as good validity. This result indicates that the language used is generally clear, communicative, and appropriate to student development.

3.2 Practicality Analysis Results

Grade III teachers' responses to the questionnaire during the implementation phase were used to determine the practicality of the flipbook media focused on Tri Hita Karana. The purpose of this evaluation was to assess the level of media use, clarity of instruction, time efficiency, and suitability to science education requirements. A Likert scale was used for assessment, and a Guttman scale was used for analysis using the following formula (Kusmaryono et al., 2022:625):

$$Persentage\ (\%) = \frac{Total\ Score}{Highest\ Score} \times 100\%$$

Table 4 below displays the results of the instructor response score calculation.

Table 4: Results of Calculation of Media Practicality Scores by Teachers

Teacher 1 Score	Teacher 2 Score	Total Score
13	14	27

(Source: Data processed by Researchers, 2026)

The practicality percentage of 96.43% shown in Table 4 indicates that the flipbook media falls into the Very Practical category. Based on teachers' responses, several specific features contributed to this high level of practicality. First, the flipbook was easily accessible through smartphones and laptops without requiring complicated installation procedures, allowing teachers and students to use the media flexibly during classroom learning. Second, the integration of visual illustrations, animations, and contextual examples helped teachers explain abstract science concepts more clearly to third-grade students. Third, the incorporation of Tri Hita Karana values into stories, examples, and environmental activities made the science materials more meaningful and easier to relate to students' daily experiences. Teachers also considered the interactive quizzes and structured navigation beneficial in maintaining student engagement and supporting classroom management. Therefore, the practicality of the media was influenced not only by its technical accessibility, but also by its ability to simplify the delivery of science concepts while integrating cultural and environmental values contextually.

3.3 Results of Prerequisite Analysis Tests

Prerequisite analysis tests, such as homogeneity of variance and normality of data distribution, are conducted before hypothesis testing. The purpose of these preliminary tests is to ensure that the data meet the assumptions of parametric statistics so that hypothesis testing can be conducted (Vrbin, 2022:663).

a. Data Distribution Normality Test

Table 5 below displays the results of the Kolmogorov-Smirnov normality test.

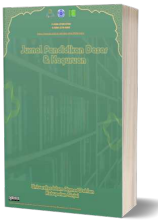
Table 5: Kolmogorov-Smirnov Normality Test Results

N	Sig.	Description
39	0,200	Normal

(Source: Data processed by Researcher, 2026)

The significance value is 0.200 based on Table 5. It can be concluded that the data from students' scientific literacy outcomes are regularly distributed because the significance value is greater than 0.05 (0.200 > 0.05). Thus, the prerequisites for parametric analysis have been met.

b. Homogeneity of Variance Test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To determine whether the data variance is homogeneous (equal) or heterogeneous (unequal), a homogeneity of variance test was used. IBM SPSS 21.00 for Windows was used to perform this test. The results of the homogeneity test are presented in Table 6 below.

Table 6: Results of the Homogeneity of Variance Test

Sig. (Based on Mean)	Description
0,153	Homogen

(Source: Data processed by Researcher, 2026)

The significance value, as shown in Table 6, is 0.153. It can be assumed that the data variance is homogeneous because this value is higher than 0.05 (0.153 > 0.05).

3.4 Hypothesis Test Results

The results of the one-sample t-test are presented in Table 7 below.

Table 7: One-Sample t-test Results

N	Mean	Test Value	t hitung	df	Sig. (2-tailed)
39	82,46	70	8,215	38	0,000

(Sumber: Data processed by researcher, 2026)

The average (mean) post-test score for students in scientific literacy was 82.46, with a comparative score (test score/KKM) of 70, according to Table 3.17. With 38 degrees of freedom (df) and a significance value (2-tailed Sig.) of 0.000, the one-sample t-test yielded a calculated t-value of 8.215. Two methods can be used to make a decision. First, the t-table value is ±2.024 when comparing the calculated t-value with the table t-value at a significance level of 0.05 and df = 38. H0 is rejected and H1 is accepted because the calculated t-value is higher than the table t-value (8.215 > 2.024). Second, based on the significance value, H0 is also rejected and H1 is accepted because the Sig. (2-tailed) value of 0.000 is less than 0.05 (0.000 < 0.05). Therefore, it can be concluded that the use of flipbooks centered on Tri Hita Karana has a significant impact on students' scientific literacy skills.

3.5 Effect Size Calculation Results

Effect size calculations were conducted to determine the extent of the impact of using Tri Hita Karana-oriented flipbooks on students' scientific literacy skills. The purpose of this calculation was to ensure the level of efficacy regardless of sample size, using the formula $ES = t\sqrt{\frac{1}{N}}$. With a sample size of 39 students, the hypothesis test yielded a t-value of 8.215. The effect size (ES), as determined by the calculation, was 1.314. An ES value > 0.8 is considered highly effective. Thus, it can be said that third-grade elementary school students in Cluster V, Busungbiu Regency, significantly improved their scientific literacy skills through the use of flipbooks oriented towards Tri Hita Karana. This finding indicates that media has a significant practical influence on science education, in addition to being statistically significant.

4. Conclusion

Based on the study findings and the creation of flipbook learning materials focused on Tri Hita Karana for third-grade science learning in elementary school, the final product met the requirements for effectiveness, practicality, and validity in improving students' scientific literacy. First, based on the validity test findings using the Lawshe formula (CVR and CVI), the flipbook media was deemed practical. The CVI for the media display component was 0.56 (fair validity category), the CVI for the language component was 0.67 (good validity category), and the CVI for the material component was 0.90 (very good validity category). This indicates that the content is entwined with Tri Hita Karana values and aligns with the third-grade science learning objectives. The media display met qualification requirements with some minor adjustments, and the language used was communicative and developmentally appropriate. Second, based on instructor feedback, the flipbook media was deemed very practical with a practicality score of 96.43%. This media was deemed easy to use, time-efficient,

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and relevant to the needs of science learning and third-grade education. Third, regarding effectiveness, the one-sample t-test findings showed a calculated t-value of 8.215, which is higher than the t-table value (2.024) and a significance value of 0.000 ($p < 0.05$). Furthermore, the estimated effect size of 1.314 is classified as highly effective. These results indicate that the scientific literacy skills of third-grade students in Cluster V, Busungbiu District, significantly improved with the use of flipbooks focused on Tri Hita Karana. This study can be broadly interpreted as indicating that the creation of digital media based on local knowledge, particularly those incorporating Tri Hita Karana values, improves the cognitive component of scientific literacy while also potentially strengthening students' moral character in the areas of spirituality, society, and the environment.

Acknowledgements

The author wholeheartedly praises God Almighty for His grace and blessings that made this research possible. Furthermore, the author would like to thank the Rector of the Mpu Kuturan State Hindu Institute and the academic community for their academic assistance throughout the research and writing process. The author also expresses his deepest gratitude to the professional validators and supervising lecturers who provided valuable suggestions, recommendations, and criticisms to improve the results and publication of this research. He also extends his gratitude to the principal, the third-grade teachers, and every child who participated in the product testing procedures at SD Negeri 1 Sepang and SD Negeri 2 Pucaksari. This research would not have been possible without the assistance and cooperation of several parties. It is hoped that all assistance and support provided will be fairly repaid and beneficial to the advancement of education, particularly in improving scientific literacy in elementary schools.

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JURNAL
Pendidikan Dasar dan Keguruan
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P-ISSN: 2527-578X
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