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Research and Development of a Canva Based E-Book on Metamorphosis for Elementary Students Digital Literacy

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Abstract: The integration of digital technology in elementary education remains limited, particularly in the use of e-book-based learning media, resulting in low levels of students' digital literacy and suboptimal learning outcomes. This study aimed to develop an e-book learning medium, EBACSIS, for third-grade Integrated Science and Social Studies (IPAS) instruction, specifically on the topic of metamorphosis. Preliminary findings revealed that only 63.4% of students met the minimum mastery criteria, while students' digital literacy averaged 44%, indicating a low competency level. This study adopted a Research and Development (R&D) methodology using the Borg and Gall model. Data were collected through interviews, observations, questionnaires, and documentation. The research instruments included needs analysis questionnaires, expert validation sheets for media and content, observation sheets, and achievement tests. Descriptive qualitative and quantitative analyses were applied to evaluate product feasibility, practicality, effectiveness, and digital literacy outcomes. The findings suggest that EBACSIS is a feasible and effective digital learning medium that supports conceptual understanding and strengthens digital literacy skills among elementary school students.

Keywords: Literasi Digital, IPAS, e-book

1. Introduction

The rapid advancement of information and communication technology has significantly transformed various sectors, including elementary education. In the context of 21st century learning, digital competence has become an essential skill that must be integrated into instructional practices to support meaningful learning experiences. Digital learning media are no longer complementary tools but core components that facilitate students' engagement, understanding, and higher-order thinking skills. Recent studies emphasize that the effective use of digital media can enhance students' motivation, diversify instructional strategies, and improve learning outcomes in elementary classrooms.

Despite the widespread availability of digital technology, its utilization in elementary school learning remains limited, particularly in the use of e-book–based instructional media. Several studies report that many teachers still rely heavily on conventional textbooks and lecture-based methods, resulting in passive learning environments and limited opportunities for students to develop digital literacy skills Suwarto et al., (2022). This condition is concerning, as digital literacy is a fundamental competence that enables students to access, evaluate, create, and communicate information effectively and responsibly in digital environments Putra et al., (2023). UNESCO further highlights that digital literacy is closely linked to students' readiness to participate actively in knowledge-based societies.

In Indonesian elementary schools, Natural and Social Sciences (Ilmu Pengetahuan Alam dan Sosial (IPAS) is one of the subjects that requires strong conceptual understanding and concrete visualization, particularly for abstract scientific processes. One of the essential topics taught in Grade III IPAS is metamorphosis, which involves biological changes in living organisms across different developmental stages. Previous research indicates that students often experience difficulties understanding metamorphosis concepts when instruction relies solely on verbal explanations or printed textbooks Wahyuni (2022). These difficulties are compounded by students' limited exposure to interactive and visual digital learning resources.

Preliminary observations and interviews conducted at elementary school revealed that students' learning achievement in

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IPAS, particularly in the metamorphosis topic, had not reached the minimum mastery standard (KKTP). Furthermore, students' digital literacy levels were categorized as low, despite their frequent use of smartphones for non-educational purposes. This finding aligns with recent studies suggesting that students' familiarity with digital devices does not necessarily translate into productive digital literacy practices for learning Syifa (2024) ; (Firdaus et al., 2025). Therefore, there is an urgent need for learning media that not only support conceptual understanding but also foster students' digital literacy competencies.

One promising solution to address these challenges is the development of e-book–based learning media. E-books offer flexible access, multimedia integration, and interactive features that can accommodate diverse learning styles and support students at the concrete operational stage. Canva, as a digital design platform, provides user friendly tools that enable teachers to develop visually engaging and pedagogically sound e-books without requiring advanced technical skills. Recent studies have demonstrated that Canva based e-books are effective in improving students' learning outcomes, engagement, and digital literacy skills at the elementary level, Ciptaningtyas et al., (2022). However, previous studies have largely focused on upper elementary grades or different subject areas, with limited attention to IPAS content, particularly metamorphosis, and its integration with digital literacy competencies. This gap highlights the need for research that systematically develops and evaluates an e-book based learning medium tailored to the characteristics of lower elementary students. Therefore, this study aims to develop an e-book based learning medium named EBACSIS (E-Book Berbasis Aplikasi Canva Materi Metamorfosis) to support IPAS learning and enhance digital literacy competencies among Grade III elementary school students.

2. Methodology

This study adopted the Borg and Gall development model Sugiyono (2013) as a systematic framework for guiding the development of the digital learning product. The model encompasses five core stages analysis, design, development, implementation, and evaluation which collectively structure the process of creating and refining an educational product. The Borg and Gall model was selected due to its emphasis on iterative and cyclical development, in which each stage is closely interconnected and informs subsequent revisions. This iterative structure ensures continuous improvement of the product based on evaluation results obtained at each phase, thereby increasing the feasibility, effectiveness, practicality, and analysis of digital literacy competencies.

2.1 Research Design

This study employed a Research and Development Borg & Gall (2003) approach aimed at developing and evaluating an e-book based learning medium named EBACSIS for elementary school students Natural and Social Sciences (IPAS) instruction. The development process followed the Borg and Gall model, which is widely applied in educational product development due to its systematic and iterative structure, allowing continuous revision based on expert judgment and field testing.

Recent studies confirm that R&D designs are effective for producing valid, practical, and effective digital learning media in elementary education contexts Firdaus et al., (2025); Ciptaningtyas et al., (2022). Due to time and resource constraints, the development stages were adapted and implemented up to the product revision after field testing, which is considered sufficient for evaluating feasibility, practicality, and effectiveness in educational R&D studies Albani (2024).

Participants and Research Setting. The study was conducted in public elementary schools in Pati Regency, Indonesia. Participants consisted as in Table 1:

Table 1: Research data expert background and expertise

Respondent	Background
R1	20 elementary school students in the experimental group
R2	20 elementary school students in the control group
R3	10 elementary school students limited product testing

Sampling was carried out using simple random sampling, as the population was homogeneous with parallel classes. This sampling technique is recommended for experimental studies to reduce selection bias and ensure internal validity Creswell, (2017).

2.2 Development Procedure

The development of EBACSIS followed below main stages and illustrated via Fig. 2:

a. Needs Analysis, conducted through classroom observations, teacher interviews, and student questionnaires to identify learning difficulties and digital literacy gaps.
b. Product Design, involving the development of IPAS metamorphosis content and multimedia elements using Canva.

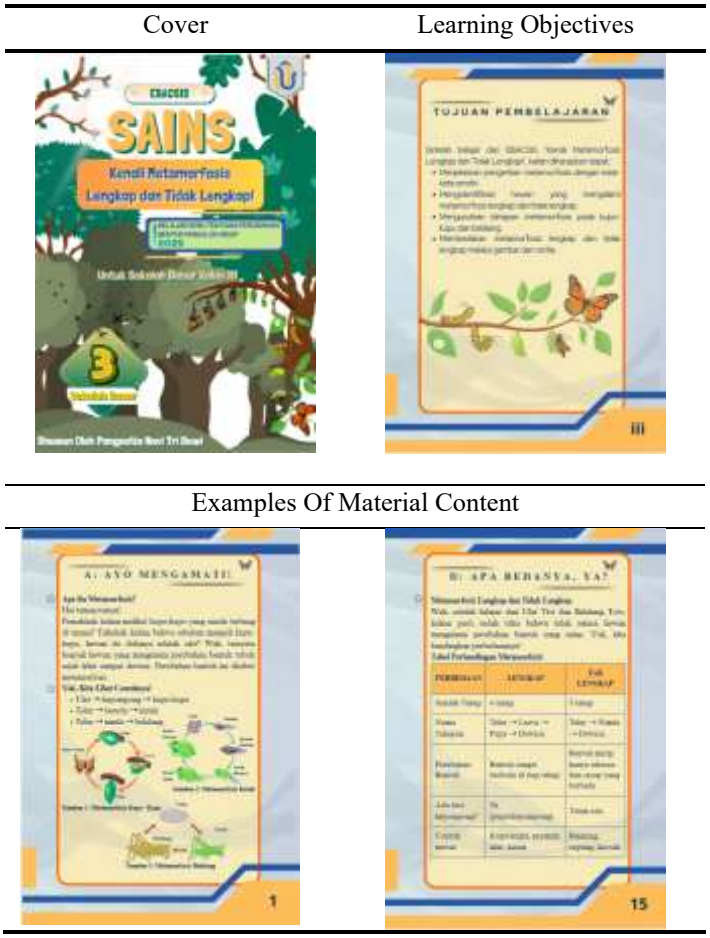

Figure 2: The process flow of the Borg & Gall (2003) model, (Research Sources 2025).

c. Expert Validation, including material experts, media experts, and assessment experts to evaluate content accuracy, instructional design, usability, and assessment quality.
d. Limited Field Testing, conducted to assess practicality and user responses.
e. Main Field Testing, employing a quasi-experimental design to evaluate effectiveness.
f. Product Revision, based on quantitative and qualitative feedback from field testing.

This staged approach aligns with best practices in instructional media development research Tegeh et al., (2014); Firdaus et al., (2025).

2.3 Instruments and Data Collection

Data were collected using test and non-test techniques:

a. Learning Achievement Tests.

Pretest and posttest instruments consisting of 20 multiple choice items were developed based on Bloom's taxonomy to measure students' conceptual understanding of metamorphosis.

b. Questionnaires
   1) Needs analysis questionnaires for teachers and students
   2) Media feasibility questionnaires for expert validation
   3) Practicality questionnaires for teacher and student responses

c. Observation Sheets

Digital literacy competence was assessed using observation instruments based on Gilster's digital literacy framework and UNESCO digital competence indicators, covering internet searching, content evaluation, problem solving, safety, and attitudes.

d. Interviews and Documentation

Semi structured interviews with teachers and documentation of learning activities supported qualitative data triangulation.

2.4 Data Analysis

Data were analyzed using quantitative and qualitative descriptive techniques:

a. Analysis was conducted using expert validation scores converted into percentages and interpreted using established feasibility criteria.
b. Effectiveness Analysis involved:
   1) Independent sample t-tests to examine differences between experimental and control groups.
   2) N-gain analysis to determine learning improvement.
   3) Effect size (Cohen's d) to measure the magnitude of EBACSIS's impact on learning outcomes and digital literacy.
c. Digital Literacy Analysis was based on repeated observations across three instructional sessions.

Effect size interpretation followed Cohen's standardized criteria, which are widely accepted in educational research for reporting practical significance (Albani, 2024).

2.5 Ethical Considerations

All participants were involved voluntarily with approval from school authorities. Students' identities were anonymized, and data were used solely for research purposes, in accordance with ethical standards for educational research Creswell (2017).

3. Results and Discussion

This section reports the findings obtained from both test and non-test data collection techniques. Non test data were gathered through classroom observations, teacher and student response questionnaires, documentation, and interviews. Classroom observations were conducted to identify initial learning conditions and to assess students' digital literacy and process skills during instructional activities. Questionnaires were administered to examine teachers' and students' responses to the developed learning media, particularly its practicality and usability. Interviews were carried out to complement the needs analysis by exploring instructional challenges and expectations regarding learning media. Test data were collected using multiple choice items administered to elementary school students. Prior to implementation, the test items were analyzed in terms of validity, reliability, difficulty level, and discrimination index. The results indicated that the instruments met acceptable measurement standards. Data from various sources were triangulated to enhance the robustness of the findings. Overall, these results provide empirical support for evaluating the effectiveness and practicality of the developed learning media.

3.1 Product Development and Validation Results

The EBACSIS e-book was developed through a systematic Research and Development (R&D) process adapted from the Borg and Gall model. Expert validation results indicate that EBACSIS meets high feasibility standards for instructional use as display in Table 2.

Table 2: Expert validation results of EBACSIS

Validators	Aspect Evaluated	Mean Score (%)	Category
Material Experts	Content accuracy, clarity, relevance	85.6	Very Feasible
Media Experts	Layout, visual design, usability	91.8	Very Feasible
Assessment Experts	Test validity & alignment	81.7	Feasible

These results demonstrate that EBACSIS satisfies pedagogical, visual, and assessment quality criteria and is suitable for classroom implementation.

3.1.1 Practicality of EBACSIS

Practicality was evaluated through a small-group trial involving teachers and students. User responses indicate a high level of usability and accessibility via Table 3.

Minor technical feedback related to file size was addressed by compressing the e-book from 27.7 MB to 3.7 MB, significantly improving accessibility without reducing content quality.

Table 3: Practicality test results

Respondent	Practicality Score (%)	Interpretation
Students	91	Very Practical
Teachers	100	Very Practical

3.1.2 Effectiveness on learning outcomes

The effectiveness of EBACSIS was tested using a quasi-experimental design comparing an experimental group (EBACSIS) and a control group (conventional learning) as in Table 4.

Independent sample t-test results showed a significant difference between groups ($p < 0.05$). The calculated **effect size**

(Cohen's d = 1.55) indicates a **very large effect**, confirming the strong impact of EBACSIS on students' learning outcomes.

Table 4: Comparison of learning outcomes

Group	Mean Pretest	Mean Posttest	N-Gain	Category
Experimental	25.75	83.25	0.78	High
Control	24.25	68.75	0.58	Moderate

3.1.3 Digital literacy improvement

Table 5 presented students' digital literacy across three instructional sessions using indicators derived from digital literacy frameworks.

Table 5: Progression of students' digital literacy

Session	Mean Score (%)	Category
Day 1	18.5	Low
Day 2	72.5	Good
Day 3	87.5	Very Good

The findings reveal a marked improvement in students' digital literacy by the third day of implementation. The majority of students demonstrated the ability to use EBACSIS to identify relevant information, navigate digital links accurately, and critically evaluate the credibility and relevance of digital content. Furthermore, students showed increased competence in organizing information, solving problems independently, and maintaining visual health during digital device use. These results indicate that the integration of EBACSIS contributes positively to the development of essential digital literacy skills in elementary school students. Fig. 3 illustrates the summarized results of the digital literacy observations.

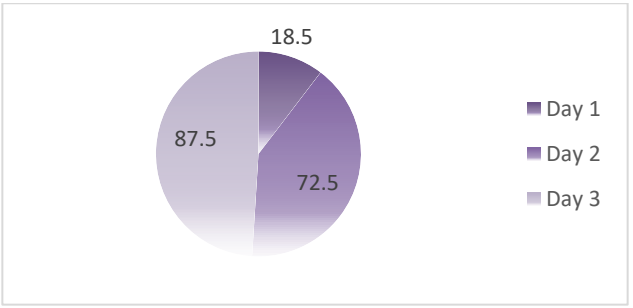

Figure 3. Digital Literacy Growth Across Sessions

These results indicate that EBACSIS not only supports\ content learning but also progressively enhances students' digital literacy skills.

4. Conclusion

The findings demonstrate that EBACSIS is a valid, practical, and effective digital learning medium for IPAS instruction in elementary education. High validation scores from experts confirm that the content structure, visual design, and assessment alignment are appropriate for elementary school. This aligns with recent studies emphasizing that well-designed digital learning media enhance conceptual understanding and engagement in primary science education (Mahmud et al., 2022) ; (Widiyono et al., 2025). The strong practicality results reflect the importance of usability and accessibility in digital learning environments. Similar findings were reported by Nyoman et al., (2024), who found that e-books with simple navigation and optimized file size significantly improve classroom adoption. EBACSIS addressed this requirement by integrating QR-code access and lightweight file optimization, which supports flexible learning both in and outside the classroom.

In terms of effectiveness, the substantial improvement in learning outcomes and the very large effect size indicate that EBACSIS provides meaningful learning experiences beyond conventional methods. These findings corroborate prior research demonstrating that interactive digital media significantly outperform traditional instruction in elementary science learning

Khofifah et al., (2023)

Importantly, EBACSIS contributed to the enhancement of students' digital literacy, as evidenced by the steady increase across observation sessions. This supports the argument that integrating digital media into subject learning can simultaneously foster academic achievement and essential 21st-century competencies Andriyani et al., (2024) ; UNESCO (2023). Therefore, EBACSIS serves not only as an instructional resource but also as a strategic tool for developing students' responsible and productive digital engagement.

References

Albani. (2024). *Efect Size Test*. https://rpubs.com/albani88/Effect-Size-Test#:~:text=kita tidak mengetahuinya.-,Cohen's d,data yang berdistribusi Normal ya..

Andriyani, F. M., Sembiring, M. G., & Prastati, T. (2024). Efektivitas E-Book dalam Pembelajaran Bahasa Indonesia Ditinjau dari Literasi Digital Sebagai Upaya Pemulihan Learning Loss (Studi Eksperimen pada Siswa Kelas 5 Sekolah Dasar). *Jurnal Studi Guru Dan Pembelajaran*, *7*(1), 297–311. https://www.e-journal.my.id/jsgp/article/view/3733

Borg, W. R., & Gall, M. D. (2003). *Educational Research An Introduction (7th Edition) by Meredith D. Gall, Walter R. Borg, Joyce P. Gall (z-lib.org).pdf* (p. 683).

Ciptaningtyas, W., Mukmin, B. A., & Putri, K. E. (2022). E-Book Interaktif Berbasis Canva Sebagai Inovasi Sumber Belajar Materi Sistem Pencernaan Manusia Kelas V SD. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)*, *10*(2), 160–174. https://doi.org/10.22219/jp2sd.v10i2.21788

Creswell, J. W. (2017). *Research Design*. Pustaka Pelajar.

Firdaus, M. L., Rukmana, K., & Hanifah, N. (2025). *Pengembangan Media Indomadu Untuk Meningkatkan Literasi Digital Siswa Kelas 6 Sekolah Dasar*. *9*(3), 1615–1632. https://doi.org/10.35931/am.v9i3.5068

Khofifah, I., Faradita, M. N., & Setiawan, F. (2023). *Development of interactive e-book for science learning in fifth grade elementary school students*. *9*(1), 10–21.

Mahmud, D. R., Mahmudi, M., Sri Wahyuni, Herawati Susilo, & Ratna Ekawati. (2022). Kebutuhan Pengembangan Digital Book "Hai Si IPA" Untuk Meningkatkan Literasi Sains di Kelas V Sekolah Dasar. *Jurnal Sains Dan Teknologi*, *1*(2), 47–57. https://doi.org/10.58169/saintek.v1i2.76

Nyoman, N., Cana, Y., & Wiarta, I. W. (2024). *E-Book Interaktif Berbasis Problem Based Learning untuk Pembelajaran IPAS di Sekolah Dasar : Kelayakan dan Efektivitas*. *4*(3), 402–409.

Putra, A. E., Rohman, M. T., Linawati, & Hidayat, N. (2023). Pengaruh Literasi Digital terhadap Kompetensi Pedagogik Guru. *Murhum : Jurnal Pendidikan Anak Usia Dini*, *4*(1), 201–211. https://doi.org/10.37985/murhum.v4i1.185

Sugiyono. (2013). *Metodologi Penelitian Kuantitatif, Kualitatif dan R & D*.

Suwarto, D. H., Setiawan, B., & Machmiyah, S. (2022). Developing Digital Literacy Practices in Yogyakarta Elementary Schools. *Electronic Journal of E-Learning*, *20*(2), 101–111. https://doi.org/10.34190/ejel.20.2.2602

Syifa, F. L. (2024). *Analisis Literasi Digital Peserta Didik pada Pembelajaran IPA di MTSN 17 Jakarta*. *11170161000057*. https://repository.uinjkt.ac.id/

Tegeh, I. M., Jampel, I. N., & Pudjawan, K. (2014). *Model Penelitian Pengembangan*. yogyakarta: Graha Ilmu.

Wahyuni, S. (2022). Pengaruh Model Pembelajaran Picture and Picture Dalam. *Indonesian Journal of Teaching and Learning*, *1*(1), 4. http://journals.eduped.org/index.php/intel

Widiyono, A., Nichla, S., Attalina, C., Zumrotun, E., & Putri, L. A. (2025). *PjBL-STEM-based Animal & Plants Metamorphosis Multimedia Innovation : Improving Students ' Critical Thinking Skills in Elementary School*. *15*(148), 85–96.