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Digital Book Creator Education Transformation Opens New Dimensions of Science Learning

Dhona Ayu Qomara[1], Adi Wijayanto[2], Musrikah[3]
[1,2,3]Sayyid Ali Rahmatullah State Islamic University of Tulungagung
[1]dhonaayuqomara@gmail.com

ABSTRACT:
The phenomenon of conventional learning that still dominates elementary education, especially in the subject of science and natural sciences, is the basis for this research. Observations at SDN Pakis 5 Surabaya identified that the use of less dynamic printed teaching materials had an impact on the lack of interest and learning achievement of students. Using the Research and Development (R&D) approach with an adaptation of the Borg and Gall model modified into 9 steps, this study applied various data collection methods including observation, interviews, questionnaires, and evaluation of learning outcomes. The results of the study showed that: (1) The design of digital learning materials based on Book Creator succeeded in presenting comprehensive multimedia content including text, images, sound, and educational videos; (2) The implementation process was carried out through a series of trials, both limited and field; (3) The effectiveness of this innovation was proven by a significant increase in student learning outcomes. Based on positive feedback from various parties and student progress in participating in more effective and enjoyable learning, it can be concluded that the development of digital content using Book Creator succeeded in improving the academic performance of grade V students of SDN Pakis 5 Surabaya in the subject of science and natural sciences, especially in the discussion of ecosystem harmony.

Keywords: Digital teaching materials, Book Creator, learning outcomes, Science, Harmony in the ecosystem.

INTRODUCTION

The digital transformation characterized by the rapid development of information and communication technology has brought about fundamental changes in various sectors, including the field of education.[1]. The Industrial Revolution 4.0 era brings a global paradigm shift in education, with digitalization becoming a dominant trend in learning activities. Based on the World Economic Forum 2022 projection, around 65% of students who are currently starting basic education will work in jobs that have not yet been created, showing the importance of updating the education system.[2]. The phenomenon of accelerating the digitalization of education in Indonesia has become more evident after the COVID-19 pandemic, involving more than 60 million students and 4 million educators in digital technology-based learning. However, the inequality of digital access is still a major obstacle, with 22.98% of the population not yet covered by internet services, which has the potential to create a gap in the quality of education[3].

[1] Ade Fricticarani et al., "Strategi Pendidikan Untuk Sukses Di Era Teknologi 5.0," *Jurnal Inovasi Pendidikan Dan Teknologi Informasi (JIPTI)* 4, no. 1 (2023): 56–68.
[2] Pipit Dwi Anggraini, Taufiq Harris, and M Furqon Wahyudi, "Literasi Pendidikan Indonesia Di Era Digitalisasi 5.0 Dalam Menghadapi Tantangan Dan Peluang," *Akademika* 17, no. 2 (2024).
[3] Dinda Buana Putri, "APJII: Jumlah Penetrasi Internet Di Indonesia Tahun Ini Mencapai 78,19 Persen," voi.id, 2023, https://voi.id/teknologi/261877/apjii-jumlah-penetrasi-internet-di-indonesia-tahun-ini-mencapai-78-19-

Previous studies have examined various methods of developing digital learning materials, ranging from the use of interactive multimedia to online learning systems. Several studies have focused on the effectiveness of e-learning in optimizing learning outcomes, while other studies have investigated the contribution of mobile technology to distance learning.[4]. However, there is still untapped research space related to the implementation of special platforms such as Book Creator that provide the ability to create interactive digital books. Studies on the integration of Book Creator in science learning, especially for complex topics such as ecosystem harmony, still require further exploration.

The main objective of this study is to design digital learning materials based on Book Creator that can improve students' learning achievement in the subject of science, especially in the material of ecosystem harmony. This study also intends to evaluate the effectiveness of Book Creator in encouraging improved student learning outcomes.[5]. Through the optimization of interactive and multimedia features of Book Creator, this research attempts to present a more dynamic and relevant learning experience to the demands of 21st century learning. This development is based on John Dewey's progressive learning theory which emphasizes the significance of active learning and direct experience.[6].

This study suggests that the development of digital learning materials based on Book Creator can provide a substantial positive impact on the quality of science learning at the elementary school level. The proposed hypothesis states that students who use digital learning materials based on Book Creator will show a more significant increase in learning outcomes compared to conventional approaches. Furthermore, this study also proposes the hypothesis that the use of Book Creator will encourage active student participation in the learning process, improve learning outcomes, and develop digital competencies that are essential for their future.

Methods

The methodology applied in this study adopts the Research and Development (R&D) approach by implementing the Borg & Gall model which has been modified into 9 stages. The selection of the R&D method is based on its suitability with the research objectives, namely developing and evaluating the effectiveness of digital learning materials based on Book Creator in the context of science learning. Sugiyono defines R&D as a research methodology that is not only limited to testing theories, but also includes a series of educational product development and validation processes (Sugiyono, 2013). The research design adapts the Borg & Gall model which consists of: (1) preliminary studies and information collection, (2) planning, (3) product prototype development, (4) initial testing, (5) product refinement, (6) medium-scale trials, (7) operational product refinement, (8) large-scale testing, and (9) product finalization (Arifin, 2012). The research participants were grade V students of SDN Pakis 5 Surabaya for the 2023/2024 academic period, who were selected using a purposive sampling technique by considering the suitability of characteristics to research needs (Makbul, 2021).

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persen#:~:text=Hasil survei Asosiasi Penyelenggara Jaringan Internet Indonesia %28APJII%29,215.626.156 jiwa dari total populasi sebesar 275.773.901 jiwa.

[4] Rahila Salay, "Perbedaan Motivasi Belajar Siswa Yang Mendapatkan Teacher Centered Learning (TCL) Dengan Student Centered Learning (SCL)," 2019.

[5] Dhea Fitrianna, Fina Nurul Hasanah, and Susi Ernawati, "Inovasi Media Pembelajaran Menggunakan Book Creator Di SDN Kadumerak 1," in *Proseding Didaktis: Seminar Nasional Pendidikan Dasar*, vol. 7, 2022, 353–62.

[6] John Dewey, The Collected Works of John Dewey (DigiCat, 2022).

Data collection methods include direct observation of science learning, structured dialogue with educators and students, distribution of expert validation questionnaires and user responses, and evaluation of learning outcomes (pretest and posttest). The research instrument was constructed based on indicators relevant to the development of digital learning materials and science learning. Testing of the validity and reliability of the instrument was carried out through expert assessment and limited trials. The data analysis process integrated qualitative and quantitative approaches. Data from observations and interviews were processed descriptively qualitatively, while questionnaire and test data were analyzed using quantitative methods. Product effectiveness testing was carried out using the t-test technique to compare learning outcomes before and after the implementation of digital learning materials, using a significance level of $\alpha = 0.05$.

Results

Digital Teaching Material Design Based on Book Creator in the Subject of Science Harmony in Ecosystems That Can Improve Student Learning Outcomes

The process of developing digital learning materials using Book Creator for the subject of science, especially the topic of ecosystem harmony, adopts a step-by-step approach according to the Borg & Gall model. Preliminary studies identified that the teaching and learning process still relies on traditional learning materials with minimal interactivity, so that students experience obstacles in digesting the abstract concept of the ecosystem. This observation supports the results of previous studies that highlight the urgency of interactive learning materials to improve understanding of science concepts at the elementary school level.[7].

The learning material design stage begins with the preparation of a storyboard that integrates various multimedia components, including text, visual elements, audio content, and learning video materials.[8]. Storyboard, which is a series of sequential visual sketches, serves to illustrate the flow of material comprehensively. This instrument plays a vital role in visualizing the script, planning the visual documentation process systematically, and ensuring optimal quality of learning media editing.[9]. Storyboarding involves several crucial stages: determining the learning approach, drafting a script that includes dialogue and narration, creating a conceptual sketch as an initial framework, and developing the storyboard in detail. An effective storyboard contains at least three main components: a title column, a visual representation, and a comprehensive description.[10]. The following is a storyboard visualization for digital learning materials based on Book Creator:

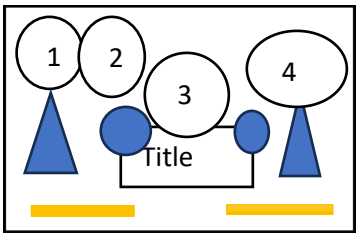
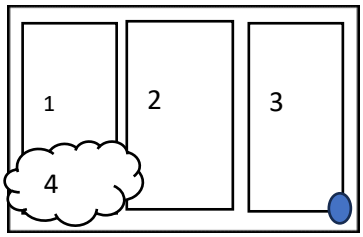
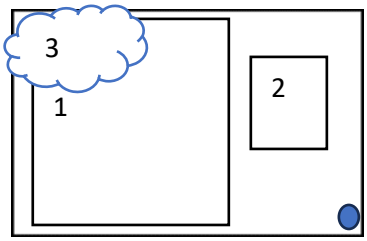
Table 1 Digital Teaching Material Storyboard

[7] Ameliana Balya Sakti and Agus Purwowidodo, "Pengembangan Media Pembelajaran Book Creator Dalam Meningkatkan Pemahaman Pembelajaran IPA Kelas V Di SDN 2 Prayungan Nganjuk," *Al-Madrasah: Jurnal Ilmiah Pendidikan Madrasah Ibtidaiyah* 8, no. 3 (2024): 1395–1405.

[8] Dwi Erma Yulfidya and Bachtiar Adi Saputra, "Optimalisasi Pemahaman Dasar-Dasar Fotografi Melalui Model Pembelajaran Berbasis Masalah (PBL) Dengan Pendekatan Pembelajaran Berdiferensiasi Dan Quizziz Di SMKIT Robbani Singosari," *Al-DYAS* 3, no. 1 (2024): 488–98.

[9] Devi Fadlika Wulan Rahmadani, Citra Kusuma Dewi, and Yosa Fiandra, "PERANCANGAN STORYBOARD VIDEO DOKUMENTASI VISUAL KKN TEMATIK BUDAYA KERATON SUMEDANG LARANG," *Kreatif: Jurnal Karya Tulis, Rupa, Eksperimental Dan Inovatif* 4, no. 2 (2022): 51–54.

[10] Arif Rinaldi Dikananda, Odi Nurdiawan, and Husein Subandi, "Augmented Reality Dalam Mendeteksi Produk Rotan Menggunakan Metode Multimedia Development Life Cycle (MDLC)," *MEANS (Media Informasi Analisa Dan Sistem)*, 2021, 135–41.

NO	Slide Show	Information
1		On the Cover page, the background is designed with a visual blend that combines elements of land, grass, and sky, where the title of the material "Harmony in Ecosystems" is placed in the middle. 1) The logo of UIN Saatu Tulungagung and 2) the logo of the Ministry of Education and Culture are placed as the identity of the institution, 3) equipped with a picture of the sun emitting bright rays, 4) clouds that decorate the sky, a round shape containing illustrations of various animals, a triangle shape that represents trees, and a rectangle at the bottom containing class information and the author's name.
2		The second page adopts a background with a combination of light blue and light brown, decorated with a photo of the author taken on the beach with matching color nuances. In part 1) there is a short introduction containing a photo, full name, and domicile of the author, 2) continued with a foreword, 3) then a special message from the author to the readers, 4) with an artistic touch in the form of flower and butterfly animations that decorate the page, as well as a round page number marker placed at the end of the page.
3		Page 3 features a background with a gradient of light blue and dark blue that creates harmony with the previous page. On this page, 1) there is a page writing that is equipped with a description, 2) the writing of the Table of Contents as a content marker, 3) decorated with torn paper ornaments that function as decorative animations, and a small circle placed at the bottom right corner as a page number marker.

The importance of storyboards lies in their ability to guide exploration and gain value from multiple perspectives, as well as helping to identify the properties needed during production and optimize budgets.[11]. This approach refers to Mayer's cognitive theory of multimedia learning, which states that multimedia learning can improve conceptual understanding through simultaneous processing of verbal and visual information.[12]. The integration of these multimedia elements has proven effective in increasing students' engagement and motivation to learn, as demonstrated by their enthusiasm during the trial.

Feasibility of Digital Teaching Material Design Based on Book Creator in the Subject of Science Harmony in Ecosystems to Improve Student Learning Outcomes at SDN Pakis 5 Surabaya

The validation stage plays a vital role in the learning material development process to ensure that the material developed meets the standards of suitability and relevance before being applied in teaching and learning activities.[13]. The feasibility evaluation was carried out by involving three experts who have expertise in related fields. The assessment from the team of material and

[11] Ahmad Fauzi, "TA: Perancangan Motion Graphic Sebagai Media Kampanye Sosial Untuk Menggugah Kesadaran Literasi Digital Generasi Muda" (Universitas Dinamika, 2024).
[12] Hamdan Sugilar, "Multimedia Matematika Di Era Digital," in *Prosiding Seminar Nasional Teknik Elektro UIN Sunan Gunung Djati Bandung*, 2020, 442–51.
[13] Rodinatul Ginayah, Prana Dwija Iswara, and Dety Amelia Karlina, "PENGEMBANGAN MEDIA INTERAKTIF MENGGUNAKAN APLIKASI CANVA UNTUK KETERAMPILAN MEMBACA PERMULAAN," *Al-Madrasah: Jurnal Ilmiah Pendidikan Madrasah Ibtidaiyah* 8, no. 4 (2024): 1770–84.

media experts indicated that the digital learning material based on Book Creator had achieved the feasibility standard with the predicate "Very Valid". The aspects that received special assessments were the systematic organization of content and the implementation of examples that were relevant to everyday life. These results are in line with the constructivism principle put forward by Piaget, which emphasizes the significance of context-based learning in constructing students' understanding.[14].

Validation evaluation not only produces a comprehensive assessment of product quality, but also identifies the specific strengths of each component evaluated.[15]. These findings serve as a critical foundation in evaluating the extent to which digital learning materials based on Book Creator can meet contemporary educational standards and modern learning needs. Based on the assessment conducted by three media experts, the evaluation results were obtained in various dimensions: general aspects reaching 86.67%, cover design aspects 88.67%, content design aspects 90%, and learning benefits aspects 89.2%. Overall, the Book Creator product managed to achieve an average score of 97.9 out of a maximum score of 110, equivalent to a percentage of 89%. Referring to the assessment criteria that place the range of 85.01% - 100.00% in the "very valid/very feasible" category, it can be concluded that this digital learning material based on Book Creator has met the highest validity and feasibility criteria to be implemented in the learning process.

Table 2 Results of media expert validation

Aspect Evaluation	Media Validation			Average	Score Maximum	Presentation
	Expert I	Expert II	Expert III			
General	14	13	12	13	15	86.67 %
Cover design	28	25	27	26.6	30	88.67 %
Content design	37	36	35	36	40	90%
Benefits of learning	24	23	20	22.3	25	89.2 %
Total Score	**103**	**97**	**94**	**97.9**	**110**	**89%**

Table 3 Results of validation by material experts

Aspect Evaluation	Material Validation			Average	Score Maximum	Presentation
	Expert I	Expert II	Expert III			
Content Eligibility	26	27	28	27	30	90%
Language	21	23	24	22.6	25	90.67%
Presentation	27	24	28	26.3	30	87.78%
Benefits of learning	14	13	15	14	15	93.3%
Total Score	**88**	**87**	**95**	**90**	**100**	**90%**

The evaluation of three material experts showed very satisfactory results in various assessment dimensions. The review covered four main aspects with the following results: material content reached 90%, language use 90.67%, presentation method 87.78%, and educational value 93.33%. Educational value stands out as the aspect with the highest assessment, showing the effectiveness of this teaching material in the context of learning. In the overall evaluation, this learning material received an average score of 90 on a scale of 100, with three assessors giving individual scores of 88, 87, and 95, indicating strong agreement between evaluators. With a percentage of 90% which falls within the range of 85.01% - 100.00%, this teaching material meets the requirements of the "very valid/very feasible" category to be implemented in learning activities.

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[14] Dina Mardiana, R M Teguh Supriyanto, and Rahayu Pristiwati, "Tantangan Pembelajaran Abad-21: Mewujudkan Kompetensi Guru Kelas Dalam Mengaplikasikan Metode Pengajaran Bahasa: History Teacher's Perception Of The Existence Of The Balanga Museum Related To History Learning In Sma Negeri 4 Palangka Raya," *Tunas: Jurnal Pendidikan Guru Sekolah Dasar* 6, no. 2 (2021): 1–18.

[15] Melyana R Pugu, Sugeng Riyanto, and Rofiq Noorman Haryadi, *Metodologi Penelitian; Konsep, Strategi, Dan Aplikasi* (PT. Sonpedia Publishing Indonesia, 2024).

The results of this evaluation strengthen the basic concept of developing learning materials that prioritize harmony between substance, delivery method, and linguistic aspects.[16]. The achievement of 93.33% in the educational value aspect proves that this teaching material not only meets the content validity standards, but is also very applicable in the implementation of learning. Although there is still room for improvement, the value of 87.78% for the presentation aspect confirms that the material has been well organized. The user-friendly interface and the use of various media are in line with Gardner's Multiple Intelligence theory. This learning material successfully accommodates various learning preferences, especially visual-spatial and verbal-linguistic, supporting Fikrah's findings about the superiority of Book Creator in accommodating various learning styles[17]. Positive feedback from limited-scale testing, especially related to visual design and ease of use, illustrates the potential of teaching materials in enhancing students' enthusiasm for learning.

Figure 1 Book Creator Product

The image above shows the book creator product that has been developed, various pages can be seen from the cover to the learning materials. This book creator combines various captivating visual components, including illustrations, animated characters, writing, and colorful background designs. The arrangement of each page is structured, prioritizing aspects of multimedia instructional design to produce an interactive and meaningful learning process for students. Book Creator combines various multimedia elements in a balanced way in each learning sheet. Friendly and expressive animated characters act as learning guides, building emotional bonds with students. The illustrations displayed are quite detailed but remain simple, making it easier for students to understand the concepts of ecosystems that were initially abstract to become more real.

The selection of colorful backgrounds with the right color combinations not only creates a fun learning atmosphere but also helps to organize information visually. This book is designed to present information in a way that is attractive and easy for readers to digest. The use of bright and contrasting colors provides a cheerful and dynamic feel. The illustrations used seem to be able to attract the attention of readers, especially elementary school students. In addition to the visual aspect, this book also utilizes various interactive features of the book creator platform, such as the ability to add multimedia content, interactive dots, and smooth page transitions.

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[16] Adri Adri, "Pengembangan Bahan Ajar Pendidikan Agama Islam Berbasis Pendidikan Multikultural Untuk Membentuk Sikap Moderasi Beragama Siswa Sekolah Menengah Atas Negeri (SMAN) 1 Nagajuang Kabupaten Mandailing Natal" (UIN Syekh Ali Hasan Ahmad Addary Padangsidimpuan, 2023).

[17] Zakiyatul Fikrah, "Pengembangan Bahan Ajar Digital Menggunakan Aplikasi Book Creator Pada Pembelajaran Tematik Terpadudi Kelas IV SDN 12 Air Sikambing Kabupaten Pesisir Selatan" (Universitas Negeri Padang, 2022).

The quality of this teaching material is proven by its ability to accommodate various student learning methods. Through a combination of text, images, animations, and interactive elements, this learning material creates a flexible and inclusive learning environment. The multimedia approach used not only increases student participation in learning, but also supports a deeper understanding of the material. This is in accordance with the concept of modern learning that emphasizes involvement and active learning to increase learning effectiveness, as explained in the cognitive theory of multimedia learning by Mayer[18]. The high level of eligibility shows the potential of teaching materials in improving student learning achievement, in line with the research of Wijayanto & Khusnaini, regarding the effectiveness of electronic modules based on Book Creator.[19].

The Effectiveness of Digital Teaching Materials Based on Book Creator in Improving Students' Learning Outcomes in the Science Subject of Harmony in Ecosystems at SDN Pakis 5 Surabaya.

The teaching of science subjects, especially in the topic of Harmony in Ecosystems, has undergone an impressive renewal with the implementation of the digital learning media Book Creator. This application provides a comprehensive method in explaining the complex concept of ecosystems through various multimedia features that can be operated and attract attention. This result is in line with a study conducted by Sakti & Purwowidodo which showed a positive development in students' understanding when learning science using Book Creator.[20]. Teachers can create learning materials enriched with visual elements, sound, and moving images. This makes it easier for students to understand theoretical concepts such as the relationship between creatures in an ecosystem, energy transfer, material circulation, and population changes.

The interactive and interesting material successfully encourages student participation and understanding. Book Creator has special advantages such as the combination of videos, images, and texts that can be changed together, allowing students to play an active role in learning activities. Students can add captions, take notes, and work together to develop their knowledge of harmony in the ecosystem. Observations during the learning process showed an increase in student activity, involvement in discussions, and courage to ask questions, which shows the importance of aspects of attention, relevance, self-confidence, and satisfaction in learning. The interactive elements in this digital learning media successfully cover these four aspects, increasing students' internal motivation, thus having an impact on improving learning achievement.

The Book Creator application facilitates students to learn about living and non-living elements through dynamic images in understanding the parts of the ecosystem. Students can explore the roles of organisms that produce, consume, and decompose, and understand the importance of environmental factors such as water, air, soil, and sunlight through interactive images and integrated audio explanations. This multimedia method helps students build a deeper understanding of the relationship between each component in the ecosystem. Interactions in the ecosystem that are usually difficult to understand abstractly can now be clearly described through animations and interactive diagrams. This is supported by research by Larasati & Rukmana which proves that interactive digital media increases student engagement in science learning.[21]. The interactive features of Book Creator that encourage active student participation in learning ecosystem concepts are in line with these findings.

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[18] Sugilar, "Multimedia Matematika Di Era Digital."

[19] Adi Wijayanto and Ernika Khusnaini, "DEVELOPMENT OF BOOK CREATOR-BASED ELECTRONIC MODULES ON LEARNING THE HUMAN DIGESTIVE SYSTEM IN MADRASAH IBTIDAIYAH," in Syekh Nurjati International Conference on Elementary Education, vol. 1, 2023, 428–39.

[20] Sakti and Purwowidodo, "Pengembangan Media Pembelajaran Book Creator Dalam Meningkatkan Pemahaman Pembelajaran IPA Kelas V Di SDN 2 Prayungan Nganjuk."

[21] Sekar Reviyana Larasati and Diki Rukmana, "Pengembangan E-Modul Menggunakan Aplikasi Book Creator Berbasis Pendekatan Saintifik Dan Keterampilan Berpikir Kreatif Pada Pembelajaran IPA Siswa Kelas IV SD," *ELSE (Elementary School Education Journal): Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar* 8, no. 3 (2024).

Book Creator provides students with the opportunity to observe different types of interactions such as predation, competition, and reciprocity in a variety of ecosystem conditions. Students can observe how living things influence and depend on each other, deepening their understanding of the complexity of relationships in ecosystems. The concept of energy and matter transfer in ecosystems is presented through a dynamic chart that shows the flow of energy from the sun through the food chain. Ecosystem balance and the effects of environmental change can be studied through interactive simulations. Students can experiment with different scenarios and observe how changes in one component can affect the entire ecosystem. This approach is very useful in explaining the concept of interconnectedness and interdependence in ecosystems.

The success of digital learning media based on Book Creator in improving student learning achievement in the science subject of Harmony in Ecosystems is reinforced by various academic studies. Fangera's research on the basics of multimedia learning supports the use of Book Creator[22]. Fangera highlighted that a systematic combination of text, images, and audio can improve student understanding. This is in accordance with the capabilities of Book Creator which allows the presentation of ecosystem material in multimedia. In addition, the 5E learning model studied by Juheti can be applied through Book Creator[23]. This platform supports the stages of Engagement, Exploration, Explanation, Elaboration, and Evaluation in ecosystem learning.

Recent research by Aima underlines the important role of appropriate learning design in the context of distance education.[24]. In this case, Book Creator appears as an application that answers the need for efficient distance learning, especially for science learning with a focus on Harmony in Ecosystems. This application provides students with the flexibility to access learning materials without time and place restrictions, including the option to download materials to study without the internet. Another advantage is the ease of sharing materials between teachers and students which greatly helps the smoothness of distance learning. Research conducted by Nisa also shows that the use of technology in science learning plays a major role in improving student understanding[25]. Book Creator supports this through various multimedia features to visualize ecosystem concepts. The use of interactive animations such as food chain illustrations, simulations of living creature interactions, and ecosystem models makes it easier for students to digest abstract concepts. The learning experience is more complete with learning videos, audio narration, and high-quality illustrations.

Book Creator as a digital teaching material platform has proven to be increasingly effective because of its ability to accommodate various learning methods in accordance with Gardner's Multiple Intelligence concept. The use of various media in this platform provides students with the opportunity to absorb and understand the material through various learning methods. The combination of interactive visuals, audio content, and virtual practice activities not only accommodates diverse learning preferences, but also improves students' comprehension and memory in real terms.[26]. Book Creator provides a variety of learning styles that allow visual learners to learn through diagrams and animations, while students who are more comfortable with an auditory approach can benefit from verbal explanations and audio narration.

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[22] Rinda Dui Fangera, "PENGEMBANGAN E-MODUL BERBASIS CHEMO-EDUTAINMENT BERBANTUAN BOOK CREATOR PADA MATERI LARUTAN ELEKTROLIT DAN NON ELEKTROLIT" (Universitas Jambi, 2024).

[23] Juju Juheti, Sofyan Hasanudin Nur, and Anna Fitri Hindriana, "Model Pembelajaran Siklus Belajar 5E Untuk Meningkatkan Literasi Sains Dan Kreativitas Siswa Dalam Memecahkan Masalah," *Edubiologica Jurnal Penelitian Ilmu Dan Pendidikan Biologi* 6, no. 1 (2018): 20–26.

[24] Zulfitri Aima et al., "PELATIHAN PENYUSUNAN BUKU DIGITAL MENGGUNAKAN PLATFORM BOOK CREATOR," *Beujroh: Jurnal Pemberdayaan Dan Pengabdian Pada Masyarakat* 2, no. 1 (2024): 69–83.

[25] Sefiya Khoirun Nisa, Dian Devita Yohanie, and Darsono Darsono, "Pengembangan Bahan Ajar Interaktif Berbantuan Aplikasi Book Creator Dengan Model Problem Based Learning," *SJME (Supremum Journal of Mathematics Education)* 8, no. 2 (2024): 265–82.

[26] PADA JENJANG MADRASAH ALIYAH, "MULTIPLE INTELLIGENCES MENURUT HOWARD GARDNER DAN IMPLIKASINYA DALAM PEMBELAJARAN PENDIDIKAN AGAMA ISLAM," n.d.

Book Creator also provides interactive activities for students with kinesthetic learning styles, allowing them to actively participate in the learning process. This diverse approach not only accommodates various learning styles but also creates a more meaningful learning experience. This reinforces the importance of technology in education, especially through interactive digital teaching materials such as Book Creator, in improving the quality of science learning in elementary schools. The platform's ability to present materials in various media formats, coupled with its interactive features, has succeeded in creating a more interesting and effective learning atmosphere in helping to understand complex science concepts.

Discussion

Digital Teaching Material Design Based on Book Creator in the Science Subject Harmony in Ecosystems

The development of digital teaching materials based on Book Creator for the subject of ecosystem harmony presents an innovative approach in learning design. Referring to Piaget's constructivism theory, the material is designed as a vehicle for active knowledge construction, where students do not simply receive information, but build understanding through dynamic interaction with multimedia content.[27]. The digital storyboard is developed comprehensively, integrating various complementary educational elements. Academic texts are combined with informative visuals, educational audio, and interactive videos, creating a multidimensional learning ecosystem. Each component is designed with Mayer's multimedia principles in mind, which emphasize the importance of multiple representations in facilitating conceptual understanding.[28].

Instructional design takes into account the diversity of students' learning styles through the implementation of Howard Gardner's Multiple Intelligence theory. Multimedia navigation is designed flexibly, allowing students to explore the harmony of ecosystem materials according to their individual preferences. Interactive structures allow students to move freely, constructing knowledge through independent exploration and personal reflection. The aspect of technological responsiveness is a key consideration in the development of teaching materials. The interface design is adjusted for accessibility across digital devices, ensuring that content can be accessed via computers, tablets, and smartphones.[29]. This not only broadens the scope of the material, but also supports the flexibility of contemporary learning.

The context of the material focuses on a deep understanding of ecosystem harmony, inviting students to see the complexity of the relationships between living things. Through interactive visualizations and scientific narratives, the teaching materials help students understand ecological balance, species interdependence, and environmental dynamics. The pedagogical approach used creates a transformative learning experience. Not just a transfer of information, but a process of building ecological awareness. Students are invited to think critically, analyze complex relationships in ecosystems, and develop a holistic perspective on the environment.

Book Creator technology enables the development of content that is not only informative, but also aesthetic and engaging.[30]. Visual design that combines color, typography, and scientific illustration creates an inspiring learning interface. Each element is designed to stimulate curiosity, encourage exploration, and facilitate conceptual understanding. The pedagogical implications of this approach are significant. Digital learning materials are no longer simply a

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[27] Nurfatimah Sugrah, "Implementasi Teori Belajar Konstruktivisme Dalam Pembelajaran Sains," *Humanika, Kajian Ilmiah Mata Kuliah Umum* 19, no. 2 (2019): 121–38.

[28] Rahmadani, Dewi, and Fiandra, "PERANCANGAN STORYBOARD VIDEO DOKUMENTASI VISUAL KKN TEMATIK BUDAYA KERATON SUMEDANG LARANG."

[29] Wirhan Fahrozi and Dedek Indra Gunawan Hts, "Pemanfaatan Teknologi Informasi Dan Komunikasi Dalam Pembelajaran Pada Siswa SMA," *JICS: Journal Of International Community Service* 2, no. 01 (2023): 59–68.

[30] Khoirul Anam Anam et al., "Pendampingan Dan Pelatihan Pengembangan Buku Ajar Digital Berbasis Bookcreator Bagi Guru Madrasah Ibtidaiyah," *CARADDE: Jurnal Pengabdian Kepada Masyarakat* 6, no. 3 (2024): 518–26.

medium for conveying information, but rather a dynamic learning environment that encourages active knowledge construction, the development of critical thinking skills, and environmental awareness.

Feasibility of Digital Teaching Material Design Based on Book Creator in the Science Subject of Harmony in Ecosystems

Book Creator-based digital teaching materials represent an innovative breakthrough in modern pedagogical approaches. Through comprehensive validation involving material and media experts, this design has proven significant advantages over conventional methods.[31]. The validation process assesses not only technical aspects, but also the depth of substance and transformative potential in the learning experience. Content experts provide a deep appreciation of the systematic structure of the content, especially the ability of the material to translate abstract concepts into concrete understanding. The use of contextual examples and multidimensional approaches allow students to explore the material more comprehensively and meaningfully.

In line with Howard Gardner's Multiple Intelligence theory, this digital teaching material is able to accommodate a variety of learning styles, including visual-spatial, verbal-linguistic, and musical.[32]. This allows for personalized learning experiences that meet the individual needs of each learner, encouraging engagement and motivation to learn. Media experts gave positive assessments to the interface design, emphasizing ease of navigation and visual quality that supports the user experience. Learning materials are not just tools, but interactive means that stimulate students' cognitive and emotional involvement in the learning process.[33].

Student feedback consistently confirms the superiority of digital learning materials, with the majority reporting increased interest and motivation to learn. They perceive significant differences compared to conventional methods, indicating the transformative potential of this innovative approach in the context of contemporary education. In conclusion, digital learning materials based on Book Creator are not just technological instruments, but rather concrete manifestations of pedagogical evolution that are responsive to the needs of the digital generation, with the potential to optimize learning outcomes and experiences.

The Effectiveness of Digital Teaching Materials Based on Book Creator in Improving Student Learning Outcomes in the Science Subject of Harmony in Ecosystems

Comprehensive research on the effectiveness of digital teaching materials based on Book Creator at SDN Pakis 5 Surabaya presents an innovative evaluation methodology that revolutionizes the approach to instructional development. The systematic research design integrates cutting-edge formative evaluation principles, adopting theoretical frameworks from leading educational experts such as Dick, Carey, and Carey.[34]The implemented testing strategy involved two critical phases: small group and large group trials. These stages allowed researchers to conduct an in-depth analysis of the effectiveness of the digital learning materials, focusing on transforming the learning experience of primary school students. Through a phased approach,

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[31] Sakti and Purwowidodo, "Pengembangan Media Pembelajaran Book Creator Dalam Meningkatkan Pemahaman Pembelajaran IPA Kelas V Di SDN 2 Prayungan Nganjuk."

[32] Rahayu Febri Riyanti, A Roedhy Koesdyantho, and Feri Faila Sufa, "Implementasi Pembelajaran Multiple Intelligences Howard Gardner (Kecerdasan Kinestetik) Pada Anak Autis," *Jurnal Audi: Jurnal Ilmiah Kajian Ilmu Anak Dan Media Informasi PAUD* 4, no. 2 (2019): 110–21.

[33] Amanda Putri Ayuni, "PENGEMBANGAN BAHAN AJAR DIGITAL BERBASIS APLIKASI BOOK CREATOR PADA TEMA PERTUMBUHAN DAN PERKEMBANGAN MAKHLUK HIDUP KELAS III SD," *Joyful Learning Journal* 12, no. 4 (2023): 190–97.

[34] Riza Faishol, "Pengembangan Paket Pembelajaran Ilmu Pengetahuan Sosial (IPS) Kelas IV Menggunakan Model Dick, Carey & Carey Di SD Negeri 2 Tamanagung," *Jurnal Tarbiyatuna: Kajian Pendidikan Islam* 2, no. 2 (2018): 31–49.

every aspect of the learning materials could be comprehensively evaluated, ensuring quality and pedagogical relevance.

The research instrument was designed with high academic rigor, covering a broad spectrum of assessment. The learning outcome test adapted Bloom's revised taxonomy, allowing for the measurement of students' cognitive abilities from fundamental to complex creativity. The success criteria were set through rigorous quantitative and qualitative parameters. Fundamentally, this research is not simply evaluating digital teaching materials, but rather exploring the transformative potential of technology in education. The focus on primary school science learning creates a rich pedagogical experimentation space, where digital innovation meets the cognitive needs of young people.

The significance of the study lies in its ability to produce valid empirical data, providing substantive contributions to the development of digital teaching material models. Through a systematic and comprehensive approach, this study has the potential to open new insights into the effectiveness of technology integration in the context of primary education, marking a step forward towards a more responsive, interactive, and meaningful learning ecosystem.

Conclusion

The conclusion of the research on the development of digital teaching materials based on Book Creator at SDN Pakis 5 Surabaya shows a significant transformation in the approach to learning science, especially on the subject of harmony in the ecosystem. This research has succeeded in presenting an innovative solution that does not simply integrate technology, but fundamentally revolutionizes the learning experience of students. The design of the digital teaching materials developed shows comprehensive advantages, combining interactive multimedia elements with cutting-edge pedagogical principles. The intuitive interface and content tailored to the characteristics of grade V elementary school students are able to create a dynamic learning environment, encouraging active involvement and learning motivation.

The systematic development process, involving validation by material and media experts, and a series of trials, resulted in a high-quality product. Interactive features have proven effective not only in enhancing conceptual understanding, but also in developing critical thinking skills and problem-solving abilities of students. Positive responses from teachers and students indicate the transformative potential of digital teaching materials. In addition to increasing learning efficiency, this approach prepares students to face the challenges of 21st-century education, developing digital literacy that is essential in the contemporary technological era. Fundamentally, this study proves that the integration of technology in education, especially through Book Creator, is not just a trend, but a strategic need to create a more meaningful, interactive, and responsive learning experience to the diversity of students' learning styles.

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