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DEVELOPING NEARPOD-BASED KENTARAPOD INTERACTIVE MEDIA FOR IMPROVING IPAS LEARNING OUTCOMES IN ELEMENTARY EDUCATION

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Abstract
Interactive media plays an important role in digital learning. The primary objectives of this study are to develop the Kentarapod interactive media based on nearpod and to test its feasibility, effectiveness, and practicality. The researchers employed a research and development design, utilizing the ADDIE model, which encompasses analysis, design, development, implementation, and evaluation. This study involved 36 fourth-grade students at SDN Bonjor Rembang. Data were collected through observation, interviews, validation questionnaires, response questionnaires, and pre- and post-tests. Based on the validation results, the product was deemed highly feasible, with a score of 88.33% from subject matter experts and 81.66% from media experts. This interactive media significantly improved the learning outcomes of fourth-grade students at SDN Bonjor Rembang in the subject of IPAS on the topic of my region and its natural resources, with an average pretest-posttest score difference of 42.77 (small group) and 42.6 (large group), and an average N-gain score of 0.7811 and 0.7742 (high category). This media received a very practical evaluation from teachers at 100% and students at 97.7% (small group) and 98.7% (large group). Overall, Kentarapod has proven to be feasible, practical, and effective in improving the learning outcomes of fourth-grade students at SDN Bonjor Rembang.

Keywords: interactive media, IPAS, Kentarapod, learning outcomes, nearpod

Introduction

Due to the swift progression of technology and the accelerated dissemination of information, the education industry must perpetually update and adapt (Asad et al., 2022, p. 2). Education is no longer only understood as a process of transmitting knowledge from teachers to students, but as a means to form a whole human being, independent, critical thinking, creative, and character (Sari & Munir, 2024). Per Law No. 20 of 2003 regarding the National Education System, education is a consciously designed process aimed at creating an environment and learning activities that support students in developing their full potential. This potential includes spiritual strength, self-control, character, intelligence, good morals, and the skills needed for themselves, the community, the nation, and the state (Pemerintah Republik Indonesia, 2003).

In the midst of the growing digital era, the world of education in Indonesia is facing great challenges in harmonizing curriculum policies and their implementation in the field. To support

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

education reform, the Kemendikbudristek has implemented the Merdeka Curriculum, which emphasizes competency-based learning, adaptation to students' abilities and learning needs, and the strengthening of character values. One of the main policies in this curriculum is the integration of science and social studies subjects into IPAS for elementary school (Menteri Pendidikan Kebudayaan Riset dan Teknologi Republik Indonesia, 2022). This policy aims to make students not only master concepts, but also be able to think critically and conduct scientific inquiry into the surrounding environment.

Nonetheless, the actual situation reveals numerous challenges, particularly in the execution of education within the domains of Natural and Social Sciences (IPAS). Research suggests that the execution of the Merdeka Curriculum in IPAS education at the elementary level has been suboptimal. Prihatini and Sugiarti (2022) as well as Ummah and Mustika (2024) discovered that educators encountered challenges in comprehending and executing the curriculum owing to insufficient training and inadequate supporting resources. Wulandari (2023), showed that teachers still rely on textbooks and lecture methods, making learning monotonous and not encouraging active student participation. Findings from Suprapmanto and Zakiyah (2024), confirmed that the lack of variety in media makes students uninterested in IPAS learning. Low student motivation and non-interactive methods have an impact on students' difficulty in understanding the material and relating it to their daily lives (Sa'adah et al., 2023).

These problems still occur today. This was found at SDN Bonjor, Rembang Regency. From interviews with fourth-grade teachers, it was found that in IPAS lessons on the topic my region and its natural resources, many students did not understand the material, students are not very involved in the learning process and rarely show enthusiasm for learning. This material is actually very relevant to the local context of students, but because the presentation still uses the lecture method, students find it difficult to build a connection between the subject matter and the reality of their own lives. This boredom leads to low concentration during learning, which affects their learning outcomes. A study by Margiathi et al. (2023), states that the lack of student concentration has a very negative impact on their learning outcomes, causing learning objectives to not be achieved. This is evident from the results of students' daily tests, which show low mastery, with only 39% of students achieving mastery and 61% of other students not achieving mastery or falling below the learning objective mastery criteria.

This low learning outcome is not only caused by students' abilities, but also by a lack of innovation, especially in the use of learning media. The learning process tends to be monotonous, lecture-centered, and limited to the use of media such as textbooks, making students passive and unmotivated. A study by Yani et al. (2022) confirms that the selection of appropriate learning media greatly influences student motivation. This is even more crucial in science education, which should be able to foster curiosity and analytical skills regarding natural and social phenomena around them. On the other hand, today's students are digital natives who are accustomed to technology and information in their everyday existence. According to Warsihna et al. (2021), digital natives have practical and quick thinking characteristics and are accustomed to information and communication technology, which requires educational methods to be adapted to their characteristics. These characteristics demand a learning approach that not only conveys information but is also visual, communicative, and interactive.

In addition, according to Setiawati et al. (2024, p. 76) the rapid advancement of digital technology has driven the need to integrate technology into education as something that cannot be avoided. This is in line with the views of Iskandar et al. (2023, p. 35) who state that integrating technology into learning activities can improve the overall efficiency and quality of education. However, based on findings at SDN Bonjor, the learning process at the school has not optimally

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

utilized technology. This situation is one of the obstacles in achieving learning objectives, as an education system that is not in line with modern developments risks falling behind and failing to meet the needs of today's learners. As a result, achieving learning objectives becomes difficult. Consequently, the creation of technology-based interactive learning media is a pertinent and immediate answer to tackle the issues of contemporary education and enhance student learning results.

Interactive media enables the creation of a more lively and enjoyable learning environment, as well as encouraging active student participation (Hasnawiyah & Maslena, 2024). According to Surjono (2017, p. 41) interactive media not only presents information visually and auditorily, but also encourages student participation and enthusiasm in learning, helping them understand the subject matter better. One form of interactive learning media that can be utilized is nearpod, a digital platform that facilitates interaction between educators and students. A study by Lestari & Sihombing (2022) found that Nearpod can be used as an effective digital medium to enhance the learning process. Abdullah et al. (2022) emphasized that nearpod's features can help students engage actively during learning activities. Nearpod provides various digital learning materials, including slides, videos, assessments, simulations, and more, enabling students to learn independently anytime and anywhere.

Prior research indicated that the utilization of nearpod-based interactive learning media markedly enhances student motivation, engagement, and academic performance. The findings of a study conducted by Helnanelis & Ulyanti (2023) indicate that a comparison of pre- and post-tests with Nearpod-based media demonstrated a significant enhancement in student motivation. A comparable study by Pazah et al. (2024) demonstrated that the development of interactive learning media coupled with nearpod is both very practical and beneficial in enhancing student academic performance. Additional research indicates that nearpod is a suitable educational tool as it satisfies the criteria of validity, efficacy, and ease of use in the learning process (Fareza & Zuhdi, 2022). Moreover, additional research demonstrates that the utilization of Nearpod substantially influences the enhancement of students' critical thinking abilities (Noor & Anggoro, 2024). The data indicate that nearpod is an innovative approach for improving the educational process in schools.

Despite numerous studies demonstrating the efficacy of nearpod-based interactive media in improving student motivation and learning results, deficiencies persist in its particular application within natural and social sciences (IPAS) topics. Most existing studies have focused on general subjects, while research examining the implementation of nearpod in IPAS learning, particularly on contextual topics such as my region and its natural resources, remains very limited. Therefore, the aims of this research are: (1) to develop a nearpod-based interactive media design called Kentarapod to improve the learning outcomes of fourth-grade students at SDN Bonjor in IPAS; (2) to test its feasibility; and (3) to test the effectiveness of the media in improving the learning outcomes of fourth-grade students at SDN Bonjor in IPAS. The study aims to address the subsequent research inquiries: (1) *How can the development design of Kentarapod interactive media based on nearpod improve the IPAS learning outcomes of fourth-grade students at SDN Bonjor?*; (2) *How feasible is Kentarapod interactive media based on nearpod in IPAS learning?*; and (3) *How effective is Kentarapod interactive media based on nearpod in improving the IPAS learning outcomes of fourth-grade students at SDN Bonjor?*. This study seeks to provide effective solutions by developing technology-based interactive learning media, aimed at enhancing student learning outcomes in IPAS topic at the elementary school level.

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

Literature Review

This literature review discusses theories related to learning outcomes, interactive learning media, and nearpod-based Kentarapod as an interactive media in IPAS learning. This literature review serves as a basis for understanding the role of interactive media in improving learning outcomes and supporting adaptive learning that is in line with technological developments.

Learning outcomes

Learning outcomes are indicators of student competence after participating in the learning process Sudjana (2010), asserts that learning outcomes indicate the degree to which students comprehend the subject covered. In this context, Arikunto (2013), elucidates that learning outcomes can be assessed through evaluations that demonstrate the attainment of educational objectives. Furthermore, Anderson & Krathwohl (2001), categorize learning outcomes into three primary domains: cognitive, affective, and psychomotor, each emphasizing different aspects of student development. In the context of IPAS learning, learning outcomes play an important role because they are used to measure the success of the integration of students' conceptual understanding with their critical thinking skills.

Interactive media in learning

According to Suprijono (2013, p. 57), interactive learning media are tools that enable students to interact directly with learning materials through computer software, web-based applications, or other multimedia tools. Such interactions can take the form of activities such as answering questions, running simulations, or performing activities that support concept understanding. Heinich et al. (2002), state that interactive media allow students to respond directly to stimuli presented, thereby creating active engagement in the learning process. In line with this, Mayer (2009), through his Multimedia Learning theory, emphasizes that learning is more effective when text, images, and animations are combined in a single interactive platform. A study found that various forms of interactive learning media, such as educational videos, simulations, educational games, and digital platforms, have proven effective in increasing motivation, strengthening conceptual understanding, and encouraging active student participation in learning activities (Utomo, 2023).

Nearpod-based kentarapod as an interactive media

According to Ali et al. (2024) in their book *Interactive Learning Media: Comprehensive Theory and Development of Interactive Learning Media in Elementary Schools*, interactive learning media is a tool designed to encourage active student engagement through direct interaction with learning materials that are visual, audio, or kinesthetic in nature. Such media can create a more enjoyable, communicative, and non-monotonous learning atmosphere. This is in line with the view of Lestari (2024) in her book *Interactive Multimedia-Based Learning Media*, which emphasizes that the use of multimedia elements in learning media, such as text, images, audio, and animation, can increase the attractiveness and effectiveness of learning. Based on this foundation, Kentarapod was developed as an interactive learning media based on Nearpod, aiming to increase active participation and concept understanding

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

among students through features such as quizzes, videos, audio, text, and integrated visual presentations.

Nearpod is a digital platform that enables teachers to create and deliver learning materials interactively and in real-time, both in online and offline learning, and allows students to respond directly through their own devices. The effectiveness of nearpod in learning has been proven by Aryani et al. (2023) in their research, which found that its use was able to increase students' learning motivation and mathematical communication skills. Another study by Puspita & Patricia (2024) demonstrated that nearpod-based learning media was considered highly feasible, practical, and effective in improving student learning outcomes and received positive feedback from teachers and students. A similar study by Sari et al. (2024) found that nearpod can enhance students' interest and participation in the learning process.

IPAS learning

IPAS is an integration of natural science and social science that emphasizes the relationship between humans and their environment (Kemendikbud, 2022) . In the Merdeka Curriculum, IPAS is taught in Phase B and C (grades III-VI) to foster critical thinking skills and curiosity from an early age. Learning IPAS requires a contextual, meaningful, and fun approach so that students can understand the interrelationships between concepts thoroughly and are relevant to everyday life. In line with this, according to Suhelayanti et al. (2023) in the book *Pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS)*, that the utilization of suitable learning media can enhance students' comprehension of IPAS content in a more contextual and engaging manner. Technological tools, like educational movies, animations, and interactive software, facilitate students' exploration of abstract concepts in a tangible way. A study by Fitri et al. (2024) states that the use of technology-based learning media in IPAS learning can facilitate teachers in delivering material and spark students' enthusiasm.

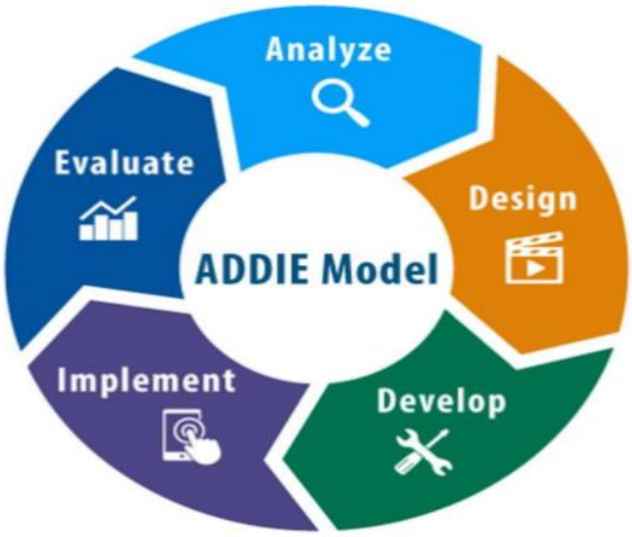
Methodology

Research design and approach of the study

This study uses a Research and Development (R&D) framework. Sugiyono (2016), asserts that the research and development methodology seeks to create a product and assess its efficacy. The aims of this study are to develop, assess the feasibility, and evaluate the effectiveness of the Nearpod-based Kentarapod interactive media. The feasibility of this platform is evaluated by expert validators who have a background in content and media, while its effectiveness is measured through pretest and posttest results from fourth-grade students at SDN Bonjor. The ADDIE model serves as the development framework for this study, encompassing analysis, design, development, implementation, and evaluation (Branch, 2009).

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

Figure 1. *Process flow of the ADDIE model (Rusmayana, 2021)*



In the analysis phase, the researchers examined the challenges and requirements faced by both teachers and students by conducting interviews, carrying out classroom observations, and reviewing data related to student learning outcomes.The design stage was carried out by developing media designs that were in line with the learning needs and objectives. In the subsequent development phase, the media is created and undergoes feasibility testing by both subject matter and media experts, with modifications made according to their feedback. During the implementation phase, the media is evaluated for its effectiveness by comparing the test scores from before and after its use, along with gathering input from both teachers and students. Finally, in the evaluation stage, researchers analyze user feedback to refine the media.

Research site and participants

All 36 fourth-grade students at Bonjor Public Elementary School were included in the population of this study. Participant characteristics included students aged 9–10 years who had participated in thematic learning based on the Merdeka Curriculum and had experience using technological devices such as smartphones. Due to the relatively small population, the sampling technique chosen was the saturated sample technique. This technique is considered appropriate because it allows the entire population to be sampled, considering the number of students is not too large. This is supported by Arikunto's opinion, where he states that if the population is less than 100, then the entire population can be sampled (Arikunto, 2002) . This technique allows researchers to involve all members of the population as samples (Sahir, 2022). To obtain more complete and representative data, 9 students were randomly selected to participate in a small group trial. Subsequently, the remaining 27 students participated in a large group trial in the product trial. This is

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

in line with Sugiyono (2015) statement that small group trials can be conducted on 6-12 people, while large group trials are conducted on 20-30 people or more to obtain representative data.

Data collection and analysis

This study used tests and non-tests to collect data. The test instruments consisted of pre-test and post-test questions aimed at evaluating the efficacy of the media in enhancing students' learning outcomes about IPAS subject. The questions were developed by the researchers based on learning objectives and indicators in line with the curriculum, and they have undergone testing for validity, reliability, difficulty, and discriminative capacity. Meanwhile, non-test instruments include observation and interviews, needs questionnaires, product feasibility validation, and feedback from teachers and students. Observations and interviews were used in the initial stage to identify learning problems. Needs questionnaires were used to identify the needs of teachers and students in the learning process. Expert validation sheets were used to assess the suitability of Kentarapod media in terms of content and design. Then, teacher and student response questionnaires were given to assess the ease of use of the media (Sugiyono, 2015). The media's feasibility was evaluated based on expert evaluations, which were calculated using a specific formula.

$$NP = \frac{R}{SM} \; x \; 100 \; ... \; (1)$$

Description:
NP = percent value sought or expected
R = raw score obtained
SM = maximum score

The percentage results of the feasibility data are then converted to the criteria in the media feasibility table.

Table 1. *Media feasibility criteria (Riduwan, 2011)*

Percentage	Criteria
76%-100%	Very feasible
51%-75%	Worth
26%-50%	Decent enough
0%-25%	Less feasible

The effectiveness of Kentarapod media based on nearpod was measured through an analysis of pretest and posttest results of fourth-grade students on IPAS material. The data was analyzed with SPSS version 24, and the efficacy level was assessed through the computation of the N-gain value using a specified formula.

$$\text{N-gain} = \frac{posttest\ score - pretest\ score}{maximal\ score - posttest\ score} \; ... \; (2)$$

These results were then classified according to the criteria set as follows.

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

Table 2. *Criteria for improving learning outcomes (Lestari, 2015)*

Coefficient Interval	Criteria
N-gain < 0.3	Low
0.3 ≤ N-gain < 0.7	Medium
N-gain ≥ 0.7	High

The entire data collection and analysis process were carried out by the researchers.

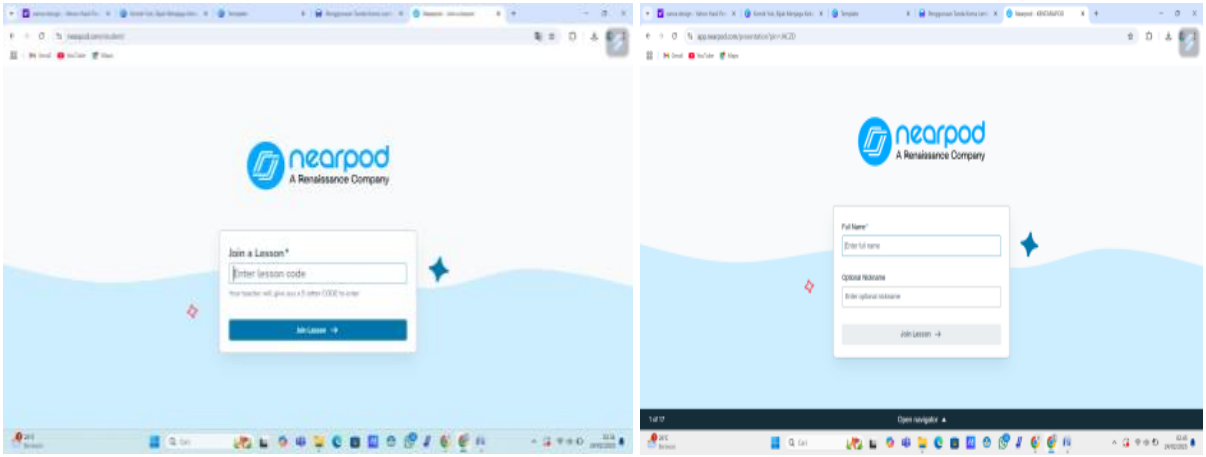
Results

Design of nearpod-based interactive media development for kentarapod

Initial analysis of observations and interviews shows that IPAS learning in grade IV at SDN Bonjor still uses conventional methods with limited media in textbooks, without the use of technology. Consequently, students become passive, readily disinterested, and achieve low learning outcomes. Only 39% of students achieve the minimum competency standard, while 61% do not. The examination of the analysis of teachers' and students' needs indicate that technology-based learning media, such as nearpod-based Kentarapod, are urgently needed to support a more effective learning process. Most students expressed interest in using interactive media equipped with attractive images, bright colors, and clear instructions. Both teachers and students hope for learning media that is not only visually appealing through the use of images and bright colors but also uses simple and easy-to-understand language and is tailored to learning outcomes and objectives.

In response to these needs, the researchers designed interactive media using Kentarapod with features such as slide presentations, videos, audio texts, matching quizzes, and the Time to Climb game. The content was created using Canva and uploaded to nearpod, with attention to aesthetics and relevance of the content to the learning objectives of IPAS. Below is a preview of the media.

Figure 2. *Name and code entry page*



ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

Figure 3. *Media usage instructions page*

Figure 4. *Learning materials page*

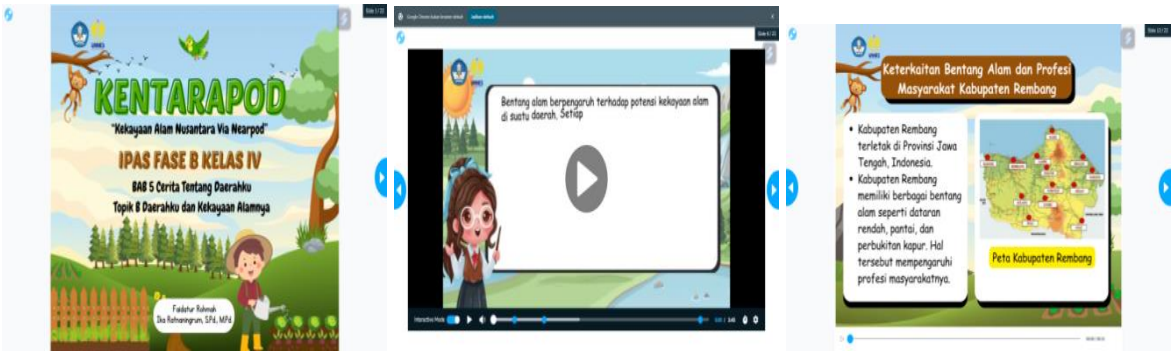
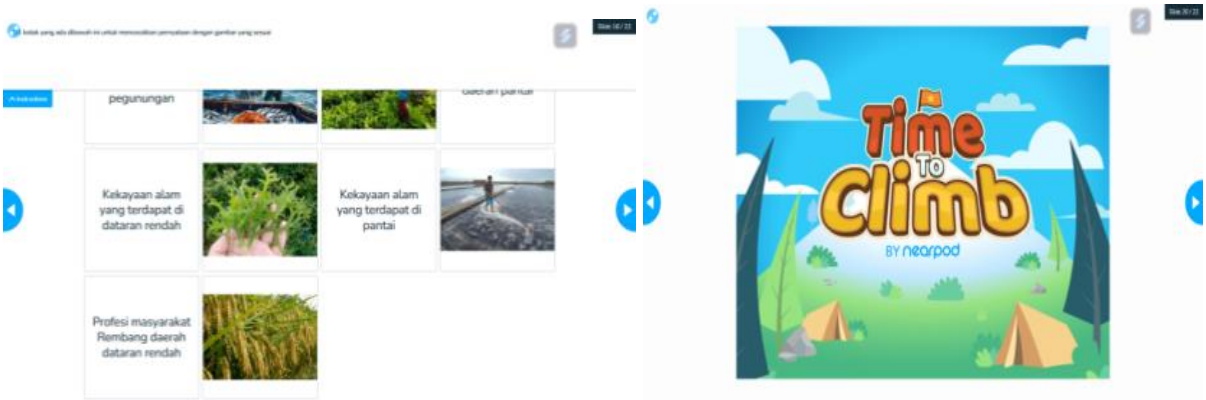


Figure 5. *Quiz and educational games page*



ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

The feasibility of nearpod-based kentarapod interactive media in improving ipas learning outcomes

The validity of the media was assessed by two expert validators, namely a subject matter expert and a media expert. The subject matter's validity was evaluated by a lecturer specializing in social science teaching within the Elementary School Teacher teaching Study Program. Meanwhile, the media was validated by a lecturer who is competent in the field of learning media. The product feasibility validation process was carried out using a special questionnaire designed to assess the product. The outcomes of the product feasibility validation are as follows.

Table 3. *Product feasibility validity results*

Validators	Percentage	Description
Material Expert	81.66%	Very Feasible
Media Expert	88.33%	Very Feasible

Based on the table above, the Kentarapod media based on nearpod is considered very feasible. However, there are still some notes for improvement. The researchers then made revisions according to expert input to perfect the product.

The effectiveness of nearpod-based interactive media in improving ipas learning outcomes

The product trial analysis results indicated an enhancement in the learning outcomes of fourth-grade pupils following the utilization of the Kentarapod interactive learning media based on Nearpod. This experiment included 36 fourth-grade kids from Bonjor State Elementary School, categorized into two groups: a small group of 9 pupils and a big group of 27 students. Both groups engaged in the educational process with Kentarapod media founded on Nearpod. Prior to the experiment on the extensive cohort, the medium was initially evaluated on a smaller group to get preliminary data regarding its efficacy. Students in each group initially completed a pretest, subsequently engaged in media-based learning activities, and finally undertook a posttest to assess the enhancement in learning outcomes. The outcomes of the pretest and posttest are delineated as follows.

Table 4. *Class IV pretest and posttest results*

action	average	highest score	lowest score	average difference
small group pretest	45	60	35	42.77
small group posttest	87.77	95	80	
large group pretest	44.25	70	30	42.6
large group posttest	86.85	100	70	

Based on Table 4, there was an enhancement in learning outcomes of 42.77 in the small group and 42.6 in the large group, indicating that the nearpod-based Kentarapod media can enhance learning

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

outcomes in IPAS, particularly in the material on my region and its natural resources. Furthermore, to assess the media's effectiveness in further depth, a study was conducted utilizing the N-gain test. Prior to executing the test, a normality assessment was conducted to verify that the data adhered to a normal distribution. A t-test was subsequently performed, followed by an N-gain test to quantitatively assess the media's efficacy.

Table 5. *Normality test results*

Action	Sig.
Small Group Pretest	0.117
Small Group Posttest	0.338
Large Group Pretest	0.104
Large Group Posttest	0.065

The data in the table show significance values (sig.) >0.05. This indicates that the data exhibit a normal distribution. In this case, the researchers employed the Shapiro-Wilk test to test normality because this test is more reliable for small sample sizes. This test is important because it forms the basis for selecting statistical tests, especially the t-test, which requires data with a normal distribution (Muhid, 2019). Since the normality criteria were met, a t-test was conducted to determine the significant difference between the pretest and posttest results of students in using the product. The analysis results are detailed in the subsequent description.

Table 6. *T-test results*

Action	t	Sig. (2-tailed)
Small Group Pretest and Posttest	-19.250	0.000
Large Group Pretest and Posttest	-28.494	0.000

According to the data in Table 6, the two-tailed significance value is 0.000, which is below the significance threshold of 0.05. Consequently, the research hypothesis is validated (Nuryadi et al., 2017). This finding demonstrates a notable impact on enhancing students' academic performance, particularly in the IPAS subject concerning the topic my region and its natural resources." Additionally, to determine the level of effectiveness of the Kentarapod interactive media based on Nearpod, an N-gain test was conducted (Sukarelawan et al., 2024).

Table 7. *N-Gain Test Results*

Action	N-Gain	Category
Small Group Pretest and Posttest	0.7811	High
Large Group Pretest and Posttest	0.7742	High

In a small-group test, the N-Gain score reached 0.7811, while in a large-group test, it was 0.7742. Both scores fall into the high category, indicating that this media is effective in the learning process, both in small and large groups. The stable improvement in both groups demonstrates that this medium is

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

capable of helping students understand the material more deeply and enjoyably. The utilization of nearpod-based Kentarapod interactive media is considered practical. This is evident from the results of the teacher and student response survey below.

Table 8. *Results of student and teacher feedback questionnaires*

Respondents	Percentage	Category
Teacher	100%	Very Practical
Small Group Students	97.7%	Very Practical
Large Group Students	98.7%	Very Practical

The percentage results presented in Table 8 demonstrate that the media is categorized as highly practical.

Discussion

The results of data analysis from student and teacher questionnaires in grade IV at SDN Bonjor revealed that interactive learning media are urgently needed in the IPAS learning process. Low student learning outcomes indicate that learning has not been optimal. Teachers expressed difficulties in presenting IPAS material in an engaging and easily understandable manner, while students stated that they needed media that not only explained the material but was also enjoyable and interesting. The interactive Kentarapod media, based on nearpod, was developed to present material on my region and its natural resources in the IPAS subject in a more communicative, engaging, and easily understandable manner for students. The results of product feasibility validity revealed that the Kentarapod interactive media based on Nearpod is feasible for use in learning. Validation conducted by subject matter experts and media experts showed that Kentarapod obtained scores of 88.33% and 81.66%, which fall into the highly feasible category. Previous research indicates that a product is considered suitable if it meets the minimum suitability criteria (Susanto, 2021) and successful if it achieves a score of 81%-100% (Chairunnas et al., 2022). Nearpod is suitable for elementary school learning (Feri & Zulherman, 2021).

Kentarapod, based on nearpod, packages material in the form of videos and audio texts, making it easier for students to understand the content rather than just reading like in a textbook. This audio-visual presentation makes students more interested, actively involved, and less likely to get bored. In addition, Kentarapod is equipped with Matching Pairs quizzes and the educational game Time to Climb, which serve to reinforce students' understanding of the material. Time to Climb comes with a ranking score, which encourages competitive spirit and increases students' motivation to learn. Nearpod-based Kentarapod also allows unlimited access anytime and from any location, provided there is an internet connection, supporting a flexible learning environment that can be tailored to the needs and learning characteristics of each student. With a variety of interactive content and learning activities, students can focus more and understand the material more deeply. This makes nearpod-based Kentarapod an effective digital platform for improving learning outcomes and encouraging active student participation in IPAS learning, particularly in the my region and its natural resources material.

The Nearpod-based interactive media Kentarapod has proven effective in improving learning outcomes in IPAS, particularly in the subject of local geography and natural resources. Based on the

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

results of the N-gain test analysis, a score of 0.7811 was obtained for the small group and 0.7742 for the large group, both falling into the high category. Additionally, data analysis revealed an increase in the average student scores from the pretest and posttest after using the media, indicating an improvement in learning outcomes. This finding is corroborated by prior studies indicating that the utilization of nearpod-based interactive media enhances students' comprehension of the topic, consequently favorably influencing learning results (Custodio et al., 2025; Muliani & Ginting, 2023; Susanto et al., 2022). The nearpod platform also contributes positively to the learning process, such as increased interaction during learning, more enthusiastic students, and better learning outcomes (Prasetyo & Andayani, 2024). These findings are also consistent with other studies indicating that Nearpod effectively enhances students' understanding of learning materials, offering alternative teaching strategies that support active knowledge construction and higher-order thinking skills (Maknun et al., 2025).

In line with this, Mayer's Multimedia Learning Theory (2009), states that learning is more effective when information is presented through a combination of words and images that complement each other. Nearpod integrates text, images, videos, audio, and interactive quizzes, helping students build visual and verbal understanding simultaneously. The engaging and interactive presentation of the material encourages active student participation and makes it easier for them to understand and remember the concepts being taught.

In addition, the practicality of Kentarapod interactive media was analyzed through questionnaires obtained from teachers and students. The practicality of Kentarapod interactive media was analysed through the distribution of response questionnaires to teachers and students. This examination was undertaken to assess the quality of the created media. The feedback questionnaire findings demonstrate that the Nearpod-based Kentarapod interactive media is exceptionally effective for educational purposes. The response rate among professors was 100%, but the response rates for students were 97.7% in the small group and 98.7% in the large group, all of which are considered highly practical. The feasibility of the method was assessed according to the aesthetic quality of the media and its conformity with the properties of the material. The results indicate that the created media aligns with the educational content and student characteristics, rendering it ideal for learning activities. These findings align with prior research suggesting that nearpod-based interactive media has a high level of practicality in supporting the smooth running of the learning process (Banjarnahor & Tarigan, 2023; Purnama et al., 2024).

Kentarapod interactive media based on Nearpod has a number of advantages that support learning effectiveness. One of its main advantages lies in its interactive nature. Through features such as quizzes, educational games, and matching activities, this media is able to create an active and fun learning atmosphere. In addition, attractive visuals and a dynamic learning experience can enhance students' motivation and interest in learning. From a pedagogical perspective, Kentarapod interactive media supports scientific and differentiated learning and facilitates real-time evaluation by teachers. This interactive media is also flexible and accessible via digital devices, both for classroom and distance learning (Nasarudin et al., 2024). However, Kentarapod interactive media also has several limitations. Dependence on a stable internet connection and user technological readiness are major challenges. In addition, the complex preparation process and limited features in the free version of Nearpod can reduce its effectiveness. Therefore, the use of Kentarapod still requires adequate infrastructure and digital literacy support.

This study has significant implications for various stakeholders. For future researchers, these results can be used as a basis for developing similar media with broader coverage of material, levels,

ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

or methods. For teachers, Kentarapod can be used as an alternative interactive and interesting learning medium, with the proviso that digital competencies need to be improved. Meanwhile, for policy makers at the school and education office levels, these findings can be taken into consideration in the provision of training and infrastructure to support technology-based learning.

However, this study has several limitations. The selection of participants was limited to one school with a relatively small number of respondents, making it difficult to generalize the results on a broader scale. The study's scope concentrated on particular topic and grade levels, thereby limiting the applicability of the media. Therefore, further research is needed to address these limitations.

Conclusion and Recommendations/Implications

The following conclusions can be drawn from the findings and discussion: (1) the Kentarapod interactive media based on Nearpod has an attractive design that aligns with the needs of the research subjects and presents content relevant to learning outcomes and objectives, thereby facilitating students' understanding of the material being studied; (2) the validity of the nearpod-based interactive media Kentarapod has very feasible criteria. The validation results yielded a score of 88.33% from subject matter experts and 81.66% from media experts; (3) the Kentarapod-based Nearpod interactive media is effective for teaching IPAS material on local geography and its richness. This is evidenced by the average N-gain score of 0.7811 (small group) and 0.7742 (large group), indicating high effectiveness. Additionally, student learning outcomes showed significant improvement, as reflected in the difference in average scores between the pretest and posttest, which were 42.77 for the small group and 42.6 for the large group. Furthermore, positive feedback from teachers (100%) and students (97.7% in the small group and 98.7% in the large group) indicated that this media is highly practical to use. Therefore, the use of the interactive Kentarapod media based on nearpod can enhance learning outcomes in the IPAS subject, particularly on the topic my region and its natural resources.

However, this study has several limitations, including the fact that the trial was only conducted in one elementary school and the focus of the study was limited to improving students' cognitive aspects. Other aspects such as learning motivation, social skills, and affective development have not been thoroughly researched. Therefore, it is recommended that further research be conducted with a broader scope, covering various levels and different school conditions..

Disclosure statement

No potential conflict of interest was reported by the authors.

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ISSN |2355-3669| E-ISSN |2503-2518|
Volume 12 | Number 1 | June 2025|

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ISSN |2355-3669| E-ISSN |2503-2518|
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