

Development of Nearpod-Based Learning Media to Improve Learning Outcomes in Elementary School Grade V IPAS Subjects

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Abstract: The purpose of this research is to develop Nearpod-based learning media to help improve students' low learning outcomes and maximize the use of technology-based media at SDN Wonosari 02 Semarang City. This research is a type of Research and Development (R&D) research with the ADDIE development model. The results showed that Nearpod-based learning media is very feasible to use in learning IPAS human respiratory system material with a percentage of assessment by material experts of 88.75% and media experts of 93.75%. The results of the questionnaire assessment by teachers related to the media obtained a percentage score of 90% and students of 93.33% with a very feasible category. For the Paired Sample T-Test test with a significance value of sig. (2-tailed) obtained a result of 0.000. So, it is known that the value is < 0.05 . Therefore, it can be concluded that there is a significant difference from the average pretest score and the average posttest score. As for the N-Gain Test, the score shows an average of 0.71 with high criteria. The conclusion of this study is that Nearpod media is feasible and effective to improve student learning outcomes in IPAS learning.

Keywords: IPAS learning outcomes; Learning media; Nearpod

Introduction

The development of science and technology in all countries is taking place very rapidly, including Indonesia. As we know, technology has now entered various aspects of the field, one of which is education (Putra, 2018). This shows that technology is very influential on everyone's life, as well as education (Bentri & Hidayati, 2022). Education and technology are two things that cannot be separated, where later education will lead Indonesia to keep up with the times.

Quality education should be designed to face the challenges that exist in accordance with the times. Therefore, improving the quality of education starts with developing and evaluating the curriculum used in the learning process. The curriculum is a set of learning plans that include content and topics that are structured and planned (Aminah & Sya'bani, 2023).

Kemendikbudristek has just issued a new curriculum, namely the Merdeka Curriculum as a replacement for the 2013 curriculum. To achieve the objectives of the independent curriculum, innovation is needed in the learning process. The learning process is an activity designed to teach students (Hasan, 2024). Classroom learning should be interactive and foster a collaborative attitude from learners (Sukma et al., 2018). The activeness of students during the learning process is very necessary, students become the center while the teacher acts as a facilitator of all learning activities (Syahrir et al., 2023). In addition, the learning model must also be designed in accordance with the learning material being taught and also the characteristics of the students. Educational activities must be created by every teacher (Amini & Saniyah, 2021).

Entering the era of society 5.0 where all technology is part of humans themselves, Learning with an

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independent curriculum should be followed by the use of adequate technology, one of which is the use of learning media. The use of media is done so that the teaching and learning process becomes interesting and not boring which can result in the inhibition of the knowledge transfer process (Listiyani et al., 2021). According to Fatayan et al. (2023) learning media is a tool that can be used in education to convey learning materials. Learning media is an intermediary that can channel information, namely learning material provided by the teacher, as a message distributor to students as message recipients in order to achieve the learning objectives set (Susanto, 2021). Learning media can make it easier for students to understand learning materials and intermediaries that make it easier for teachers to convey learning materials (Fauzi et al., 2024). Then Kustandi & Darmawan (2020) added, tools that can be used in the teaching process so that the objectives of learning can be achieved are called learning media.

Without learning media, the material presented becomes abstract and can cause misconceptions so that it can hinder students' understanding of the material being taught. For this reason, in understanding and learning material, students need help from learning media (Ibda et al., 2023). With learning media, students can foster reasoning, care, and desire of students, so that students can receive and understand the learning material conveyed by the teacher properly (Munandar & Ahmad, 2022). Media can also facilitate learners to work together with their friends in the form of collaboration in achieving learning goals (Meisaroh & Suparno, 2024).

Given today's technological advances, media has an important use in the teaching process, teachers can create appropriate learning media based on technology (Cheng & Tsai, 2019). In learning activities, teachers are required to present media and make it a learning resource for students (Cynthia et al., 2023). The selection of appropriate and appropriate learning media will make students excited, motivated to learn, and learning will not be boring (Gustini et al., 2023). Interactive media is one example of media needed in learning activities and in accordance with the times. Interactive learning media is a software that can combine images, animation, sound, and video where it can make users or learners interact directly (Devega, 2022). Interactive learning media is media that allows learners to interact actively with learning materials because it is supported by features such as choices, simulations, practice questions, and feedback (Jafnihirda et al., 2023). Through interactive media, students can receive information effectively and students become enthusiastic in learning activities (Andrian et al., 2018).

Interactive media can be created through applications or educational platforms that have been provided, teachers can choose and customize it

appropriately. In choosing applications as learning media, teachers can pay attention to several things, including the advantages and disadvantages of the media, the material being taught, the characteristics of the students, besides that learning media must be efficient, relevant, and productive (Osborne et al., 2019).

Based on the results of observations and interviews with the fifth grade teacher conducted by researchers at Wonosari 02 State Elementary School in Semarang City, problems were found in the subject of human respiratory system. In the independent curriculum, science and social studies subjects at the elementary school level are combined into Natural and Social Sciences (IPAS) subjects. The combination of science and social studies subjects is due to considerations that students tend to see everything as a whole and integrated (Purnawanto, 2022). Learners find it difficult because of the breadth of human respiratory system material and the low learning motivation possessed by students which has an impact on learning outcomes that are not optimal. In the material of the human respiratory system there are also several scientific names that result in students having to study the respiratory system material in depth. So that when an interview was conducted with the fifth grade teacher, the researcher found that the IPAS learning outcomes, especially in the material of the human respiratory system as a whole, showed that the learning outcomes of students had not met the criteria for Achievement of Learning Objectives.

Student learning outcomes are things that need to be considered in the world of education because by obtaining high learning outcomes, the process of learning can be said to be successful as indicated by the achievement of learning objectives. Learning outcomes themselves are the ability of students from learning and remembering various facts and being able to communicate the knowledge gained orally or in writing during tests or exams (Aulia & Sontani, 2018). From the results of exams or tests, teachers can get feedback in the form of information about how far students can understand the material that has been taught (Datu et al., 2022).

During observations of the learning process at Wonosari 02 State Elementary School in Semarang City, the fifth grade teacher had used media in delivering the material such as using artificial lung props made of bottles, clear hoses, and balloons. However, the props have a limited number. Meanwhile, technology-based media used is limited to power points and learning videos taken from YouTube. However, it is felt that the media used by the teacher does not vary, causing low learning motivation from students. Interactive technology-based media with learning materials that can increase students' learning motivation has not been

developed by teachers to support the learning process due to limited abilities and time.

Based on these problems, researchers want to provide a solution, namely by developing Nearpod-based learning media in IPAS subjects on human respiratory system material. Nearpod is an application for learning that can be accessed online and offline so that learning can be done directly in the classroom or students can learn the material independently at home (Minalti & Erita, 2021). Nearpod media increases learner participation, motivation, and help learners learn the material well (Carrillo-Yalán et al., 2023). Through Nearpod, teachers can also create evaluation questions for daily assessments, interactive presentations, surveys, and other learning activities that can be easily accessed by students via mobile phones or laptops (Powa & Murniarti, 2022). Musa & Momani (2022) added, the Nearpod application has features to combine presentations, add PDFs, provide VR displays, interactive quizzes, and long-answer quizzes. Nearpod media makes learning activities more dynamic and fosters students' interest in learning so that learning activities become active and students can understand the material deeply (Feri & Zulherman, 2021). In accessing learning on Nearpod requires an internet connection, teachers can create learning media with Nearpod for free but there are also paid features for learning that exceeds 40 MB file capacity (Pan, 2020).

There are several studies that discuss the use of Nearpod applications as learning media, such as research conducted by Muliani & Ginting, (2023) with the title "Development of Interactive Learning Media Assisted by Nearpod Theme 6 Subtheme 3 Class IV Students of Elementary School 054870 Tanjung Jati T.A 2022/2023" From this study, it was found that the increase in learning outcomes after students used Nearpod media, which reached an average of 91.34 from the previous average of 65. From these results, it is proven that Nearpod media is effective and practical to use in learning activities and can improve learning outcomes. Research by Laras et al. (2022) with the title "Development of Nearpod-Based Gapadia Learning Media with the Subtheme of Beautiful Cultural Diversity in My Country Class IV at Petungasri III Pandaan Elementary School, Pasuruan Regency" The results showed that the media practicality questionnaire got 87.5% with "very practical" criteria and the effectiveness of the media from the analysis of students' responses reached 88% with the "very good" category. So that the Nearpod-based Gapadia learning media developed is effective, valid, and also practical and learning becomes interesting, meaningful, and fun. Then the research by Rahmawati et al. (2023) with the title "Development of Nearpod-Based Interactive Learning Media for the Theme of how rich my country Subtheme of Utilization

of Natural Wealth in Indonesia". The results of the study stated that the developed media received a validation result of 95% in the "very good" category by the fourth grade teacher of SDIT Putra Pakuan and got a percentage of 89% from students after the product was tested. From these results, it can be said that Nearpod received a positive impression from both teachers and students and made learning more active and students more enthusiastic about learning. Thus, it can be seen that the use of Nearpod-based application media is very useful for teaching and learning activities (Ichsan et al., 2021).

Based on the explanation of the problems that have been described, researchers will conduct development research (Research & Development) with the title Development of Nearpod-Based Learning Media to Improve Learning Outcomes in Class V Elementary School IPAS Subjects, especially at Wonosari 02 State Elementary School. Seeing from some relevant research, Nearpod media is very effective, practical, and makes learning more active so that it can improve learning outcomes.

Method

This research was conducted in the fifth grade of Wonosari 02 State Elementary School in Semarang City. The type of research used in this study is R&D (Research and Development), which is a research method with the aim of producing a product and then testing the effectiveness of the product (Sugiyono, 2017). The development model used in this research is the ADDIE model developed by Reiser and Mollenda in the 1990s. According to research by Anugrahini & Windrawanto (2017) with the ADDIE development model, the stages carried out in the research can be seen in the following Figure 1.

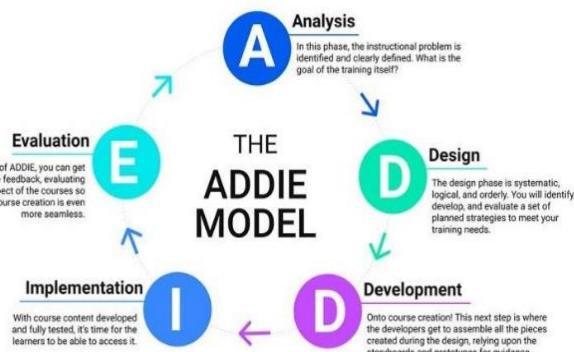


Figure 1. ADDIE research model

Development-based research on media can use the ADDIE model (Dwitiyanti et al., 2020). Nearpod is the media developed in this study to improve the learning

outcomes of fifth grade IPAS at Wonosari 02 State Elementary School in Semarang City, especially on human respiratory system material. With Nearpod learning media, learning will be more focused and interesting and can stimulate the creativity of students (Aji et al., 2023). The products produced in the study will be tested for feasibility by two validators, namely media experts and material experts. Effectiveness of the product is tested through the results of the pre-test and post-test on small-scale product trials and large-scale tests.

In research and development of Nearpod-based media with the ADDIE development model which consists of five steps, namely in the first stage, the analysis stage. At the analysis stage, researchers analyze related material analysis, media needs analysis, and learner analysis. The second stage, the Design stage, at this stage, the activity carried out is to design the media design by producing a prototype. The content of the design is adjusted with the results of the analysis of learning materials, students, and learning needs. In the next stage, development, researchers develop learning media in accordance with the media design. In the fourth stage, implementation, at this stage, Nearpod-based learning media begins to be implemented in the learning process. By conducting trials in small groups and trials in large groups involving students to determine the response of students and the attractiveness of Nearpod-based learning media. Students are also given pre-test and post-test activities so that they know the effect of using Nearpod-based applications as an interactive media and can test its effectiveness. The last stage, evaluation, researchers conducted an evaluation by distributing questionnaires to teachers and students regarding the use of Nearpod-based media in learning activities. From data obtained will be analyzed, namely between quantitative data and qualitative data, then based on the results of the data, conclusions will be obtained regarding the level of practicality of using the Nearpod application as a learning innovation media and suggestions or input will also be obtained which will be the basis for preparing product revisions to suit the needs.

Results and Discussion

Researchers developed Nearpod-based learning media that contains human respiratory system material packaged attractively, in accordance with the characteristics of elementary school students. Nearpod media can be accessed through links or codes shared by teachers and can be opened on student's smartphones or laptops. At the beginning of Nearpod-based media there is a login page for users, cover page, instructions for

using the media, description of learning outcomes, indicators and learning objectives, learning materials, and evaluation in the form of quizzes. The results of Nearpod-based learning media development developed by researchers are as follows.

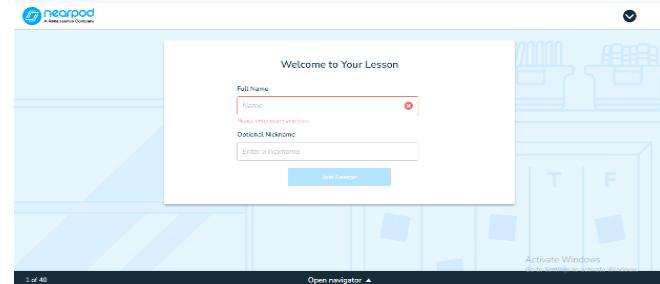


Figure 2. User login page

On the user login page, learners write their identity to be able to join the learning that has been designed by the teacher.



Figure 3. Cover page

The cover page consists of the university logo, department, research faculty, title "Human Respiratory System", class, and name of the media developer.



Figure 4. Instructions for use page

The instructions for use page contains button instructions consisting of button images and descriptions or functions of the buttons on the Nearpod media. With the instructions for using the buttons, students will be able to easily access Nearpod media to be used in learning activities.



Figure 5. Elements and learning outcomes page

The elements and learning outcomes page contains the limiters of the material to be learned by students.



Figure 6. Learning objectives and learning indicators flow page

This learning flow page contains the flow of learning activities and description of learning indicators based on the specified outcomes.



Figure 7. Learning objectives page

This page contains the learning objectives that need to be achieved.

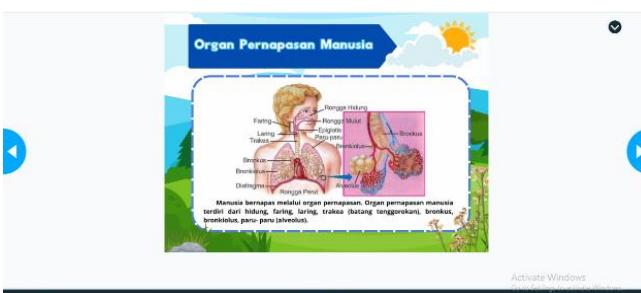


Figure 8. Material page

This page discusses respiratory system material such as respiratory organs, respiratory mechanisms, respiratory diseases, and efforts to maintain respiratory organs.



Figure 9. Evaluation page

The evaluation page contains multiple choice questions, the evaluation is presented in the form of a quiz game.

Media Validation

Nearpod media with human respiratory system material before being tested in the field has first been validated. Media validation by researchers is used for reference in order to produce good and appropriate learning media and to determine the feasibility of media products developed by researchers through validation assessments from material experts and media experts. In this assessment, the assessment instrument used is a questionnaire in the form of a Rating Scale, where expert validators can provide a checklist mark on each aspect of the assessment. In addition, expert validators can also provide suggestions regarding media products developed by researchers as reference material to produce good media products.

The feasibility assessment from expert validators is expressed in the form of scores which are then converted into values with criteria. The criteria in this assessment consist of four criteria, namely very feasible criteria with a value of 81-100%, feasible criteria with a value of 61-80%, less feasible criteria with a value of 41-60%, inappropriate criteria with a value of 21-40%, very inappropriate criteria with a value of 0-20% (Akbar in Novianti et al., 2019). Based on the results of the validation of material experts and media experts on Nearpod-based media products, below is presented the assessment of expert validators in Table 1.

Table 1. Expert validation

Expert Validator	Maximum score	Acquisition score	Percentage (%)
Material expert	80	71	88.75
Media expert	80	75	93.75

With the results of this assessment, Nearpod media is very feasible so that it can be tested.

Small Scale Product Trial

Nearpod-based learning media that has been validated and declared feasible is then tested on a small scale and large scale. The small-scale product trial involved a sample of 9 students of class VB wonosari 02 elementary school, Semarang city. The purposive sampling technique was used by the researcher for sampling. Selection was made from the ranking in class, namely 3 top-ranked students, 3 middle-ranked students, and 3 lower-ranked students. In this small-scale product trial, it was carried out using Nearpod media that had been developed by researchers. Learning begins with students being asked to do pretest questions to measure students' initial knowledge of human respiratory system material. Then, students are asked to access Nearpod learning media that has been developed by researchers and follow the prescribed learning. Furthermore, after participating in learning activities with Nearpod media, students are asked to do posttest questions to find out how effective Nearpod media is in improving student learning outcomes. This small-scale trial activity also aim of knowing the responses from teachers and students regarding use and readability of Nearpod media before conducting a large-scale trial.

Large Scale Product Trial

At the large-scale use trial stage, learning was carried out with 27 students in class VB SDN Wonosari 02 Semarang City. Learning was carried out for 2 meetings with Nearpod media that has been developed by researchers. Before learning begins, students are first asked to do *pretest* questions to measure students' initial knowledge of the Human Respiratory System material to be taught. After that, students can access Nearpod-based learning media and study human respiratory system material and conduct discussion activities according to the direction or learning design on the Nearpod media that has been made. Then, students are asked to do posttest questions to find out how effective Nearpod media is in improving student learning outcomes.

Researchers also distributed questionnaires on responses to Nearpod media to teachers and students. The response questionnaire was used to assess the effectiveness of media in IPAS learning, especially the material of the Human Respiratory System. In addition, the results of the response questionnaire are also used by researchers as a consideration in improving the media products that have been developed. The assessment criteria used consist of four criteria, namely very feasible criteria with a value of 81-100%, feasible criteria with a value of 61-80%, less feasible criteria with a value of 41-

60%, unfeasible criteria with a value of 21-40%, very unfeasible criteria with a value of 0-20% (Akbar in Novianti et al., 2019). The results of large-scale pilot test are presented in Table 2.

Table 2. Results of responses to media use by teachers and students

Response results	Maximum score	Acquisition score	Percentage (%)
Teacher	60	54	90.00
Learners	60	56	93.33

The results of the large-scale use trial above on the use and readability of Nearpod media obtained answers to 15 questions. The developed media obtained a score from the teacher of 54 with a percentage of 90% in the very feasible category and obtained a score from students of 56 with a percentage of 93% in the very feasible category. So that the media developed by this researcher does not need to be improved again because it is very feasible to be applied in learning.

Data Analysis

Data analysis is a stage to measure the effectiveness of Nearpod on Human Respiratory System material in improving student learning outcomes in IPAS learning through the results of data obtained by researchers from students' pretest and posttest scores.

Normality Test

The normality test aims to determine whether the data from the pretest and posttest results of students are normally distributed or not. This is a reference for researchers in determining the T test that will be used in data analysis. In this normality test, researchers used the Shapiro-Wilk formula assisted by SPSS version 27 to analyze the data. With criteria: Significance value > 0.05 , then the data is declared normally distributed, but if Significance value < 0.05 , then the data is not normally distributed. Results of the normality test can be seen in Table 3.

Table 3. Normality test results

Test criteria	Statistic	df	Sig.
Large scale Pretest Score	0.957	27	0.317
Large scale posttest score	0.934	27	0.085

Based on the results in table 3, it can be concluded that the data from the pretest and posttest scores on a large scale are normally distributed with a significance value > 0.05 . So researchers can continue at the next stage of testing.

T-Test

Paired Sample T-Test or called the T test is a paired sample test conducted to determine whether the average

difference in pretest and posttest scores is significant or not after using Nearpod-based learning media. In this Paired Sample T-Test test, researchers used the help of SPSS version 27, with criteria: The significance value sig. (2-tailed) < 0.05 explains the significant difference in the average pretest score and the average posttest score; The significance value of sig. (2-tailed) > 0.05 explains that there is no significant difference in the average pretest score with the average posttest score. T-test results presented in Table 4.

Table 4. T-test results of pretest and posttest values data

Test criteria	Mean	T	Df	Sig. (2-tailed)
Pair 1 large scale pretest score - large scale posttest score	-32.148	-36.013	26	0.000

Based on the results in Table 4, the significance value sig. (2-tailed) is 0.000. So, the value is < 0.05 . So, it is known that there is a significant difference between the average score of pretest with posttest.

N-Gain Test

N-Gain test aims to analyze the criteria for improving the results of pretest scores before using Nearpod media and posttest scores of students after learning by using Nearpod media. In this study, researchers used normalized gain (N-Gain). The equation is,

$$N - Gain = \frac{\text{posttest score} - \text{pretest score}}{\text{ideal maximum score} - \text{pretest score}} \quad (1)$$

(Lestari & Yudhanegara, 2017)

The following criteria for the N-Gain score are presented in Table 5 and the criteria for interpreting the effectiveness of the N-Gain score will be presented in Table 6.

Table 5. N-Gain score criteria

N- gain value	Criteria
$N - Gain \geq 0.70$	High
$0.30 \leq N - Gain < 0.70$	Medium
$N - Gain \leq 0.30$	Low

(Lestari & Yudhanegara, 2017)

Table 6. Criteria for interpretation of effectiveness N-Gain score

Percentage (%)	Interpretation
< 40	Ineffective
40 - 55	Less Effective
56 - 75	Effective Enough
> 76	Effective

In this N-Gain test, researchers used the help of SPSS version 27. Results of N-Gain test are presented in Table 7.

Table 7. Results of N-Gain test

Test criteria	N	Minimum	Maximum	Mean	Std. Deviation
N-gain score	27	0.50	0.91	0.71	0.11
N-gain percent	27	50.00	90.91	71.52	11.81

Results of the N-Gain test of pretest and posttest scores above can be seen in the mean/average section. The mean value of the N-Gain score above is 0.71 so that it is included in the high criteria. N-Gain percent the mean value obtained is 71.52 which in the criteria for interpreting effectiveness is included in the moderately effective category.

Conclusion

Based on the results of Nearpod media development research, it can be concluded that the Nearpod media developed is very feasible to use in IPAS learning. This is evidenced by the assessment of material experts who scored 88.75% and the assessment by media experts of 93.75% with very feasible criteria. Nearpod-based learning media is also proven to be effective in improving the learning outcomes of grade V elementary school students in science subjects on the subject of the human respiratory system. These results were obtained by looking at the results of pretest and posttest scores. After testing, one of them t-test shows the significance value sig. (2-tailed) with a value of 0.000. So it is known that the value is < 0.05 . This explains the evidence of a significant difference between the average score of the pretest and posttest. The N-Gain score showed an average of 0.71 with high criteria. This proves that Nearpod media can effectively improve the learning outcomes of fifth grade students in IPAS subjects on human respiratory system material.

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Author Contribution

The main author, O.E.D., conceptualized the research methods, data analysis, and was responsible for research planning. The second author, S.Y., reviewed, supervised the research, and validated the instruments.

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Conflict of Interest

The researcher has no conflict of interest.

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