STUDY OF THE NEEDS FOR DEVELOPING NEARPOD AS AN INTERACTIVE MULTIMEDIA ON HUMAN RESPIRATORY SYSTEM MATERIAL

Rabeka Putri Aini[1], Yuyu Yuliati[2], Budi Febriyanto[3]
[1,2,3]Primary School Teacher Education Study Program, Universitas Majalengka
[1]e-mail: rabekaputriaini17@gmail.com

ABSTRACT

The use of technology in education is increasingly necessary to meet the learning needs of the 21st century. This study aims to identify the need for developing NearPod as interactive multimedia in teaching the human respiratory system to fifth-grade elementary school students. This research uses a quantitative method with a population consisting of teachers and fifth-grade students at SDN Munjul II. The research sample includes 24 teachers and 25 students selected using purposive sampling to ensure proper representation of the target population. Data collection was conducted through media needs questionnaires, interviews, and observations. The results indicate that both teachers and students agree on the importance of developing interactive multimedia to facilitate a more engaging and effective learning process. Most teachers struggle to teach the human respiratory system due to the complexity of the concepts, which are difficult for students to understand. Students face challenges in understanding the material because of the limitations of the available learning media, particularly in visualizing the respiratory process, which cannot be directly observed. This study confirms that the need to develop NearPod is based on the necessity of making the learning process more interactive, with visual elements added to help students grasp abstract concepts.

Keywords: *NearPod interactive multimedia, human respiratory system, science learning, elementary school*

ABSTRAK

Penggunaan teknologi dalam pendidikan semakin diperlukan untuk memenuhi kebutuhan pembelajaran abad ke-21. Penelitian ini bertujuan untuk mengidentifikasi kebutuhan pengembangan NearPod sebagai multimedia interaktif dalam pembelajaran sistem pernapasan manusia di kelas V sekolah dasar. Penelitian ini menggunakan metode kuantitatif dengan populasi penelitian yang terdiri dari guru dan siswa kelas V SDN Munjul II. Sampel penelitian melibatkan 24 guru dan 25 siswa yang dipilih melalui teknik purposive sampling untuk memastikan representasi yang tepat dari populasi target. Pengumpulan data dilakukan melalui angket kebutuhan media, wawancara, dan observasi. Hasil penelitian menunjukkan bahwa guru maupun siswa sepakat akan pentingnya pengembangan multimedia interaktif untuk memfasilitasi pembelajaran yang lebih menarik dan efektif. Sebagian besar guru merasa kesulitan dalam menyampaikan materi sistem pernapasan manusia karena kompleksitas konsep yang sulit dipahami oleh siswa. Siswa mengalami hambatan dalam memahami materi karena keterbatasan media pembelajaran yang ada, terutama dalam memvisualisasikan proses pernapasan yang tidak dapat diamati secara langsung. Penelitian ini menegaskan bahwa kebutuhan pengembangan NearPod didasarkan

pada kebutuhan untuk membuat proses pembelajaran lebih interaktif, dengan menambahkan elemen visualisasi dapat membantu siswa memahami konsep yang abstrak.

Kata Kunci: multimedia interaktif NearPod, sistem pernapasan manusia, pembelajaran IPA, sekolah dasar

INTRODUCTION

Indonesia is currently facing the era of the industrial revolution 4.0. It is marked by the digitalization era in various fields and human needs. The digitalization era also greatly impacts the rate of economic movement, which has largely shifted from manual to mechanical automation. This shows that the movement that was originally central to humans has now shifted to the digitization of technology (Kuswara & Sumayana, 2020). The progress of a country is supported by the quality of human resources (HR), technological progress and knowledge are the two things that have the most influence on the development of the country. All developed countries in the world are due to the ability of human resources supported by technological advances in processing their natural resources (Camelia, 2020).

The development of science and technology has a major impact on the world of education. As time goes by and technological developments, forcing the elementary school curriculum to update and continue to undergo changes in order to achieve the expected educational goals (Onde et al., 2020). In dealing with this situation, educators must be adaptive to the changes that occur. In the current condition, of course, it has a difference with the learning system in the previous stage, the learning system in the previous stage, the learning process was more conventional and the teacher was still the center of the learning process (Kuswara & Sumayana, 2020). Educators must master science and technology in transferring subject matter to students, so that students learn in the learning process will be more meaningful (Firmansyah, 2019).

According to Firmansyah (2019) said that teachers have a very important role in this case to be able to develop ideas or ideas on how to create learning by utilizing technological innovation by not closing the possibility that those who are still far from the reach of internet frequencies to try to keep up with the times. Teachers are required to have the ability to manage information, media utilization, selection of learning methods, and the use of infrastructure in accordance with the

needs of the teaching and learning process, to form a new generation that is creative, innovative, and competitive (Maharuli & Zulherman, 2021). With the presence of technology in the world of education, it can produce graduates who can keep up with the times and the demands of digital technology (Syamsuar & Reflianto, 2019).

In line with the need to use learning media, there are challenges in using learning media in schools. Teachers tend to use the same media in every learning process. This opinion is relevant to the statement Octaviani (2021) that using the same media repeatedly in every learning activity will cause boredom in students. This is because the use of monotonous media will not increase students' enthusiasm or enthusiasm in participating in learning. For this reason, teachers are required to be able to motivate students to be active, creative, and systematic towards various existing problems, be able to provide solutions based on the knowledge and understanding possessed by the teacher, for example by applying various methods or approaches and good learning media to attract students' attention.

Based on the results of interviews at SDN Munjul II, the problems experienced by teachers in applying learning media are (1) the limited media used in the learning process. School facilities only have a projector and 10 computers, (2) lack of understanding of the development of other types of media, because the media that are often used are WhatsApp groups, canva, powerpoint, and videos. This shows that there needs to be attention to new innovations related to learning media. Teachers need the latest and innovative learning media to achieve learning goals with students.

According to Nurrita (2018) learning media that is attractive to students can be a stimulus for students in the learning process. Learning media can be used as a tool in teaching and learning activities. Magdalena et al., (2021) stated that there are three fundamental reasons why media needs to be used in learning. First, students at the elementary school level generally still think real, so that abstract subject matter still needs to be visualized to be more real. Second, the use of media can increase interest in learning activities and motivate learners, and can influence the results of systematic thinking. Third, media-based learning can provide memorable experiences for students. This is because the use of media

allows learners to experience directly what is happening around.

Learning media must be tailored to the needs of students who have visual, auditory, and kinesthetic learning styles. Practical and innovative learning media is one of the keys to the success of learning, from various existing media such as text, props, images, video, and audio which is commonly referred to as multimedia (Winangsih & Harahap, 2023). Various learning media that can be utilized and developed are very diverse. Some are in the form of Zoom meting or Google meet applications for the learning process (Susanto, 2021).

One of the learning media is interactive multimedia. According to Akbar (2016) interactive multimedia is an effort to fulfill learning support facilities in improving the quality of learning with the collaboration of several media that cause two directions. The use of multimedia in learning will certainly be more able to attract the attention of students so that it is easier to understand the material. Interactive multimedia has great potential and is worth using in the future in the learning process because learning becomes more interesting and interactive so that it can improve student learning outcomes (Dwiqi, Sudatha & Sukmana, 2020).

Learning media that includes interactive multimedia is NearPod-based learning media. NearPod is one of the learning support application software. NearPod media has many interesting features that can be used to support interactive learning and can be accessed free of charge by students and teachers without being limited in space and time (Nurhamidah, 2021). NearPod media provides a variety of features that can be used by teachers, including content and activities features (Ami, 2021). Oktafiani & Mujazi (2022) said that there are advantages in using NearPod media that can be implemented through online and face-to-face learning and there are interesting features, as well as creating an active class in the classroom. NearPod media can be used easily and can involve students in learning, as well as supervision by utilizing the participants feature in the media (Az-Zahro & Panduwinata, 2023).

This research is in line with research Faradisa *et al.,* (2021) from IAIN Ponorogo who developed NearPod interactive learning media for environmental pollution material. Using the 4D development model, media, material, and language

validation reached 73.33%, 86.67%, and 66.67%, respectively. Another research by Oktafiani & Mujazi (2022) from Esa Unggul University showed that NearPod has a positive influence on math learning motivation, with the t test producing t_{count} (11.081) > t_{table} (2.042). Research by Aulia & Baalwi (2022) from Nahdlatul Ulama University Sidoarjo also supports the effectiveness of NearPod, with media validation reaching 89.5% and material validation 93.5%, indicating that NearPod is very feasible to use in thematic learning in grade III SD/MI.

Research on the development needs of NearPod as an interactive multimedia on human respiratory system material has not been widely conducted. This research will fill the gap by comprehensively examining the needs of students and teachers that can be optimized for human respiratory system learning. The results of this study are expected to provide a strong foundation for the development of NearPod that is more effective and in accordance with the learning needs of the human respiratory system. Furthermore, this study has the potential to provide new insights into the utilization of interactive learning technology in the context of science education in general. Considering the urgency of improving the quality of science learning and the potential of NearPod as an interactive learning tool, this development needs study is an important step in efforts to improve the effectiveness of human respiratory system learning in the digital era.

METHOD

This study uses a quantitative approach to evaluate the need for NearPod as an interactive multimedia on human respiratory system material at the elementary school level. According to Nadya et al., (2022) the main characteristic of quantitative methods is structured data collection instruments, such as surveys and questionnaires. These instruments are designed to provide measurable results and can be used for statistical analysis. The study population consisted of class teachers and fifth grade students of SDN Munjul II who studied the material of the human respiratory system. The research sample included 24 teachers and 25 students who were selected using purposive sampling technique to ensure proper representation of the target population.

Data collection was conducted through three main methods, namely media needs questionnaire, interview, and observation. The media needs

questionnaire was distributed to teachers and fifth grade students of SDN Munjul II, specifically designed to measure perceptions and needs related to the use of interactive multimedia in learning the human respiratory system. Questionnaires for grade V students were made with simple and easy-to- understand language, and may use visual elements to aid understanding.

Semi-structured interviews were conducted with selected teachers and students to gain more in-depth information about their experiences and expectations of the use of technology in learning. For grade V students, interviews were conducted with a child-friendly approach and in a comfortable atmosphere. Classroom observations were also conducted to observe current teaching methods and student interactions in learning about the human respiratory system at SDN Munjul II.

The research procedures include: (1) development and validation of research instruments suitable for grade V students of SDN Munjul II, (2) data collection through questionnaires, interviews, and observations by considering the characteristics of respondents, (3) quantitative and qualitative data analysis, and (4) interpretation of results and drawing conclusions. The validity and reliability of the instruments were ensured through content validity tests by basic education experts and reliability tests using methods appropriate for instruments used with children.

This study emphasizes strict research ethics, especially considering student participation. This included consent from SDN Munjul II and assent from the students themselves. The data collection process was designed to be a positive and educational experience for the grade V students. Confidentiality and anonymity of data were strictly maintained, with special protection for information relating to students (Kartika et al., 2019; Lestari & Effendi, 2022).

RESULTS AND DISCUSSION

This research is based on the needs in the field, the needs in question are a form of gap between the desired conditions and the current real conditions, so that to overcome this gap, it is necessary to improve the quality of learning through needs analysis activities. Collecting information on the needs of NearPod interactive multimedia in learning the human respiratory system is done by distributing media needs questionnaires, interviews, and observations. Based on the results of

the needs analysis that has been carried out by researchers, the following data is obtained.

Learning Media Needs Analysis

In the learning media needs analysis step, researchers explore information obtained through field studies, which can then be identified by focusing on four techniques, such as interviews, observations, teacher and student needs questionnaires, and critical thinking skills tests. Interviews were conducted to obtain information about learning tools, learning processes, learning problems, learning media development, as well as understanding, availability, and utilization of information and communication technology. There were two educators who became respondents in the interview process, namely the principal and fifth grade teacher of SDN Munjul II. Interview data was obtained using a voice recording device. This is done so that there are no errors in the analysis conducted by researchers (Kogan et al., 2017).

The results of interviews conducted with principals and teachers related to learning tools show that learning tools have been designed comprehensively by considering various key factors. This is in line with the findings which state that lesson planning should include learning objectives, student characteristics and targeted competencies to ensure effectiveness in the teaching and learning process. Learning objectives, student characteristics, and targeted competencies become the basis for selecting models, methods, and approaches (Candra et al., 2020; Faridah et al., 2020). Teaching materials and media are selected based on suitability to the objectives and efficiency. Although learning objectives are carefully formulated, the focus on critical thinking skills still needs to be improved. Previous research shows that critical thinking skills are an important aspect of education that must be considered in the design of learning tools (Trimawati et al., 2020; Husna & Pritasari, 2024). In addition, assessment and reflection conducted to monitor students' progress show that the frequency is still limited which can affect the overall effectiveness of learning (Nuriyatin & Hartono, 2016; Putri et al., 2021). Based on this, the learning tools have been comprehensively designed based on objectives, student characteristics, and competencies, but still need improvement in the development of

critical thinking skills and the frequency of assessment.

The results of interviews that have been conducted related to the learning process implemented by teachers show that the learning process involves enrichment and remedial which is carried out on a limited basis, focusing on students who have not reached the Minimum Completion Criteria (KKM). This is in line with research that shows that appropriate evaluation and intervention can help students who have difficulty in achieving academic standards (Kandimba et al., 2023). The use of Learner Worksheets (LKPD) in learning the human respiratory system in class V SDN Munjul II is done selectively based on the complexity of the material, learning objectives, and availability of resources. According to Hamidah et al., (2023) stated that this reflects the importance of careful planning in the learning process. Evaluation is carried out after the completion of one topic, with questions prepared based on learning objectives and expected competencies. Previous research shows that planned and continuous evaluation is essential for assessing student progress and adjusting learning strategies (Yan et al., 2021; Yan & Chiu, 2023). In practice, learning strategies often undergo adjustments due to differences between plans and classroom realities influenced by various factors such as student conditions, classroom dynamics, and technical constraints.

The results of interviews on understanding, availability, technology utilization, and learning media development show that teachers' knowledge related to the use of learning media, especially NearPod interactive multimedia is very limited. In the learning process, teachers only use PowerPoint media, videos from YouTube and the school environment. Whereas the use of varied and interactive media can increase students' interest and critical thinking skills (Zulhelmi, 2021; Rodiyah et al., 2023). This shows a gap between the potential of available technology and its application in the learning process. Furthermore, the results of interviews about learning problems conducted with fifth grade teachers show that learning problems include time constraints, diversity of student understanding, and the complexity of the material. Critical thinking skills of grade V students are still low, indicated by passivity in receiving information and difficulty in analyzing problems in depth. Students who actively participate in learning activities, such as

discussions and interaction with interactive learning media, show improvement in critical thinking skills compared to students who only passively receive information (Praheto et al., 2020; Septiani et al., 2020; Yalán et al., 2023).

In seeking information on needs, the researcher made observations during the learning process. The findings from the observations showed that students had considerable difficulty in solving problems with a not too high level of complexity, let alone facing high-level challenges. This can be attributed to students' tendency to accept help in overcoming difficulties that could potentially hinder the development of critical thinking skills. Appropriate interventions in learning can improve student learning outcomes, but without the right approach, students may not be able to develop the skills needed to face more complex challenges (Musfirah et al., 2023; Nurhaedi et al., 2023). In addition, the data from the initial needs analysis of critical thinking skills showed that there were 4 students in the very poor category, 12 students in the poor category, 3 students in the sufficient category, and 1 student in the good category. The percentage results of the initial needs analysis of critical thinking skills are presented in Figure 1 below.

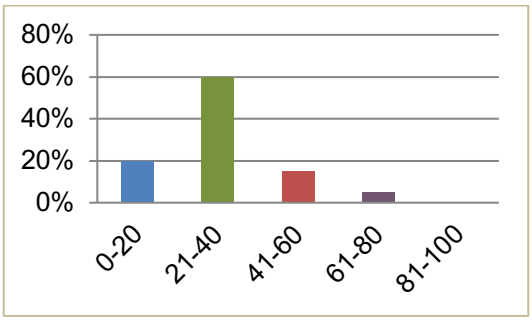
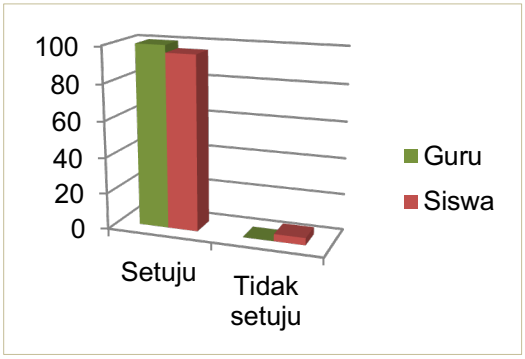


Figure 1. Results of Initial Needs Analysis of Critical Thinking Skills

Based on Figure 1 above, it shows that there are no students who get scores from 80-100. The 61-80 percentage shows 5%. The value of 41-60 the percentage shows 15%. The value of 21-40 the percentage shows 60%. The value of 0-20 the percentage shows 20%. It can be concluded that students' critical thinking skills are still lacking. The results of the needs analysis questionnaire that has been conducted by students and teachers related to making learning media can be seen in Figure 2 below.



Gambar 2. Hasil Persetujuan Pembuatan Media

Based on Figure 2 above, it shows that all teachers or in the percentage of 100% teachers have agreed to the development of application-based or web-based learning media. Likewise, the results of the student needs analysis questionnaire show 96% of students who agree to the development of application-based learning media or web and 4% of students who do not agree to the development of application-based learning media or web.

Curriculum Analysis

The purpose of conducting a curriculum analysis is to ensure that the selected materials are in accordance with established educational standards, relevant to student needs, support the achievement of learning objectives, and can improve students' critical thinking skills. By conducting this analysis, education policy makers can ensure that the selected subject matter can provide maximum benefits for the learning process and student development (Cahit, 2019; Lukaka, 2023).

The results of the analysis of interviews with the principal and grade V (five) teachers stated that the curriculum of SDN Munjul II has implemented an independent curriculum. Only a few classes have implemented an independent curriculum. The implementation of an independent curriculum in Indonesia aims to provide freedom to students in choosing learning needs. In this context, it is important to understand how a more flexible approach to education can support the development of critical thinking skills among students. By providing space for students to choose and direct student learning, the independent curriculum can create an environment that supports better development of critical thinking skills (Cahyono, 2023; Kurniati & Kusumawati, 2023; Febriani et al., 2023; Nahdhiah & Suciptaningsih, 2024). Therefore, the main focus of NearPod interactive multimedia development is adjusted to the curriculum that has been determined in grade V SDN Munjul II.

Table 1. Analysis of the Phase C IPAS Independent Curriculum for Primary V Grade

Component	Contents
Learning Outcomes	Elements of Understanding IPAS (Science and Social): Learners perform a simulation using simple media about the human respiratory system that is linked to how to maintain the health of its organs correctly.
Topic	Topic A. How Does Breathing Help Me Do Daily Activities?
Material	Human Respiratory System
Learning Objectives	1. Identify the organs of the human respiratory system.

Component	Contents
	2. Understand the function of each human respiratory organ. 3. Understand the mechanism of breathing in humans. 4. Understand human respiratory system disorders and relate the importance of maintaining human respiratory organs.

Based on Table 1 related to the independent curriculum analysis of IPAS phase C grade V, it shows that there are detailed learning components for the topic of the human respiratory system. The curriculum analysis is designed with a holistic approach, combining theoretical knowledge with the developed media. Learning objectives are organized in stages, starting from organ identification to a complex understanding of the mechanisms and health of the human respiratory system. The holistic approach is in line with the principles of an independent curriculum that emphasizes active learning, critical thinking, and self- development (Wibowo et al., 2022; Amiruddin et al., 2023; Azizah et al., 2023).

The results of the analysis of the interviews that have been conducted, lessons that are quite difficult to be taught by teachers and understood by students are IPAS lessons, especially in the science section. The science lesson focuses on material that is considered difficult for students to understand, namely the human respiratory system. The human respiratory system is often difficult for students to understand due to several factors, including complex terminology and prevalent misconceptions. The scientific language found in the respiratory system material can be difficult for students leading to misunderstandings of fundamental concepts, such as gas exchange and the role of oxygen in metabolism (Fančovičová & Prokop, 2019; Utamy & Rosdiana, 2023; Candrasari et al., 2023). In addition, the anatomical complexity of the respiratory system including its various components and functions can confuse students, making it difficult to understand the interrelated processes involved (Yusnaeni et al., 2019). In this study, not only conducted interviews with teachers, researchers explored information by conducting interviews with students. According to students' views, one of the materials that is difficult to understand is the human respiratory system. The reason the human respiratory system material is very difficult, because the material is difficult to imagine.

The results of the teacher needs analysis questionnaire related

to human respiratory system material show that of the 25 teachers who filled out the questionnaire, there were 15 teachers who chose difficult. Likewise, the results of the student questionnaire show that there are 12 students who choose that the human respiratory system material is difficult to learn. A comparison of the percentage of teacher and student needs questionnaires related to the difficulty of human respiratory system material can be seen in Figure 3 below.

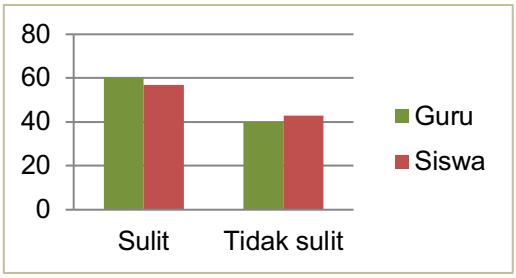


Figure 3. Comparison of Material Difficulty

Based on Figure 3 above, the results of the media needs questionnaire show that 60% of teachers and 57% of students choose difficult material on the human respiratory system. About 40% of teachers and 43% of students chose not difficult on human respiratory system material.

Learning Environment Analysis

Analysis of the learning environment revealed some weaknesses in the ongoing learning process. First, students' ability to formulate questions is still inadequate which can be caused by the lack of active involvement in the learning process (Wafi et al., 2022; Lestari et al., 2023). Second, students show difficulty in planning problem-solving strategies independently as seen from students' dependence on teacher assistance. This shows that students are not familiar with learning approaches that encourage them to think critically and independently (Ernanda et al., 2022; Wardani & Fiorintina, 2023).

Third, the ability to evaluate students' decisions needs to be improved, because students have not been able to solve problems well. This inability is reflected in the difficulty of performing precise calculations and drawing comprehensive conclusions from problem solving (Yusnaeni et al., 2019; Zulia & Alimah, 2023). Further analysis indicates that students in this category have not reached the expected level in asking questions and still show low ability in determining problem-solving strategies.

Educational Technology Analysis

The results of the educational technology analysis revealed that the technology infrastructure at SDN Munjul II is adequate although still limited. The school has a number of

computers and two projector units but is not yet equipped with Chromebooks, which are usually provided by the government. The utilization of computer facilities is currently limited to the implementation of the Computer-Based National Assessment (ANBK) for grade V students. Meanwhile, the use of projectors in learning activities is still rare. This reflects that the existing technology facilities have not been maximally utilized to support the daily learning process. Technology integration in education can increase student engagement and learning effectiveness (Delgado et al., 2015). Therefore, it is important for schools to develop better strategies in utilizing the existing technology infrastructure to support more interactive and effective learning.

One solution to maximize the utilization of available technology is to use interactive media such as NearPod. NearPod media offers various advantages in the learning process, especially in increasing student motivation and engagement. The use of NearPod can support the significant improvement of students' mathematical ability and motivation (Risky et al., 2023; Aryani et al., 2023). In addition, this media also allows teachers to present materials interactively, so that students can access content more easily and interestingly (Utami & Bektiningsih, 2023).

Another advantage of NearPod is its ability to improve students' critical thinking skills. By using a discovery-based learning model, NearPod can help students analyze and evaluate information more effectively (Susanto, 2021). In addition, the app also provides various interactive features, such as quizzes and polls that can increase students' participation in the class (Aryani et al., 2023). Overall, NearPod is an effective tool for creating a more dynamic and interactive learning experience.

CONCLUSION

The need for NearPod interactive multimedia development in science subjects for grade V elementary school is based on several key factors. First, there is unanimous agreement from teachers and the majority of students that learning media is very important to facilitate the delivery of material and make the learning process more interesting. Second, the difficulties faced by both teachers and students in teaching and understanding human respiratory system material caused by the complexity of the concept and the inability to observe the breathing

process directly. This NearPod interactive multimedia development needs study is expected to bridge the gap between modern learning needs and the challenges faced in teaching human respiratory system material.

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