
Analysis of the Need to Develop Integrated STEAM-PjBL Worksheets on the Digestive System for Phase F Students

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ABSTRACT

Learning about the digestive system in Phase F still faces obstacles due to the complexity of the material and the conventional use of Student Worksheets. This study aims to analyze the need for developing integrated STEAM-PjBL Student Worksheets (LKPD) on digestive system material. The research method used is quantitative descriptive with one biology teacher and 39 students at SMA Negeri 7 Sijunjung as subjects. Data were collected through a needs questionnaire and analyzed using descriptive techniques. The results of the study indicate that students have difficulty understanding scientific terms and memorization-based material, while the available LKPDs have not integrated the STEAM-PjBL approach. The conclusion of the study states that the development of integrated STEAM-PjBL LKPDs is needed as a solution to create a contextual, interesting learning experience that is in line with the Merdeka Curriculum.

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INTRODUCTION

Biology learning guides students not only to master concepts, but also to be able to relate them to life. The learning process requires the support of learning media that can facilitate the active involvement of students in building knowledge. Dea et al., (2025) state that learning media serve as intermediaries that help teachers convey learning messages effectively. In addition, Aprianti et al., (2024) emphasize that the use of learning media that are appropriate to the characteristics of students can increase motivation and learning effectiveness. Therefore, the use of appropriate learning media is an important requirement in biology learning.

One learning medium that plays a direct role in directing student learning activities is the Student Worksheet (LKPD). LKPD functions as a medium that contains a series of activities, questions, and tasks designed to guide students in the active learning process. Depdiknas (2008) explains that LKPD is a learning tool used to help students carry out learning activities in accordance with learning objectives. In line with this, Suwastini et

al., (2022) state that LKPD as a learning medium can help students understand concepts through structured and systematic activities. Thus, LKPD has great potential to be developed as an innovative learning medium.

The development of LKPD as a learning medium needs to be supported by a learning approach that is relevant to the demands of the 21st century, one of which is the STEAM approach. This approach emphasizes the integration of science, technology, engineering, art, and mathematics into a single contextual learning unit.. Yakman (2008) states that the STEAM approach aims to develop cross-disciplinary thinking skills and real-world problem-solving skills. In addition, Puspitaningtyas et al., (2025) argue that STEAM-based learning can improve students' critical thinking, creativity, and collaboration skills. Therefore, the integration of the STEAM approach in the development of LKPD as a learning medium is relevant to be applied.

The STEAM approach requires a learning model that can facilitate the integration of concepts and learning activities in a real way, one of which is through Project-Based Learning (PjBL). The PjBL model places students as active subjects who learn through working on problem-based projects. Nugraha et al., (2025) state that PjBL is effective in improving conceptual understanding because students are directly involved in the process of investigation and problem solving. This opinion is reinforced by Anggraeni et al., (2025) who state that PjBL is capable of developing higher-order thinking skills and student learning responsibility. With these characteristics, PjBL has great potential to be integrated into the development of LKPD as a learning medium.

One of the biology materials that is relevant to be developed through STEAM-PjBL integrated LKPD is the digestive system. This material is closely related to the daily lives of students and requires a good conceptual understanding. Hall (2021) explains that the digestive system plays an important role in digesting food and absorbing nutrients needed by the body. According to Wau & Fadilah (2024), the complex and abstract nature of the digestive system material requires the support of learning media that can visualize concepts clearly. Therefore, the development of LKPD as a learning medium for digestive system material is important.

Although LKPD has considerable potential as a learning medium, conditions in the field show that LKPD used in biology learning still tends to be conventional. A literature review shows that LKPD has not yet systematically integrated the STEAM approach and the PjBL model. According to Faiza & Wardhani (2024), although technology-based learning media are increasingly developing, their implementation in schools still faces various challenges. In addition, Daud (2025) states that learning about the digestive system still tends to be teacher-centered and lacks context. This condition shows a gap between ideal learning needs and actual learning practices.

Based on this description, this study aims to analyze the need to develop Student Worksheets as integrated STEAM-PjBL learning media on digestive system material for Phase F students. This needs analysis is important as a basis for designing learning media that is in line with student characteristics, curriculum requirements, and 21st-century learning needs. The results of this study are expected to contribute to the development of

innovative and contextual Biology learning media, particularly on the subject of the digestive system in Phase F.

METHOD

This study is a quantitative descriptive study that aims to analyze the need for developing integrated STEAM-PjBL Student Worksheets (LKPD) on digestive system material for Phase F students. The research was conducted at SMA Negeri 7 Sijunjung, West Sumatra, with the research subjects consisting of one Phase F Biology teacher and 39 Phase F students. The data collection technique used a questionnaire instrument for teachers and students. The data obtained was analyzed using descriptive percentage analysis techniques to describe the level of need for the development of integrated STEAM-PjBL LKPD.

RESULTS AND DISCUSSION

An analysis of the need to develop an integrated Science, Technology, Engineering, Arts, and Mathematics–Project Based Learning (STEAM-PjBL) Student Worksheet (LKPD) on the digestive system was conducted to ensure that the learning media developed was in line with the needs of students and teachers. Therefore, this study describes the information obtained from observations, teacher interviews, and questionnaires distributed to Phase F students. The results of this needs analysis were then used as the basis for developing integrated STEAM-PjBL LKPD on the digestive system for Phase F students at SMA Negeri 7 Sijunjung.

Problem Analysis

The researchs data was obtained from questionnaires filled out by biology teachers and Phase F students. In this study, the teachers interviewed were biology teachers and 39 Phase F students at SMA Negeri 7 Sijunjung. Based on the results of interviews with Biology teachers regarding the learning media used in Biology lessons, it was revealed that students still had difficulties in understanding the material on the digestive system. Based on the interview results, it was found that the learning media used in the Biology learning process included textbooks, student worksheets, torsos, charts, PowerPoint presentations, and communication media in the form of WhatsApp groups. Student worksheets were the most frequently used media to support classroom learning. However, the use of these media has not been fully optimized in improving student learning outcomes, especially in the digestive system material.

Based on the results of the student questionnaire, it was found that most students had difficulty with the digestive system material. Students stated that the digestive system material covered a lot of content, contained many confusing scientific terms, and required memorization. In addition, the student worksheets used so far are not very interesting and are still simple, and do not integrate the STEAM-Project-Based Learning (PjBL) approach. Teachers also stated that the development of STEAM-PjBL integrated student worksheets is necessary to increase students' interest, motivation, and thinking skills in accordance with the requirements of the Merdeka Curriculum.

Analysis of Learning Media Needs

Based on observations during the implementation of the Educational Field Practice (PLK), SMA Negeri 7 Sijunjung has great potential for the application of the STEAM approach. This is supported by the availability of facilities owned by the school. Although supporting facilities are available, the LKPD used so far has not integrated the STEAM approach. In fact, the STEAM approach is very relevant to Biology learning because it connects scientific concepts with real contexts and 21st century challenges. According to Sari et al., (2021), STEAM creates an interdisciplinary learning experience that teaches students to solve problems creatively and innovatively..

STEAM-PjBL integrated LKPDs are considered relevant to develop because they are able to integrate science concepts with technology, engineering, art, and mathematics through project activities. This is in line with the findings of Afni et al. (2025) that integrated STEAM worksheets can improve students' critical and creative thinking skills simultaneously. Thus, these worksheets are a much-needed tool to increase the active participation and learning motivation of Phase F students at SMA Negeri 7 Sijunjung..

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the results of the needs analysis, it can be concluded that the development of STEAM-PjBL integrated Student Worksheets (LKPD) on digestive system material is urgently needed by teachers and Phase F students at SMA Negeri 7 Sijunjung. The findings show that the learning media currently used are still conventional and have not been able to overcome the difficulties of students in understanding scientific terms and complex concepts of the digestive system. The integration of the STEAM approach and the PjBL model in LKPD is considered a strategic solution to transform rote learning material into a contextual learning experience that is relevant to the demands of the Merdeka Curriculum.

Recommendations

Based on these conclusions, it is recommended that future researchers develop draft LKPD integrated with STEAM-PjBL. For education practitioners, especially biology teachers, it is recommended to start identifying school-based projects optimally. In addition, schools need to facilitate training on innovative teaching tools for teachers to support the implementation of the Merdeka Curriculum.

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