Development Of Learning Media for Physical Education and Health Subjects in Grade VIII of SMP Negeri 24 OKU

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Abstract	This study aims to develop and evaluate the feasibility of Adobe Flash CS6-based learning media for Physical Education, Sports, and Health (PJOK) subjects for Grade VIII students at SMP Negeri 24 OKU. The study employed a research and development (R&D) approach, conducted through stages of design, development, expert validation, and field testing. The data were obtained from media experts, learning design experts, material experts, and students as research subjects. The population of this study consisted of all Grade VIII students, with samples selected through staged trials: individual testing (3 students), small-group testing (7 students), and field testing (28 students). Data were collected using validation sheets and questionnaires and analyzed using descriptive statistical techniques, including percentage feasibility analysis. The results indicate that the developed learning media achieved very good feasibility criteria based on expert validation and student trials. Media, design, and materials experts rated the product as highly feasible, while student responses showed positive perceptions of ease of use, attractiveness, and clarity of learning content. These findings demonstrate that Adobe Flash CS6-based learning media is suitable for use as a learning support tool in PJOK subjects at the junior high school level and has the potential to enhance student engagement and learning motivation.
Keywords	Adobe Flash CS6; Development; Learning Media; PJOK

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1. INTRODUCTION

Education is a deliberate and systematic effort to develop human potential through structured learning processes that foster cognitive, affective, and psychomotor competencies. In the contemporary educational landscape, the integration of technology into teaching and learning has become not merely an option but a necessity. The rapid advancement of digital technology has transformed how knowledge is accessed, processed, and internalized, thereby influencing pedagogical practices across educational levels (Selwyn, 2016; UNESCO, 2023). Schools are increasingly expected to adapt instructional approaches to align with technological developments and the characteristics of digitally exposed learners (OECD, 2021; Bates, 2019).

Learning, fundamentally, is a complex interaction process between learners and their environment. It involves active mental engagement, behavioral change, and experiential construction of knowledge

(Rusman, 2011; Schunk, 2020). Sudjana, as cited in (Rusman, 2011b), explains that learning is a goal-directed process that involves observing, understanding, and acting upon information. Similarly, Sadiman, (2014) defines learning as a lifelong process characterized by changes in behavior encompassing cognitive, affective, and psychomotor domains. These multidimensional characteristics of learning demand instructional strategies and media that can simultaneously stimulate various sensory modalities and learning channels.

One important factor influencing learning effectiveness is the use of instructional media. Learning media function as intermediaries that facilitate the transmission of messages from teachers to students and help concretize abstract concepts (Kustandi & Sutjipto, 2016; Warsita, 2008). Effective media can clarify learning objectives, enhance student attention, and reduce verbalism in classroom instruction. In the context of digital transformation, multimedia-based learning tools have shown strong potential in enhancing engagement and comprehension (Clark & Mayer, 2016; Mayer, 2021).

The theoretical foundation for multimedia learning is strongly supported by the Cognitive Theory of Multimedia Learning (CTML), which posits that individuals learn more effectively from words and pictures than from words alone (Mayer, 2021). This principle is grounded in dual-channel processing, limited-capacity, and active-processing assumptions. Students process verbal and visual information through separate channels, each with limited capacity; therefore, instructional design must be structured to avoid cognitive overload (Sweller et al., 2011). Poorly designed instructional materials can impose extraneous cognitive load, thereby reducing learning efficiency. Consequently, digital learning media must be developed based on instructional design principles that optimize cognitive processing (Clark & Mayer, 2016).

In addition to the Cognitive Theory of Multimedia Learning, recent scholarship further emphasizes the importance of generative processing in multimedia environments. Fiorella & Mayer (2015) explain that meaningful learning occurs when students actively select, organize, and integrate information rather than passively receive it. Interactive multimedia environments that require learner engagement, such as quizzes and embedded video prompts, promote generative cognitive activity and deeper understanding.

Cognitive Load Theory has also evolved to address complex learning tasks. van Merriënboer & Sweller (2005) argue that instructional materials should be structured progressively to manage intrinsic load while minimizing extraneous load. Similarly, Paas et al. (2003) highlight that effective instructional design must balance task complexity with learner expertise to optimize learning efficiency. These perspectives reinforce the need for carefully designed multimedia PJOK materials that avoid decorative overload and focus on instructional clarity.

Moreover, Mayer & Fiorella (2014) emphasize principles for reducing extraneous processing, such as signaling, redundancy control, and spatial contiguity. These principles are directly relevant to the present development process, in which interface layout, video placement, and text integration were structured to enhance cognitive efficiency.

In the context of Physical Education, Sports, and Health (PJOK), the role of instructional media becomes even more crucial. PJOK is not solely concerned with theoretical knowledge but also emphasizes the development of motor skills, physical fitness, character formation, and healthy lifestyle habits (Winarno, 2013; Kirk, 2019). The psychomotor domain is central in PJOK learning, requiring clear demonstrations of movement techniques and procedural skills. Traditional teaching methods that rely heavily on verbal explanations and live demonstrations may not always accommodate diverse student learning speeds and observational abilities.

Research indicates that digital technologies can support pedagogical innovation in physical education by enhancing visualization, feedback mechanisms, and student engagement (Casey & Goodyear, 2015; Goodyear et al., 2019). The use of video-based demonstrations, interactive modules,

and multimedia presentations allows students to repeatedly observe and analyze movement patterns, which supports motor learning processes (Chen & Wu, 2015). Furthermore, multimedia-based instruction has been shown to increase motivation and participation in physical education contexts (Anggraini et al., 2014; Putra & Nugroho, 2020).

Recent research further demonstrates that digital technologies in physical education can extend pedagogical practices beyond traditional demonstration models. Casey et al., (2017) argue that digital tools enable reflective learning, peer assessment, and tactical analysis in physical education contexts. Rather than replacing physical practice, technology can enrich understanding of movement concepts and strategic decision-making.

Bodsworth et al., (2020) Also report that digital integration in physical education enhances both teacher professional development and student engagement when implemented with clear pedagogical intent. Their findings indicate that technology adoption is most effective when grounded in learning theory rather than technological novelty, aligning with the design rationale of this study.

Motivational aspects are also critical in PJOK learning. According to Self-Determination Theory, student engagement increases when learning environments support autonomy, competence, and relatedness (Ryan & Deci, 2020a). Interactive multimedia learning environments provide opportunities for self-paced learning, immediate feedback, and visually stimulating content, which can enhance intrinsic motivation. Hattie & Yates (2014) further argue that visible, concrete demonstrations significantly enhance learning outcomes, particularly in skill-based subjects.

Meta-analytic evidence further confirms the role of Self-Determination Theory in physical education settings. Ntoumanis et al. (2021) demonstrate that autonomy-supportive instructional strategies significantly increase intrinsic motivation and behavioral engagement in physical education contexts. Digital learning environments that allow self-paced navigation and immediate feedback are particularly effective in fostering perceptions of competence and autonomy.

Similarly, Howard et al. (2021) report that student engagement in physical education is strongly predicted by instructional clarity, structured feedback, and perceived relevance of learning tasks. Multimedia-based PJOK materials that integrate interactive evaluation and visual demonstration, therefore, have strong theoretical grounding in contemporary engagement research.

Despite the recognized importance of digital integration, many schools still rely on conventional instructional approaches in PJOK. Observations at SMP Negeri 24 OKU indicate that learning activities are predominantly teacher-centered, utilizing printed books, worksheets, and direct field demonstrations without digital support. Such conditions may limit students' opportunities to review material independently and reduce variation in instructional delivery. In addition, the lack of structured multimedia resources can hinder students' comprehension of complex movement techniques in large-ball games such as soccer, volleyball, and basketball.

The development of computer-based learning media represents a strategic response to these challenges. Authoring tools such as Adobe Flash CS6 enable the integration of text, images, animations, audio, and video into interactive applications. Although newer technologies have emerged, Adobe Flash CS6 remains a powerful development tool capable of producing offline multimedia applications suitable for schools with limited internet access. In developing educational contexts, simplicity, accessibility, and low technical barriers are critical considerations (Al-Azawei et al., 2017). Offline multimedia applications can provide stable, controlled learning environments without depending on high-bandwidth connectivity.

From an instructional design perspective, systematic development models are essential to ensure product quality and effectiveness. Borg & Gall, (2003) emphasize that research and development (R&D) approaches in education aim not only to test hypotheses but also to produce validated and practical learning products. Similarly, Branch, (2009) explains that structured development processes such as

analysis, design, development, implementation, and evaluation ensure that instructional materials align with learner needs and curriculum standards.

Previous studies have demonstrated the effectiveness of multimedia-based learning media in PJOK contexts. Sunardi & Widodo (2019) reported that interactive multimedia improved student understanding of physical education concepts. Prabawa et al. (2021) found that video-based PJOK learning increased student engagement at the elementary level. More recent studies also highlight the growing relevance of ICT-based physical education media in Indonesian schools (Saryono et al., 2024). However, there remains a need for context-specific development studies that focus on junior high school settings and incorporate comprehensive expert validation.

Based on the theoretical foundations and empirical gaps described above, the development of Adobe Flash CS6-based learning media for PJOK in Grade VIII at SMP Negeri 24 OKU is both relevant and necessary. This development is intended to address limitations in existing instructional practices, enhance visualization of movement techniques, and support student-centered learning experiences. The integration of multimedia principles, instructional design theory, and PJOK pedagogical needs is expected to produce a feasible and effective learning product. Therefore, this study aims to develop and evaluate the feasibility of Adobe Flash CS6-based learning media for PJOK subjects in Grade VIII at SMP Negeri 24 OKU, using a systematic R&D approach that includes expert validation and staged field trials.

2. METHODS

This study uses a research and development (R&D) approach to develop and assess the feasibility of Adobe Flash CS6-based learning media for Physical Education, Sports, and Health (PJOK) subjects. This approach was chosen because the study is not only oriented towards testing phenomena but also producing learning products that can be used in the learning process.

The research was conducted at SMP Negeri 24 OKU Baturaja, Ogan Komering Ulu Regency, South Sumatra. This location was chosen based on preliminary observations showing that conventional methods still dominated PJOK learning and did not optimally utilize digital learning media. The research was conducted in the even semester of the 2022/2023 academic year.

The research data consisted of quantitative and qualitative data. Quantitative data were obtained from expert assessments of the learning media's feasibility and from students' responses to questionnaires. Meanwhile, qualitative data were obtained from expert input, suggestions, and comments, as well as from students' open responses during the media trial process. The data sources in this study involved media experts, learning design experts, and PJOK material experts as validators, as well as eighth-grade students at SMP Negeri 24 OKU as product trial subjects.

The research population was all eighth-grade students at SMP Negeri 24 OKU. Sampling was conducted purposively, with consideration of students' academic abilities and their readiness to participate in computer-based learning media trials. The research sample was determined in stages according to the research development procedure, namely through individual, small-group, and field trials. The individual trials involved three students with different academic abilities; the small-group trials involved seven students; and the field trials involved twenty-eight eighth-grade students as the main users of the media in a real learning situation.

Data collection techniques included expert validation sheets, student response questionnaires, and documentation throughout the research process. Assessment instruments were developed to measure the appearance of the media, the suitability of the material with the curriculum, ease of use, and the attractiveness of the learning media. The collected data were then analyzed using descriptive statistical analysis techniques, namely by calculating the percentage of media feasibility. The analysis results were

used to determine the feasibility of the learning media category, enabling a conclusion on whether the developed media were suitable for use in PJOK learning.

3. FINDINGS AND DISCUSSIONS

Findings

Needs Analysis and Media Design Stage

The preliminary needs analysis revealed that PJOK instruction at SMP Negeri 24 OKU was predominantly teacher-centered, relying on textbooks, worksheets, and direct demonstrations in the field. Although practical demonstration is an essential component of physical education, the absence of structured multimedia support limited students' opportunities for repeated observation and independent review. This condition aligns with findings from Kirk, (2019), who argues that traditional physical education often struggles to integrate reflective and analytical learning processes.

In skill-based subjects such as soccer, volleyball, and basketball, visualization plays a central role in facilitating motor learning. According to Winarno, (2013) Effective PJOK instruction requires clear modeling of movement patterns so students can accurately internalize technical sequences. However, live demonstrations alone may not accommodate different student learning speeds. Chen & Wu, (2015) emphasize that video-supported instruction enhances sustained attention and allows learners to revisit complex procedures.

The needs analysis, therefore, confirmed a gap between existing instructional practice and the potential benefits of multimedia-based learning. This gap provided a strong rationale for developing an interactive Adobe Flash CS6-based learning application tailored to curriculum competencies.

Initial Product Development Results

The developed product integrates text explanations, animated illustrations, embedded video demonstrations, interactive quizzes, and evaluation feedback within a structured navigation system. The multimedia integration was designed based on Mayer's (2021) Multimedia Learning principles, particularly the principles of multimedia, coherence, and signaling. By combining visual and verbal information, the media aims to enhance dual-channel processing while minimizing extraneous cognitive load (Sweller et al., 2011).

The interface structure includes login pages, competency displays, material explanations, video demonstrations, evaluation menus, and result pages. The sequential organization reflects systematic instructional design principles (Dick et al., 2015; Branch, 2009). Clear navigation buttons and consistent layouts were implemented to reduce cognitive disorientation and enhance usability (Clark & Mayer, 2016).

From a pedagogical standpoint, the inclusion of evaluation menus supports formative assessment and immediate feedback, which are essential components of effective learning environments (Schunk, 2020). Immediate feedback enhances self-regulation and supports competence development, which is central to student motivation (Ryan & Deci, 2020b).

The initial product in the development of this learning media is a product produced by researchers through several stages of work procedures, namely analyzing and organizing the material, designing, and applying the design to a learning media form developed in Adobe Flash CS6. The initial learning media product, before undergoing product evaluation by design experts, material experts, and media experts, consists of several menu pages, each of which is described as follows:

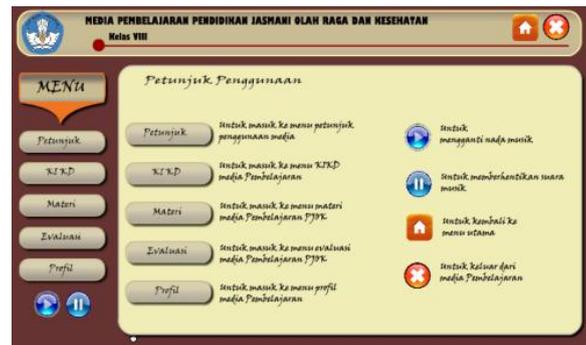**Figure 1.** Login Display Page

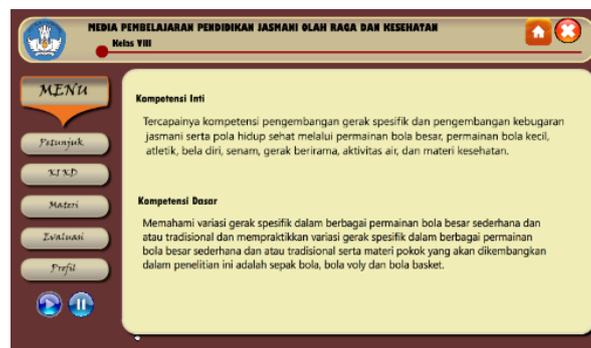**Figure 2.** Main Menu Display

Figure 3. Instructions Page

Figure 4. Competency Page
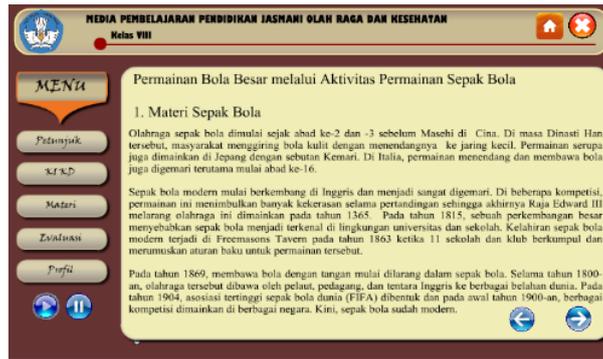
Figure 5. Materials Page
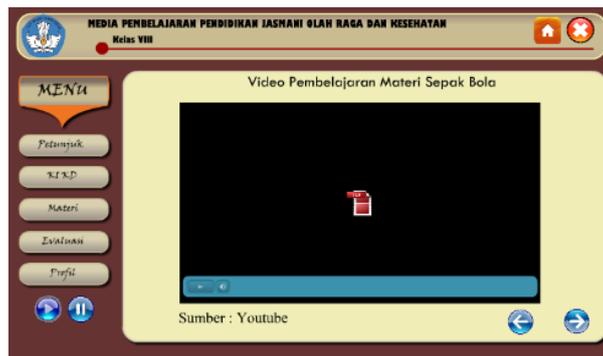

Figure 6. Video Materials Page
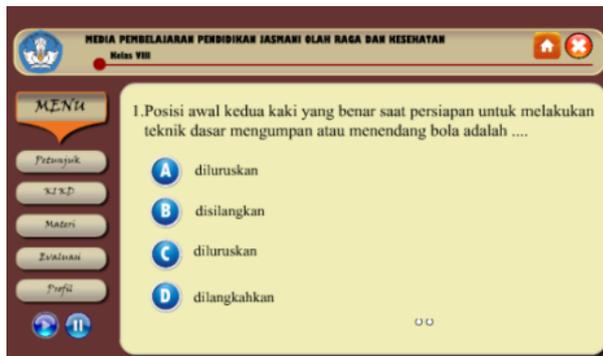

Figure 7. Your Selection Evaluation Page

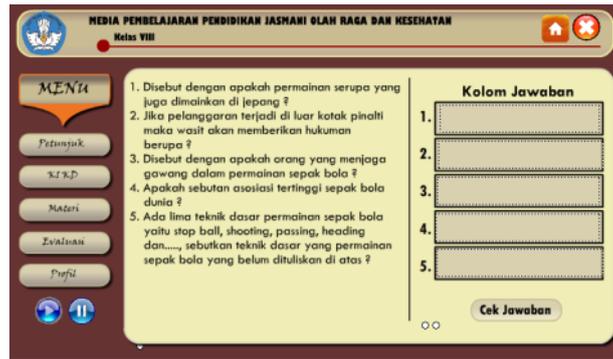**Figure 8.** PG Evaluation Results Page

Figure 9. Short Answer Evaluation Page

Figure 10. JB Evaluation Results Page

Figure 11. Profile Page

In general, the media display can present material on ball games (soccer, volleyball, and basketball) through text, images, animations, and videos in an integrated manner. According to Sadiman, (2014)Learning media that combine visual and audio elements can increase attention, clarify message delivery, and facilitate the learning process for students. The initial development results of this study show these characteristics.

Product Validation Results

The media expert assessment scored 86.28%, which is classified as excellent. The media expert assessed that the media were in accordance with the syllabus, had clear navigation, and could support independent learning. Improvements were made to the consistency of page identity and presentation sequence, and more distinctive visual elements were added. This view of media experts is in line with the views of Kustandi & Sutjipto, (2016), who explain that effective learning media must have a consistent appearance, be easy to operate, and provide a learning experience that is not confusing for users.

Design experts gave a score of 89.15%, which is classified as excellent. The main input from design

experts included emphasizing titles and subtitles, adjusting colors for greater contrast, and standardizing font sizes. Revisions were made to improve the display's aesthetics and make it more representative of a digital learning medium. These results are in line with the opinion of Dick et al., (2015), who emphasize that good learning design must pay attention to readability, visual clarity, and the flow of information delivery so that students can learn without visual or cognitive barriers.

Subject matter experts gave it a score of 97.8% and deemed it very good. Subject matter experts assessed that the content presented was relevant, accurate, and appropriate for PJOK learning needs. The media was also considered capable of increasing student motivation, deepening understanding, and providing variety in learning activities. This assessment aligns with Winarno's (2013) view, which emphasizes that PJOK learning requires concrete, engaging media that clarify basic movement skills, enabling students to understand the material better.

Individual testing of three students resulted in an average of 89.9%, placing them in the very good category. At this stage, students assessed the media as easy to use, attractive, and easy to understand. This stage is important as an initial indicator of media acceptance by users, as explained by Borg & Gall, (2003). A small-group test with seven students yielded a 88.3% score, also in the excellent category. The results show that the media can be used more widely and remains effective in delivering material.

A field test with 28 students yielded a 92.5% success rate, indicating that the media is suitable for large-class learning. Students responded positively to the combination of material, video, and interactive evaluation, which increased their motivation. These findings are in line with the research by Anggraini et al., (2014), which states that technology-based learning media can increase student enthusiasm and participation in PJOK learning.

Media experts rated the product highly for layout consistency, navigation clarity, and multimedia integration. This result indicates that the application meets essential usability and visual communication standards. According to Clark & Mayer, (2016) Well-designed multimedia should eliminate unnecessary decorative elements and focus learners' attention on essential content.

The expert suggestions regarding visual identity consistency and interface refinement are consistent with Cognitive Load Theory Sweller et al., (2011), which emphasizes that even minor design inconsistencies can increase extraneous load. After revision, improvements in layout structure and visual coherence further strengthened instructional quality.

Evaluation by Design Experts

Based on the evaluation by design experts, the total score for the 13 items was 1,159, with an average of 89.15. Thus, the overall percentage of the design expert evaluation questionnaire was 89.15%, with a rating of very good. Based on the completed questionnaire, the design experts provided comments and suggestions about the media developed.

Design experts highlighted the importance of title differentiation, color contrast, and font standardization. These elements directly influence readability and hierarchical information processing. Dick et al., (2015) argue that instructional materials must guide learners through structured layers of information to support comprehension.

Adjustments to typography and contrast enhanced the signaling function of the interface, supporting Mayer, (2021) signaling principle. Effective signaling reduces unnecessary cognitive effort and directs learners toward key concepts. This reinforces the importance of integrating design theory into digital media development.

The design expert's comments on the learning media developed by the researcher were that the media could be used for school learning tutorials and put into practice. The images and sequence of material were very good, but the titles and subtitles were difficult to distinguish. The design expert's suggestions were to add borders or distinguishing features to each title and subtitle, add color to the

titles and subtitles so they do not match the other material themes, and standardize the font size.

Based on the recommendations obtained from the design expert, the researcher made improvements in certain aspects. This was in accordance with the design expert's instructions and suggestions. The design expert advised the researcher to change the colors to make them more contrasting. In the evaluation, the title and font size were also changed to make them clearer and more attractive.

Evaluation by Material Experts

The next step taken by the researcher was an evaluation by material experts, namely physical education and health teachers of grade VIII at SMP Negeri 24 OKU, by showing the results of the products developed by the researcher in grade VIII, namely learning media, followed by using a questionnaire containing detailed instruments in accordance with the product to assess the product.

The highest validation score was provided by subject matter experts, indicating strong curriculum alignment and conceptual accuracy. PJOK learning requires an accurate representation of movement sequences and tactical understanding (Winarno, 2013). The integration of video demonstrations ensures that theoretical explanations are supported by visual modeling.

Research in physical education pedagogy suggests that digital visualization enhances skill acquisition by enabling repeated exposure and self-analysis (Casey & Goodyear, 2015; Goodyear et al., 2019). Therefore, the high material validation score reflects not only content accuracy but also pedagogical relevance.

Based on the design expert's evaluation, the total score for the 10 instrument items was 978, with an average of 97.8. The overall percentage for the subject-matter expert evaluation questionnaire was 97.8%, with a good rating. Based on the completed questionnaire, the subject matter expert provided comments and suggestions about the developed media. The comments from the material experts regarding the learning media developed by the researcher were that the media was very creative, could increase enthusiasm in the learning process, could deepen insight, and was visually appealing. Based on the media developed by the researcher, the material experts were very interested in the media because it offered many advantages, namely that it was very creative, could increase enthusiasm in the learning process, deepen insight, and was visually appealing.

Individual Evaluation

After evaluation by media, design, and subject matter experts, the researcher conducted an individual evaluation. At this stage, the researcher conducted tests on three students with varying levels of intelligence: high, moderate, and low. The evaluation was conducted on June 11, 2019, from 8:00 a.m. to 10:00 a.m. in Classroom VIII. The respondents in this individual evaluation were three eighth-grade students at SMP Negeri 24 OKU.

This data analysis was used to assess the suitability of the product produced. The first step in the data analysis process was to assess the completeness of the responses on the questionnaires completed by the respondents. Then, the researcher tabulated the data obtained. From the 15 items in the instrument, the total score was 4,047; 4,047:45 resulted in 89.9. Thus, the assessment of the suitability of the learning media using the Adobe Flash CS6 application reached 89.9% of the expected criteria. This percentage is included in the very good criteria.

The staged trials (individual, small-group, and field testing) consistently showed very high feasibility ratings of 89.9%, 88.3%, and 92.5%, respectively. These results indicate strong user acceptance and operational practicality.

Student responses demonstrated that the media was easy to operate, visually engaging, and helpful in understanding movement techniques. This aligns with findings by Anggraini et al., (2014) and Putra

& Nugroho, (2020), who report increased motivation and comprehension in multimedia-supported PJOK learning.

The interactive quiz component enhanced active engagement. According to Hattie & Yates, (2014)learning becomes more effective when students receive visible evidence of their progress. The application's evaluation feedback system supports this principle.

Furthermore, the positive responses reflect the motivational benefits described in Self-Determination Theory (Ryan & Deci, 2020b). Interactive media provide autonomy (self-paced navigation), competence (quiz feedback), and engagement through attractive visuals. These elements collectively strengthen intrinsic motivation.

Small Group Evaluation

After conducting individual evaluations, the researcher conducted a small-group evaluation. It was held on June 14, 2019, from 9:00 a.m. to 11:00 a.m. in the 8th-grade classroom at SMP Negeri 24 OKU. The respondents in this small-group evaluation were 7 Grade VIII students at SMP Negeri 24 OKU.

This data analysis was used to assess the suitability of the product produced. The first step in the data analysis process was to assess the completeness of the responses on the questionnaires completed by the respondents. Then, the researcher tabulated the data obtained. From the 16 items in the instrument, the total score was 8,663; 8,663:98 yielded 88.3. Thus, the feasibility assessment of the learning media using the Adobe Flash CS6 application reached 88.3% of the expected criteria. This percentage is included in the very good criteria.

Field Trial

After conducting a small-group evaluation, the researchers conducted a field trial. It was held on June 18, 2019, from 8:00 a.m. to 10:00 a.m. in Classroom VIII of SMP Negeri 24 OKU. The respondents in this field trial were 28 eighth-grade students at SMP Negeri 24 OKU. Data analysis was used to assess the product's suitability. The first step in the data analysis process was to assess the completeness of the responses on the questionnaires completed by the respondents. The researchers then tabulated the data obtained.

From the 14 items on the instrument, the total score was 36,275; 36,275: 329 = 92.5. Thus, the percentage of the learning program's suitability assessment against the expected criteria was 92.5%. This percentage falls within the very good criteria.

Final Product Results

The final product of the learning media development activity is a learning program in the form of an application that includes materials and videos to facilitate student learning. This program consists of pages interconnected via buttons. The program begins with the main program menu display:

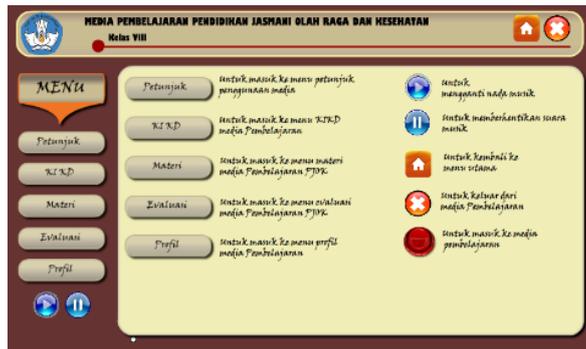**Figure 12.** Login Display Page

Figure 13. Main Menu Display
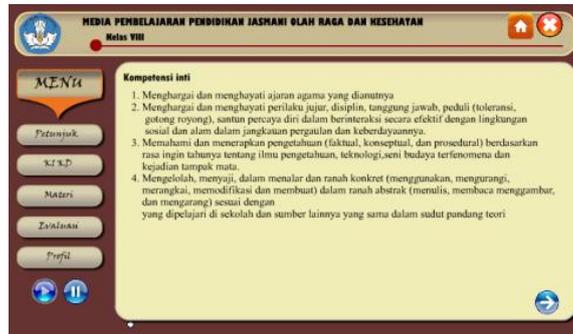

Figure 14. Instructions Page
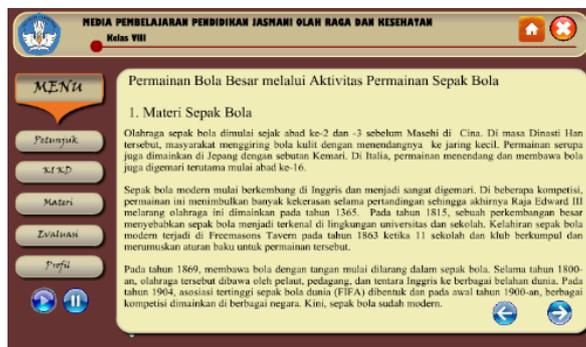

Figure 15. Competency Page

Figure 16. Materials Page

Figure 17. Video Materials Page
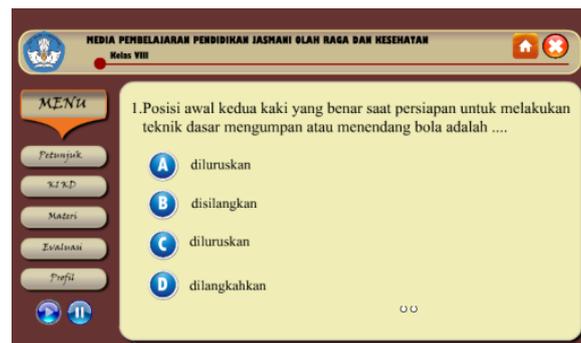

Figure 18. Your Selection Evaluation Page

Figure 19. PG Evaluation Results Page
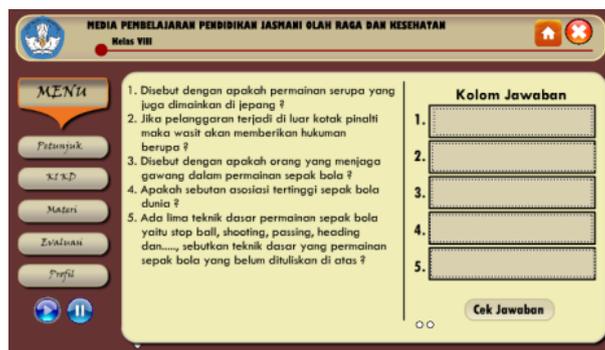

Figure 20. Short Answer Evaluation Page

Figure 21. JB Evaluation Results Page

Figure 22. Profile Page

Discussion

The findings of this study are consistent with generative learning theory, which emphasizes that learning improves when students actively process multimedia materials (Fiorella & Mayer, 2015). The interactive quizzes and structured video materials embedded in the application likely stimulated generative processing, contributing to high student acceptance scores.

From a Cognitive Load Theory perspective, the high feasibility ratings suggest that intrinsic and extraneous cognitive loads were appropriately managed (Paas et al., 2003; van Merriënboer & Sweller, 2005). Revisions made after expert validation, particularly regarding layout consistency and contrast, further minimized unnecessary cognitive demands.

The motivational outcomes observed during field trials align with large-scale meta-analytic findings in physical education research (Howard et al., 2021; Ntoumanis et al., 2021). The provision of structured feedback and visually rich demonstrations appears to support autonomy and competence needs, which are central components of Self-Determination Theory.

Furthermore, the integration of multimedia in PJOK contributes to the broader pedagogical shift described by Casey et al. (2017), where digital technologies serve as tools to enhance understanding rather than merely deliver content. The present findings support the argument that integrating technology into physical education can strengthen both conceptual understanding and engagement when aligned with instructional design principles.

The findings of this study confirm that Adobe Flash CS6-based learning media can effectively support PJOK instruction at the junior high school level. The consistently high validation results from experts and students demonstrate instructional feasibility, pedagogical alignment, and practical usability.

From a theoretical perspective, the results strongly support the Cognitive Theory of Multimedia Learning (Mayer, 2021). The combination of text, images, animation, and video appears to facilitate

dual-channel processing, thereby enhancing comprehension. The high student satisfaction ratings suggest that multimedia integration did not overload cognitive capacity, indicating that the design successfully minimized extraneous cognitive load (Sweller et al., 2011).

The results also reinforce instructional design principles proposed by Dick et al., (2015) and Branch, (2009), emphasizing systematic development processes. The R&D approach ensured iterative refinement through expert feedback and staged trials, consistent with recommendations from (Borg & Gall, 2003). This structured development enhances product validity and reliability.

In the context of physical education, the study contributes to ongoing discussions regarding digital transformation in PJOK pedagogy. Casey & Goodyear, (2015) argue that digital technologies can extend pedagogical possibilities in physical education by supporting reflection and visualization. Similarly, Saryono et al., (2024) emphasize that ICT integration increases student engagement in Indonesian PJOK classrooms.

Although Adobe Flash CS6 is no longer widely supported in web environments, its offline application capability makes it suitable for schools with limited internet infrastructure. In developing contexts, technological appropriateness is often more important than technological novelty (Al-Azawei et al., 2017). The developed application operates independently of internet connectivity, ensuring accessibility and stability.

The findings also align with the broader educational technology literature, which emphasizes the importance of contextualized innovation. Selwyn, (2016) notes that technology integration must respond to real pedagogical needs rather than technological trends. In this case, the development was driven by observed instructional gaps, not by technological determinism.

Importantly, the study demonstrates that multimedia-based PJOK instruction can support not only cognitive understanding but also psychomotor learning. Visualization of movement techniques provides students with structured observational models, which are crucial in motor learning processes (Winarno, 2013). Repeated video observation allows students to analyze posture, coordination, and sequencing before physical practice.

Moreover, integrating interactive evaluation enhances formative assessment. Formative feedback is known to improve learning outcomes significantly (Hattie & Yates, 2014). By embedding evaluation within the media, the application supports continuous learning rather than one-time assessment.

Overall, the findings confirm that the developed Adobe Flash CS6-based learning media meet essential characteristics of effective instructional media: clarity, relevance, interactivity, and motivational appeal (Kustandi & Sutjipto, 2016; Warsita, 2008). The systematic validation process further strengthens its credibility as a feasible instructional product.

The results of this study indicate that the Adobe Flash CS6-based learning media developed is highly feasible, as evidenced by expert assessment and field testing with students. All findings from the expert validation and field testing stages show consistency in quality across appearance, material presentation, and ease of use. This reinforces the idea that digital media tailored to student characteristics can improve the quality of PJOK learning.

First, the results of the expert media assessment, with a score of 86.28%, indicate that the layout, navigation, and integration of multimedia elements are in accordance with standards. Kustandi & Sutjipto, (2016) emphasize that effective learning media must clarify messages, help students focus visually, and align with instructional design principles. The findings of this study reinforce this view, as media experts assessed that the use of text, images, videos, and animations supported material comprehension and clarified the learning process. The finding that the use of text, images, animations, and videos can improve student understanding is in line with the Multimedia Principle in Mayer, (2021), which asserts that students learn more effectively through a combination of visual and verbal

channels. In addition, according to Moreno & Mayer, (2007)A multimodal learning environment enables deeper knowledge integration, as students access information through various complementary representations.

Second, learning design experts assigned a feasibility rating of 89.15%, particularly for display aesthetics, visual balance, and clarity of information structure. Input regarding the color difference between titles and subtitles, as well as font size consistency, is in line with the design principles proposed by Dick et al., (2015), namely that visual displays must attend to contrast, information hierarchy, and graphic balance to avoid overloading students' cognitive abilities. Revisions to these aspects improve readability and the user navigation experience. The emphasis on consistency of appearance, color contrast, and navigation flow is in line with the principles of modern instructional design presented by Clark & Mayer, (2016), namely that learning interfaces should minimize extraneous cognitive load and provide an intuitive learning experience. Sweller et al., (2011) Also emphasize that poor visual display can increase cognitive load and decrease learning retention.

Third, the subject-matter expert assessment with the highest percentage, 97.8%, indicated that the media content was accurate, relevant, and in accordance with the PJOK curriculum. Winarno, (2013) stated that PJOK requires media that can clarify movement techniques, increase insight, and facilitate psychomotor learning in stages. Subject matter experts noted that the developed media is not only interesting but also helps deepen students' understanding of ball games, aligning with the principles of skill-based learning.

Fourth, the results of individual, small-group, and field trials consistently showed a "very good" rating of 89.9%, 88.3%, and 92.5%, respectively. This positive response indicates that the media can be used easily and clearly, without creating technical obstacles for students. This finding is supported by Sadiman's (2014) theory, which holds that multimedia use makes learning more meaningful by providing visual and auditory stimuli that facilitate understanding. In the context of PJOK, the video element in this media serves as an alternative demonstration for students who have difficulty observing basic technical movements directly.

In addition, various previous studies show consistent similar findings. Anggraini et al., (2014) found that multimedia-based instruction on basic volleyball techniques can increase student motivation and learning performance. The same can be seen in this study, where students gave very good ratings to the video's clarity, the material's flow, and the media's interactivity. The presence of interactive exercises and multiple-choice or short-answer evaluations also strengthened the feedback aspect of learning. Students' positive response to interactive learning media supports the Self-Determination theory of motivation (Ryan & Deci, 2020b), which emphasizes that engagement and learning autonomy increase when students have interesting learning experiences that match their interests. The visualization of movement in videos also makes PJOK learning more "visible" in line with the Visible Learning concept from Hattie & Yates, (2014), which states that concrete demonstrations improve understanding of psychomotor concepts.

Overall, all stages of this study showed that Adobe Flash CS6-based learning media had advantages in terms of motivation, visuals, and pedagogy. The media not only served as a tool for delivering material, but also helped teachers overcome the limitations of learning resources that previously relied solely on lectures and manual demonstrations. This is in line with Warsita, (2008) The opinion that the use of learning technology serves to expand learning access, increase the effectiveness of delivery, and change the learning experience of students to be more interesting and productive. The development of digital media is also relevant to 21st-century learning. Bates (2019) emphasizes that educational technology is not just a complement However, has become a necessity for creating independent and flexible learning experiences. Horton (2012) asserts that interactive media can expand access to learning and allow students to practice repeatedly without being bound by space and time.

Thus, the learning media developed meet the characteristics of effective media according to

educational theories and previous research findings: easy to use, visually appealing, relevant to the curriculum, and capable of increasing student motivation and understanding. The consistent results of expert and user trials demonstrate that this media is well-suited for PJOK learning at the junior high school level. The use of digital media such as Adobe Flash CS6 provides an alternative when school facilities are limited. This is in line with the findings of (Al-Azawei et al., 2017) that technology-based learning in developing countries is effective if it is designed to be simple, easy to operate, and has low technical barriers, which are requirements met by the media.

4. CONCLUSION

This study produced Adobe Flash CS6-based learning media that are suitable and effective for use in Grade VIII PJOK learning. The development process, which included design, expert validation, and field testing, demonstrated that the media met the suitability criteria for appearance, learning design, and material suitability. The results of assessments by media, design, and material experts showed a very good rating, confirming that the media aligns with learning technology principles, is accurate in its content, and supports student learning.

Trials with students at the individual, small-group, and field scales produced positive responses, with consistently high feasibility rates. This shows that the media is easy to use, engaging, and helps students understand ball game material more clearly and in a structured manner. The integration of text, images, animations, and videos has been proven to increase student motivation and engagement during learning.

Overall, this study confirms that Adobe Flash CS6-based learning media can be an effective alternative to improve the quality of PJOK learning. This media is suitable for classroom learning and as an independent learning resource for students, and can be further developed as needs and technological developments evolve.

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