Contents list available at PELTA

Physical Education Learning, Teaching, and Assessment (PELTA)

Publisher: Perkumpulan Pengelola Jurnal Keolahragaan Indonesia (PJKI)

Task submission patterns in Edu-Tech-supported physical education among seventh-grade students

Pola pengumpulan tugas dalam pembelajaran PJOK berbasis Edu-Tech pada siswa kelas VII

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ARTICLE INFO

Received 16 July 2026
Revised 18 August 2026
Accepted 17 September 2026
Published 30 September 2026

Keywords:
Educational technology
Physical education
Task completion
Student participation
Secondary school

***Kata kunci*:**
Teknologi pendidikan
Pendidikan jasmani
Penyelesaian tugas
Partisipasi siswa
Sekolah menengah

APA style in citing this article:
Minerva, M., Sakti, A. A. B., Sukarno, Z. N. S., & Amiriyadi, N. (2026). Task submission patterns in Edu-Tech-supported physical education among seventh-grade students. *Physical Education Learning, Teaching, and Assessment (PELTA), 1*(1), 27-32. https://doi.org/10.68536/pelta.v1i1.11

ABSTRACT

Background: The integration of educational technology into physical education offers opportunities to support instructional delivery and students' learning activities. However, evidence regarding students' participation patterns in completing assigned tasks within technology-enhanced physical education, particularly at the junior secondary school level, remains limited.
Objective: This study aimed to describe students' task-submission patterns in Edu-Tech-supported Physical Education, Sports, and Health (PESH) learning and to compare submission proportions between two Grade VII classes.
Methods: A descriptive observational design was employed using administrative records of task submissions collected over a three-month period. A total of 65 students from Class VII B (n = 31) and Class VII F (n = 34) were included through total sampling. Task-submission participation was determined based on students' submission status for kasti and pencak silat assignments and analyzed using frequencies and percentages.
Results: The results showed that task-submission rates for kasti were 48.39% in Class VII B and 76.47% in Class VII F, whereas the corresponding rates for pencak silat were 41.94% and 70.59%, respectively. Overall, the task-submission rates were 63.08% for kasti and 56.92% for pencak silat.
Conclusion: These findings indicate descriptive variation in task-submission participation between classes in Edu-Tech-supported physical education. However, because the study did not include a comparison group, baseline measurements, or validated instruments for assessing student engagement, the findings should not be interpreted as evidence of the effectiveness of Edu-Tech. Future research should employ experimental or longitudinal designs and incorporate validated measures of student engagement.

ABSTRAK

Latar belakang: Integrasi teknologi pendidikan dalam pembelajaran pendidikan jasmani memberikan peluang untuk mendukung penyampaian materi dan aktivitas belajar siswa. Namun, bukti mengenai pola partisipasi siswa dalam menyelesaikan tugas pada pembelajaran pendidikan jasmani berbasis teknologi, khususnya pada tingkat sekolah menengah pertama, masih terbatas.
Tujuan: Penelitian ini bertujuan untuk mendeskripsikan pola pengumpulan tugas siswa pada pembelajaran Pendidikan Jasmani, Olahraga, dan Kesehatan (PJOK) berbasis *Edu-Tech* serta membandingkan proporsi pengumpulan tugas antara dua kelas VII.
Metode: Penelitian menggunakan desain observasional deskriptif berdasarkan catatan administratif pengumpulan tugas selama periode tiga bulan. Sebanyak 65 siswa dari kelas VII B (n = 31) dan VII F (n = 34) dilibatkan menggunakan total sampling. Partisipasi pengumpulan tugas ditentukan berdasarkan status pengumpulan tugas pada materi bola kasti dan pencak silat dan dianalisis menggunakan frekuensi dan persentase.
Hasil: Hasil menunjukkan bahwa pengumpulan tugas kasti mencapai 48,39% pada kelas VII B dan 76,47% pada kelas VII F, sedangkan pengumpulan tugas pencak silat masing-masing mencapai 41,94% dan 70,59%. Secara keseluruhan, tingkat pengumpulan tugas adalah 63,08% untuk kasti dan 56,92% untuk pencak silat.
Kesimpulan: Temuan menunjukkan adanya variasi deskriptif dalam partisipasi pengumpulan tugas antarkelas pada pembelajaran PJOK berbasis Edu-Tech. Namun, karena penelitian tidak menggunakan kelompok pembanding, pengukuran awal, atau instrumen keterlibatan siswa yang tervalidasi, temuan ini tidak dapat digunakan untuk

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menyimpulkan efektivitas Edu-Tech. Penelitian selanjutnya perlu menggunakan desain eksperimental atau longitudinal serta ukuran keterlibatan siswa yang tervalidasi.

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Highlights

- ✓ Task-submission rates varied substantially between the two Grade VII classes in Edu-Tech-supported physical education.
- ✓ Class VII F showed higher submission rates than Class VII B for both kasti and pencak silat assignments.
- ✓ Overall task submission was higher for kasti (63.08%) than for pencak silat (56.92%).

Introduction

Physical Education, Sports, and Health (PESH) differs from predominantly classroom-based subjects because it integrates motor activity with cognitive, affective, and social processes. Successful PESH learning therefore depends not only on students' ability to perform physical activities but also on their engagement in following instructions, completing learning activities, and responding to tasks assigned by teachers. Student engagement becomes increasingly important at the secondary school level because participation in learning may be influenced by interest in the activity, support from teachers and peers, prior learning experiences, and the characteristics of the tasks provided. Allard-Latour et al. (2022), for example, showed that students' situational interest in physical education tasks may vary according to activity type and student characteristics, while Zhang and Han (2026) demonstrated dynamic relationships among teacher support, peer support, and students' behavioral and emotional engagement in physical education. These findings indicate that student participation in learning is a complex phenomenon that is not determined solely by the delivery of instructional content.

The development of digital technology has expanded the ways in which teachers design and deliver PESH instruction. Technologies such as instructional videos, web-based platforms, mobile applications, interactive media, gamification, wearable devices, and blended learning enable information and skill demonstrations to be presented more flexibly and revisited by students when needed. A systematic review by Jastrow et al. (2022) showed that digital technology has been used in physical education to support a range of outcomes across physical, cognitive, social, and affective domains, including motivation and motor development, although implementation may also be constrained by teacher readiness. More recent findings by Tohănean et al. (2025) suggest that the integration of digital technologies, including artificial intelligence and information and communication technologies, may support personalized learning, feedback, motivation, and student participation; however, these benefits remain dependent on infrastructure, teacher competence, and ethical considerations. Other reviews similarly indicate that the digitalization of physical education is increasingly incorporating gamification, wearable technology, digital assessment, and technology-enhanced pedagogical approaches (Dartini et al., 2026; Müller & Wagner, 2026; Zhao & Su, 2026).

Technology is particularly relevant to PESH because motor-skill learning often requires visual representations, movement demonstrations, opportunities to review material repeatedly, and feedback that may not be optimally provided through verbal explanation alone. Papastergiou and Mastrogiannis (2021) developed interactive digital learning objects for secondary school physical education and found that more constructivist-oriented media were perceived by teachers as more interactive, engaging, and useful than more instructivist learning objects. Video technology also provides students with opportunities to review movement demonstrations and may support motor learning processes (Ha et al., 2026). In the Indonesian context, Ulya et al. (2026) developed web-based learning media integrating flashcards, QR codes, and video demonstrations for rhythmic activities and reported improvements across cognitive, affective, and psychomotor domains following implementation. Pujiyanto et al. (2025) likewise demonstrated that an Android-based multimedia application could be applied in junior secondary physical education and received positive responses from both teachers and students. Thus, educational technology can provide flexible supplementary learning resources, but its availability does not automatically ensure that all students will participate in the same way.

Empirical evidence also suggests that students' responses to technology-supported physical education may differ depending on media design, implementation context, and the type of learning activity provided. Botagariyev et al. (2024) reported that the use of digital technology among secondary school students was associated with increased motivation for sport participation, while their study of web-based technologies in middle school physical education showed changes in physical activity, motivation, and performance after technology was integrated into instruction. Jiang and Ning (2023) also demonstrated the potential of social media as an interactive communication tool for supporting physical activity. In blended learning, Liu et al. (2022) found that most university students completed online learning tasks and evaluated digital learning resources positively, although participation in offline group activities was lower. In the context of pencak silat instruction, Ariadi et al. (2025) reported improvements in cognitive and psychomotor scores following the use of Quizizz in a one-group pretest–posttest design.

Meanwhile, Mdhlalose (2024) emphasized that the success of virtual physical education in supporting students' interest and engagement depends strongly on the quality of planning, educator competence, learner readiness, and the availability of infrastructure and resources. Taken together, these findings suggest that technology can support physical education learning, but its outcomes are context-dependent and closely related to how both the technology and learning tasks are implemented.

In the context of student engagement, it is important to distinguish engagement as a multidimensional construct from specific observable behavioral indicators within learning activities. Engagement in physical education may include behavioral, emotional, and cognitive dimensions, as well as self-regulatory processes. Zhang and Han (2026), for example, measured behavioral and emotional engagement separately in secondary school physical education. Li (2026) showed that on-task behavioral engagement in technology-enhanced physical education was associated with teachers' real-time monitoring and self-regulated learning. Accordingly, task completion or submission should not be treated as a representation of the entire student-engagement construct. Nevertheless, task-completion or task-submission status can still serve as an objective and readily observable indicator of behavioral participation in learning. In the context of physical education homework, Kääpä et al. (2022) showed that successful task completion was also related to task characteristics and environmental support, making task-completion patterns relevant for examination in their own right.

Previous studies have provided important evidence regarding the implementation of technology in physical education, but their emphases differ from the focus of the present study. First, Papastergiou and Mastrogiannis (2021) focused on the development and evaluation of digital learning objects for secondary school physical education, emphasizing interactivity, design, engagement, usability, and perceived usefulness from teachers' perspectives. Second, Botagariyev et al. (2024) examined the digitalization of physical education among secondary school students with particular attention to physical activity, fitness, motivation, and academic performance. Third, Pujiyanto et al. (2025) developed an Android-based multimedia application for healthy-lifestyle education and evaluated its feasibility and learning outcomes. Fourth, Ulya et al. (2026)

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evaluated web-based learning media, QR codes, and video demonstrations using cognitive, affective, and psychomotor indicators. Fifth, Ariadi et al. (2025) examined the use of Quizizz in pencak silat instruction through changes in cognitive and psychomotor learning outcomes. Sixth, research on technology-enhanced physical education has also begun to investigate factors associated with on-task engagement, such as teacher monitoring and self-regulation (Li, 2026). Although these studies have expanded the evidence base regarding the benefits and processes of technology use in physical education, most have focused on media development, perceptions of technology, motivation, engagement measured through formal instruments, or changes in learning outcomes. Relatively few studies have specifically described actual task-submission patterns as a form of students' behavioral participation in routine technology-supported physical education, particularly among junior secondary school students and across more than one learning topic.

This gap is important because the success of technology implementation at the classroom level should not be assessed solely in terms of media quality or changes in learning scores, but also in terms of how students actually respond to the learning demands placed on them. Task-submission rates provide simple but practical information about the extent to which students complete learning responsibilities assigned by teachers. Variations in submission patterns across classes or learning topics may also serve as an early signal for teachers to evaluate how learning activities are being implemented, although such differences do not, by themselves, explain their underlying causes. This issue is particularly relevant because research on technology use in physical education has also identified challenges related to technological access, teacher readiness, user acceptance, and variability in students' responses to digital media (Jastrow et al., 2022; Pürgstaller et al., 2025; Rahman et al., 2026; Tohănean et al., 2025). Therefore, descriptive studies of task-submission behavior remain valuable as classroom-level evidence that can complement experimental research and media-development studies.

The novelty of the present study lies in its focus on task-submission patterns as an observable behavioral indicator within Edu-Tech-supported physical education, rather than on digital product development or the effectiveness of technology in improving learning outcomes. The study also compares these patterns across two physical education topics with different characteristics—kasti and pencak silat—and between two Grade VII classes in a junior secondary school context. This approach provides a perspective that differs from previous research, which has more commonly emphasized media feasibility, motivation, learning outcomes, or multidimensional engagement constructs. Nevertheless, task submission in the present study is deliberately positioned as a specific indicator of behavioral participation rather than as a comprehensive measure of student engagement.

Based on these issues and research gaps, this study aimed to describe students' task-submission patterns in Edu-Tech-supported physical education and to compare submission proportions between two Grade VII classes across kasti and pencak silat assignments. Empirically, the study is expected to provide an initial description of variations in students' participation in task completion within technology-supported physical education. Practically, the findings may provide teachers with information for identifying participation patterns across classes and learning topics as a basis for evaluating task implementation. Scientifically, the study is expected to contribute to the literature on educational technology in physical education by positioning task-submission behavior as a specific indicator of participation that can be examined further alongside behavioral, cognitive, and emotional engagement using longitudinal or experimental designs in future research.

Materials and Methods

Study Design

This study employed a descriptive observational design with a quantitative approach to characterize students' task-submission patterns in Edu-Tech-supported Physical Education, Sports, and Health (PESH) learning. The study was based on administrative records of students' task submissions collected over a three-month period across two learning topics, namely kasti and pencak silat. The study did not involve manipulation of variables, experimental treatment, pre- and post-intervention measurements, or a control group. Therefore, the study was intended to describe patterns of student participation in task submission and to compare submission proportions between the two observed classes, rather than to evaluate the effectiveness or causal effects of Edu-Tech on student engagement.

In this study, task submission was used as an observable behavioral indicator of participation. This indicator represented whether students completed and submitted the assigned learning tasks, but it was not intended to serve as a multidimensional measure of student engagement encompassing behavioral, cognitive, and emotional dimensions. This approach was selected because the study relied on factual administrative records of task submission during the implementation of Edu-Tech-supported PESH learning.

Participants

The participants were 65 Grade VII students from SMPN 11 Malang, comprising 31 students from Class VII B and 34 students from Class VII F. All students enrolled in the two classes were included in the study. Accordingly, total sampling was used, whereby all members of the defined study population were included as participants. Task-submission data were collected over a three-month period during the implementation of Edu-Tech-supported PESH learning.

Classes VII B and VII F were selected because both classes were taught by the same physical education teacher, followed the same curriculum, and used the same Edu-Tech-based learning and task-submission procedures during the study period. During the study period, both classes participated in PESH learning involving kasti and pencak silat and received assignments through the Edu-Tech-based learning mechanism implemented by the teacher. Participants were included in the analysis only if they were actively enrolled in one of the two classes during the data-collection period and were recorded as participating in the learning activities for the topics analyzed.

Instruments and Data Collection

The study data were obtained from administrative records of students' task submissions in Edu-Tech-supported PESH learning. These records were used to identify each student's submission status for two learning topics, namely kasti and pencak silat. For each assignment, student status was classified dichotomously as submitted or not submitted. Students were categorized as having submitted an assignment if it had been sent through the WhatsApp Group in accordance with the submission procedure established by the teacher, whereas students with no recorded submission by the specified deadline were categorized as not having submitted the assignment.

The Edu-Tech media used in the learning process consisted of interactive learning activities and interactive games. For the kasti topic, students were required to create a practical demonstration video, answer questions, and upload a worksheet. A similar procedure was applied to the pencak silat topic, in which students created a practical video demonstrating one basic technique, answered questions, and uploaded a worksheet. Submission records were then summarized by class and task type to determine the number and proportion of students who submitted each assignment.

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Because the study variable was an administrative task-submission status rather than a score derived from a questionnaire or psychometric scale, internal consistency testing such as Cronbach's alpha was not applicable. Data accuracy depended primarily on the consistency of the recording procedures.

Statistical analysis

The data were analyzed using descriptive statistics in the form of frequencies and percentages to characterize students' task-submission patterns by class and learning topic. The number of students who submitted each assignment in each class was calculated and compared with the total number of students enrolled in that class. The task-submission percentage was calculated using the following formula:

$$P = (f / N) \times 100$$

where P represents the task-submission percentage, f represents the number of students who submitted the assignment, and N represents the total number of students in the group analyzed.

The analyses were conducted separately for kasti and pencak silat assignments in Classes VII B and VII F. Frequencies and percentages from both classes were then combined to provide an overall description of task-submission patterns.

The results were presented in frequency and percentage distribution tables. Comparisons between Classes VII B and VII F were interpreted descriptively based on differences in task-submission proportions. Because the study did not employ inferential hypothesis testing, terms such as statistically significant were not used in the interpretation of the findings.

Results

Task-submission patterns by class and learning topic

The results showed variation in task-submission patterns between Classes VII B and VII F across the two Edu-Tech-supported PESH learning topics. Overall, the proportion of students who submitted assignments was higher in Class VII F than in Class VII B for both kasti and pencak silat.

As shown in Table 1, 15 of 31 students in Class VII B submitted the kasti assignment, compared with 26 of 34 students in Class VII F. A similar pattern was observed for pencak silat, with 13 students in Class VII B and 24 students in Class VII F recorded as having submitted the assignment. Overall, the task-submission rate was 63.08% for kasti and 56.92% for pencak silat. Thus, Class VII F consistently showed higher task-submission proportions than Class VII B across both learning topics, while within each class, the submission rate for kasti was higher than that for pencak silat.

Table 1
Distribution of task submissions in Edu-Tech-supported physical education by class and learning topic

Class	Number of students	Kasti, *n*	Kasti, %	Pencak silat, *n*	Pencak silat, %
VII B	31	15	48,39	13	41.94
VII F	34	26	76,47	24	70.59
Total	65	41	63,08	37	56.92

Descriptive differences between classes

The differences in task-submission proportions between Classes VII B and VII F showed a consistent pattern across both learning topics. For the kasti assignment, the difference between Class VII F and Class VII B was 28.08 percentage points, whereas for pencak silat the difference was 28.65 percentage points. These findings indicate that the between-class variation in task-submission participation was relatively similar across the two learning topics.

When differences between learning topics were considered, the task-submission rate for pencak silat was lower than that for kasti in both classes. In Class VII B, the difference was 6.45 percentage points, while in Class VII F it was 5.88 percentage points. Overall, the difference in submission rates between kasti and pencak silat was 6.16 percentage points. This pattern indicates that the between-class differences were greater than the differences between the two types of learning tasks.

Discussion

The findings showed that task-submission patterns in Edu-Tech-supported PESH learning differed between Classes VII B and VII F. Class VII F had higher task-submission proportions than Class VII B for both kasti and pencak silat. In addition, within both classes, the submission rate for kasti was slightly higher than that for pencak silat. These findings indicate variation in students' behavioral participation in completing learning tasks. However, they should not be interpreted as evidence that Edu-Tech directly increased student engagement because the study did not include baseline measurements, a comparison group, or a multidimensional measure of student engagement.

These findings are consistent with the literature suggesting that the use of technology can support the physical education learning process, although students' responses are strongly influenced by the context in which the technology is implemented. Jastrow et al. (2022) showed that digital technologies in physical education have been used to support motivation, engagement, motor learning, and knowledge development, but their outcomes depend substantially on instructional design and user readiness. In the Indonesian context, Pujiyanto et al. (2025) showed that an Android-based multimedia application could support physical education learning at the junior secondary school level and received positive responses from both students and teachers. Ulya et al. (2026) also reported that web-based media integrating flashcards, QR codes, and video demonstrations have the potential to support flexible and repeated learning opportunities. Meanwhile, Ariadi et al. (2025) showed that the use of Quizizz in pencak silat instruction was associated with improvements in cognitive and psychomotor learning outcomes. Mdhlalose (2024) further emphasized that student engagement in technology-supported learning depends not only on the media used but also on teacher readiness, learner preparedness, infrastructure, and instructional support.

The differences in task-submission patterns between Classes VII B and VII F may be related to several factors that were not directly measured in the present study. These may include differences in student motivation, access to digital devices or the internet, digital literacy, teacher and parental support, task characteristics, and classroom dynamics. In technology-supported learning, access to digital media alone does not necessarily result in comparable levels of participation across students. Differences in students' ability to use digital platforms, manage their time, understand instructions, and perceive task difficulty may influence whether they complete and submit assigned tasks. Similarly, the slightly lower submission rates for pencak silat than for kasti may be related to differences in the characteristics of the learning content and task demands. However, this explanation remains interpretative because these factors were not directly assessed in the present study.

Clinical implications

From a practical perspective, the findings suggest that PESH teachers should not focus solely on providing Edu-Tech resources but should also regularly monitor students' participation patterns. Task-submission records can serve as an initial indicator for identifying classes or groups of students who may require additional support. Teachers may improve participation by providing clearer task instructions, offering easily accessible examples, sending reminders, providing feedback, and offering technical assistance to students who experience difficulties using digital media. Differences in task-submission patterns across classes may also provide useful information for evaluating whether the mechanisms used to deliver learning materials and assignments adequately address students' needs.

Study limitations

This study has several limitations. First, the descriptive observational design does not permit causal conclusions regarding the effectiveness of Edu-Tech. Second, student participation was assessed solely on the basis of task-submission status and therefore does not represent student engagement comprehensively across behavioral, cognitive, and emotional dimensions. Third, the study involved only two classes from a single school, limiting the generalizability of the findings. Fourth, factors such as motivation, digital literacy, access to digital devices, family support, and task characteristics were not directly measured. Future studies should employ longitudinal or experimental designs, include larger and more diverse samples, and combine task-submission data with validated measures of student engagement to provide a more comprehensive understanding of participation mechanisms in technology-supported physical education.

Conslusions

The findings showed that task-submission patterns in Edu-Tech-supported PESH learning varied between Classes VII B and VII F and between the kasti and pencak silat learning topics. Class VII F consistently showed higher task-submission proportions than Class VII B, while submission rates for kasti were slightly higher than those for pencak silat in both classes. These findings indicate that students' participation in completing and submitting technology-supported learning tasks was not uniform across classes or learning topics.

However, because the study employed a descriptive observational design and assessed participation solely through task-submission status, the findings should not be interpreted as evidence of the effectiveness of Edu-Tech or as a comprehensive measure of student engagement. Future research should involve larger and more diverse samples, use validated measures of student engagement, and examine factors such as motivation, digital literacy, technology access, instructional support, and task characteristics to better explain variation in students' participation.

Author contributions

Conceptualization: M.M., A.A.B.S., Z.N.S.S., and N.A.; Methodology: M.M., A.A.B.S., Z.N.S.S., and N.A.; Investigation: M.M., A.A.B.S., and N.A.; Data curation: M.M., A.A.B.S., and N.A.; Formal analysis: M.M., A.A.B.S., and Z.N.S.S.; Project administration: M.M.; Supervision: Z.N.S.S.; Visualization: M.M., A.A.B.S., and N.A.; Writing – original draft: M.M., A.A.B.S., and N.A.; Writing – review & editing: M.M., A.A.B.S., Z.N.S.S., and N.A. All authors have read and approved the final version of the manuscript and agree to be accountable for the integrity and accuracy of the work.

Ethical statement

The study was conducted in accordance with ethical principles for research involving human participants. Formal permission to conduct the study was obtained from the relevant educational authorities and SMP Negeri 10 Palembang prior to data collection. The research procedures were coordinated with the school and Physical Education teacher before the study was conducted.

Informed consent

Written informed consent was obtained from the participants' parents or legal guardians prior to participation in the study. In addition, assent was obtained from all participating students. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without penalty.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) solely to improve language, grammar, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the accuracy, integrity, and content of the publication.

Funding

This research received no external funding.

Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to appropriate ethical and privacy considerations.

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