

# Web-Based EduSport Learning Application Integrating Multimedia, Interactive Exercises, and Digital Assessment to Support Technical Students' Learning Motivation and Understanding in Physical Education

Sunarno Basuki\*, M. Mutiani, M. Mashud, Recky Ahmad Haffyandi, Faisal Mandala Siregar, Rian Kurnia, Elsa Ariestika

Universitas Lambung Mangkurat, Banjarmasin, Indonesia  
sunarno.basuki@ulm.ac.id

**Abstract**—This study developed a Web-Based EduSport learning application with multimedia, interactive exercises, and digital assessment to support the learning motivation and understanding of technical students in Physical Education. The study employed a Design-Based Research approach that included needs analysis, system design, development, validation, testing, evaluation and revision. Observations and interviews with Physical Education teachers and technical students were used to identify instructional limitations and requirements for digital learning support. Based on these findings, EduSport was developed as a web-based learning environment integrating structured content, multimedia resources, interactive exercises, progress monitoring, and digital assessment. Product feasibility was evaluated by one material expert and one media expert, followed by a limited trial involving 20 technical students. Expert validation indicated that the application was feasible for learning, while the limited student trial showed positive user responses regarding perceived understanding and learning motivation. The findings indicate that integrating multimedia, interactive activities, and digital assessment within a web-based environment can complement practical Physical Education by supporting theoretical preparation, engagement, self-monitoring, and learning evaluation among technical students.

**Keywords**—digital assessment; EduSport; multimedia learning; physical education; technical students; web-based learning

## I. INTRODUCTION

The rapid advancement of digital technology has transformed educational practices by extending learning beyond conventional teacher-centred environments toward more flexible, interactive, and technology-supported forms of instruction. In technical education, web-based learning applications can provide students with flexible access to instructional resources while integrating learning materials, multimedia content, interactive activities, assessment, and feedback within a single environment. When appropriately designed, these applications can support

student engagement, learning autonomy, and continuity of learning (Oubadi & Lamkhanter, 2024; Yorganci, 2026).

The potential of web-based learning is particularly relevant to Physical Education (PE) in technical education because PE combines conceptual understanding with demonstration, practice, feedback, and performance-based assessment. Technical students are expected to understand sports rules, techniques, fitness, health, and safety while applying this knowledge through practical physical activities. Digital technology can therefore complement practical instruction by providing learning resources that technical students can access before, during, and after face-to-face activities. Technology-based instructional videos have also been used to support cognitive and physical performance in Physical Education, demonstrating the potential value of integrating visual learning resources into PE instruction (Zarco et al., 2026).

Multimedia is particularly relevant to Physical Education because visual and audiovisual representations can support students' understanding of movement, technique, and preparation for practical activities. Text, images, demonstrations, and videos can help technical students observe movement sequences, review techniques, and prepare for practical activities. Multimedia-supported learning has also been applied in sport-related instruction to support the development of physical abilities and basic skills (Abbood, 2024). However, digital learning should complement rather than replace direct physical practice, teacher guidance, and performance-based assessment.

Interactive exercises and digital assessment can further strengthen web-based learning by encouraging technical students to actively engage with learning materials rather than merely access information. Exercises, quizzes, progress indicators and scoring features afford technical students the opportunity to respond to learning content, receive feedback and monitor their learning progress. Assessment is also important in technical education because technical students

need to develop conceptual understanding and practical competence. Previous studies in technical education have highlighted the need for systematic development of assessment instruments to evaluate students' understanding of technical learning content (Fiandini et al., 2024).

In vocational education, digital learning environments should facilitate the linking of conceptual knowledge and practical competence. Technical students should have the opportunity to work independently, review the instructional materials, practice the concepts, receive feedback, and evaluate their learning progress. Therefore, educational apps for technical education should be designed with consideration for pedagogical alignment, usability, accessibility, and the learning needs of students (Dritsas & Trigka, 2025; Maxim & Arnedo-Moreno, 2025). Mobile-based learning media in Physical Education is another example of the integration of digital technology to support learning and training activities (Basuki et al., 2026).

Therefore, to create an effective educational application, it is necessary to combine pedagogical, technological and user-oriented considerations (Lu et al., 2022; Harpur & De Villiers, 2015). The Web-Based EduSport Learning Application developed in this study integrates structured learning materials, multimedia support, interactive exercises, learning progress features, and digital assessment into a single web environment. The application was designed to support the learning motivation and understanding of technical students, while complementing the practical characteristics of Physical Education, instead of only focusing on the functionality of the software.

The objective of this study was to develop and evaluate a Web-Based EduSport Learning Application integrating multimedia, interactive exercises and digital assessment for technical students in Physical Education. The study investigates the learning needs that influence the development, the design and the technical characteristics of the application, its feasibility to media and material experts and the results of a limited student trial. This study enriches the development of digital learning environments in technical education by involving structured content, multimedia, interaction, assessment and preparation for practical Physical Education learning. From the point of view of technical education, the contribution of EduSport consists not only in the digitization of Physical Education content, but also in the connection of the theoretical preparation, the interaction of the learner, the monitoring of progress and the evaluation with the practical learning activities.

## II. LITERATURE REVIEW

### A. Web-Based Learning in Physical Education

Web-based learning technologies provide flexible and accessible learning environments that allow technical students to access instructional materials, multimedia resources, interactive activities, assessment and feedback beyond conventional classroom settings (Goad et al., 2019; Killian et al., 2019). In Physical Education, these

technologies can complement face-to-face and practical instruction by supporting theoretical preparation, review, demonstration and evaluation of learning. However, their effectiveness is not only influenced by the technology available but also by the consistency between pedagogical objectives, system features, usability, accessibility and the learning needs of the students in the technical fields (Hadjerrouit, 2010).

For technical students, web-based learning can offer opportunities to prepare for practical activities, review theoretical explanations, do exercises, receive feedback and monitor learning progress. That's important flexibility, because technical education is based on the combination of conceptual knowledge and practical skills. Digital learning should then be a complementary environment that supports preparation and reflection, without replacing direct practice and teacher guidance.

### B. Multimedia Support for Physical Education Learning

Multimedia works well in Physical Education because learning involves movement, technique, coordination, and physical performance. Text, images, audio, animation, and video show these concepts from different angles, helping students grasp the ideas and steps before they try them in practice. Technology-based instructional videos have been reported as useful for supporting cognitive and physical performance in Physical Education (Zarco et al., 2026).

The use of multimedia in sport-related learning can also facilitate the presentation and observation of movement patterns and basic skills. Abbood (2024), for example, reported the use of multimedia-supported cooperative learning in developing physical abilities and basketball skills. These findings support the use of multimedia as an instructional component rather than merely a visual addition. In the EduSport application, multimedia is therefore intended to support theoretical explanations, demonstrations of sports techniques, fitness and health content, and preparation for practical learning.

### C. Interactive Exercises and Learning Engagement

Interactive learning activities require technical students to actively respond to instructional content rather than passively receive information. In digital learning environments, exercises, quizzes, answer choices, progress indicators, and scoring features can encourage participation and provide feedback regarding learning progress. Dynamic visualization and interactive learning tools have also been associated with increased student motivation and engagement in educational settings (Villavecencio et al., 2025).

Interactive exercises let students drill conceptual material repeatedly before moving to hands-on work. They can track what they've done and spot gaps that need more attention. EduSport includes exercise sections, practice questions, navigation tools, progress tracking, and scoring to keep students engaged and aware of their own learning.

#### D. Digital Assessment and Learning Monitoring

Digital assessment will benefit both technical students and instructors by offering structured information on learning progress and performance. With the help of quizzes, scores from exercises, and dashboards, technical students will be able to evaluate their learning outcomes, whereas teachers will be able to track attendance and performance. Digital assessment is relevant in technical learning since conceptual knowledge and competency should be assessed complementarily.

The tools used for the assessment should be systematically linked to the learning content and the skills that are being taught. Fiandini et al. (2024) showed the relevance of structured cognitive assessment design in vocational education, especially in assessing the technical learning content comprehension. Digital assessment is thus utilized in this research in order to assist practical assessment rather than substitute it.

The EduSport software application is designed to have different features that apply to technical students as well as the administrators. Technical students will be able to use this application to get the material they need, solve exercises, monitor their progress and their scores, while the administrators will be able to manage the learning material and monitor the performance of the students.

### III. METHOD

#### A. Research Design

This study used the Design-Based Research (DBR) method in developing and evaluating the Web-Based EduSport learning application for Physical Education, and revising it to improve the feasibility and educational relevance of the developed application. The development process consisted of five stages: (1) needs analysis, (2) system design, (3) development, (4) validation and testing, and (5) evaluation and revision.

#### B. Needs Analysis

The needs analysis aimed to identify problems and requirements related to Physical Education learning. Data were collected through observations and interviews with Physical Education teachers and technical students. The analysis focused on limitations of conventional instruction, requirements for digital learning support, access to internet-connected devices, and the need for interactive learning materials and evaluation systems.

The findings were used to define the functional requirements of the EduSport application. These requirements included structured learning content, multimedia support, interactive learning activities, exercises, learning progress features, and digital assessment.

#### C. System Design

At the design stage, the structure, interface, functionality, and learning features of the EduSport application were planned. The design included the user interface and user experience, client-server architecture, database structures

for storing user information, learning materials, and scores, as well as lesson modules, multimedia support, exercise sections, quizzes, dashboards, learning progress features, and digital assessment.

Flowcharts and system diagrams were developed to describe the processes of content preparation, approval, publication, user access, and online learning implementation.

#### D. Development Stage

The EduSport application was developed as a web-based platform with the use of HTML and CSS for the interface, JavaScript for functionality, server-side programming for data handling, and a database management system to store users' accounts and results of their learning. The application was created for two types of users: technical students and administrators/teachers.

Technical students could access learning materials, complete exercises, monitor learning progress, and view scores. Administrators could manage learning content and monitor student performance. These functions were integrated within a client-server system to support web-based learning access through internet-connected devices.

#### E. Validation and Testing

Product validation was conducted to evaluate the feasibility of the developed EduSport application. One material expert and one media expert participated in the validation process. The material expert evaluated the suitability, accuracy, and completeness of the learning content, while the media expert assessed interface design, usability, technical quality, and interactivity.

The validation instrument used a five-point Likert scale ranging from very inappropriate to very appropriate. Product feasibility was calculated using:

$$\text{Feasibility Percentage} = (\text{Total Score Obtained} / \text{Maximum Score}) \times 100\%$$

The feasibility results were interpreted using the following criteria: 81–100% = Very Feasible, 61–80% = Feasible, 41–60% = Fairly Good, 21–40% = Not Feasible, and 0–20% = Very Not Feasible.

After expert validation, a limited trial was conducted involving 20 technical students in Physical Education. The trial examined usability, attractiveness, perceived benefits, and students' responses to the application as a learning medium.

#### F. Evaluation and Revision

The opinions of experts and technical students were used as a basis for the application revision. Revisions included improvements in system functionality, clarity of learning materials, visuals, interactivity, and technical aspects. Special emphasis was placed on improvements in the use of videos, as Physical Education is about movements and videos demonstrate them. The revision stage was intended to strengthen the integration of multimedia, interactive learning

activities, and digital assessment within the EduSport application.

#### G. Data Analysis

Quantitative data from the validation and feasibility questionnaires were subjected to descriptive analysis to establish the feasibility level of the product. The qualitative data and suggestions from experts and technical students were also subjected to descriptive analysis to aid in the process of revision and improvement of the product.

### IV. RESULTS AND DISCUSSION

#### A. Needs Analysis Results

Technology creates a need for innovation in Physical Education learning. There is a need for learning media that will be able to offer instruction in a systematic manner and according to the needs of the curriculum. There is also a need for the provision of visuals and audio components to demonstrate sport techniques.

Teachers need assessment mechanisms to monitor learning outcomes efficiently. Features such as digital dashboards and learning management systems may offer data on technical students' advancement and performance. Such demands have become particularly pertinent in learning settings where face-to-face interaction combines with the web-based environment. In relation to student needs, accessibility is also of importance. Technical students need time for independent learning in order to get familiar with theoretical material and other sources of information outside regular class hours. The process of interactive learning through the use of multimedia, exercises, and tests together with feedback can be useful in this case as well. Navigation and a user-friendly interface are also essential requirements in order not to be overwhelmed by technology.

Using the above-mentioned needs analysis, the EduSport system was developed as a web-based system that incorporates well-structured content, multimedia support, interactive exercises, and assessment methods. The learners will access the system using an internet-enabled laptop/mobile phone. After accessing the system, the user will first prepare an internet-enabled device, browse and then access the EduSport website. Figure 1 illustrates this initial process.

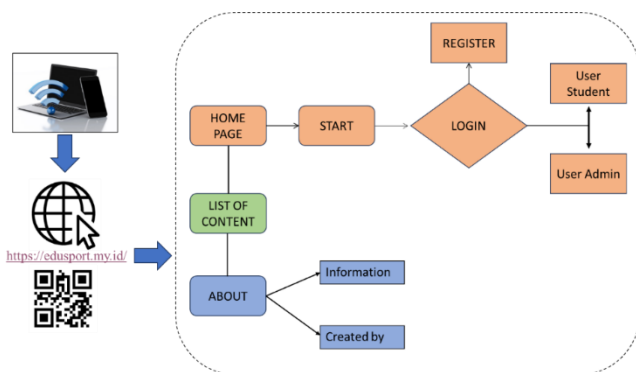


Fig. 1. Process before conducting web-based learning.

Once on the website, the learner is redirected to the first landing page, which gives all the information regarding the learning materials and the functionalities of the main system. The technical learner will begin the learning process by clicking on the “START” button. Figure 2 shows the initial web interface of the EduSport application.



Fig. 2. Initial web view.

This program is suitable for technical student users as well as administrator users. Users who don't have an account can create one; however, those with accounts can sign in depending on their roles. Figure 3 is for the login screen where users sign in to the application as technical students or administrators.

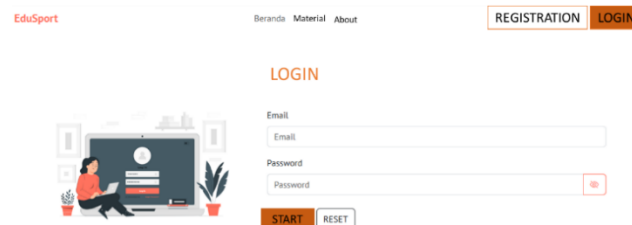


Fig. 3. Display when logged in

Once signed in successfully, the technical student users are taken to the dashboard. The dashboard features the following elements: the subject list, profile, progress, and scores. In the subject list, technical student users get learning material and exercises, as well as the conclusions. Practice exercises come with the following components: progress, question, answers, and next item buttons. Figure 4 presents the dashboard and learning flow for technical student users.

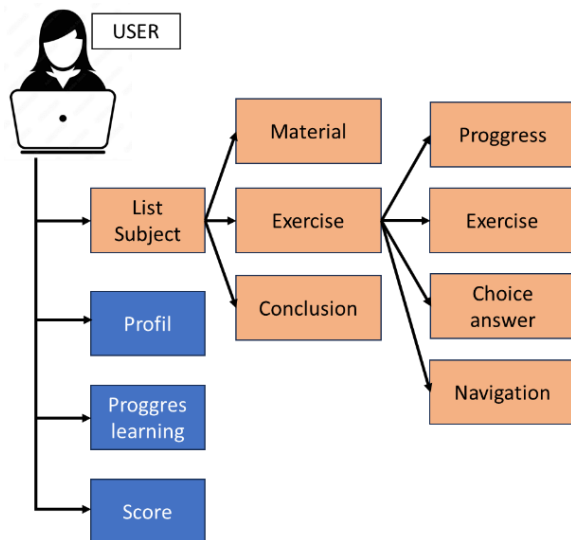


Fig. 4. Dashboard view and flow for student users.

This arrangement facilitates access to learning materials, exercises, feedback, and progress within one web-based system. Such an approach may help overcome fragmentation of learning materials and testing, as well as facilitate individual study of the materials by technical students before or after practical Physical Education classes.

#### B. Integration of Multimedia and Interactive Exercises

Multimedia technologies were incorporated into EduSport to improve the presentation of Physical Education learning materials. Visual and auditory materials are offered along with traditional text materials. This is especially important in this case because technical students have to learn the technique of playing before participating in practical exercises.

The evaluation process also emphasized the importance of video integration because Physical Education is closely related to physical movement. Multimedia can therefore connect theoretical explanations with visual demonstrations and practical learning experiences. Technology-based instructional videos have similarly been used to support cognitive and physical performance in Physical Education (Zarco et al., 2026), while multimedia-supported learning has been applied to support physical abilities and sport-related skills (Abbood, 2024).

Interactive exercises are integrated through practice sections and quizzes where technical students are able to pose questions, choose answers, undertake learning processes and check their progress. Such actions promote active engagement rather than mere access to instructional materials. The indicators of progress and score-based features can give visible evidence of accomplishment in learning, which might motivate learners.

#### Administrator Dashboard and Learning Monitoring

The administrator's dashboard has been created in order to manage and control the learning process. It allows an administrator to get grades of technical students from the exercises, to search for individual students, to see consolidated grade data and average results. Figure 5

illustrates the dashboard and workflow of administrator users.

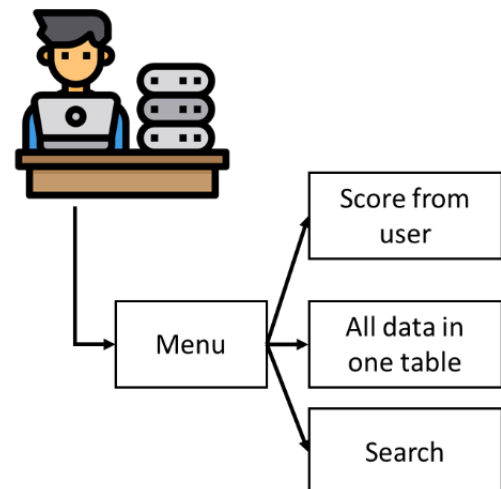


Fig. 5. Dashboard view and flow for admin users.

The administrator dashboard complements the technical student interface by providing teachers or administrators with centralized information about student participation and learning results. This enables the web-based environment to function not only as a repository of learning materials but also as a system for monitoring learning progress.

#### C. Integration of Digital Assessment

Digital assessment is integrated through exercises, quizzes, score displays, and administrator monitoring. Technical students can complete learning activities and obtain information about their progress and scores, while administrators can access performance data. The digital assessment component therefore supports both student self-monitoring and teacher evaluation.

In technical education, assessment needs to be aligned with the competencies and learning materials being taught. Structured cognitive assessment has been emphasized as an important component of vocational learning because it provides information about students' understanding of technical content (Fiandini et al., 2024). In EduSport, digital assessment primarily evaluates theoretical understanding and learning activities. It is therefore complementary to practical assessment rather than a replacement for direct observation of physical performance.

#### D. Application Development and System Workflow

The EduSport application operates through a client-server system. Technical students access the application through a browser on a computer or smartphone. When the website address is entered, the Domain Name System translates the domain name into the corresponding server location. The request is then transmitted through the internet to the server, where the application processes the request and retrieves the required information from the database.

The server contains the technologies and database resources required to operate the application. These include HTML and CSS for interface presentation, JavaScript for

interactive functions, server-side programming for processing requests, and a database for storing user and learning information. After processing the request, the server returns the required information to the user's browser. Figure 6 illustrates this web-based application workflow.

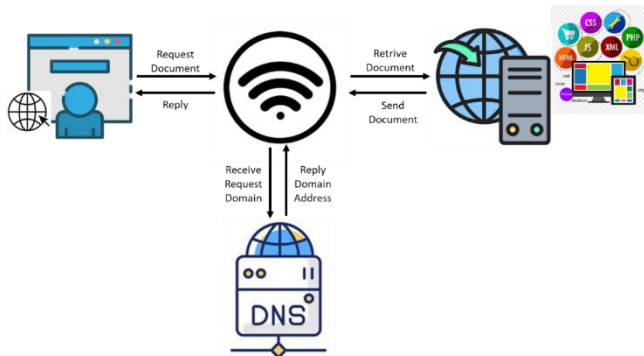


Fig . 6. Web-based application workflow.

This client-server structure enables technical students to access learning materials, exercises, user accounts, progress information, and assessment data through a connected web environment. The workflow also supports a systematic process in which lesson materials are prepared, submitted, reviewed, revised when necessary, approved, and subsequently published for learning implementation.

#### E. Validation and Technical Student Trial Results

The results from the validation demonstrated that the learning materials were highly appropriate and feasible. The experts confirmed the applicability of the EduSport application as the medium of digital learning, particularly on the aspects of content appropriateness and media quality.

A preliminary trial using twenty technical students was done to determine the usability, appeal and the advantages of the application for learning. The trial revealed favorable responses regarding the technical students' comprehension of the learning materials and motivation after using EduSport. Unfortunately, the information obtained did not contain any pre-test/post-test numerical results or inferential statistics. Thus, the findings must be taken as results from the preliminary test rather than a cause-and-effect relationship.

#### F. Discussion

The findings indicate that the Web-Based EduSport Learning Application can support technical students in Physical Education by integrating structured learning resources, multimedia, interactive exercises, and digital assessment. This integration is particularly relevant because Physical Education requires both conceptual understanding and practical competence. A web-based environment can support theoretical preparation, independent review, learning engagement, and evaluation while practical activities continue to be conducted in appropriate physical settings.

Multimedia integration is important because Physical Education involves movement, technique, and demonstration. Visual and audiovisual resources can help technical students review movement procedures and prepare for practical activities. This is consistent with studies demonstrating the potential of technology-based instructional videos in Physical Education (Zarco et al., 2026) and multimedia-supported instruction for sport-related skill development (Abbood, 2024).

Interactive exercises further strengthen the learner-centered characteristics of the application. Practice questions, answer choices, progress indicators, and scores provide opportunities for active participation and self-monitoring. Similar educational applications using visualization and interactive tools have been associated with increased student motivation and engagement (Villavecencio et al., 2025).

Digital assessment strengthens the role of EduSport as an integrated learning environment. Technical students can review their scores and progress, while teachers or administrators can monitor performance and use the information for learning follow-up. Nevertheless, digital assessment should remain complementary to practical assessment because theoretical scores cannot fully represent physical performance, movement quality, and sport-related competencies.

The technical education context further reinforces the importance of connecting digital learning with practical competencies. Technical students require learning experiences that support both knowledge acquisition and its application. EduSport provides a flexible environment in which technical students can access learning materials before, during, or after practical sessions, thereby supporting preparation, reflection, and evaluation.

Overall, the findings support the use of EduSport as a complementary educational technology rather than as a replacement for direct Physical Education instruction. Its educational value lies in the integration of technological functionality with pedagogical objectives, technical students' learning needs, teacher practices, and the practical characteristics of Physical Education.

#### CONCLUSION

The study created a Web-Based EduSport Learning Application which consists of multimedia, interactive exercises, and digital assessment for technical students in Physical Education. This application was developed using needs analysis, system design, development, validation and testing, and evaluation and revision processes. EduSport has structured learning materials, multimedia, interactive exercises, quizzes, feedback on progress, scores, dashboards, and digital assessment in a web-based learning environment. Validation by experts showed that the application was feasible for the learning process, while the limited trial carried out with 20 technical students provided positive responses related to comprehension and learning motivation. All of the results should be understood in the context of limited feasibility and user trial, not as evidence of effectiveness in a causal relationship. EduSport can be

used to supplement practical Physical Education since it can help with theoretical preparation, independent study, involvement, progress, and evaluation in the learning process. Further research should include a large sample size and comprehensive quantitative measurement of learning motivation, comprehension, practical skill, usability, and learning outcome.

#### ACKNOWLEDGMENT

The authors acknowledge the Physical Education teachers, technical students, material expert, and media expert who participated in the development, validation, and limited trial of the Web-Based EduSport Learning Application.

#### REFERENCES

- Abbood, A. M. H. (2024). Effectiveness of cooperative learning using multimedia in some physical abilities and basic skills for junior players in basketball. *ASEAN Journal of Physical Education and Sport Science*, 3(1), 7–16.
- Basuki, S., Amirudin, A., Perdinanto, P., Sahrian, A., Reza, M., & Mutiani, M. (2026). Development of mobile-based learning media for the supervision of physical education and sports training. *Journal of Engineering Science and Technology*, 21(2), 468–479.
- Dritsas, E., & Trigka, M. (2025). Methodological and technological advancements in e-learning. *Information*, 16(1), 56.
- Fiandini, M., Hofifah, S. N., Ragadhita, R., & Nandiyanto, A. B. D. (2024). How to make a cognitive assessment instrument in the Merdeka curriculum for vocational high school students: A case study of generating device materials about the Stirling engine. *ASEAN Journal for Science Education*, 3(1), 65–86.
- Goad, T., Towner, B., Jones, E., & Bulger, S. (2019). Instructional tools for online physical education: Using mobile technologies to enhance learning. *Journal of Physical Education, Recreation & Dance*, 90(6), 40–47.
- Hadjerrouit, S. (2010). Developing web-based learning resources in school education: A user-centered approach. *Interdisciplinary Journal of E-Learning and Learning Objects*, 6(1), 115–135.
- Harpur, P., & De Villiers, M. R. (2015). MUUX-E, a framework of criteria for evaluating the usability, user experience and educational features of m-learning environments. *South African Computer Journal*, 56(1), 1–21.
- Killian, C. M., Kinder, C. J., & Woods, A. M. (2019). Online and blended instruction in K–12 physical education: A scoping review. *Kinesiology Review*, 8(2), 110–129.
- Lu, J., Schmidt, M., Lee, M., & Huang, R. (2022). Usability research in educational technology: A state-of-the-art systematic review. *Educational Technology Research and Development*, 70(6), 1951–1992.
- Maxim, R. I., & Arnedo-Moreno, J. (2025). EDTF: A user-centered approach to digital educational games design and development. *Information*, 16(9), 794.
- Oubadi, Y., & Lamkhanter, F. (2024). The role of web technologies in promoting learner autonomy among EFL university students. *International Journal of Language and Literary Studies*, 6(3), 343–356.
- Villavecencio, R. D., Layno, P. J. S., Tumangday, B. T., Estrella, A. D., Jr., Mailla, F. A., Jr., Abusama, H. P., Mecida, S. V., & Valdez, D. M. (2025). Utilization of dynamic visualization tools: Enhancing students' motivation and engagement in biology education. *ASEAN Journal for Science Education*, 4(2), 65–84.
- Yorganci, S. (2026). Evaluating students' learning experiences in blended learning environment integrated with interactive GeoGebra applets: A self-determination theory perspective. *Journal of Computer Assisted Learning*, 42(4), e70283.
- Zarco, M. E. H. C., Calixtro Jr., V. L., Deligero, J. D., Raymundo, A. M. O., & Tubac, J. L. V. (2026). Developing technology-based instructional videos to enhance cognitive and physical performance in physical education. *ASEAN Journal of Educational Research and Technology*, 5(1), 47–56.