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DIGITAL PEDAGOGICAL NEEDS IN PHYSICAL EDUCATION: MAPPING TEACHER AND STUDENT PERSPECTIVES ON MULTIMEDIA GYMNASTICS LEARNING

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ABSTRACT
This study maps the instructional and technological needs of elementary school students and physical education teachers in Makassar, Indonesia, regarding the development of a multimedia-based 7E instructional model for gymnastics learning. Using a mixed-methods design, the research involved surveys and interviews with 100 students and 40 teachers to examine their perspectives on current instructional practices, digital integration, and expectations for pedagogical innovation. Findings revealed that while students exhibit high motivation to engage in gymnastics, they face persistent challenges in movement comprehension and learning confidence. Teachers reported significant barriers, including limited access to multimedia tools, unfamiliarity with the 7E model, and the need for structured digital support. Both groups strongly endorsed multimedia-based instruction as a necessary enhancement to promote clarity, safety, and student engagement. This research contributes to broader educational transformation by offering a replicable framework that blends Direct Instruction and Dynamical Systems Theory within the 7E model, thus aligning with principles of Education for Sustainable Development (ESD). Although centered on physical education, the proposed model exemplifies a learner-centered, digitally enriched approach that can be adapted to other subject areas, including Indonesian Language and Literature Education, by fostering student agency, differentiated learning, and interactive pedagogy.

Keywords: physical education, gymnastics learning, multimedia-based instruction, digital innovation, elementary schools

INTRODUCTION
Transforming education in the digital era requires pedagogical frameworks that are responsive not only to academic standards but also to broader goals of sustainable development and human flourishing. Within this paradigm, physical education (PE) has emerged as a critical avenue for fostering holistic development by integrating cognitive, affective, and psychomotor domains (McGuire et al., 2019). Physical education (PE) has emerged as a crucial avenue for promoting sustainable development and holistic student growth in the digital era. Research indicates that PE can contribute significantly to achieving the Sustainable Development Goals (SDGs), particularly SDGs 3 (Health and Wellbeing), Quality Education and Gender Equality . Integrating technology in PE can enhance student motivation and participation through blended and cooperative learning approaches (Mulato et al., 2024). To optimize PE's impact, educators should employ practice-based models and foster critical and systemic thinking among students

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(Baena-Morales & González-Víllora, 2023). Furthermore, PE offers unique opportunities to develop key competencies for sustainability in higher education, with potential benefits for vulnerable communities (Baena-Morales et al., 2023). Of the 169 SDG targets, 24 can be effectively addressed through PE, highlighting its potential to contribute to a more sustainable world (Baena-Morales et al., 2021). As part of this mission, gymnastics—specifically floor gymnastics as a simplified form of artistic gymnastics—has been embedded within the Indonesian national PE curriculum across all levels. Gymnastics, particularly floor gymnastics, is an integral part of the Indonesian physical education curriculum across all levels. It is widely applied and popular among early childhood students, offering benefits for basic movement training and physical development (Ginanjar et al., 2023). This approach aligns with the broader goals of physical education curricula, which often include gymnastics as a core movement domain. Recent studies highlight the importance of implementing physical education and character-building programs in elementary schools. Creative dance programs have shown potential to enhance children's cognitive and psychosocial development (Konstantinidou, 2023). A game-based physical education model effectively improved motor skills, cooperation, and discipline among elementary students (Fizi et al., 2023). Nevertheless, the practical realization of gymnastics instruction in primary education has encountered significant barriers. Participation in national-level student gymnastics competitions remains low, with only 20% engagement reported in the O2SN (Kemenpora, 2022). Key barriers include insufficient teacher preparation and resource limitations (Suherman et al., 2024). Preliminary studies also highlight a disconnection between student enthusiasm (74%) and actual skill acquisition, as seen in the 62% remedial rate among learners (Rahman, 2023). This discrepancy signals an urgent need to reevaluate instructional design and accessibility within PE, especially in resource-limited contexts. Teachers report difficulties in delivering effective remote PE instruction, with issues around technology access, student engagement, and assignment submission varying by region and school type (Mercier et al., 2021). Research indicates a disconnect between appropriate instructional practices and student outcomes, emphasizing the importance of effective teaching strategies for student engagement, motivation, and learning (Nesbitt et al., 2021). The 5E Learning Cycle (Engage, Explore, Explain, Elaborate, Evaluate) has shown promise in enhancing learning outcomes and instructional design skills. Studies have demonstrated its effectiveness in improving conceptual understanding, science achievement, and attitudes toward science (Ruiz-Martín & Bybee, 2022). However, gymnastic-based instruction—particularly in motor-rich environments—demands the integration of embodied learning theories. The integration of multimedia into motor learning contexts has also demonstrated a positive impact on attention, perception, and motivation (Giustino et al., 2021) . A systematic review of digital technology in PE revealed positive impacts on motivation, sport-specific motor capabilities, and skills (Jastrow et al., 2022). However, the review also identified barriers related to teacher preparation. Overall, these studies demonstrate the potential of digital media to enhance PE instruction, particularly for motor skill acquisition and inclusive education, while highlighting areas for further development in implementation. In light of Education for Sustainable Development (ESD), this study addresses the intersection of equity, innovation, and digital transformation in PE by proposing a multimedia-assisted 7E instructional model. This model utilizes the structured sequencing of the 7E learning cycle to support meaningful and developmentally appropriate gymnastics instruction for

elementary students. By aligning pedagogical innovation with learner needs and contextual realities, it aims to improve instructional effectiveness and broaden equitable access to quality physical education across Indonesia.

METHOD

This research employed a mixed-methods approach (Minc et al., 2022; Shantha Nair & S Prem, 2020) with an emphasis on needs analysis to identify the gaps, expectations, and contextual requirements for the development of a multimedia-based instructional model in elementary school. Mixed methods were selected to allow for triangulation of data from different perspectives—quantitative (survey) and qualitative (interview)—to generate a comprehensive and grounded understanding of the pedagogical challenges and digital needs (Ramírez-Montoya & Lugo-Ocando, 2020) . Participants and Sampling . Participants consisted of 40 physical education (PE) teachers and 100 elementary school students (grades 4–6) from ten public schools across Makassar, Indonesia. Schools were selected based on accessibility and prior implementation of gymnastics activities. Teachers were selected purposively for their direct instructional role in gymnastics, while student participants were selected via stratified random sampling to ensure diversity in age and gender. Instruments and Tools To capture data for the needs analysis, two main instruments were developed: Teacher Questionnaire. this instrument contained 24 items divided into four domains: (1) instructional challenges in teaching gymnastics, (2) current access and use of digital learning media, (3) perceptions of students' engagement and learning outcomes, and (4) preferences and expectations for multimedia-based instructional tools. A 4-point Likert scale (1 = Strongly Disagree, 4 = Strongly Agree) was used. Example item: *"Multimedia tools would help me teach complex movement skills more effectively."*. Student Questionnaire This instrument included 15 items addressing students' motivation to learn gymnastics, experiences with current PE lessons, and preferences for digital and visual learning media. Interview Protocol Semi-structured interviews were conducted with 10 teachers and 20 students to explore their responses in more depth. The protocol focused on themes such as perceived instructional challenges, media usage, and desired improvements in teaching gymnastics.

Data Collection Procedure. Data collection was conducted over a four-week period in selected schools. Questionnaires were administered during school hours with support from the research team. Interviews were recorded (with permission) and transcribed for analysis. Data Analysis Quantitative data were analyzed using descriptive statistics, including mean, frequency, and percentage to describe trends and patterns. Qualitative data from interviews were analyzed through thematic coding (Remmen, 2024; Roseveare, 2023), allowing for the identification of emergent categories such as media preference, instructional barriers, and student engagement issues. Triangulation was used to validate the consistency between questionnaire results and interview findings. Ethical Considerations The research received ethical approval from the Institutional Review Board of Universitas Negeri Makassar. Informed consent was obtained from all participating teachers and from parents or guardians of student participants. Anonymity and confidentiality were maintained throughout the study.

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RESULTS AND DISCUSSION

This section presents the integrated results from needs assessments involving 111 elementary students and 15 physical education (PE) teachers from Makassar. The findings are categorized into two main components: (1) quantitative data that highlight statistical trends and instructional gaps, and (2) qualitative insights reflecting attitudes, expectations, and practical challenges regarding floor gymnastics learning.

Table 1. Summary of Quantitative Findings from Students

Dimension	Indicator	Response (%)
Emotional Engagement	Students who enjoy gymnastics learning	73.9%
Instructional Source	Dependence on teacher explanation	72.1%
Digital Exposure	Use of gymnastics-specific apps	16.2%
Motor Learning Difficulty	Difficulty following movements	55.9%
Risk Perception	Fear of injury during gymnastics	33.3%
Awareness of 7E Model	Never heard of or unfamiliar with 7E	62.2%
Multimedia Preference	Preference for video tutorials	82.9%
Device Access	Use of smartphone/tablet at home	86.5%
Willingness to Try 7E	Very interested if presented engagingly	64%

Table 1 summarizes students' responses related to their experiences and perceptions of gymnastics instruction in elementary schools. A substantial proportion of respondents (73.9%) indicated that they enjoyed participating in gymnastics activities, while 72.1% acknowledged a strong dependence on their teacher's verbal explanation during lessons. Despite the widespread enthusiasm, the use of gymnastics-specific digital applications remained notably low, with only 16.2% reporting prior exposure. Challenges in motor learning were evident, as more than half of the students (55.9%) experienced difficulty following movement demonstrations. Additionally, one-third (33.3%) expressed concerns about potential injury during participation. Awareness of the 7E instructional model was limited, with 62.2% stating that they had never encountered or were unfamiliar with the framework. In contrast, preferences for digital learning media were markedly high: 82.9% favored video-based tutorials, and 86.5% reported regular access to smartphones or tablets at home. Interestingly, 64% expressed strong interest in engaging with the 7E model, provided it was delivered in an interactive and appealing manner. These findings highlight both the enthusiasm of learners and the pressing need for pedagogical innovations that integrate multimedia tools into gymnastics education.

Table 2. Summary of Quantitative Findings from Teachers

Dimension	Indicator	Response (%)
Teaching Strategy	Use of direct instruction and demonstration	86.7%
Digital Teaching Support	Use of smartphone/laptop in PE	73.3%
Common Instructional Media	Use of printed books and internet content	80%
Pedagogical Barriers	Lack of tools, multimedia, and time	66.7%

Dimension	Indicator	Response (%)
Knowledge of 7E Model	Unfamiliar or minimal understanding	46.7%
Belief in 7E Potential	Agree that 7E enhances motivation and skill acquisition	100%
Multimedia Integration Support	Agree that 7E can be enhanced through multimedia	100%
Multimedia Feature Priority	Request for video tutorials and 3D visuals	93.3%
Needed Support for Adoption	Request for training, technology access, and 7E implementation guide	46.7%

Table 2 outlines key findings from teacher responses regarding current instructional practices and multimedia integration in gymnastics learning. The majority (86.7%) reported relying on direct instruction and demonstration as their primary teaching strategy, supported by the use of smartphones or laptops (73.3%) and printed or online content (80%). However, challenges remain evident: 66.7% cited limited access to multimedia tools, time constraints, and insufficient resources as major barriers. Notably, nearly half (46.7%) indicated unfamiliarity with the 7E model. Despite these limitations, all respondents acknowledged the potential of the 7E framework to improve student motivation and skill acquisition, with equal agreement that its implementation would be more effective through multimedia. Teachers expressed a strong preference for digital features such as video tutorials and 3D visuals (93.3%) and emphasized the need for further support in the form of training, improved technology access, and clear implementation guidelines (46.7%). These findings point to both readiness and urgency for structured digital innovation within the PE curriculum.

Table 3. Thematic Summary of Open Responses (Students and Teachers)

Theme	Student Insights	Teacher Insights
Visual Learning Need	Prefer video demonstrations and animations for understanding movement	Emphasize lack of multimedia tools and request for video-based learning resources
Safety and Confidence	Request safe environments, simplified movement instructions	Highlight concern over student confidence and safety, especially during skill introduction
Pedagogical Expectation	Desire for fun, easy-to-follow, and engaging learning	Emphasize need for structured yet flexible methods that accommodate varying student abilities
Need for Multimedia Tools	Expect smartphone-accessible content with step-by-step visuals	Suggest training and infrastructure upgrades to support multimedia-enhanced 7E model implementation
Motivation and Repetition	Believe repetitive and interactive learning boosts confidence	Recommend collaborative activities to enhance consistency in practice

Thematic analysis of open responses revealed consistent priorities across students and teachers. Both groups emphasized the importance of visual support, with students preferring video demonstrations and teachers highlighting the lack of multimedia tools. Safety and confidence emerged as shared concerns—students requested simplified instructions in safe environments, while teachers noted challenges in supporting beginner learners during skill acquisition. Pedagogically, students expressed a desire for engaging and structured instruction, and teachers emphasized the need for methods that accommodate diverse abilities. Expectations for accessible digital content were evident; students sought mobile-based, step-by-step visuals, while teachers called for training

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and infrastructure to support multimedia integration. Additionally, both groups acknowledged the value of repetition and interaction in enhancing learning consistency and confidence. These themes underline the relevance of a multimedia-based instructional model that is responsive to both learner needs and classroom realities.

Discussion

The dual-perspective analysis offers a compelling narrative for redesigning gymnastics pedagogy in elementary education through multimedia-enhanced, student-centered frameworks. The strong interest among students (73.9% enjoy learning gymnastics) and high teacher agreement (100% support multimedia-integrated 7E) reveal a clear readiness to embrace digital innovation—despite current limitations. Both groups cited significant barriers to effective instruction. Students face challenges in comprehending complex movements and harbor safety concerns, while teachers struggle with inadequate access to multimedia resources and limited demonstration time.

These issues resonate with Mayer's assertion that effective learning, especially in movement education, requires multisensory input and learner-centered visualization (Mayer, 2024). Furthermore, the discrepancy between high digital device access (86.5% of students use smartphones) and low implementation of multimedia learning tools (only 16.2% used relevant apps) points to an untapped potential in digitally mediated PE. The limited familiarity with the 7E instructional model among both students and teachers (only 13.3% of teachers are fully aware) underscores a gap not in willingness but in *preparation*. Teachers explicitly called for formal training, instructional guidelines, and technology access to confidently implement the model—a finding consistent with implementation research in technology-enhanced education (Thomas et al., 2019). Conceptually, integrating Direct Instruction (DI) and Dynamical Systems Theory (DST) within the 7E framework creates a pedagogically robust foundation. DI ensures explicit skill modeling and safety scaffolding during early learning phases (Rosenshine, 2012), Recent research has explored teaching DST concepts through embodied learning experiences, demonstrating potential for improving students' ability to integrate and transfer knowledge across disciplines (Almarcha et al., 2022) . Combined, these approaches support both structure and autonomy, which are critical in elementary motor skill development.

The convergence of qualitative feedback further supports this integrated model. Students want enjoyable, interactive sessions with clear movement models and repetition; teachers seek tools that enhance motivation, engagement, and differentiation. These shared expectations affirm that the multimedia-based 7E model is not only desirable but necessary for *equity, accessibility, and relevance* in PE pedagogy.

In conclusion, the data confirms the pedagogical urgency and contextual appropriateness of developing a multimedia-assisted 7E instructional model for gymnastics. Such innovation aligns with the broader goals of Education for Sustainable Development (ESD) by promoting inclusive, adaptive, and future-ready learning ecosystems in physical education.

CONCLUSION

This study highlights a critical intersection between pedagogical innovation and the practical realities of elementary physical education, particularly in the domain of floor gymnastics. The integrated findings from students and teachers in Makassar

demonstrate a strong interest in gymnastics learning, yet reveal substantial instructional gaps—ranging from inadequate access to multimedia resources, low familiarity with structured instructional models, and insufficient support for differentiated motor skill development. Students' high motivation is compromised by difficulties in understanding movement sequences and safety concerns, while teachers face systemic barriers such as the lack of instructional technology, visual aids, and comprehensive professional development. Despite these challenges, both stakeholders express a clear openness to embracing digital pedagogies—particularly through the integration of interactive, visual, and mobile-accessible learning tools. The findings validate the need for a multimedia-assisted instructional model based on the 7E framework, strategically enhanced by the principles of Direct Instruction (DI) and Dynamical Systems Theory (DST). This model not only aligns with current digital habits and technological readiness among students and educators but also addresses fundamental pedagogical needs—clarity, safety, progression, and engagement—in teaching movement-based content. From the perspective of the digital paedagogical themes, this research strongly contributes to Innovative Pedagogies in the Digital Age by proposing a digital solution tailored to the embodied, experiential nature of physical education. It echoes the core values of Transforming Education for Sustainable Development (ESD) by promoting inclusive and context-responsive instruction that supports physical literacy, well-being, and lifelong learning. Moreover, by responding to infrastructure limitations and professional training needs, the study advocates for greater equity and access in global education systems, especially within under-resourced school environments.

The implications of this study extend beyond gymnastics. It provides a replicable model for how curriculum design, multimedia technology, and evidence-based pedagogy can converge to create active, participatory, and sustainable learning environments. As education systems move toward digital transformation, this research underscores the importance of grounding innovation in local needs and teacher-student voices to ensure meaningful and lasting educational impact.

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BIBLIOGRAPHY

Almarcha, M. C., Martínez, P., Balagué, N., & Hristovski, R. (2022). Embodied transfer of knowledge using dynamic systems concepts in high school: A preliminary study. *Human Movement Science*, *84*, 102974. https://doi.org/10.1016/j.humov.2022.102974

Baena-Morales, S., & González-Víllora, S. (2023). Physical education for sustainable development goals: reflections and comments for contribution in the educational framework. *Sport, Education and Society*, *28*(6), 697–713. https://doi.org/10.1080/13573322.2022.2045483

Fizi, R. M., Winarni, S., Guntur, & Hartanto, A. (2023). A game model in physical education to improve motor skills, cooperation, and discipline of primary school learners. *Pedagogy of Physical Culture and Sports*, *27*(6), 448–455. https://doi.org/10.15561/26649837.2023.0602

Ginanjar, S., Widyawan, D., & Faruqi, H. (2023). Systematic Literature Review: Sports in Early Childhood in Indonesia. *International Journal of Human Movement and Sports Sciences*, *11*(5), 1140–1149. https://doi.org/10.13189/saj.2023.110523

Giustino, V., Messina, G., Alesi, M., Mantia, L. L. A., Palma, A., & Battaglia, G. (2021). *STUDY OF POSTURAL CONTROL AND BODY BALANCE IN SUBJECTS*. *22*(1), 66–71.

Jastrow, F., Greve, S., Thumel, M., Diekhoff, H., & Süßenbach, J. (2022). Digital technology in physical education: a systematic review of research from 2009 to 2020. *German Journal of Exercise and Sport Research*, *52*(4), 504–528. https://doi.org/10.1007/s12662-022-00848-5

Konstantinidou, E. (2023). Creative dance studies in elementary schools: a systematic search and a narrative review. *Research in Dance Education*, 1–35. https://doi.org/10.1080/14647893.2023.2177266

Mayer, R. E. (2024). The Past, Present, and Future of the Cognitive Theory of Multimedia Learning. *Educational Psychology Review*, *36*(1), 8. https://doi.org/10.1007/s10648-023-09842-1

McGuire, M., Long, J., Esbensen, A. J., & Bailes, A. F. (2019). Adapted Dance Improves Motor Abilities and Participation in Children With Down Syndrome: A Pilot Study. *Pediatric Physical Therapy*, *31*(1), 76–82. https://doi.org/10.1097/PEP.0000000000000559

Mercier, K., Centeio, E., Garn, A., Erwin, H., Marttinen, R., & Foley, J. (2021). Physical Education Teachers' Experiences With Remote Instruction During the Initial Phase of the COVID-19 Pandemic. *Journal of Teaching in Physical Education*, *40*(2), 337–342. https://doi.org/10.1123/jtpe.2020-0272

Minc, S. D., Chandanabhumma, P. P., Sedney, C. L., Haggerty, T. S., Davidov, D. M., & Pollini, R. A. (2022). Mixed methods research: A primer for the vascular surgeon. *Seminars in Vascular Surgery*, *35*(4), 447–455. https://doi.org/10.1053/j.semvascsurg.2022.09.003

Mulato, N., Hidayatulloh, F., Purnama, S. K., & Syaifullah, R. (2024). Optimization of Learning Physical Education In Digital Era: A Systematic Review. *Retos*, *54*, 844–849. https://doi.org/10.47197/retos.v54.105211

Nesbitt, D., Fisher, J., & Stodden, D. F. (2021). Appropriate Instructional Practice in Physical Education: A Systematic Review of Literature From 2000 to 2020. *Research Quarterly for Exercise and Sport*, *92*(2), 235–247. https://doi.org/10.1080/02701367.2020.1864262

Ramírez-Montoya, M.-S., & Lugo-Ocando, J. (2020). Systematic review of mixed methods in the framework of educational innovation. *Comunicar*, *28*(65), 9–20. https://doi.org/10.3916/C65-2020-01

Remmen, K. B. (2024). En kritisk diskusjon av 'tematisk analyse etter Braun og Clarke (2006)' i naturfagdidaktiske studier. *Nordic Studies in Science Education*, *20*(1), 57–71. https://doi.org/10.5617/nordina.10094

Roseveare, C. (2023). Thematic Analysis: A Practical Guide , by Virginia Braun and Victoria Clarke. *Canadian Journal of Program Evaluation*, *38*(1), 143–145. https://doi.org/10.3138/cjpe.76737

Ruiz-Martín, H., & Bybee, R. W. (2022). The cognitive principles of learning underlying the 5E Model of Instruction. *International Journal of STEM Education*, *9*(1), 21. https://doi.org/10.1186/s40594-022-00337-z

Shantha Nair, S., & S Prem, S. (2020). A Framework for Mixed-method Research. *Shanlax International Journal of Management*, *8*(2), 45–53. https://doi.org/10.34293/management.v8i2.3220

Suherman, A., Julia, J., & Supriyadi, T. (2024). Improving Movement Skills and Choreographing Rhythmic Gymnastics Movements for Primary School Sports Teacher Candidates: An Action Research in Indonesia. *International Journal of Human Movement and Sports Sciences*, *12*(1), 59–70. https://doi.org/10.13189/saj.2024.120108