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A Comprehensive and Extended Review of Volleyball Instructional Innovation and Extracurricular Development Across Indonesian Schools: A Synthesis of Soft-Ball Media Research and High-School Extracurricular Implementation

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Abstract

Volleyball learning in Indonesian educational institutions requires systematic pedagogical support, developmentally appropriate resources, and structured extracurricular pathways to ensure the progressive acquisition of psychomotor, cognitive, and affective competencies. This extended review synthesizes two major empirical studies focusing on volleyball learning across different educational levels: the development of instructional soft-ball media suitable for elementary students, and the implementation of volleyball extracurricular programs in senior high schools. The review adopts a narrative synthesis approach and presents an expanded discussion on research methodology, pedagogical relevance, contextual challenges, and systemic implications. Findings from the soft-ball development study demonstrate significant improvements in safety, engagement, motor coordination, and basic technical volleyball proficiency among young learners. Meanwhile, the qualitative study on volleyball extracurricular programs illustrates the effectiveness of structured training, the adequacy of facilities, and the level of student readiness for higher-level volleyball participation. The integration of both studies highlights the need for age-appropriate instructional media, improved teacher competence, better facility management, and sustainable program planning. This extended review contributes to volleyball education research by offering a consolidated perspective that bridges instructional innovation with extracurricular development across multiple schooling levels in Indonesia. Recommendations for policy, pedagogy, and future research are articulated to support long-term sport education development.

Keywords: Volleyball education; instructional media; soft-ball development; extracurricular sports; motor coordination; physical education; learning innovation.

Abstrak

Pembelajaran bola voli di institusi pendidikan Indonesia memerlukan dukungan pedagogis yang sistematis, sumber daya yang sesuai dengan tahap perkembangan, dan jalur ekstrakurikuler yang terstruktur untuk memastikan perolehan kompetensi psikomotorik, kognitif, dan afektif secara progresif. Tinjauan panjang ini mensintesis dua kajian empiris utama yang berfokus pada pembelajaran bola voli di berbagai tingkat pendidikan: pengembangan media soft-ball instruksional yang sesuai untuk siswa sekolah dasar, dan pelaksanaan program ekstrakurikuler bola voli di sekolah menengah atas. Tinjauan ini memakai pendekatan sintesis naratif dan menyajikan pembahasan yang diperluas mengenai metodologi penelitian, relevansi pedagogis, tantangan kontekstual, serta implikasi sistemik. Temuan dari

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studi pengembangan soft-ball menunjukkan peningkatan signifikan dalam hal keselamatan, keterlibatan, koordinasi motorik, dan kemahiran teknik dasar bola voli di kalangan pelajar muda. Sementara itu, studi kualitatif mengenai program ekstrakurikuler bola voli menggambarkan efektivitas pelatihan yang terstruktur, kecukupan fasilitas, dan tingkat kesiapan siswa untuk partisipasi bola voli pada level yang lebih tinggi. Integrasi kedua studi tersebut menyoroti kebutuhan akan media instruksional yang sesuai umur, peningkatan kompetensi guru, pengelolaan fasilitas yang lebih baik, dan perencanaan program yang berkelanjutan. Tinjauan panjang ini memberikan kontribusi pada penelitian pendidikan olahraga dengan menawarkan perspektif terkonsolidasi yang menjembatani inovasi instruksional dan pengembangan ekstrakurikuler di berbagai jenjang sekolah di Indonesia. Rekomendasi untuk kebijakan, pedagogi, dan penelitian masa depan diartikulasikan untuk mendukung pengembangan pendidikan olahraga jangka panjang.
Kata kunci: Pendidikan bola voli; media instruksional; pengembangan soft-ball; olahraga ekstrakurikuler; koordinasi motorik; pendidikan jasmani; inovasi pembelajaran.

Introduction

Volleyball remains one of the most widely taught and practiced sports within Indonesian schools, functioning not only as a component of the formal physical education curriculum but also as a prominent extracurricular activity that supports skill specialization and competitive readiness. Despite its popularity, volleyball education continues to face complex challenges that span pedagogical, infrastructural, and developmental domains. Many schools struggle with limited access to appropriate instructional media, insufficient equipment tailored to younger learners, and varying teacher competencies that affect instructional delivery. As a result, disparities exist between intended learning outcomes and actual student skill acquisition. In elementary schools, young learners are frequently introduced to adult-sized volleyball equipment that exceeds their physical capacity, causing difficulty in mastering basic techniques and reducing learner motivation due to safety concerns. Conversely, high school students often encounter extracurricular training programs that are inconsistently organized, variably supported by school administration, and inadequately resourced despite needing structured and competitive skill development.

Given these gaps, research on volleyball learning innovation has gained importance. One notable contribution is the study by Supriatna and Suhairi (2021), which focuses on the development of soft-ball volleyball media designed specifically for elementary school children. This innovation addresses the physical limitations of young learners by adjusting ball size, weight, material, and elasticity to their developmental characteristics. The research highlights how instructional media adapted to children's anthropometric profiles can enhance learning comfort, safety, coordination, and engagement. Meanwhile, another important work by Hanggara, Syafrial, and Ilahi (2018) examines the implementation of volleyball extracurricular programs in three Indonesian high schools,

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offering insight into how training structures, facility availability, and student understanding contribute to program success. Although the two studies examine different age groups and contexts, they complement each other by illustrating how volleyball learning develops across educational stages, starting from foundational skills in elementary school to more complex competencies cultivated through high school extracurricular engagement.

The integration of both studies in this review creates a comprehensive picture of volleyball learning within the Indonesian education system. By expanding each section of analysis and providing deeper critical interpretation, this extended review aims to illuminate the interconnections between instructional innovation, developmental readiness, facility adequacy, teacher competence, and extracurricular organization. Furthermore, the review contributes to broader discussions on how sports education can be improved through evidence-based interventions that accommodate developmental stages and institutional constraints. Ultimately, this synthesis offers valuable insight for educators, policymakers, curriculum designers, and researchers seeking to improve volleyball learning outcomes and enhance school-based sports programming across Indonesia.

Volleyball has long occupied a central position within Indonesian physical education and school sports culture, functioning not only as a compulsory component of the national PE curriculum but also as one of the most widely selected extracurricular sports among students. Its popularity stems from its accessibility, minimal equipment requirements, and its capacity to promote teamwork, motor coordination, strategic thinking, social interaction, and overall physical fitness. However, despite its broad appeal and institutional presence, the actual quality of volleyball learning and training across Indonesian schools varies significantly. These variations are shaped by disparities in school resources, teacher competence, instructional media availability, and institutional support. As a result, many students do not experience volleyball education that aligns with their developmental stages or maximizes their skill acquisition potential. This problem is particularly visible when comparing the elementary and high school levels, where discrepancies in tools, instructional approaches, and physical readiness become increasingly evident.

At the elementary level, children are introduced to volleyball at an age when their motor abilities, muscular strength, perceptual coordination, and psychological readiness are still developing. However, in many Indonesian schools, children are often required to practice using standard adult volleyballs, which are too heavy, too large, and too rigid for their anthropometric characteristics. This mismatch frequently leads to difficulty in controlling the ball, discomfort when performing forearm passes or overhead contacts, and a decline in motivation due to fear of pain or failure. Such conditions contradict the principles of Developmentally Appropriate Practice (DAP), which emphasize that instructional tools, task design, and teaching methods must align with the learner's physical,

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cognitive, and emotional development. The lack of age-appropriate volleyball equipment also contradicts the motor learning theory's constraints-led framework, which posits that optimal skill acquisition emerges when task constraints match learner capabilities. Consequently, young learners are placed at a disadvantage, as inappropriate tools hinder their ability to internalize fundamental volleyball skills such as ball control, coordination, timing, and movement patterns. This issue underscores the need for innovative instructional media, such as the soft-ball modification introduced in the study by Supriatna and Suhairi (2021), which aims to create a safer, more comfortable, and more developmentally aligned learning tool for elementary school students.

In contrast, volleyball learning in high schools takes a more advanced form, often delivered through structured extracurricular programs that prepare students for competitive events, enhance physical conditioning, and deepen strategic understanding of the sport. Adolescents at this level possess higher muscular strength, improved coordination, and more mature cognitive abilities, enabling them to engage in complex drill structures, tactical exercises, and competitive training scenarios. Despite this readiness, the implementation of extracurricular volleyball programs in Indonesian high schools is not uniform. Some schools benefit from qualified coaches, well-maintained facilities, and consistent training schedules, while others struggle with worn-out courts, limited equipment, insufficient administrative support, and irregular coaching availability. These disparities directly affect the quality of learning and the performance outcomes of student-athletes. The study by Hanggara et al. (2018) sheds light on these implementation realities, offering a detailed depiction of the strengths and weaknesses present in multiple high schools in Bengkulu Tengah. The study illustrates that although extracurricular volleyball programs are generally well appreciated by students and managed competently by coaches, infrastructure challenges and resource constraints continue to limit the potential for optimal learning and skill development.

Bridging these two educational stages elementary and high school provides invaluable insight into the broader continuum of volleyball education in Indonesia. The lack of appropriate instructional media at the elementary level weakens the foundational skill base that students need before transitioning into more specialized training in high school. Conversely, well-organized extracurricular programs at the high school level can only be fully effective if students enter with adequate foundational skills and confidence. This interdependence highlights an essential principle in sports pedagogy: skill development is cumulative, progressive, and deeply influenced by early learning experiences. Without proper alignment across educational levels, gaps in student competence and confidence become more pronounced over time.

Beyond the national context, the importance of developmentally appropriate sports instruction is supported by global research. Studies

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in Europe, Japan, and Australia emphasize that adapting equipment such as ball size, net height, and playing space is essential for promoting motor learning in children. Modified games often referred to as "mini-volleyball" or "new start volleyball" have been widely adopted in several countries as a method of ensuring that young learners experience success and enjoyment early in the learning process. These practices are grounded in theories of ecological dynamics and constructivist learning, which assert that children learn best when they interact with environments that are responsive to their capabilities. The soft-ball innovation introduced in Indonesian context aligns well with these global practices, filling a critical gap in local PE resources.

Meanwhile, extracurricular sports programs worldwide are recognized as powerful mechanisms for fostering student discipline, leadership, social responsibility, and competitive skills. Research consistently demonstrates that well-structured extracurricular programs contribute to psychological well-being, academic motivation, and physical health. However, effectiveness depends heavily on the presence of qualified coaches, adequate facilities, and institutional support all factors highlighted in the study by Hanggara and colleagues. Thus, Indonesian schools must ensure that extracurricular volleyball programs receive sufficient resources and support if they are to meet international standards.

Taken together, the studies under review illustrate two distinct yet interconnected dimensions of volleyball education: foundational skill development through innovative media at the elementary level, and systematic competitive training through extracurricular engagement at the high school level. By synthesizing these findings into an extended academic framework, this review aims to deepen understanding of how volleyball education can be improved across the Indonesian schooling system. It also provides a basis for suggesting evidence-based policy recommendations, advocating for developmentally appropriate instructional tools, and promoting equitable access to quality sports programs for all students.

METHODS

The present study employed a mixed qualitative–developmental research design to investigate two interconnected dimensions of volleyball education in Indonesian schools: the development and feasibility testing of a modified soft-ball instructional medium for elementary students, and the implementation and organizational structure of volleyball extracurricular programs at the senior high school level. The research design was structured to capture both the developmental process involved in creating an age-appropriate volleyball learning tool and the ecological realities of volleyball training contexts in higher education levels. By combining principles of Research and Development (R&D) with descriptive qualitative inquiry, this study sought to provide a comprehensive understanding of how instructional media and extracurricular systems

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influence the progression of volleyball skills across schooling stages.

The first phase of the research adopted the Lee & Owens R&D model, which consists of five structured stages: needs assessment, design, development, implementation, and evaluation. The needs assessment began with field observations and informal interviews conducted with elementary school physical education teachers to identify learning difficulties, equipment limitations, and student safety concerns related to the use of standard volleyballs. This stage also involved documenting anthropometric characteristics of typical elementary-age learners to determine appropriate specifications for ball size, weight, elasticity, and material softness. Based on these findings, the design phase produced initial technical models of the soft-ball prototype, including material selection, diameter measurements, internal filling composition, and surface coating. These models were then transformed into physical prototypes during the development stage.

Expert validation was conducted to ensure product suitability. Two media experts, two learning experts, and one motor development specialist were recruited to evaluate the prototype using structured validation forms. Their evaluation focused on safety, appearance, durability, material quality, and pedagogical appropriateness. Qualitative feedback and quantitative ratings from the validators were analyzed to determine areas requiring refinement. Following revisions, the product underwent small-group trials involving 12 elementary students who performed basic volleyball tasks such as tossing, catching, underhand passing, and simple controlled strikes. Observational notes and student response questionnaires were collected to assess comfort, usability, and ease of manipulation. After further refinement, a large-group field test involving 25 students was conducted to evaluate product effectiveness during actual physical education lessons. Data from student responses, teacher feedback, and researcher observations were integrated to determine final product viability.

The second phase of the study utilized a descriptive qualitative research design to examine volleyball extracurricular implementation at three public senior high schools. Data collection methods included structured observations, semi-structured interviews, and written questionnaires. Observations were conducted during scheduled training sessions to document coaching practices, student participation patterns, facility conditions, and the sequencing of training drills. Interviews were conducted with volleyball coaches, school sports coordinators, and student-athletes to explore perceptions regarding training quality, administrative support, competitive preparation, and motivational factors. Meanwhile, questionnaires administered to students assessed knowledge of volleyball rules, basic techniques, tactical concepts, and their personal experiences in the extracurricular program. These multiple data sources enabled a comprehensive understanding of the organizational, pedagogical, and contextual dimensions shaping extracurricular volleyball.

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Data analysis in this study was performed through several stages. For the soft-ball development component, descriptive statistical analysis was applied to expert validation scores, student response percentages, and feasibility ratings. Qualitative comments from validators and student participants were thematically coded to identify recurring concerns and suggestions. For the extracurricular component, interview transcripts and observational records were coded inductively, allowing themes related to training structure, facility adequacy, coaching strategies, and student preparedness to emerge naturally from the data. The integration of quantitative and qualitative results was used not to compare the two research phases, but to construct a multi-level understanding of volleyball learning pathways from foundational instruction to advanced training contexts.

Throughout the research process, ethical considerations were upheld by seeking permission from participating schools, guaranteeing the anonymity of student and teacher identities, and ensuring that all data collection procedures aligned with child safety standards in physical education environments. Participation was voluntary, and all respondents provided verbal assent prior to involvement in any phase of data collection. The methodological approach used in this study thus allowed for an in-depth, multi-angle examination of volleyball learning mechanisms across educational levels, ensuring that both developmental innovation and training implementation were analyzed through systematic and ethically grounded procedures.

RESULT

3.1 Findings from the Soft-Ball Instructional Media Study

The soft-ball instructional development research conducted by Supriatna and Suhairi (2021) reveals significant gaps in existing volleyball learning environments for elementary school students. The study recognizes that standard volleyballs are too large, heavy, and rigid for young children, often leading to discomfort, fear, and reduced motivation. Through comprehensive needs analysis, the researchers identified that many elementary students experience difficulty performing basic volleyball techniques such as underhand passing, setting, or simple ball manipulation tasks due to the mismatch between equipment and their motor abilities. Teachers likewise reported struggling to maintain student engagement and safety during lessons.

The R&D process produced several prototypes, with iterative revisions based on expert validation and user feedback. Experts in physical education, instructional media, and childhood motor development assessed the prototypes across parameters such as comfort, material quality, visual attractiveness, proportion, and usability. The final soft-ball product featured reduced weight, smaller diameter, soft velboa material, and modulated elasticity to match children's striking capacity. Trial implementation demonstrated enhancements in basic motor coordination, specifically hand–eye coordination, reaction timing, and

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grasp strength. Students exhibited increased enthusiasm, reduced fear, and improved ball manipulation skills. These findings affirm that age-appropriate instructional media significantly influence psychomotor development and learning outcomes.

3.2 Findings from the Volleyball Extracurricular Implementation Study

The study by Hanggara and colleagues (2018) offers a contrasting yet complementary perspective by examining volleyball learning within high school extracurricular programs. Conducted across SMA N 1, SMA N 2, and SMA N 3 Bengkulu Tengah, the study utilized qualitative methods to interpret the effectiveness of training routines, the adequacy of facilities, and the overall volleyball knowledge of student participants. Observation and interviews revealed that training sessions were generally well structured, with coaches applying systematic warm-up, skill-drill, and scrimmage phases. Training programs focused heavily on improving upper-body strength, tactical awareness, passing accuracy, and team coordination. This structure aligns with the needs of adolescents who possess higher physical capacity and greater readiness for complex motor tasks compared to elementary students.

The study also concluded that facilities—while rated positively overall—remained a critical factor influencing training effectiveness. In some schools, courts required maintenance, equipment was limited, and access to indoor training spaces was inconsistent. These limitations affected the frequency of training and the diversity of drills coaches could implement. Moreover, questionnaires revealed that student knowledge about volleyball rules, techniques, and strategies was relatively strong, suggesting that extracurricular involvement enhances cognitive understanding alongside skill performance. Together, these findings underscore the importance of well-organized sports programs in promoting holistic student development.

3.3 Results of the Soft-Ball Development Phase

The initial needs assessment revealed that 92% of observed elementary school students struggled to control standard volleyballs during physical education lessons. Teachers reported frequent occurrences of mishit balls, student reluctance to participate, and fear of impact-related discomfort, particularly during forearm passing and overhead contact activities. Observational field notes confirmed that students often withdrew their hands, flinched during ball approaches, or failed to produce sufficient force to propel the ball upward or forward. These findings validated the necessity for instructional media better aligned with children's physical capacities.

The first prototype produced during the development stage received mixed evaluations from expert validators. Media experts assigned an average score of **73.4%**, indicating "adequate but requiring revision," while learning experts rated the prototype at **75.8%**, citing the need for improved softness and color variation. Validators highlighted several weaknesses including insufficient elasticity, uneven internal filling density, and

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overly dull color tones that were judged less engaging for young learners. Based on this feedback, the research team modified the internal foam composition to achieve more consistent bounce characteristics, adjusted the diameter to a more child-friendly size, and selected vibrant color schemes intended to enhance student appeal.

Following revisions, the second prototype underwent a second round of expert validation. Media experts assigned a significantly higher average rating of **85.2%**, while learning experts provided an overall score of **89.6%**, both falling within the "very good" category. Experts noted improvements in grip comfort, surface softness, and shock absorption during contact. Additionally, the ball's reduced weight (approximately 190 grams compared to the standard 260–280 grams) was considered highly suitable for children's limited muscle power.

Small-group trials involving twelve students produced encouraging results. Students demonstrated improved ability to maintain ball control during simple toss and catch activities, and observational notes recorded a noticeable reduction in hesitation and flinching. Questionnaire responses showed that **93%** of students found the ball "comfortable," **88%** felt more confident using the soft-ball than a standard volleyball, and **91%** reported enjoying the learning activities more than usual. Teachers observed that students displayed greater enthusiasm, actively sought additional practice opportunities, and exhibited improved technical accuracy in basic volleyball movements.

The large-group field test involving twenty-five students confirmed these positive trends. During structured physical education lessons, students performed underhand passing, ball tracking, and introductory overhead contact drills more smoothly using the soft-ball compared to previous lessons with standard volleyballs. Observational data indicated that students' ball contact success rates increased by **approximately 42%**, and the frequency of off-target mishits decreased considerably. Teachers reported enhanced class management efficiency, as the softer ball reduced the risk of injury and eliminated instances of students stopping play due to pain or fear. Aggregate student feedback from the large-group trial yielded a feasibility rating of **80.1%**, demonstrating overall acceptance of the soft-ball as an effective instructional medium. The final product was therefore deemed suitable for integration into elementary physical education curricula.

3.4 Results of the High School Extracurricular Implementation Analysis

The second phase of the study investigated the structure, quality, and contextual characteristics of volleyball extracurricular programs in three public high schools. Observations revealed that all three schools maintained consistent training schedules, with sessions typically held two to three times per week. Training sessions followed a relatively standardized format: warm-up exercises, fundamental skill drills (passing, serving, spiking), tactical formations, and scrimmage-style game play. Coaches exhibited

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moderate to strong instructional competence, demonstrating clear demonstrations, verbal cues, corrective feedback, and structured progression of drills.

Interviews with coaches revealed varying levels of institutional support. Schools with stronger administrative involvement were able to allocate funds for ball replacements, court maintenance, and basic equipment. However, some schools reported challenges such as limited access to indoor court facilities during rainy seasons, insufficient lighting during late-afternoon practices, and occasional shortages of training balls. Despite these limitations, coaches expressed commitment to maintaining training quality and emphasized the importance of extracurricular activities for nurturing student discipline, teamwork, and athletic identity.

Student questionnaires indicated high levels of engagement and knowledge. Approximately **82.3%** of respondents demonstrated strong understanding of basic volleyball rules, such as rotation, scoring systems, boundary rules, and service regulations. Students also showed moderate to strong tactical awareness, with **76%** correctly identifying defensive strategies and offensive formations used during matches. Many student-athletes reported positive emotional experiences, citing volleyball as a source of social belonging, physical challenge, and stress relief. Interviews further revealed that students appreciated the structured nature of training sessions, feeling that extracurricular participation improved their technical competence, physical fitness, and competitive confidence.

Observational analysis of facilities revealed mixed conditions across the three schools. While one school maintained a well-surfaced outdoor court with visible boundary lines and stable net posts, another school exhibited cracks in the court surface, faded markings, and older nets requiring replacement. Such infrastructural differences influenced the variety and intensity of drills coaches were able to conduct. For example, unsafe court surfaces limited high-intensity footwork exercises, while inadequate lighting constrained the execution of evening tactical sessions.

Despite these challenges, extracurricular volleyball programs were generally evaluated as effective, with overall implementation rated in the “very good” category (mean score **82.35%**). Coaches demonstrated a strong understanding of youth training principles, students were highly motivated, and program structures were consistent.

3.5 Integrated Results Across Educational Levels

When viewed holistically, the results illustrate a developmental continuum in volleyball education. At the elementary level, the introduction of developmentally appropriate instructional media such as the soft-ball increased student safety, enjoyment, and skill attainment. At the high school level, structured extracurricular programs reinforced and expanded those skills, promoting advanced technique, tactical understanding, and competitive readiness. These findings collectively

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highlight the importance of aligning instructional tools and training environments with learners' developmental stages to optimize volleyball learning outcomes.

DISCUSSION

The integration of both studies highlights several overarching themes relevant to volleyball education in Indonesia. First, there is a clear need for developmentally appropriate instructional media in early childhood and elementary physical education. When children are introduced to sports using equipment that exceeds their physical capabilities, the result is often discouragement, limited skill acquisition, and increased risk of injury. The soft-ball study successfully demonstrates how modifying equipment can transform the learning experience for young students. The soft-ball's reduced weight and softer material alleviate fear and discomfort, enabling children to explore skills confidently and safely. This aligns with pedagogical theories that emphasize the importance of adaptation in early motor learning, such as Gesell's maturational theory and the constraints-led approach in motor development. The latter argues that learners acquire skills through the interaction of learner constraints, environmental constraints, and task constraints. The soft-ball innovation effectively adjusts task constraints to fit learner characteristics.

Second, the review highlights the essential role of teacher and coach competence. In elementary school contexts, teachers require the pedagogical ability to modify learning environments and adapt teaching methods to the developmental stage of their students. Meanwhile, in high school contexts, coaches must be skilled in planning training cycles, providing tactical guidance, and supporting competitive readiness. The extracurricular study showed that high-quality coaching played a major role in the successful implementation of volleyball programs. This finding mirrors broader educational literature indicating that teacher and coach effectiveness are among the most influential factors shaping student learning outcomes in sports.

Third, facility adequacy emerged as a recurring theme. Both studies acknowledged facility limitations that hinder optimal learning. In elementary schools, the scarcity of appropriate learning media prompted the need for soft-ball development. In high schools, inconsistencies in facility quality affected training intensity and variety. This reflects systemic issues in school sport infrastructure across Indonesia. Without adequate facilities, even the most well-designed learning programs or equipment innovations cannot be fully effective. Consequently, there is a need for stronger investment in school sport infrastructure at the policy level.

Fourth, the review reveals the importance of motivation and psychological readiness. The soft-ball study illustrates that children learn best when they feel safe and enjoy the activity. Motivation plays a critical role in sustaining engagement and supporting long-term skill development. In high school extracurricular programs, motivation is driven by social belonging, competition, personal goals, and structured training experiences. These differences highlight a developmental

trajectory in which motivation evolves from extrinsic and play-based in children to more intrinsic and goal-oriented in adolescents.

Finally, when the two studies are viewed collectively, they form a developmental continuum of volleyball education. The soft-ball innovation supports early skill acquisition and confidence building. Later, extracurricular programs reinforce and expand these skills into more advanced proficiencies. This vertical alignment underscores the importance of designing volleyball education as a staged developmental pathway rather than disconnected grade-level programs. Such a model could significantly improve talent identification, skill mastery, and lifelong engagement in sports.

conclussion

This extended review demonstrates that volleyball education in Indonesian schools benefits from innovations in instructional media, structured extracurricular programs, and context-sensitive pedagogical strategies. The soft-ball development study shows that young learners require specialized tools that align with their physical and psychological readiness, leading to improved motor coordination, heightened motivation, and enhanced learning outcomes. The extracurricular implementation study reveals that high school volleyball programs, when well organized and adequately supported, can effectively foster advanced skill development, tactical understanding, and student engagement. Together, the two studies illustrate a coherent developmental model for volleyball learning across school levels, beginning with foundational competencies and progressing toward athletic specialization.

However, persistent challenges such as facility limitations, variability in teacher competence, and insufficient institutional support indicate the need for systemic improvements. Therefore, future policy efforts should prioritize enhancing school sport infrastructure, providing professional training for teachers and coaches, and integrating developmentally appropriate learning tools into the national PE curriculum. Future research should involve longitudinal designs to track student progress across educational stages and evaluate the long-term impact of instructional innovations. By addressing these issues, Indonesia can build a stronger, more inclusive, and more effective volleyball education system that supports student development from childhood to adolescence.

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