

Movement Coordination and the Performance of Serving and Passing Skills in Beginner Volleyball Players: A Literature Review

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Abstrak

Penelitian ini bertujuan untuk mengkaji hubungan antara koordinasi motorik, khususnya koordinasi mata-tangan dan keseimbangan tubuh, dengan keberhasilan teknik servis dan passing pada pemain voli pemula. Penelitian ini menggunakan pendekatan tinjauan literatur terhadap beberapa studi nasional yang diterbitkan antara tahun 2021 dan 2025 di jurnal yang terindeks SINTA. Berdasarkan hasil seleksi 168 artikel relevan, teridentifikasi 10 studi yang memenuhi kriteria inklusi. Hasil tinjauan menunjukkan bahwa koordinasi motorik berperan signifikan dalam meningkatkan keterampilan servis dan passing. Koordinasi tangan-mata secara kuat mempengaruhi akurasi dan kecepatan gerakan, sementara koordinasi tubuh secara keseluruhan mendukung stabilitas postural selama gerakan. Penelitian ini menekankan pentingnya pelatihan koordinasi terstruktur dalam mengajarkan teknik dasar voli kepada pemain pemula. Implikasi praktis: Pelatih dan guru pendidikan jasmani disarankan untuk mengintegrasikan pelatihan koordinasi ke dalam program latihan mereka guna mengembangkan keterampilan servis dan passing secara optimal.

Kata kunci: Koordinasi gerakan, servis, passing, voli, pemain pemula.

Abstract

This study aims to examine the relationship between motor coordination, particularly hand-eye coordination and body balance, and the success of serving and passing techniques in novice volleyball players. This study used a literature review approach to several national studies published between 2021 and 2025 in SINTA indexed journals. Based on the selection results of 168 relevant articles, 10 studies were identified that met the inclusion criteria. The review results indicate that motor coordination significantly contributes to improving serving and passing skills. Hand eye coordination strongly influences accuracy and speed of movement, while overall body coordination supports postural stability during movement. This study emphasizes the importance of structured coordination training in teaching basic volleyball techniques for novice players. Practical implications: Coaches and physical education teachers are advised to integrate coordination training into their training programs to optimally develop serving and passing skills.

Keywords: Coordination of movement, service, passing, volleyball, beginner players.

1. INTRODUCTION

Volleyball is a popular sport, widely enjoyed and taught at various levels of education in Indonesia (Ahmadi, 2020; Putra & Wibowo, 2021). Besides being a recreational activity, this sport is an important part of the physical education curriculum because it contains educational values such as teamwork, sportsmanship, responsibility, and self-control (Herlina & Kurniawan, 2022; Sari & Prasetyo, 2023). The dynamic nature of the game demands good coordination of movement, technical skills, and strategic abilities (García-de-Alcaraz & Torres-Luque, 2020; Palao et al., 2021). The two most important basic techniques in volleyball are serving and passing (Palao et al., 2020; Papageorgiou & Spitzley, 2021). The serve serves to initiate play and serves as the first offensive weapon, while the pass keeps the ball in play and sets up opportunities for subsequent attacks (Costa et al., 2021; João et al., 2022). Both techniques require coordination between the upper and lower limbs, balance, and

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timing (Malý et al., 2021; Fuchs et al., 2022). According to Rohendi et al. (2021), successful serving depends not only on muscle strength but also on coordination between vision, balance, and hand movements. Furthermore, Schmidt and Lee (2019, as cited in Fadli et al., 2025) describe eye–hand coordination as the integration of visual information with precise hand movements, which underpins accuracy in volleyball service and passing. Recent evidence also shows that eye–hand coordination, finger strength, and concentration together have a significant impact on overhead passing performance in volleyball students (Syafuruddin, 2020; Yusfi et al., 2025).

Motor coordination itself is the body's ability to harmoniously integrate the functions of the nervous and muscular systems to produce efficient and targeted movements (Hirtz & Starosta, 2020; Kokštejn et al., 2022). In volleyball, especially in underhand passing and serving techniques, eye–hand coordination plays a crucial role in controlling the direction of the ball and determining the correct contact time (Mahmudin et al., 2025; Fadli et al., 2025). Ningtyas and Amrulloh (2024) emphasized that good coordination allows players to adjust their body position to the direction and speed of the ball, resulting in more stable and accurate movements. In addition to technical aspects, coordination is also related to cognitive and perceptual aspects (Rabello et al., 2022; Giuriato et al., 2021). Players with good coordination tend to have higher reaction speeds and the ability to make quick decisions during the game (Wolbers & Künzell, 2020; Zhannisa & Sunarko, 2023). In dynamic match situations, the ability to read the direction of the ball and determine the appropriate response is a crucial factor in game success (Pojskic et al., 2021; Silva et al., 2022). Studies in team sports also show that adaptability and complex reaction time—two key coordination-related abilities—are closely linked with the effectiveness of offensive and defensive actions (Nowak et al., 2022; Gümüş et al., 2021).

Research by Susmita et al. (2023) shows that targeted and repeated hand-eye coordination training can improve the accuracy of underhand passing in beginner students. Through simple exercises such as catching and throwing the ball or visual reflex training, students can hone their ball control and body reactions to visual stimuli (Haryanto & Susilo, 2020; Kurnia & Feriandi, 2021). This type of training not only improves technical skills but also fosters confidence and physical readiness before learning advanced techniques (Rahmawati & Nugroho, 2022; Yuliana et al., 2024). Empirical data indicate that hand–eye coordination, hand muscle strength, and concentration together or separately have a significant association with underhand and overhead passing skills in school-level volleyball players (Siregar & Siahaan, 2021; Wibowo et al., 2023). Moreover, specific coordination and cognitive–coordination training programs have been shown to enhance sport-specific physical performance and decision-making in young athletes, highlighting the value of integrating such drills into volleyball practice (Vestberg et al., 2020; Hunget al., 2022).

However, many volleyball lessons on the field are still outcome-oriented and underemphasize experiential learning (Nugraha & Widodo, 2021; Pratama et al., 2023). As a result, students often struggle to master basic techniques due to poor coordination and motor perception (Machado et al., 2020; Coker, 2021). Therefore, a learning approach that emphasizes coordination exercises and hands-on experience is needed so that students not only understand the theory but also apply it effectively on the field (Casey & Goodyear, 2020; Sin & Amaruddin, 2022). Recent community-based training initiatives in Indonesian universities also underline the importance of practical, experiential instruction for improving basic volleyball techniques, tactical understanding, and teaching competence among physical education students (Lopo et al., 2025; Arifin & Hartono, 2024).

Based on this, motor coordination can be considered a key factor in successfully mastering basic volleyball techniques, particularly serving and passing (Roberts et al., 2021; Hermassi et al., 2022). This literature review aims to analyze the relationship between motor coordination and successful basic volleyball techniques in beginner players and to provide a theoretical and practical basis for physical education teachers in designing more effective and adaptive learning in accordance with the demands of the Independent Curriculum (Kemdikbudristek, 2021; Siregar et al., 2025). Strengthening coordination-focused training and assessment in school volleyball programs is expected to support holistic competency development, including physical, cognitive, and social dimensions of learning (Bailey et al., 2023; Lubis & Marzuki, 2024).

2. METHOD

This study uses a literature review approach by examining the results of relevant empirical research. Data were collected from various national journals such as *Jurnal Master Penjas & Olahraga* (Journal of Physical Education & Sports), *JISBG* (Journal of Physical Education, Health, and Sport), *SPRINTER* (Journal of Physical Education, Health, and Sport), *PPSDP International Journal of Education*, and *INNOVATIVE: Journal of Social Science Research*.

Inclusion criteria:

1. Articles published between 2021–2025.
2. Focus on the relationship between movement coordination and service or passing techniques.
3. The research subjects were beginner volleyball players (school or college age).
4. Research based on empirical or correlational data.

Exclusion criteria:

1. Review articles that do not present quantitative data.
2. Research that is not relevant to the aspect of motor coordination. The search process used the following keywords: “motor coordination,” “volleyball serve,” “volleyball pass,” and “beginner player.” Of the 168 articles found, only 10 articles met the final inclusion criteria.

3. RESULT AND DISCUSSION

Result

Table 1. Summary of Research Related to Movement Coordination and Service and Passing Skills

| No | Author & Year | Journal | Focus of Study | Main Results |
|----|--------------------------|---|--|--|
| 1 | Hoedaya & Rohendi (2021) | Master of Physical Education & Sports Journal | Relationship between muscle strength, basic technique, and self-confidence toward service. | Coordination and strength contribute significantly to service success. |
| 2 | Amaliah et al. (2025) | JISBG | Hand-eye coordination and the quality of overhead passing. | Hand-eye coordination relates positively with passing accuracy. |
| 3 | Nugraha et | PPSDP | Contribution of hand-eye | Movement coordination |

| No | Author & Year | Journal | Focus of Study | Main Results |
|----|----------------------------|------------------------------------|--|--|
| | al. (2024) | International Journal of Education | coordination and muscle strength to service. | increases the precision of service direction. |
| 4 | Ningtyas & Amrulloh (2024) | JPEHS Unnes | Relationship between agility, reaction speed, and coordination with underhand passing. | Coordination and reaction speed have a significant impact on passing performance. |
| 5 | Susmita et al. (2023) | Sprinter | Contribution of hand-eye coordination toward underhand passing. | Coordination accounts for a 42% improvement in passing skills. |
| 6 | Sari & Ramora (2021) | Innovative | Connection between hand-eye coordination and service ability. | Strong correlation ($r = 0.73$) between hand-eye coordination and service success. |

Discussion

A literature review shows that motor coordination, particularly hand-eye coordination, is a key determinant of successful basic volleyball techniques, particularly serving and passing, in beginner players. Both techniques require the ability to control body position, predict the ball's direction and speed, and precisely time contact with the ball. Players with good coordination tend to have greater ability to maintain body balance, control the power of their shots, and maintain stable movement when receiving and delivering the ball.

According to Rohendi et al., (2021), coordination cannot stand alone without the support of other physical components, such as muscle strength, agility, and selfconfidence. When motor coordination is combined with good physical readiness, technical performance tends to be more optimal. For example, a player with good coordination but lacking arm muscle strength will have difficulty producing a powerful serve and penetrating the opponent's area. Conversely, players who are physically strong but lack coordination often make errors in the direction and speed of the ball. Therefore, holistic training, encompassing physical, psychological, and motor-perception aspects, is essential in the volleyball learning and training process.

Furthermore, Amaliah et al., (2025) and Nugraha et al., (2024) emphasizes that hand-eye coordination has a significant impact on the accuracy of the ball's direction in both passing and serving techniques. Players with good coordination can precisely position their hands and adjust the ball's contact angle in a very short time. This ability is acquired through repeated practice, during which the nervous and muscular systems adapt to produce more efficient and precise movements. Practically, this means that coordination training is not merely supplementary, but a core component of learning basic volleyball techniques.

In addition, Ningtyas & Amrulloh, (2024) found that coordination is closely related to reaction speed, especially in game situations that require quick decision making. Players who react quickly to the ball's movement are better able to anticipate its direction and adjust their body position. This provides a competitive advantage in the game, as players can maintain rhythm and reduce passing errors. The relationship between coordination and reaction speed

demonstrates that motor skills do not exist in isolation but are the result of a complex interaction between perceptual, cognitive, and motor aspects. Pedagogically, these findings support the motor learning theory proposed by Schmidt & Lee in 2019, which states that coordination is the result of the interaction of the sensorimotor system through a process of repeated and structured practice. In the context of volleyball learning, each coordination exercise provides an opportunity for the nervous system to develop new movement patterns, correct errors, and strengthen the synaptic pathways responsible for fine motor control. This process is known as motor adaptation, in which students or novice players gradually move from the cognitive stage (understanding movements) to the associative and automatic stages (mastering movements without full awareness).

In the context of physical education training, coordination-based training models such as *the Motion Coordination Learning Model*. Risma et al., (2023) has been proven effective in improving students' coordination and technical skills. This model emphasizes learning through repetitive movements that focus on balance, timing, and response to ball stimuli. Practice activities are carried out in stages, starting with simple activities such as throwing and catching the ball with varying distances and directions, to complex activities such as serving and passing combinations in real-life game conditions. This approach allows students to experience a fun and meaningful learning process, as each activity is designed to enhance the connection between perception and motor action.

In addition to improving technical skills, coordination training also has positive psychological impacts on students, such as increased concentration, self-confidence, and motivation to learn. When students experience progress in their coordination and movement techniques, feelings of competence emerge, which can strengthen intrinsic motivation to continue practicing. This aligns with Bandura's *self-efficacy theory*, which emphasizes that small successes in physical skills can strengthen students' confidence in their ability to face more complex challenges.

From a practical perspective, the results of this study confirm that basic volleyball technique instruction must be designed in an integrative manner, combining physical training, coordination, and experiential learning. Physical education teachers serve not only as instructors of technique but also as facilitators, creating a learning environment that supports students' exploration of movement and social interaction. Through planned, systematic, and contextual learning, students not only master passing and serving techniques but also develop the ability to think quickly, collaborate, and adapt to changing game situations.

Thus, it can be concluded that motor coordination is the main foundation in learning basic volleyball techniques. Learning and training that emphasizes the development of coordination, both through individual and group exercises, can help students achieve optimal performance and improve the overall quality of physical education instruction.

4. CONCLUSION

Motor coordination, particularly eye-hand coordination, plays a crucial role in the success of serving and passing techniques in beginner volleyball players. This relationship was positive and significant in almost all studies reviewed. Therefore, coordination training needs to be a core component of volleyball learning and training, combining motor skills, agility, and muscle strength approaches. Teachers and coaches are expected to design training programs that adapt to students' coordination abilities to optimally develop mastery of basic volleyball

techniques.

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