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Effect of Structured Volleyball Activities on the Motor Performance of Students in Physical Education

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ABSTRACT

This study investigated the effect of structured volleyball activities on the motor performance of students enrolled in Physical Education at Bohol Island State University, Bilar Campus, Philippines, during the second semester of the academic year 2024–2025. A quasi-experimental pretest–posttest design was employed with 37 students who fully participated in volleyball sessions. The intervention included fundamental drills such as serving, passing, blocking, setting or tossing, and spiking. Motor performance was measured using a validated and expert-reviewed instrument, and data were analyzed through descriptive statistics and an independent samples t-test. Pre-test results indicated very poor levels of motor performance across most skills, reflecting limited ability in volleyball fundamentals. Post-test findings revealed significant improvement, with most skills assessed at a very good level, and serving obtained the highest mean score. Statistical analysis confirmed a significant difference between pre-test and post-test scores. The results highlighted the effectiveness of structured volleyball activities in enhancing students' motor performance and physical competence.

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1. INTRODUCTION

Volleyball has become a valuable component of the Physical Activities Towards Health and Fitness (PATHFit) program, offering structured yet enjoyable movement experiences that promote essential physical skills among students. As a dynamic sport, it naturally develops motor performance elements such as coordination, agility, balance, and reaction time skills foundational to overall physical literacy (Li *et al.,* 2024; Yousif, 2023; Siva, 2025; Suzin *et al*., 2023). These outcomes align with Motor Learning Theory, which highlights how repeated skill practice combined with timely feedback helps students refine movement patterns and achieve motor efficiency (Schmidt & Lee, 2019). In volleyball, drills like serving, passing, and spiking allow learners to engage in purposeful repetitions that enhance neuromuscular control. Recent studies with adolescent volleyball participants have shown considerable improvements in lower-limb strength and vertical jump performance through structured training (Suzin *et al.,* 2023). When volleyball sessions are paired with core strengthening and balance exercises, students display significant gains in agility and explosive movement (Bilici & Selçuk, 2020). These developments are supported by the Dynamic Systems Theory, which posits that motor behavior is shaped by the interaction of multiple systems (including physical strength, environmental context, and motivation) rather than through isolated skill development. Volleyball's fast-paced, ever-changing gameplay provides an ideal environment for this interplay to unfold, allowing students to adapt and grow physically in real time.

Instructional approaches that emphasize coordination-based learning in volleyball have also gained recognition. Techniques such as controlled drills and modified gameplay foster both motor control and tactical thinking (Risma *et al*., 2024). In school settings, small-sided games and modified volleyball activities have been shown to boost explosive power and improve participation rates in PE classes. These approaches reflect principles of the Constructivist Learning Theory, which views learning as an active, experience-based process. Within volleyball contexts, students construct knowledge about movement, strategy, and teamwork through meaningful engagement with their peers and the game itself (Ennis, 2017). Despite these promising outcomes, much of the literature tends to focus on varsity-level athletes or sports specialists. There remains a clear gap in research examining how volleyball influences the motor performance of general student populations, especially within a structured curriculum like PATHFit. Although pedagogical models such as Teaching Games for Understanding (TGfU) have been introduced in PE to improve both skill execution and decision-making (Ferraz *et al*., 2023), their full potential remains underutilized in non-athletic classroom settings.

This study, therefore, aims to explore how structured volleyball activities influence the motor performance of PATHFit students at Bohol Island State University, Bilar Campus, Philippines. Unlike elite training environments, these students represent a more diverse, non-athletic group. Through pre- and post-assessment of motor performance, this research hopes to contribute to a broader understanding of how volleyball (when integrated effectively into the PE curriculum) can support skill development and physical competence among all learners. This aligns with the growing movement in education that emphasizes inclusive, skill-based programs that promote lifelong engagement in physical activity (Lorås, 2020).

2. METHODS

Volleyball continues to be one of the most engaging and beneficial sports for enhancing students' physical fitness and motor skills. In the context of the PATHFit program, it offers opportunities not only for movement but also for skill development. This study was designed

to explore how structured volleyball activities could influence the motor performance of PATHFit 4 students. To do this, a quasi-experimental pretest-posttest design was used during the second semester of Academic Year 2024-2025 at Bohol Island State University, Bilar Campus, Zamora, Bilar, Bohol, Philippines.

The respondents were 37 PATHFit 4 students who were selected through purposive sampling (Etikan *et al*., 2016). These students were chosen based on their full participation in the volleyball sessions that were part of their PATHFit class. Activities included fundamental volleyball drills such as serving, passing, spiking, setting/tossing, and blocking, all designed to improve different aspects of motor performance. To measure the outcomes, we used an adapted performance tool. This tool was based on previously validated instruments and reviewed by experts to ensure it was suited to the students' level and context. After completing both the pretest and post-test, the responses were analyzed using descriptive statistics, particularly the mean and standard deviation, to summarize the results. An independent samples t-test was also applied to determine whether there was a significant difference between the students' motor performance before and after the volleyball activities (Fiandini *et al*., 2023).

Before the study began, ethical approval was obtained from the university's ethics committee. All students were informed about the nature and purpose of the study, and participation was entirely voluntary. Informed consent was secured, and all responses were handled with care to maintain confidentiality and anonymity. The data collected were used strictly for educational and research purposes.

3. RESULTS AND DISCUSSION

The results of the pre-test assessment in **Table 1** indicated that students demonstrated generally low motor performance across the evaluated volleyball skills. Among the five indicators, serving obtained the mean score (M = 2.57, SD = 1.09), which fell under the "poor" category. This suggested that although students had slightly better control in serving compared to the other skills, their overall execution still needed substantial improvement.

The remaining skills—setting/tossing (M = 2.24, SD = 0.98), passing (M = 2.27, SD = 1.07), blocking (M = 2.19, SD = 1.13), and spiking (M = 2.19, SD = 1.27)—were all rated as "very poor." These results revealed that students struggled significantly with key technical components of volleyball before any structured instruction. The overall mean score of 2.29 (SD = 1.11) also reflected a "very poor" level of motor performance, reinforcing the notion that participants lacked the foundational skills necessary for effective participation in volleyball activities. This outcome emphasized the need for focused and well-structured physical education programs that aim to build basic motor abilities and sport-specific techniques. These findings were consistent with prior research, which highlighted that insufficient early exposure to quality physical education could lead to underdeveloped motor competence in sport-related tasks (Chen *et al*., 2020; Katic *et al*., 2021).

Table 1. Pre-test assessment of motor performance in volleyball activities.

Indicators	Mean	SD	Description
Setting/Tossing	2.24	0.98	Very Poor
Serving	2.57	1.09	Poor
Passing	2.27	1.07	Very Poor
Blocking	2.19	1.13	Very Poor
Spiking	2.19	1.27	Very Poor
Total Mean	**2.29**	**1.11**	**Very Poor**

The post-test results in **Table 2** revealed a significant improvement in the students' motor performance across all volleyball-related skills following the intervention. The highest performance was recorded in serving with a mean score of 9.00 (SD = 0.71), which was classified as "very good." This indicated that students developed a strong ability to execute effective serves after the training period. Similarly, passing (M = 8.95, SD = 0.71), blocking (M = 8.70, SD = 0.78), and spiking (M = 8.54, SD = 0.56) also showed "very good" performance ratings, suggesting that students had successfully enhanced their technical skills in both offensive and defensive areas of volleyball. Meanwhile, setting/tossing received a mean score of 8.32 (SD = 0.58), rated as "good," reflecting a positive outcome but with slightly more room for refinement compared to the other skills.

The overall mean score of 8.70 (SD = 0.67) was interpreted as "very good," clearly demonstrating that the instructional strategies or interventions implemented during the course had a strong and favorable impact on learners' motor skill development. These findings affirmed the effectiveness of structured physical education and targeted practice in significantly improving students' performance in sport-specific tasks.

These results aligned with recent studies that emphasized how appropriate instructional approaches, consistent practice, and skill-based training could substantially enhance students' motor proficiency and sport performance (Ghasemi *et al*., 2021; Nesbitt *et al*., 2020; Calixtro, 2024; Silva *et al*., 2022).

Table 2. Post-test assessment of motor performance in volleyball activities.

	Mean	SD	Description
Setting/Tossing	8.32	0.58	Good
Serving	9.00	0.71	Very Good
Passing	8.95	0.71	Very Good
Blocking	8.70	0.78	Very Good
Spiking	8.54	0.56	Very Good
Total Mean	**8.70**	**0.67**	**Very Good**

The results in **Table 3** from the independent samples t-test revealed a statistically significant difference in students' motor performance before and after the intervention. The computed t-value of -44.037 with 8 degrees of freedom and a p-value of less than .001 indicated a highly significant improvement in motor skills following the post-test.

This result confirmed that the observed increase in performance (from "very poor" ratings in the pre-test to "very good" in the post-test) was not due to chance, but rather a direct outcome of the instructional program or training administered during the intervention period.

The large t-value suggested a strong effect size, pointing to meaningful learning gains and substantial motor skill development in volleyball activities.

The data supported the effectiveness of structured, skill-focused physical education interventions in improving athletic competencies among students. These findings echoed similar conclusions in recent studies that emphasized how targeted instruction, repeated practice, and game-based learning approaches could significantly enhance motor proficiency and performance in youth sports settings (Kozinc *et al*., 2022; Moreira *et al*., 2021; Marques *et al*., 2020).

Table 3. Significant difference in motor performance between the pre-test and post-test in volleyball activities.

	t	df	p
Mean Scores	-44.037	8	< .001

4. CONCLUSION

The findings demonstrated that structured volleyball activities significantly improved the motor performance of students in Physical Education 4. Before the intervention, students showed very poor proficiency in volleyball fundamentals, while after the intervention, their performance reached good to very good levels across all assessed skills. Statistical analysis confirmed these improvements as highly significant. The study emphasized that structured volleyball training is an effective approach to develop motor competence and physical literacy among students, supporting the role of well-designed physical education programs in promoting skill development and lifelong participation in physical activity.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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