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Assessing the Students' Performance on Volleyball through Skills-Related Training Program

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ABSTRACT

This study assessed changes in students' volleyball performance following a skills-related training program at Immaculada Concepcion College during the academic year 2023–2024. Using a quantitative descriptive pretest–posttest design, data from 100 respondents were analyzed through a 20-item assessment, volleyball skill rubric, and validated questionnaire using descriptive statistics, a paired-samples t-test, and Spearman correlation. Results revealed a significant increase in mean assessment scores from 11.58 to 13.63 ($t = -8.147$, $p = .001$). Respondents reported positive training outcomes ($M = 2.86$), particularly in understanding volleyball strategies, forearm passing, and serving, while serve anticipation and defensive digging required further improvement. Physical fatigue, injuries, skill-level differences, and motivational concerns emerged as the leading implementation challenges. Age, sex, educational year level, and playing experience demonstrated significant associations with perceived training impact. The findings indicate improved assessment performance following structured training, although development varied across volleyball competencies. Schools should strengthen differentiated instruction, defensive skills training, performance monitoring, and injury-prevention practices. The single institution setting, absence of a comparison group, and reliance partly on self-reported assessments limit broader interpretation. Overall, the study provides an evidence-based foundation for improving inclusive, responsive, and sustainable school-based volleyball instruction through systematic evaluation and continuous program enhancement.

Keywords: *Defensive Skills, Physical Education, Skill Development, Sports Training, Student Performance, Volleyball*

1. INTRODUCTION

Volleyball requires the coordinated development of technical skills, physical fitness, tactical awareness, and teamwork. Fundamental skills such as serving, passing, setting, spiking, and defensive movements are essential to effective performance. Research indicates that structured training interventions can improve volleyball players' agility, explosive strength, speed, and sport-specific movement capabilities (Chuang et al., 2022; Nejić et al., 2023; Keoliya et al., 2024). Furthermore, appropriate instructional strategies, systematic practice, and learner-centered training activities contribute to the development of volleyball competencies (Fernandez et al., 2023; Astuti et al., 2024). Despite the importance of structured training, students may experience difficulties mastering fundamental volleyball techniques, affecting their preparedness for competitive participation. Addressing these limitations requires organized skills-related training, consistent performance assessment, and instructional adjustments based on individual

learning needs. Accordingly, this study assessed students' volleyball performance before and after implementing a skills-related training program and examined its perceived impact, implementation challenges, and implications for improving physical education and sports training.

Research Problem

The study addressed the limited mastery of fundamental volleyball skills observed among student players, particularly in executing essential techniques during training and competition. Inadequate technical proficiency may affect movement accuracy, consistency, game awareness, and overall performance. Fernandez et al. (2023) identified instructional strategies and learner-related factors influencing students' volleyball skill acquisition, while dela Cruz (2024) demonstrated that structured drills and small-sided games could improve forearm passing among young learners. These findings emphasize the importance of appropriately designed learning activities and measurable skill development. Although previous studies have documented improvements following specialized training, the effectiveness and implementation challenges of such programs require assessment within specific educational settings. This study therefore examined students' performance before and after skills-related training, evaluated its impact, identified difficulties experienced by participants, and determined whether demographic characteristics were significantly associated with training outcomes.

Assumptions of the Study

The study was premised on the assumption that students' volleyball competencies could be assessed through consistent performance measures before and after participating in a structured training program. It also recognized that systematic practice, progressive skill development, and performance feedback could support technical improvement, while differences in students' characteristics and training experiences might contribute to variations in performance. Contemporary research supports structured volleyball training and the monitoring of training responses to guide appropriate adjustments (Chuang et al., 2022; Rebelo et al., 2024). Consistent with the original research hypotheses, the study tested the null assumptions that no significant difference existed between students' volleyball performance before and after training and that no significant relationship existed between respondents' demographic profiles and the impact of the skills-related training program.

Objectives of the Study

The study aimed to assess students' volleyball performance through the implementation of a skills-related training program. Specifically, it sought to describe the respondents' demographic characteristics in terms of age, sex, educational year level, and years of volleyball-playing experience; determine their performance levels before and after the training program; evaluate the program's impact on their volleyball competencies; identify the challenges encountered during implementation; establish whether significant differences existed between pre-training and post-training performance; determine whether significant relationships existed between demographic characteristics and the impact of training; and develop a proposed action plan to enhance the effectiveness, inclusivity, and continuity of volleyball skills development.

Theoretical or Conceptual Basis

The study was conceptually guided by a systematic sports-training approach emphasizing planning, implementation, performance monitoring, and evaluation. Contemporary volleyball research supports the use of progressive training interventions and regular assessments to guide performance development and manage training demands. Chuang et al. (2022) demonstrated improvements in skill-related physical capabilities following structured agility training, while Nejić et al. (2023) reported improvements in motor abilities through programmed training. Rebelo

et al. (2024) further emphasized the importance of monitoring training stress, fatigue, and well-being in volleyball. The study also adopted the Input–Process–Output (IPO) framework to organize its investigation. The input comprised students' demographic characteristics, initial volleyball performance, available instructional resources, and training requirements. The process involved implementing skills-related activities, conducting pre-training and post-training assessments, gathering participant evaluations, and analyzing the resulting data. The output consisted of evidence regarding performance changes, perceived training impact, identified implementation challenges, and a proposed action plan for improving and sustaining the volleyball training program. This framework provided a systematic basis for evaluating training outcomes and guiding future instructional improvements.

The study primarily supports Sustainable Development Goal 3 (Good Health and Well-Being) and Sustainable Development Goal 4 (Quality Education) by promoting physical activity, safer sports participation, and quality physical education. The World Health Organization (2022) emphasizes the importance of physical activity for health, while UNESCO and Loughborough University (2024) highlight the value of inclusive and equitable physical education. By assessing volleyball performance, training effectiveness, and challenges such as fatigue and injuries, the study provides evidence for improving instructional strategies, strengthening skill development, and implementing safer, more inclusive training practices. Overall, the findings contribute to educational and institutional sustainability by supporting continuous improvement in volleyball instruction and school-based sports programs.

2. METHODOLOGY

Research Design

The study utilized a quantitative descriptive research design to measure and compare students' volleyball performance before and after participating in a skills-related training program. This approach facilitated the collection and statistical analysis of numerical data to describe students' skill levels, identify performance changes, and evaluate the program's effectiveness. Pretest and posttest assessments were conducted to determine improvements in volleyball competencies without manipulating participant characteristics.

Research Locale or Study Setting

The study was conducted at Immaculada Concepcion College during the academic year 2023–2024. The institution served as the setting for assessing the volleyball performance of senior high school and college students who participated in the skills-related training program. The research focused on evaluating students' technical competencies and the effectiveness of structured volleyball training activities within the educational setting.

Participants or Data Sources

The study population comprised 145 senior high school and college students from Immaculada Concepcion College who participated in the volleyball training program. Simple random sampling was employed to minimize selection bias and determine the respondents. The sample size was established using the Classgist sample size calculator based on Taro Yamane's formula (Yamane, 1967, as cited in Iddon, 2022). A total of 102 respondents were reported in the methodology chapter. The participants were selected from students directly involved in volleyball training, allowing the researcher to assess their performance and experiences.

Research Instruments or Materials

The study employed the Volleyball Skill Test rubric (iRubric, 2024) and a researcher-developed questionnaire to assess students' performance, the effectiveness of the training program, and

challenges encountered during implementation. The instrument consisted of three components. The first evaluated students' volleyball performance before and after training using the Volleyball Skill Test rubric (Rcampus, 2024). The second assessed the perceived effectiveness of the program using a four-point Likert scale, while the third examined challenges experienced by participants. The questionnaire underwent expert validation by a graduate school professor, a master teacher, and a head teacher specializing in physical education. Their evaluations were used to assess the instrument's suitability, clarity, and relevance. A pilot test involving students excluded from the main study was conducted to examine reliability. Cronbach's alpha was calculated to assess the internal consistency of questionnaire items, with a coefficient above 0.70 identified in the methodology as an indicator of acceptable reliability.

Data Gathering Procedure

Data collection began with securing authorization from the Schools Division Superintendent and obtaining approval from the school principal. Consent letters were subsequently distributed to respondents before their participation. Research questionnaires were administered electronically through Google Forms, allowing participants to submit their responses through an online platform. A 20-item pretest and posttest were utilized to assess students' volleyball competencies. The pretest was administered before implementation of the training program to establish baseline performance, while the posttest was conducted after completion to determine changes in students' skills. The questionnaires also collected information concerning the program's perceived effectiveness and implementation challenges. Responses and assessment results were compiled for statistical analysis.

Data Analysis

The collected data were analyzed using descriptive and inferential statistics. Frequency distribution and percentage were employed to describe respondents' demographic characteristics, while mean and standard deviation were used to summarize assessment results and questionnaire responses. A paired-samples t-test was applied to determine whether a statistically significant difference existed between students' pretest and posttest volleyball performance. Spearman's rank-order correlation coefficient was utilized to examine relationships between demographic characteristics and the perceived impact of the skills-related training program. These statistical procedures provided the basis for interpreting performance changes, training effectiveness, and associations among the study variables.

Ethical Consideration

The study observed ethical principles concerning informed consent, voluntary participation, confidentiality, and participant protection. Necessary approvals were obtained from educational authorities before data collection. For participants who were minors, informed consent was obtained from students and their parents or guardians. Respondents were informed of the study's purpose, procedures, and potential risks and were allowed to withdraw without penalty. Participant information was treated confidentially, and findings were reported using aggregated data to protect individual identities. The study adhered to Department of Education Order 16, s. 2017, or the Research Management Guidelines, and the Data Privacy Act of 2012. Collected information was anonymized, securely maintained, and used exclusively for research purposes to safeguard participants' privacy, rights, and welfare.

3. RESULTS AND DISCUSSION

3.1 Demographic Profile of the Respondents

3.1.1 Age Distribution

Of the 100 respondents, 55% were aged 19–21 years, 20% were 22–24 years, 15% were 18 years or younger, and 10% were 25 years or older. The majority therefore belonged to the 19–21 age group, indicating a predominantly young adult sample. The distribution highlights the importance of considering learners' developmental characteristics when designing volleyball training activities. Novan et al. (2024) examined age-related specialization and training factors among elite athletes but found that age itself was not significantly associated with sporting achievement in their sample. Consequently, the predominance of young adults in the present study should inform age-appropriate instruction without assuming that age alone determines training success.

3.1.2 Sex Distribution

The respondents comprised 65% males and 35% females, indicating greater male representation in the study. Both groups participated in the assessment of the skills-related volleyball training program. This distribution emphasizes the importance of inclusive participation and equitable training opportunities. Walton et al. (2022) identified the underrepresentation of women and girls in sport-focused psychology research and emphasized the need for balanced representation. Although the present findings describe participation rather than access to opportunities, they underscore the importance of designing volleyball programs that accommodate students of both sexes.

3.1.3 Educational Year Level

Second-year college students constituted the largest group of respondents at 40%, followed by first-year college students at 18%, third-year college students at 12%, Grade 12 students at 12%, Grade 11 students at 10%, and fourth-year college students at 8%. Overall, 78% were college students, while 22% were senior high school students. The variation in educational year levels suggests that participants may have different learning experiences and training requirements. Ator and Ortizo (2024) emphasized the importance of time management in supporting student-athletes' academic and athletic responsibilities. Their findings support considering academic demands when organizing training schedules, although they do not establish that students in higher year levels necessarily achieve better volleyball performance.

3.1.4 Volleyball Playing Experience

Half of the respondents (50%) had three to four years of volleyball-playing experience, while 20% had at least five years. Meanwhile, 18% had one to two years of experience, and 12% had played for less than one year. Thus, 70% reported at least three years of participation in volleyball. The differences in playing experience suggest varying levels of familiarity with volleyball techniques and competitive situations. Navaja and Cancio (2024), in their study of track-and-field student-athletes, identified individualized training backgrounds and progression challenges as important considerations in skill development. Although their research involved another sport, it supports considering individual training experiences when developing differentiated activities for beginning and experienced volleyball players.

3.2 Volleyball Performance Before and After Training

3.2.1 Performance Before the Training Program

The pretest assessment of 100 respondents yielded a mean score of 11.58 and a standard deviation of 3.07. The original study characterized this performance as relatively low, indicating that students had room for improvement before participating in the skills-related training

program. The variation in scores also indicated differences in initial assessment performance. These findings suggest a need for structured instruction that addresses learners' existing knowledge and competencies. Fernandez et al. (2023) found that students' volleyball skill acquisition was influenced by attitudes, teaching strategies, and other learning-related factors. Their findings support the importance of assessing students' initial capabilities and providing appropriate instructional activities to address identified learning needs.

3.2.2 Performance After the Training Program

Following the implementation of the training program, the respondents obtained a mean posttest score of 13.63 with a standard deviation of 3.63. Compared with the pretest mean of 11.58, the posttest mean increased by 2.05 points. The higher standard deviation indicated greater dispersion of scores after training. The increase in mean performance suggests that students demonstrated improved assessment outcomes following the intervention. Keoliya et al. (2024) reviewed volleyball training interventions and reported benefits for physical performance characteristics, while Astuti et al. (2024) found that structured mental and circuit-based training contributed to improved volleyball learning outcomes. These studies support the potential value of organized training, although the increase in score variability suggests that participants did not achieve identical outcomes.

3.2.3 Significant Difference Between Pretest and Posttest Performance

The comparison of pretest and posttest scores yielded a reported t-value of -8.147, with 99 degrees of freedom and a p-value of 0.001. The result indicated a statistically significant difference between the two assessments, leading to rejection of the null hypothesis. The posttest mean was higher than the pretest mean. This finding provides statistical evidence of improved assessment performance following the training program. Singh and Shukla (2024) likewise reported improvements in volleyball-related coordination and skill performance following targeted training. Chuang et al. (2022) demonstrated that structured agility training improved selected physical capabilities among young volleyball players. These findings are consistent with the importance of systematic training, although the present study's pretest–posttest design does not independently rule out other possible explanations for the observed improvement.

3.3 Perceived Impact of the Skills-Related Training Program

The respondents generally agreed that the training program positively affected their volleyball performance, with an overall mean of 2.86 and a standard deviation of 0.88. Understanding volleyball skills and strategies received the highest mean rating (M = 3.44, SD = 0.62), followed by accuracy and control in forearm passing (M = 3.36, SD = 0.48) and consistency and power in serving (M = 3.28, SD = 0.70). Respondents also reported positive assessments of spiking effectiveness (M = 2.91), confidence in hitting techniques (M = 2.84), setting precision (M = 2.74), and blocking performance (M = 2.74). Lower ratings were recorded for anticipating and reacting to serves (M = 2.30, SD = 0.90) and digging low and fast attacks (M = 2.45, SD = 0.98). These findings suggest that respondents perceived greater improvement in their understanding of volleyball and selected technical skills than in reactive defensive abilities. Cruz (2024) found that structured drills and small-sided games improved forearm passing performance among young learners. Similarly, Li et al. (2024) demonstrated the importance of perceptual anticipation and information processing in volleyball performance. The comparatively low ratings for serve anticipation and digging therefore identify areas where additional game-based practice, perceptual training, and defensive drills may be beneficial.

3.4 Challenges Encountered During Training Implementation

The respondents' assessment of implementation challenges produced an overall mean of 2.37 and a standard deviation of 0.85, interpreted as disagreement that the listed conditions were generally problematic. However, physical fatigue and injuries received the highest rating (M = 2.68, SD = 0.96), followed by skill-level disparities (M = 2.52, SD = 0.96) and motivational issues (M = 2.51, SD = 1.07). Respondents generally disagreed that time constraints (M = 2.13), communication barriers (M = 2.20), low attendance (M = 2.23), and limited access to equipment (M = 2.30) were major challenges. The findings indicate that physical strain, differences in skill proficiency, and motivation were the principal concerns identified by participants, whereas scheduling and resource limitations received lower ratings. Rebelo et al. (2024) emphasized the importance of monitoring internal and external training loads, fatigue, and well-being among volleyball athletes. Their review supports incorporating appropriate recovery measures and monitoring practices into training. Differentiated activities may also help address differences in students' skill levels without requiring all participants to perform identical tasks.

3.5 Relationships Between Demographic Characteristics and Training Impact

3.5.1 Relationship Between Age and Training Impact

The analysis revealed a strong positive relationship between respondents' age and the reported impact of the training program ($r = 0.923$, $p = 0.001$). The association was statistically significant, resulting in rejection of the corresponding null hypothesis. The finding indicates that age was positively associated with the measured training-impact variable within the study sample. However, this relationship does not establish that increasing age directly improves training effectiveness. Novan et al. (2024) found that age and age of specialization were not significantly associated with sporting achievement among elite athletes in their investigation, while training frequency was associated with achievement. These findings indicate that age-related associations may vary according to the participants, outcomes, and training context.

3.5.2 Relationship Between Sex and Training Impact

The analysis identified a statistically significant association between respondents' sex and the reported impact of the training program ($r = 0.820$, $p = 0.001$). Accordingly, the null hypothesis concerning the relationship between sex and training impact was rejected. The finding indicates an association between the recorded sex variable and training-impact scores, although the reported coefficient alone does not establish which group benefited more. Solli et al. (2024) reviewed sex-related performance differences in Olympic winter endurance sports, while Koźlenia et al. (2024) examined sex-specific relationships involving maturity, body characteristics, and agility among adolescent volleyball players. These studies highlight the relevance of considering individual characteristics during training, but the present findings require careful interpretation because the direction of a correlation involving a binary category depends on how that category was coded.

3.5.3 Relationship Between Educational Year Level and Training Impact

Educational year level demonstrated a strong positive correlation with the reported impact of the training program ($r = 0.884$, $p = 0.001$). The relationship was statistically significant, leading to rejection of the corresponding null hypothesis. The finding suggests that the coded educational year-level variable was positively associated with training-impact ratings. However, the analysis does not establish that academic advancement directly causes improved volleyball

performance. Ator and Ortizo (2024) emphasized the importance of student-athletes' time management and academic responsibilities, while Fernandez et al. (2023) identified instructional and learner-related factors affecting volleyball skill acquisition. These findings support considering students' educational circumstances when developing training activities without assuming that academic year level alone determines training success.

3.5.4 Relationship Between Volleyball Experience and Training Impact

The relationship between volleyball-playing experience and training impact was statistically significant ($r = 0.878$, $p = 0.001$). The strong positive association resulted in rejection of the corresponding null hypothesis. The finding suggests that respondents with greater recorded playing experience tended to report higher training-impact scores. Li et al. (2024) found that expert volleyball players demonstrated better anticipation accuracy and faster responses than amateur players under specified experimental conditions, illustrating the relevance of accumulated expertise to selected aspects of volleyball performance. Navaja and Cancio (2024) also emphasized individualized training backgrounds in athlete skill progression. Together, these findings support considering participants' experience when planning developmental activities, although the present correlation does not demonstrate a causal effect.

3.6 Proposed Action Plan for Sustainable Volleyball Training

Based on the findings, the study proposed an action plan focused on participant profiling, differentiated training modules, injury prevention and recovery, performance monitoring, and continuous program evaluation. The plan included grouping participants according to educational year level and playing experience, providing customized drills, conducting wellness assessments, using performance feedback, and periodically reviewing training outcomes. The proposed activities assigned responsibilities to coaching personnel, athletic trainers, performance evaluators, and program coordinators. The proposed plan addresses the observed differences in students' characteristics, assessment performance, and reported training challenges. The findings of Rebelo et al. (2024) support the integration of training-load and well-being monitoring, while Chuang et al. (2022) and Keoliya et al. (2024) provide evidence supporting structured volleyball training interventions. The plan therefore offers a basis for improving the responsiveness, safety, and continuity of school-based volleyball instruction. Its effectiveness, however, remains to be established through subsequent implementation and evaluation.

4. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that the skills-related volleyball training program was associated with significant improvement in students' assessment performance at Immaculada Concepcion College. Most respondents were male, aged 19–21, second-year college students, and had three to four years of volleyball experience. Posttest scores were significantly higher than pretest scores, indicating improvement in assessed volleyball competencies following training. Respondents also reported improved understanding of volleyball strategies and greater control in forearm passing, although serve anticipation and defensive digging remained areas requiring further development. Physical fatigue, injuries, differences in skill levels, and motivational concerns emerged as the principal implementation challenges. Moreover, age, sex, educational year level, and playing experience demonstrated statistically significant relationships with perceived training impact. Collectively, the findings highlight the value of structured, differentiated, and continuously evaluated volleyball instruction in addressing students' learning needs and strengthening training outcomes within the institutional setting.

School administrators and physical education teachers should sustain and strengthen the skills-related volleyball training program through systematic assessment, differentiated instruction, and continuous performance monitoring. Coaches should conduct baseline and follow-up assessments, group students according to skill proficiency and playing experience, and provide appropriate training activities for beginners and advanced players. Greater emphasis should be placed on serve anticipation, reaction time, defensive digging, and tactical decision-making through specialized drills, simulated gameplay, and regular feedback sessions. To address physical fatigue and injuries, coaches and athletic trainers should implement proper warm-up and cool-down routines, adequate recovery periods, hydration practices, and training-load monitoring. Motivational support, peer mentoring, and inclusive participation should also be strengthened to accommodate varying student capabilities. Furthermore, program coordinators should regularly evaluate training outcomes, document individual progress, and refine instructional strategies. Future researchers should consider more diverse participants and educational settings to further examine the effectiveness and applicability of skills-related volleyball training programs.

The study was limited to students from Immaculada Concepcion College during the academic year 2023–2024, restricting the generalizability of its findings to other educational settings. Its quantitative descriptive approach and pretest–posttest assessment did not include a comparison group, limiting causal interpretations of performance improvements. The 20-item assessment primarily measured volleyball knowledge and situational decision-making, while perceptions of training effectiveness and challenges relied on self-reported responses. Additionally, the methodology reported 102 respondents, whereas the results analyzed 100. Future investigations may address these limitations through broader participant representation, direct observation of volleyball skill execution, and more rigorous comparative assessments.

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