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Research Article

Assessment of physical education resource management in public tertiary institution in Manila

Lisa D. Camarador

Polytechnic University of the Philippines, Manila, Philippines

ABSTRACT

Physical education (PE) promotes students' health, fitness, and overall well-being, particularly within educational institutions. Effective resource management provides high-quality learning opportunities and fosters a physical activity and fitness culture. This study aims to evaluate the current state of resource management in PE across selected tertiary institutions. It included a survey of 64 college students majoring in PE and sports and 11 teachers, employing a descriptive research design. The results highlighted the need for ongoing improvements, particularly regarding access to clean drinking water and creating optimal learning conditions, which are essential for enhancing academic performance, well-being, and student engagement. In addition, adequate compensation and a supportive workplace culture are vital for motivating teachers and enhancing their performance, which impacts educational institutions' overall success. It is recommended that schools develop policies to support both facilities and human resource management in the fields of PE and sports.

Keywords: Facilities and equipment, Physical education status, Resource management

INTRODUCTION

Physical education (PE) plays a crucial role in enhancing individuals' overall health and well-being, especially within educational institutions. The effective allocation of resources in PE programs is essential for providing students with high-quality learning experiences and cultivating a culture of physical activity and fitness.

It is widely recognized that school-based PE programs significantly contribute to students' health, fitness, and well-being. Numerous studies (Kennedy *et al*., 2020; Naylor *et al*., 2015) indicate that consistent participation in PE programs is associated with better mental health outcomes, improved motor skill development, and enhanced physical fitness. The importance of PE in promoting holistic development and overall student achievement is further underscored by its connections to improved academic performance, increased focus, and better classroom behavior. For instance, the integration of sports and education has been shown to positively influence students' character, temperament, and sports morality, thereby enhancing their overall development (Zhang, 2024). In addition, regular participation in PE is linked to psychological benefits such as improved self-esteem, reduced stress, and enhanced cognitive function, which collectively support better academic outcomes (Bamta *et al*., 2023).

PE plays a crucial role in enhancing individuals' overall health and well-being, especially within educational institutions. The effective allocation of resources in PE programs is essential for providing students with high-quality learning experiences and cultivating a culture of physical activity and fitness.

There are numerous advantages for schools that prioritize their PE programs, particularly in terms of efficient infrastructure and resource management. According to Neil-Sztramko *et al*. (2021), these benefits include increased student engagement and participation, enhanced academic performance, and improved physical fitness levels. Moreover, Martinek and Hellison (2016) emphasized that well-implemented PE programs contribute to cultivating a positive school climate that emphasizes health promotion, lifelong wellness, and physical exercise among both students and staff.

Address for correspondence:
Lisa D. Camarador,
E-mail: lacamarador@pup.edu.ph

The significance of PE in schools is immense, and effective management of facilities and resources is essential for the sustainability of these programs. This, in turn, promotes better health and well-being for students. Therefore, evaluating the management of resources – such as facilities, equipment, materials, and human capital – can yield valuable insights into enhancing the quality and effectiveness of PE initiatives.

Purpose of the Study

This study explores the present state of resource management in PE at a selected tertiary institution. The research aims to gain insights into the strengths and challenges within the university's PE programs by examining the allocation, utilization, and effectiveness of resources dedicated to PE. The results of this study can contribute to the ongoing dialogue about optimizing resource allocation in educational settings, ultimately supporting holistic development and encouraging lifelong physical health among students.

METHODS

The descriptive method was employed to collect information and evaluate the facilities and human resource management at a selected tertiary public school in the Philippines. Purposive sampling was utilized to include all Bachelor of PE and Bachelor of Science in Exercise and Sports Science students currently enrolled at the university for the first semester of the 2023–2024 academic year. The researcher also extended an invitation to all faculty members overseeing both major programs to participate in the study. The respondents comprised 64 college students and 11 faculty members from the University College of Human Kinetics.

In this study, the researcher employed two adapted survey instruments. The first instrument contained questions aimed at gathering information about the students' demographic profiles and their evaluations of the facilities and equipment management. Conversely, the second instrument sought to determine the profiles of the faculty respondents and assess the human resource management practices as evaluated by the teachers. Responses were recorded on a 7-point Likert scale, where (7) indicated "strongly agree," (6) "agree," (5) "slightly agree," (4) "neutral," (3) "slightly disagree," (2) "disagree," and (1) "strongly disagree." The survey was administered online, with respondents informed about the confidentiality of their data, and consent was obtained.

To analyze the data, statistical tools such as frequency, percentage, and mean average were employed to determine the demographic profile, assess facility and equipment management, and evaluate the human resource management practices as perceived by the teachers.

RESULTS AND DISCUSSION

Profile of the Student-Respondents

Table 1 shows that majority of the student-respondents were female, ranging from 18 to 19 years old and were enrolled in Bachelor in PE Program at the Polytechnic University of the Philippines, Mabini Campus, Manila.

Facilities and Equipment Management

Table 2 presents the assessment of facilities and equipment management as evaluated by the students.

The data reveals that most statements received a verbal description of "slightly agree," indicated by a weighted mean score ranging from 4.81 to 5.16.

Conversely, the statement "Safe drinking water is available at each setting with adequate space" garnered the lowest mean score of 4.42, categorized as neutral. Ensuring ready access to free drinking water in schools is crucial for preventing obesity, dental caries, and enhancing student learning (Hecht *et al*., 2017). Kimbugwe *et al*. (2018) further emphasize that access to safe drinking water and suitable sanitation facilities is as essential as qualified teachers, classrooms, and educational materials. Therefore, it is imperative for every academic institution to provide an adequate supply of potable drinking water for all students.

With a grand weighted mean of 5.14, described as "Slightly Disagree," there remains a significant opportunity for improvement in meeting student needs. Effective facility management is vital for enhancing the quality of education, as it includes planning, managing, utilizing, and maintaining

Table 1: Profile of the students-respondents

Profile	Frequency	Percent
Gender		
Male	23	36
Female	34	53
LGBTQIA+	5	8
Prefer not to say	2	3
Age		
Below 18	1	1.5
18–21	55	86
22–25	7	11
26 above	1	1.5
Course		
BSESS	54	84
BPED	10	16

BSESS: Bachelor of science in exercise and sports science, BPED: Bachelor of physical education

Table 2: Facilities and equipment management as assessed by the students

Facilities and equipment	Weighted mean	Verbal description
1. There is a safe and secured environment that promotes health and positive learning experiences	5.48	Agree
2. Appropriate and adequate facilities are available	5.16	Slightly agree
3. Available indoor and outdoor PE facilities are accessible to all students	5.38	Agree
4. There are adequate PE equipment and materials to promote effective learning	5.41	Agree
5. PE equipment and supplies are efficiently kept in good condition	5.31	Agree
6. Facilities and equipment are regularly inspected, cleaned, and maintained	5.06	Slightly Agree
7. First-aid supplies are readily available in all indoor and outdoor locations where PE classes are held	5.23	Slightly agree
8. Safe drinking water is available at each setting with adequate space	4.42	Neutral
9. Well-equipped toilet facilities and shower areas with adequate space are available	4.81	Slightly agree
10. Maintenance services that include cleaning, disinfection, and ventilation are regularly done	5.16	Slightly agree
11. The school/college is equipped with available technology for blended learning modality	5.13	Slightly agree
12. Grand weighted mean	5.14	Slightly agree

Scale, range, descriptive rating: 1, 1.00–1.85, strongly disagree; 2, 1.86–2.71, disagree; 3, 2.72–3.57, slightly disagree; 4, 3.58–4.43, neutral; 5,4.44–5.29, slightly agree; 6, 5.30–6.15, agree; 7, 6.16–7.00, strongly agree

infrastructure to support students (Siswanto and Hidayati, 2020). In addition, proper management of classroom facilities fosters a conducive learning environment and equips students with essential maintenance skills, benefiting all stakeholders in education (Okeke, 2013).

Profile of Teacher-Respondents

The majority of the teacher respondents, as shown in Table 3, were female, between the ages of 30 and 40, and they had been teaching for no more than 5 years for both programs in the university.

Table 3: Profile of the students-respondents

Profile	Frequency	Percent
Gender		
Male	3	27
Female	7	64
LGBTQIA+	1	9
Age		
30 and below	4	36.5
31–40	4	36.5
41–50	1	9
51 and above	2	18
Program being handled		
BSESS	5	45
BPED	6	55
Teaching years in PUP		
5 years and below	6	55
6–10 years	1	9
11–15 years	2	18
16–20 years	0	0
21 years and above	2	18

BSESS: Bachelor of science in exercise and sports science, BPED: Bachelor of physical education

Human Resource Management Practices as Assessed by Teachers

Table 4 presents an evaluation of human resource management practices as assessed by the teachers. The majority of teachers "agree" with most of the indicators, indicating that effective human resource management is being implemented at the university. However, the indicator for "compensation" received a mean score of 5.03, which corresponds to a verbal interpretation of "slightly agree."

Wenno (2016) notes that compensation is closely linked to teacher performance, suggesting that the interplay between principals' managerial leadership and compensation significantly influences teachers' effectiveness. Furthermore, Norawati and Syafarisna (2023) found that compensation has a considerable direct impact on teacher performance, as it affects work motivation (Ariani and Desi, 2018) and the degree of achievement in fulfilling their responsibilities in the classroom. Consequently, it is essential for academic institutions to offer competitive compensation and foster a positive working environment for their teachers.

Table 4: Human resource management practices as assessed by teachers

Indicators	Weighted mean	Verbal description
Recruitment and selection		
1. The recruitment and selection system of our school/college enables us to hire good employees	5.64	Agree
2. The recruitment and selection process of our school/college is effective	5.64	Agree
3. The employees we hire achieve a good person-job fit	5.73	Agree
	5.67	Agree
Training and development		
4. Our school/college has an effective training and development system	5.36	Agree
5. The performance of our training and development is high	5.27	Slightly agree
	5.32	Agree
Performance appraisal		
6. Our school/college completes employees' performance appraisals in a timely fashion	5.45	Agree
7. Our supervisors always provide performance appraisal feedback to their subordinates	5.45	Agree
8. Our employees are satisfied with our performance appraisal system	5.45	Agree
	5.45	Agree
Compensation		
9. Our school has a well-implemented salary system	4.91	Slightly Agree
10. Our school has a well-implemented benefit system	5.00	Slightly Agree
11. Our Retirement plan and compensation plan for a bereaved family are well-implemented	5.18	Slightly Agree
	5.03	Slightly Agree
Health and safety		
12. Our school/college provides a safe working environment	5.36	Agree
13. The sanitation of our school is good	5.27	Slightly Agree
14. Our school has a low working injury	6.09	Agree
	5.58	Agree

Scale, range, descriptive rating: 1, 1.00–1.85, strongly disagree; 2, 1.86–2.71, disagree; 3, 2.72–3.57, slightly disagree; 4, 3.58–4.43, neutral; 5, 4.44–5.29, slightly agree; 6, 5.30–6.15, Agree; 7, 6.16–7.00, strongly agree.

CONCLUSION

Evaluating facilities and equipment management emphasizes continuous development, particularly in providing clean drinking water and maintaining optimal learning conditions. Addressing these aspects is crucial to ensuring students' academic performance, well-being, and engagement within the educational institution. The findings also underscore the significance of compensating teachers adequately and fostering a supportive workplace culture. These factors are vital for cultivating high levels of motivation and commitment among educators, enhancing any educational institution's overall effectiveness and success. Thus, improving the academic environment and promoting teacher satisfaction and performance require addressing salary concerns within the human resources management framework.

While the school currently offers satisfactory physical and human resource management for teachers and students, considerable enhancement opportunities remain. Schools are strongly recommended to develop policies to support programs, interventions, and the establishment of high-quality facilities and equipment for PE and sports.

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Research Article

Senior high students' attitude toward blended physical education

Jearian Ross V. Pontejos, Miguel John M. Pedida, Kart Norris E. Calis, Melchor M. De Guzman, Rhene A. Camarador

Polytechnic University of the Philippines, Manila, Philippines

ABSTRACT

Physical education (PE) is essential for students' health and well-being, yet its significance is often debated, particularly with the rise of blended learning. This study investigates senior high school students' attitudes toward the blended learning modality in PE classes. A survey was conducted with 370 students from four public secondary schools, utilizing a researcher-designed questionnaire. The results indicated a positive attitude among students, especially regarding health, participation, and satisfaction. In addition, significant differences in attitudes were observed based on sex. Despite the challenges presented by the pandemic and the transition to blended learning, this research offers valuable insights into student perspectives in the current educational landscape.

Keywords: Attitudes, Blended learning, Engagement, Perception, Physical education

INTRODUCTION

One of the most crucial subjects in the school curriculum is physical education (PE), which focuses on imparting knowledge and enhancing individual health and well-being. Unfortunately, over time, the importance of PE is often overlooked and deemed less significant compared to other academic subjects. As a result, students tend to disengage and lose interest in both their studies and participation in activities. This lack of engagement has serious consequences, particularly in the context of decreasing physical activity levels among students. Consequently, many students become more susceptible to various health issues, struggle with proficiency in games, recreational activities, or sports, face challenges in body coordination, demonstrate limited collaboration with peers, and, most critically, remain unaware of their health and well-being.

In today's education system, influenced by COVID-19, where online classes are prevalent, it is essential to encourage students to engage in activities even outside of the classroom. This provides an additional layer of significance to PE for their overall well-being, as it fosters holistic development and nurtures vital traits such as leadership, teamwork, and communication. It is essential to recognize that PE encompasses much more than merely acquiring physical skills. When individuals fail to appreciate its value, students miss out on the extensive range of benefits that PE has to offer.

Despite its importance, many individuals view PE as a secondary component of the curriculum, often considering it a minor subject with limited relevance to a child's overall education and development (Sprake and Palmer, 2018). This perception can result in reduced focus and investment in the field, stemming from the belief that PE is less rigorous or significant than other subjects, as well as a lack of appreciation for the critical role of wellness and physical activity in supporting overall health and academic achievement. PE constantly advocates for its inclusion in educational programs, frequently facing the perception that it lacks intellectual depth. Furthermore, although research demonstrates that regular physical activity can enhance cognitive function, academic performance, and overall well-being, more traditional subjects continue to regard it as a peripheral discipline of lesser importance (Cook, 2020).

PE is a crucial subject that plays a significant role in a student's life, greatly contributing to their overall health and

Address for correspondence:
Jearian Ross V. Pontejos,
E-mail: pontejosjearianross12@gmail.com

well-being. It encompasses more than just learning sports or exercise; it fosters the development of essential life skills such as leadership, teamwork, and communication. Through PE classes, students have opportunities to enhance their physical fitness, coordination, and motor skills, which can positively impact their daily lives and future pursuits. Moreover, PE programs can promote mental health by reducing stress, anxiety, and depression. Students who engage in regular physical activity are more likely to establish healthy habits that help prevent chronic illnesses such as diabetes, obesity, and heart disease later in life.

Attitude plays a significant role in determining how often students participate in PE classes (Abdi, 2019). For students to engage fully, they must cultivate positive attitudes toward PE. According to Wade (2018), attitudes can profoundly influence a person's life, shaping their educational journey. A positive mindset enhances a person's ability and willingness to learn. Conversely, if negative attitudes persist, students are less likely to pursue further education beyond what is mandatory. Therefore, it is essential to implement strategies that identify the underlying causes of these attitudes and use this understanding to foster change by addressing students' unfavorable perceptions of learning.

In countries where schools have been closed, the COVID-19 pandemic has significantly affected the global educational landscape. As a result, in-person classroom instruction faced limitations due to safety protocols, leading to the swift adoption of distance learning methods to sustain education. According to Reyes, in 2021, the Department of Education introduced an innovative teaching approach that combines online learning (utilizing technology) with offline activities, referred to as "blended learning." This method has since become the new standard for education in the Philippines.

One of the most pressing challenges students encounter in digital learning is engagement. Research by Hollister *et al*. (2022) indicates that students are less participative in online classes compared to traditional settings, underscoring engagement as a significant concern in digital learning environments. Go (2020) notes that PE has become one of the casualty courses for some educational institutions due to the transition to online classes in the Philippines. Some institutions have had to cut costs, while others struggle to teach PE effectively, as the subject typically requires in-person settings and group activities. According to De La Rosa (2020), 54% of high school students reported that their engagement levels with online learning were lower compared to physical instruction. Many students find it difficult to maintain focus for extended periods on screen, often distracted by online content. As a result, they struggle to pay attention and frequently lose interest in their studies (Prakash, 2021).

The effectiveness of virtual meetings varies significantly across different courses, with practical subjects such as PE particularly impacted by the pandemic (Apriyanto and Sapto, 2021). These courses are essential, as they rely on physical presence for optimal learning – a necessity disrupted by COVID-19 safety measures. Students who previously participated in regular physical activities are now encountering diminished physical and mental well-being. Athletes, in particular, may experience weight gain, a decline in physical fitness, and technical deficiencies in their sports due to the closure of stadiums, gyms, and other facilities (Northlines, 2024). This loss of opportunities for physical activity not only hampers personal growth but also negatively influences academic performance, which is contingent on holistic development and engaging learning environments.

Numerous research studies conducted before the pandemic revealed that students held positive views about PE (Bhushan, 2015; Bhushan *et al*., 2016). However, it is essential to examine the various ways in which blended learning affected students' perceptions and engagement in PE during the pandemic. Regardless of the learning modality employed, understanding this impact is crucial to ensuring that students receive a high-quality PE.

Furthermore, much of the prior research conducted internationally has primarily focused on traditional classroom environments, specifically targeting elementary, junior high, and college students before the pandemic. Therefore, this study seeks to investigate how senior high school students perceive and engage with PE within a blended learning model in a local context.

Purpose of the Study

This study aims to determine attitudes of senior high students toward PE in blended learning. The results of the study may provide valuable insights and guidance to educators and professionals on how to design and deliver engaging and effective PE classes in a blended learning environment.

METHODOLOGY

In this study, the researchers employed a descriptive research design to gather information and address the objectives outlined. Using Cochran's formula, a sample of 370 respondents was determined through a simple random sampling technique. The participants were senior high school students from four public secondary schools.

An adapted questionnaire based on Yimer (2014), aimed at assessing students' attitudes toward PE, was utilized in this research. The questionnaire was divided into two parts. The first section contained demographic questions developed by the researcher to collect information such as name, age,

gender, affiliated school, and grade level. The second part comprised 26 questions to evaluate the students' attitudes toward PE in a blended learning environment. These questions explored various aspects of PE, including health, participation, satisfaction, and perceptions of PE teachers.

The researchers sought permission from the four selected public secondary schools to gather the necessary data. After receiving endorsement letters, they visited the schools to discuss the study with the administrators. An agreement was established to distribute the survey questionnaire through a Google Form link to all senior high school teachers, who would then share it through group chats on the Facebook app, thus encouraging student participation. Respondents secured parental consent for minors and completed an informed consent form before participation. The researchers allotted ample time for participants to complete the forms accurately according to their availability.

Data obtained were processed using Statistical Packages for the Social Sciences software, and analyses were conducted using frequency counts, percentages, mean scores, and independent sample *t*-tests.

RESULTS AND DISCUSSION

Attitude of the students toward PE in a blended learning environment.

The results presented in Table 1 demonstrate that students generally held a positive attitude toward PE in a blended learning environment, particularly regarding their health. The weighted mean of 3.21 indicates that most respondents agreed with the statements about the health benefits of participating in physical activity within this modality. Notably, students strongly endorsed that PE in a blended setting is essential for promoting fitness (M = 3.36) and contributes significantly to their mental well-being (M = 3.11).

The systematic reviews by Wang and colleagues ("Blended Learning in PE," 2023) and "Effects of Blended Learning in PE among University Students" (2022) significantly contribute to the discussion, emphasizing the positive effects on attitudes, such as attitudes toward exercise, views regarding the objective, behavioral thinking, and psychological experiences. These findings align with the positive attitudes revealed, showcasing the versatility of blended learning across diverse sports activities (Wang *et al*., 2022).

Expanding on this, Wang *et al*. (2023) explored 22 journal articles, emphasizing global interest in blended learning since 2018. The collective results from both studies validate and expand on the positive attitudes observed, offering a strong foundation for understanding the broader implications of blended learning in PE.

Similar research was conducted by Zheng *et al*. (2021), who provided significant evidence. After 9 years, the results demonstrated that children exposed to the new blended education performed better than those who just used one learning technique regarding the course content, attitude toward self-learning, learning effectiveness, behavioral attempt, and level of physical activity. This creative approach supports the primary goal of promoting physical and mental health by improving accessibility to learning and providing fresh perspectives and conceptual frameworks for PE.

Table 1: The attitude of the students toward physical education in a blended learning mode in terms of health

Health	SD	D	A	SA	Weighted mean	Verbal interpretation
Vigorous physical activity in a blended learning setting helps to reduce my emotional tensions and stress	4	35	245	86	3.12	Agree
For me, Physical education is valuable in the blended learning setup as it promotes fitness and overall health	2	13	206	149	3.36	Strongly agree
Physical education in a blended learning format contributes significantly to my mental well-being	5	37	240	88	3.11	Agree
Physical education in the blended learning context, plays a valuable role in building my strength and stamina for everyday life	4	25	212	129	3.26	Agree
Physical activities in blended learning mode play a valuable role in maintaining my health and well-being	2	32	231	105	3.19	Agree
The blended learning setup helped me to realize that Physical fitness is the most important aspect of life	3	44	232	91	3.11	Agree
I believe that participation in physical activities in the blended learning setting is essential for students as it promotes wellness	1	13	217	139	3.34	Strongly agree
General weighted mean					3.21	Agree

These findings are crucial as they highlight the importance of maintaining PE programs that adapt to blended learning contexts, ensuring that students continue to value and engage in physical activity for their overall health and wellness.

The results in Table 2 reflect a generally positive attitude among students regarding their participation in PE within a blended learning environment, evident through a general weighted mean of 3.19. This suggests that students value personal and social development opportunities through PE.

Specifically, students agree that blended learning programs foster leadership skills (M = 3.08) and create a platform for moral and ethical development (M = 3.13). Importantly, participants expressed satisfaction with the social experiences gained through collaborative activities, with a weighted mean of 3.19, indicating that these environments significantly enhanced their social interactions.

In addition, respondents recognized the inclusivity of blended programs, indicating that both genders have equal opportunities to enhance their physical abilities (M = 3.29). This underscores the effectiveness of blended learning environments in facilitating participation and equitable opportunities in PE.

In line with Parri and Ceciliano's (2022) study on gender equity in PE, our blended learning environment strives to challenge gender stereotypes and foster reflective thinking among teachers, contributing to an inclusive and equitable space that provides equal opportunities for both genders. Moreover, insights from Bower *et al*. (2016) study on "Collaborative learning across physical and virtual worlds" shed light on the dynamics of blended reality environments. This pilot study emphasizes the importance of addressing technical issues to enhance communication and learning in a blended reality setting.

Furthermore, addressing students' psychological requirements for connection, ability, and independence is crucial for enhancing engagement in a blended learning mode, according to Chiu's study in 2021. Hence, these findings illustrate that blended learning formats can play a critical role in developing students' leadership, social skills, and equitable participation, ultimately enriching their educational experiences in PE.

The findings presented in Table 3 demonstrate a predominantly positive attitude toward satisfaction with PE experiences in a blended learning environment, reflected by an overall weighted mean of 2.94. This score indicates that students generally view their experiences favorably, while also pointing out specific areas that may require further improvement.

The item assessing whether students learn more effectively in a blended learning environment resulted in a mean score of 3.06, indicating that students recognize the benefits of this approach in deepening their understanding of PE. Furthermore, the improvement in academic performance, reflected by a mean score of 3.18, further supports the idea that blended learning can provide significant advantages in PE.

The item assessing whether students learn more effectively in a blended learning environment resulted in a mean score of 3.06, indicating that students recognize the benefits of this approach in deepening their understanding of PE. Furthermore, the improvement in academic performance, reflected by a mean score of 3.18, further supports the idea that blended learning can provide significant advantages in PE.

The collective responses of the participants indicate a generally agreeable sentiment, highlighting their alignment with the statements provided. These findings reveal a positive attitude among students regarding their satisfaction with PE in the context of blended learning. The results are consistent with

Table 2: The attitude of the students toward physical education in a blended learning mode in terms of participation

Participation	SD	D	A	SA	Weighted mean	Verbal interpretation
Blended learning physical education programs offer opportunities for developing my leadership skills	2	56	221	91	3.08	Agree
There are many opportunities for me in the development of moral and ethical conduct within the context of physical education in blended learning	4	31	248	87	3.13	Agree
Participating in physical education activities in a blended learning mode allows me to have satisfying social experiences	3	38	214	115	3.19	Agree
Collaborative physical education activities in blended learning foster a better understanding me and appreciation among the participants	0	16	248	106	3.24	Agree
I believe that in a blended learning environment both girls and boys have opportunities to develop their physical abilities to the highest level, even in a blended learning environment	2	23	212	133	3.29	Strongly Agree
General weighted mean					3.19	Agree

Tomas *et al*.'s (2023) examination of student satisfaction in educational settings. The study characterizes satisfaction as a positive emotion arising from the successful completion of tasks or the fulfillment of desires. Positive feedback in our ratings – particularly for statements such as "I enjoy participating in PE and games because they are fun, even in a blended learning format," and "The blended learning mode introduces engaging elements that enhance our eagerness to learn PE" – reflects the positive emotions intertwined with satisfaction.

In addition, insights from the study by Vernadakis *et al*. (2012) further support the positive attitudes observed. This research compared student satisfaction between traditional face-to-face classes and blended lecture instruction formats, with findings indicating a preference for blended course delivery. Moreover, Zeqiri *et al*. (2021) also demonstrate how blended learning affects students' performance and satisfaction, which ultimately results in improved performance. This aligns with the positive attitudes and satisfaction levels depicted, collectively emphasizing the benefits and student preferences associated with blended learning in PE.

However, it is notable that a significant portion of students (M = 2.23) disagreed with the notion of pretending to be ill to avoid participation, and the response regarding participation despite not feeling well (M = 2.86) indicates that attitudes toward compulsory involvement vary. This discrepancy suggests that while students enjoy engaging in PE, some may still grapple with participation concerns possibly related to physical or mental well-being.

Table 4 presents an analysis of significant differences in students' attitudes toward PE in a blended learning environment when classified by sex. Regarding the aspect of "Health," the *P*-value obtained is 0.0641, which exceeds the significance level of 0.05. This indicates that there is no significant difference in students' attitudes toward PE based on sex in a blended learning context. In contrast, statistically significant differences were identified in the areas of "Participation" and "Satisfaction." These findings underscore the importance of considering sex dynamics when examining students' attitudes toward PE in a blended learning setting.

Research by Leong *et al*. (2021) and Dang *et al*. (2016) further highlights the gender-related challenges associated with satisfaction in blended learning, reinforcing existing disparities. In addition, Castejón and Giménez (2015) propose a gender-oriented perspective in PE, which aligns with our results. Insights from a study in the Philippines emphasize the

Table 3: The attitude of the students toward physical education in a blended learning mode in terms of satisfaction

Satisfaction	SD	D	A	SA	Weighted mean	Verbal interpretation
In blended learning mode, I learn more about physical education	7	44	237	82	3.06	Agree
With the help of blended learning setup, I got higher grades in physical education	8	46	188	128	3.18	Agree
The blended learning mode offers something interesting that makes us more eager to learn physical education	6	44	236	84	3.08	Agree
Sometimes I pretend to be ill to avoid participating in physical education and games in a blended learning environment	104	112	120	34	2.23	Disagree
Even when I don't feel well, I still want to participate in physical education and games in the blended learning context	13	92	197	68	2.86	Agree
I enjoy doing physical education and games because they are fun, even in a blended learning format	1	33	215	121	3.23	Agree
General weighted mean					2.94	Agree

Table 4: Significant difference in students' attitudes toward physical education in a blended learning environment when grouped in terms of sex

Students attitude	Sex	Mean	*t*-value	*P*-value	Decision	Remarks
Health	Male	3.26	1.8569	0.0641	Do not reject Ho	Not significant
	Female	3.18				
Participation	Male	3.25	2.5180	0.0122	Reject Ho	Significant
	Female	3.14				
Satisfaction	Male	3.00	2.3532	0.0191	Reject Ho	Significant
	Female	2.90				

complex nature of students' attitudes, particularly highlighting the influence of curriculum and teacher characteristics (Cruz *et al*., 2021).

CONCLUSION

This study has explored the attitudes of senior high school students toward PE within a blended learning environment, underscoring the significance of this subject in light of the challenges posed by the COVID-19 pandemic. Based on the findings, students demonstrated a positive and proactive involvement in PE within a blended learning environment. The weighted mean scores related to participation reflect students' willingness to engage in blended learning, showcasing their resilience and adaptability in the learning process. This highlights the necessity of fostering engaging and flexible approaches to maintain students' interest and involvement in PE across various learning modalities.

In terms of satisfaction, the study found that students experienced a high level of contentment with the blended learning approach. They reported increased enjoyment and engagement in PE, which was further enhanced through collaborative activities. Such interactions not only improved their social experiences but also reinforced the necessity of maintaining connections among peers, even in remote or hybrid educational settings.

Interestingly, the analysis of gender dynamics revealed that while there were no significant differences in health-related attitudes based on gender, there were notable variations in participation and satisfaction levels. This observation indicates that gender may influence how students engage with and derive satisfaction from PE, suggesting a need for further exploration into these dynamics to inform teaching practices.

The study emphasizes the critical need for educators to develop engaging, adaptive PE programs that cater to diverse learning needs, particularly within blended environments. This entails providing comprehensive training and resources to teachers, enabling them to effectively deliver PE across various instructional modalities.

It is essential to establish training programs, seminars, workshops, and professional development opportunities for teachers, focusing on the latest innovations in PE. This will ensure that educators, particularly those with diverse academic backgrounds, are well-informed and proficient in their teaching practices. In addition, offering refresher courses, certifications, and programs can support and enhance the skills of PE educators in delivering effective classes, regardless of their backgrounds.

Finally, the researchers encourage future studies to investigate the factors influencing students' attitudes toward PE, especially in local contexts and within blended learning frameworks. Such examinations would deepen understanding of the multifaceted nature of student perceptions and assist in crafting strategies aimed at enhancing student engagement in PE.

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Research Article

Extracurricular sports participation among students at Ho Chi Minh City University of industry and trade

Le Van Thao[1], Nguyen Thi My Linh[2], Nguyen Trung Kien[2]

[1]Ho Chi Minh City University of Industry and Trade, Ho Chi Minh, Vietnam, [2]University of Sport, Ho Chi Minh, Vietnam

ABSTRACT

The research results showed that students at the Ho Chi Minh City University of Industry and Trade have a positive attitude, high enthusiasm, and a strong demand for extracurricular sports activities. Furthermore, up to 87.3% of students desire to participate in extracurricular sports with an equivalent duration as a replacement for mandatory physical education courses. This is a positive signal, serving as a foundational condition to promote and enhance the quality of extracurricular sports activities at the university.

Keywords: Extracurricular, Ho Chi Minh City University of Industry and Trade, Sport, Student

INTRODUCTION

Physical education (PE) and sports in schools play a crucial role in the development of individuals, as their primary goal is to enhance the structure and function of the human body. Beyond physical benefits, these activities also contribute to moral, intellectual, mental, and esthetic education.[4] All these activities aim to provide fundamental knowledge and motor skills, foster the habit of regular physical exercise to improve health, develop physical fitness, enhance stature, and shape personality. In addition, they support academic performance, social engagement, and the cultivation of a positive attitude, ultimately contributing to the goal of holistic education.[41]

According to Article 2 of Decree No. 11/2015/NĐ-CP, issued by the Vietnam Government on January 31, 2015, regarding PE and sports activities in schools, school sports activities are voluntary activities for students, organized in the form of extracurricular programs, sports clubs, groups, or individual participation. These activities are designed to align with students' interests, gender, age, and health conditions, aiming to enhance motor skills, support the objectives of PE through various training and competitive sports formats, foster athletic talents, and identify and nurture gifted athletes.[41]

Address for correspondence:
Le Van Thao,
E-mail: thaolv@huit.edu.vn

In addition, these activities help students increase physical activity to strengthen their health, maintain and improve their physical capacity, develop their physique, and even serve therapeutic purposes. They also play a crucial role in cultivating essential motor skills, willpower, and movement techniques.[24]

In recent years, the administration of Ho Chi Minh City University of Industry and Trade (HUIT) has shown great interest in students' sports activities. However, in practice, extracurricular sports activities still face certain limitations, reducing students' opportunities to engage in physical training, develop sports skills, and contribute to the overall sports movement of the university. Given this situation, a comprehensive assessment of the current state of extracurricular sports activities at the university is an essential initial step. In particular, analyzing students' participation, including their attitudes and demands for these activities, is a critical aspect of this research. The findings of this study will provide a scientific basis for developing appropriate strategies to enhance school sports activities, thereby improving students' physical and mental well-being while fostering a holistic and sustainable learning environment for the future.

METHODOLOGY

The study employs the following research methods: Document review, analysis, and synthesis; sociological survey; pedagogical observation; and statistical mathematics.

Sample

The research subjects consist of 590 full-time students who participated in extracurricular sports activities at the university at the time of the survey.

RESULTS

Current Status of Students' Participation in Extracurricular Sports at HUIT

Rate of student participation in extracurricular sports activities

Among the 590 students currently engaged in extracurricular sports activities, male students account for 58.3%, whereas female students make up 41.7%. Regarding participation by academic year, 2nd-year students have the highest participation rate at 32.2%, followed by 1st-year students at 27.6%. Third-year students rank third with 22.9%, whereas final-year students have the lowest participation rate at 17.3%.

Extracurricular sports activities students are participating in

The survey on extracurricular sports activities shows that the most commonly chosen sports for training are swimming (16.1%), basketball (11.7%), karatedo (8.8%), volleyball (5.8%), football, and taekwondo (4.9%). Other sports, such as badminton, sepak takraw, modern dance, and Vovinam, each have a participation rate of 4.7%. The remaining sports with participation rates under 4.7% include aerobics, boxing, running, e-sports, dancing, fitness, traditional martial arts, and others (unclear responses).

Frequency of participation in extracurricular sports activities

The majority of students participate in sports activities occasionally (1–2 times/week), accounting for 52.9%. The second-largest group consists of students who rarely participate, making up 21.5%, followed by those who train regularly (3 times/week) at 19.7%. The smallest group, which trains very frequently (more than 3 times/week), accounts for 5.9%.

Time spent on extracurricular sports training

Regarding the duration of training, 49.5% of students train for over 120 min/session, whereas 28% train for 90–120 min. Training for 30–60 min accounts for 9.8%, whereas 60–90 min is 9%, and <30 min represents 3.7%.

Preferred time for training

Students primarily choose to train in the evening (60.3%), followed by the afternoon (19.8%). Fewer students train during the morning or noon. In comparison with the types of training, the duration of training often depends on the extracurricular sports activities students engage in. For example, students in sports teams or self-organized clubs tend to train more frequently than those who train individually.

Types of extracurricular sports training

Regarding the form of extracurricular sports activities, the largest group of students' trains in class groups, accounting for 54.9%. The second-largest group consists of students who train in self-organized clubs, making up 32.5%, followed by students who train individually at 9.8%. A small group of students, 2.7%, participates in training with sports teams. In terms of the impact on academic performance, the group of students participating in extracurricular sports activities reported that these activities had little to no effect on their academic results. 28.5% of students stated that sports activities "had no effect," 38.6% said they "did not affect" their academic performance and 29.5% indicated it was "neutral." Only 3.4% of students reported that extracurricular sports activities "had an impact" on their studies.

Interest and Demand for Extracurricular Sports among Students at HUIT

Interest and positive engagement in extracurricular sports training

Interest and active participation are crucial factors that form the foundation of motivation for students to engage in extracurricular sports training. Statistical results show that among the 590 students who provided information for this survey, 30% of students are "very interested" in extracurricular sports training, and 40% are "interested." The categories of "neutral," "not interested," and "very uninterested" each account for a low percentage of 10%. Therefore, the majority of students show an interest in extracurricular sports training, which is a positive indicator for the development of extracurricular sports programs at the university.

Reasons for participating in extracurricular sports activities

The reason "personal interest" is the most frequently chosen motivation for students participating in extracurricular sports activities, accounting for 32.5%. The second most common reason is the "desire to improve health," which accounts for 27.5%. The third reason is the "desire to improve academic performance," representing 14.2%.

Actions before, during, and after training sessions

To assess the level of engagement of students in extracurricular sports activities, we examined their attitudes toward these activities. Regarding actions before training sessions, 50.3% of students "research techniques through books, the internet, or friends," and 38.6% "plan ahead/know the content they want to practice or discuss." In addition, there is a small percentage of students who "don't prepare anything" (5.6%) or "act on impulse" (5.4%).

When participating in extracurricular sports activities, if students were unable to perform a technique or skill, 50.3% of students chose to "practice more at home," and 41.0% sought

"help from friends." 4.2% of students thought, "I'll continue in the next session," whereas 3.7% looked for assistance from their instructor (only 0.7%). This demonstrates a relatively high level of proactivity among students in participating in extracurricular sports activities, as reflected in their preparation before training and how they resolve difficulties during training. These results indicate a positive attitude toward extracurricular sports activities.

Opinions on extracurricular sports activities as a substitute for PE

In the past academic year, the physical education department proposed an initiative allowing students to participate in extracurricular sports clubs based on their interests as a substitute for mandatory PE classes. This topic was included in the survey to capture students' actual opinions. The results showed that 47.8% of students strongly agreed, and 39.5% agreed with the idea that PE (mandatory) could be replaced by extracurricular sports. A small percentage of students were indifferent (7.6%), whereas only 1.2% strongly disagreed, and 3.9% disagreed with the proposal.

To further explore the reasons behind the preference for extracurricular sports over mandatory PE classes, students who agreed or strongly agreed with the proposal were asked to provide their reasons. Among the five reasons provided, the most popular was "Focus on practicing a favorite sport" (30.0%), followed by "part-time job" (26.8%), and "Convenience for personal and family work" (16.4%). Other reasons included "Convenience for the academic schedule" (4.2%), "Double majoring" (2.5%), and "Other reasons" (7.3%). In addition, 12.7% of students did not respond to this question, which corresponds to the percentage of students who either had no opinion or disagreed with the proposal to substitute PE with extracurricular sports.

Need for extracurricular sports training

Survey results regarding the need for the school to organize extracurricular sports clubs (with guidance/instruction) show that 45.4% of students think it is necessary, 26.9% of students think it is very necessary, 18% of students consider it normal, and 9.7% of students think it is unnecessary. In addition, the survey also asked about the sports that students prefer and wish to practice, with multiple sports being chosen by students [Table 1].

Of the 19 sports proposed as feasible for the organization (including swimming, as the school has rented a swimming pool for the long term), the top three sports chosen by students were: Basketball (89 votes), swimming (82 votes), and karatedo (57 votes). This reflects the actual situation at the school. In recent years, the basketball and karatedo movements have developed enormously, attracting many students to participate in training or register for PE courses. As for swimming, this sport offers numerous benefits for students and is also a priority for development at the school according to sports regulations. Therefore, there is a high demand among students to participate in this sport to enhance their knowledge and skills in swimming.

Table 1: Statistics on sports students like and need to practice

No	Sports	Choices	No	Sports	Choices
1	Aerobic	22	11	Swimming	82
2	Basketball	89	12	Boxing	24
3	Football	31	13	Sepak Takraw	28
4	Volleyball	25	14	Tennis	31
5	Table Tennis	26	15	Athletics	26
6	Dancing	36	16	Karatedo	57
7	E-Sports	39	17	Taekwondo	24
8	Modern Dance	22	18	Traditional Martial Arts	26
9	Fitness	32	19	Vovinam	24
10	Badminton	21	20	Other sports:	None

The Situation of Sports Competition Activities of Students at HUIT

The situation of sports team activities

In recent years, the sports movement at HUIT has been vibrant with various sports, providing students with opportunities to improve their health, develop skills, and exchange experiences. Under the professional guidance of the departments and the direct management of the Youth Union and the Student Union, the number of students participating in sports has been increasing in both scale and quality. However, due to the inability to meet the practical conditions and criteria for establishment, there are currently no officially operating sports clubs at the University. Most teams operate in a spontaneous manner outside of class hours. Survey results from students regarding sports clubs at the University show that 44.2% of students "have no information about official extracurricular sports clubs (from the Youth Union or departments)," 35.8% believe that there "are no extracurricular sports clubs," 18.1% say there are "spontaneous sports clubs," and only 1.9% report that there "are official extracurricular sports clubs" but do not specify which clubs.

The situation of sports competition activities

Recently, the University has promoted training and competitive sports activities, integrating PE programs with extracurricular sports to encourage students with talent and passion for sports. As of the survey time, the thesis recorded five sports with many students participating in regular and active training: Football, volleyball, badminton, karatedo, and basketball. Among these, basketball is a sport that is not yet included in the PE program but still attracts many students to practice. The other four

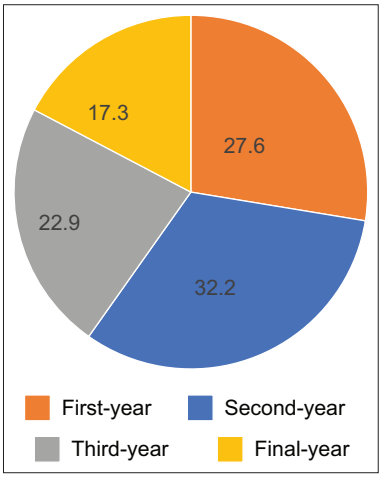

Figure 1: Extracurricular sports participation by academic year

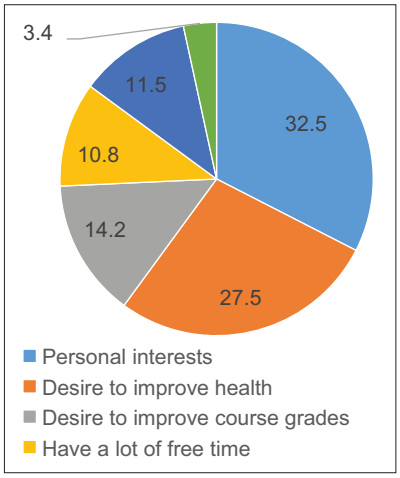

Figure 4: Reasons for participating in extracurricular sports activities

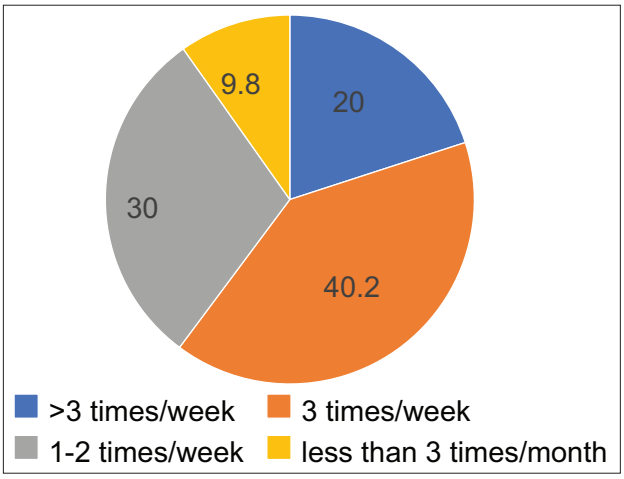

Figure 2: Current status of participation in extracurricular sports activities

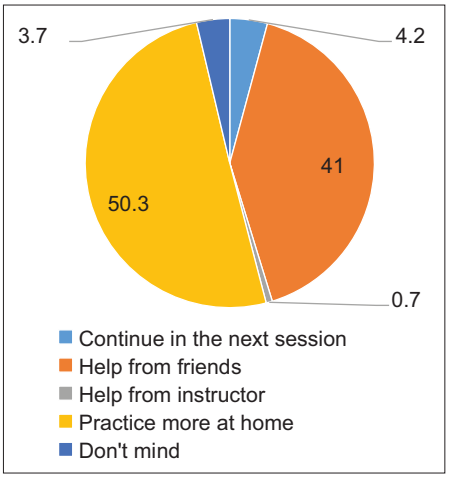

Figure 5: Students' actions in extracurricular sports activities

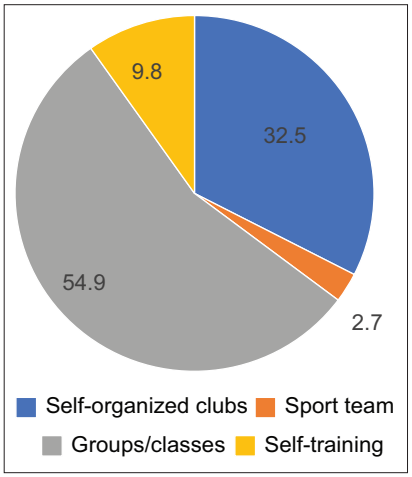

Figure 3: Current status of extracurricular sports activities

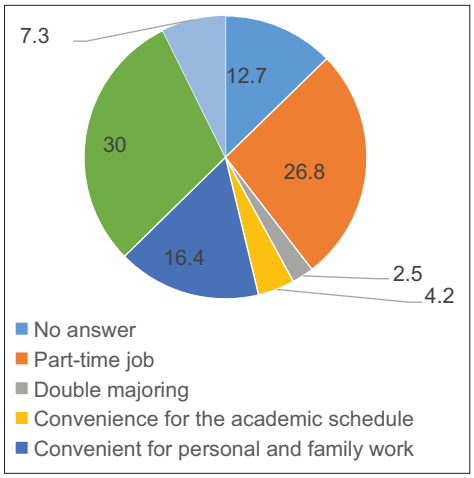

Figure 6: Reasons students want to choose extracurricular sports instead of physical education

sports, football, volleyball, badminton, and karatedo, have the advantage of being taught in the PE curriculum. Therefore, the facilities and fields for these sports are already available. Although some students actively practice and compete,

Table 2: Statistics on some sports achievements of students at HUIT

No	Sport	Year	Tournament Name	Achievement	Notes
1	Football	2018	2020 HCM City Student Football Tournament	Reached the quarterfinals	Men's team
2		2022	2022 HCM City Student Football Tournament (Open)	Reached the semifinals	Men's team
3	Basketball	2021	2021 HCM City Student Basketball Tournament	Reached the semifinals	Men's team
4	Badminton	2021	2021 HCM City Student Badminton Tournament	1 Gold Medal (G) 1 Silver Medal (S) 1 Bronze Medal (B)	Mixed doubles Men's singles Women's singles

playing a key role in the university's sports movement, most activities remain spontaneous. Many students only start training when a competition is approaching, which results in a lack of outstanding achievements. Nevertheless, students with excellent sports achievements are still recognized, rewarded, and given favorable conditions to perform well academically [Table 2].

The university organizes the Annual Student Sports Festival to promote sports activities and develop sports clubs. This is the largest sports event of the year. The festival not only attracts the participation of students from within the university but also includes sports teams from various universities around Ho Chi Minh City. The competitions feature a variety of sports, such as badminton, chess, table tennis, football, and volleyball. In addition, internal tournaments are frequently held to provide a healthy playground and strengthen the connection between students from different faculties and classes. These events also help students develop skills, improve their health, and foster team spirit.

CONCLUSION

Although extracurricular sports activities at the University of Economics and Technology in Ho Chi Minh City are mostly spontaneous and lack specific plans and programs, students have a high demand for training, a positive attitude, and enthusiasm for these activities. This is a good sign and provides a foundational condition to promote, improve, and enhance the quality of extracurricular sports activities at the university. However, to achieve this, it is necessary to take further steps such as establishing sports clubs and developing and completing the extracurricular sports program. The results of these efforts are expected to not only encourage the growth of the sports movement at the university but also enhance students' overall health, optimize the effectiveness of the university's training activities, and create a healthy, beneficial environment that promotes the comprehensive physical and mental development of students.

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Review Article

Yoga for life and its sociocultural values in recent trends

Pradeep Kumar Lenka

Prof. V. B. Shah Institute of Management, R.V. Patel College of Commerce (E.M.), V.L. Shah College of Commerce (G.M.), Sutex College of Computer Applications and Science, VNSGU, Surat, Gujarat, India

ABSTRACT

Yoga, an ancient practice originating from India, has undergone significant evolution in recent years, adapting to the needs and preferences of modern society. This essay provides an in-depth analysis of the current trends in yogic practice, exploring its various forms, integration with technology, emphasis on mental health, and sociocultural importance. By examining how yoga transcends physical exercise to become a lifestyle, a tool for self-awareness, and a catalyst for social change, this essay underscores its profound impact on individuals and communities worldwide.

INTRODUCTION

Yoga, often perceived as a physical exercise regimen, encompasses a rich tapestry of spiritual, mental, and cultural dimensions. Originating from ancient Indian traditions, yoga has transcended geographical and cultural boundaries, permeating societies worldwide. In recent years, yoga has witnessed a renaissance, with practitioners embracing diverse styles, integrating technology, and emphasizing mental well-being. This essay aims to delve into the multifaceted nature of modern yogic practice, exploring its current trends and sociocultural significance.

Modern Trends in Yogic Practice

1. Diversification of yoga styles:
   - Traditional forms: Classical yoga styles, such as Hatha, Ashtanga, and Iyengar continue to resonate with practitioners seeking authenticity and depth in their practice.
   - Modern variations: Contemporary variations, such as hot yoga, power yoga, and aerial yoga cater to diverse preferences, offering dynamic and challenging experiences.
   - Fusion practices: Hybrid forms, such as Yogalates, combining yoga and Pilates, exemplify the innovative fusion of different fitness modalities to create holistic wellness routines.
2. Integration of technology:
   - Virtual classes: With the advent of technology, virtual yoga classes, and live-streamed sessions have become increasingly popular, providing accessibility and flexibility for practitioners.
   - Yoga apps: Mobile applications offering guided yoga sessions, meditation practices, and wellness tracking tools have democratized access to yoga, enabling individuals to practice anytime, anywhere.
   - Online communities: Social media platforms and online forums have facilitated the formation of virtual yoga communities, fostering connection, inspiration, and knowledge-sharing among practitioners worldwide.
3. Focus on mental health:
   - Mindfulness practices: Yoga's integration with mindfulness techniques has led to the emergence of mindful yoga, emphasizing present-moment awareness and self-compassion.
   - Yoga Nidra: The practice of yoga nidra, or yogic sleep, has gained traction for its profound relaxation and stress-relief benefits, offering a therapeutic tool for managing anxiety and insomnia.
   - Trauma-informed yoga: Recognizing the sensitive nature of trauma, trauma-informed yoga approaches prioritize safety, empowerment, and choice, providing a healing pathway for individuals navigating past traumas.

Address for correspondence:
Pradeep Kumar Lenka,
E-mail: pradeeplenka9429016830@gmail.com

4. Corporate wellness programs:
   - Workplace stress reduction: Many corporations have integrated yoga into their wellness programs to mitigate workplace stress, enhance employee morale, and foster a culture of well-being and productivity.
   - Chair yoga: Chair yoga sessions tailored for office settings accommodate desk-bound employees, offering rejuvenating stretches, breathwork, and mindfulness practices to alleviate tension and improve posture.

5. Yoga for special populations:
   - Seniors: Gentle yoga classes cater to the unique needs of seniors, promoting mobility, balance, and vitality in aging bodies.
   - Children: Yoga programs for children cultivate mindfulness, body awareness, and emotional regulation skills, supporting holistic development and well-being from an early age.
   - Pregnant women: Prenatal yoga classes provide pregnant individuals with a safe and supportive environment to connect with their bodies, alleviate discomfort, and prepare for childbirth.
   - Individuals with disabilities: Adaptive yoga practices accommodate diverse abilities, empowering individuals with disabilities to experience the benefits of yoga and cultivate self-acceptance and resilience.

Social and Cultural Importance of Yogic Practice

1. Advancement of physical health:
   - Holistic wellness: Yoga promotes holistic well-being by addressing the physical, mental, and emotional dimensions of health, fostering balance and integration.
   - Disease prevention: Regular yoga practice has been associated with numerous health benefits, including improved cardiovascular health, enhanced immune function, and reduced risk factors for chronic diseases such as hypertension and diabetes.
   - Rehabilitation: Yoga serves as a therapeutic tool for rehabilitation and injury prevention, offering gentle movement, breathwork, and mindfulness practices to support recovery and restore function.

2. Stress management and mental well-being:
   - Stress management: Yoga techniques such as asana (physical postures), pranayama (breath control), and meditation help mitigate the physiological and psychological effects of stress, promoting relaxation and resilience.
   - Emotional regulation: Through self-awareness and mindfulness practices, yoga cultivates emotional intelligence, empowering individuals to navigate challenging emotions with equanimity and compassion.
   - Anxiety and depression: Research indicates that yoga interventions can effectively reduce symptoms of anxiety and depression, offering a complementary approach to conventional mental health treatments.

3. Cultural dynamics and global unity:
   - Cultural appropriation versus appreciation: As yoga transcends cultural boundaries, it raises questions about cultural appropriation and authenticity. While some argue that commercialization and misrepresentation dilute yoga's cultural roots, others emphasize the importance of respectful engagement and cross-cultural dialogue.
   - Global presence of Yoga: The globalization of yoga has led to a rich exchange of ideas, practices, and perspectives, enriching the global yoga community and fostering a sense of interconnectedness and mutual respect.
   - Yoga Tourism: Yoga retreats and wellness tourism destinations attract travelers seeking rejuvenation, self-discovery, and cultural immersion, contributing to local economies and cross-cultural understanding.

4. Preservation of traditional wisdom:
   - Ancient lineages: Yoga's rich philosophical and spiritual heritage, rooted in ancient Indian scriptures such as the Yoga Sutras and Bhagavad Gita, serves as a source of inspiration and guidance for modern practitioners.
   - Guru-disciple tradition: The transmission of yoga teachings through the guru-disciple lineage ensures the preservation of traditional wisdom and the authenticity of the practice, maintaining the integrity of yoga's spiritual essence amidst contemporary adaptations.
   - Yoga philosophy: Philosophical concepts, such as ahimsa (non-violence), satya (truthfulness), and svadhyaya (self-study) provide ethical guidelines and spiritual principles that inform the practice of yoga on and off the mat.

5. Community cohesion and social cohesion:
   - Sangha: The concept of sangha, or spiritual community, holds significance in yoga philosophy, emphasizing the supportive relationships and collective practice that nurture personal growth and transformation.

- Yoga studios and retreat Centers: Yoga studios, ashrams, and retreat centers serve as gathering spaces for practitioners to connect, learn, and deepen their practice in a supportive and inclusive environment.
- Seva (Selfless service): Many yoga communities engage in seva projects, volunteering their time and resources to support social causes, humanitarian efforts, and environmental sustainability initiatives, embodying the spirit of karma yoga (selfless action).

CONCLUSION

The current trends in yogic practice reflect its dynamic evolution and adaptability to contemporary lifestyles and needs. From diverse yoga styles and technological innovations to a growing emphasis on mental health and social impact, yoga continues to evolve as a transformative practice with far-reaching implications. Its sociocultural importance extends beyond physical fitness to encompass holistic wellness, cultural exchange, spiritual growth, and wellness of human beings.

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Research Article

Impact of learning environment in the acquisition of physical education competencies among grade 9 students in Bulan, Sorsogon, Philippines

Rachelle D. Otivar

De La Salle University - Dasmariñas, Cavite, Philippines

ABSTRACT

Physical education (PE) provides all learners the opportunity to acquire and develop several competencies that promote holistic development which is the foundation of the quality of life. In relation, learners need a conducive environment that nurtures physical well-being and vitality. This descriptive study attempted to know the impact of learning environment (classroom, facilities, and equipment) to the acquisition of PE competencies among grade nine (9) students in 12 public secondary schools in one of the provinces of the Philippines. It also investigated the strategies applied by the teachers to address the challenges brought about by the existing learning environment conditions to ensure high quality of learning. Data gathered generally revealed that the very limited facilities and equipment used in teaching PE class greatly influence the level of learning acquired by the students which resulted in poor acquisition of competencies and fitness level. The study also identified the innovative strategies and practices applied by the teachers to enhance the teaching-learning process despite the lack of appropriate venue and equipment when teaching PE. However, despite the instructional intervention made by the teachers, data reveal that there were only few students who showed improvement in their fitness level. Further, the acquisition of important PE competencies was also missed. The study proves that the learning environment particularly the availability of learning appropriate learning resources is contributory in the promotion of effective and efficient PE class. The innovativeness and creativity of the teachers is not also enough to augment the need.

Keywords: Competencies, Learning environment, Physical education

INTRODUCTION

One of the vital achievements one could ever have is to attain education. Advancement of all fields of study is made possible due to education and it contributes to have longer life expectancies, people tend to exercise more and play more sports and understand the implications of diet and lifestyle on health enabling individuals to make healthy choices.

Mayer (2015) said that, physical education (PE) as part of the curriculum help improves the physical, emotional, social, and mental qualities of a student. PE plays a great impact in any individual's development. Recent advances in studies in neuroscience have shown that the brain functions better through the use of exercise and play, and PE is a great way to introduce global learning concepts using movement and games. Philippines as part of Asia joined the significant movement in adapting the K-12 Program last school year 2012–2013. The Department of Education ensures learning for each Filipino student to learn the skills guided by the curriculum. Teachers follow a certain curriculum guide to guarantee standards based quality of teaching. As Bilbao *et al*. (2014) mentioned on their book Curriculum Development that curriculum is considered the "heart" of any learning institution which means that schools or universities cannot exist without a curriculum. Philippine Public schools dreams to produce every school the facilities, training for teachers, and other pertinent educational needs that will synergistically provide great results in the learning process and services rendered. According to the study of Fraser (2004) and Kilgour (2006), there are two components of learning environment, the physical component which includes classroom, teaching-learning materials, and learning facilities and the psychosocial component which includes interaction

Address for correspondence:
Rachelle D. Otivar,
E-mail: xymilricia16@gmail.com

between student-students, students with teachers, and students with environment. In addition, the environment can affect the morale of students; if they feel their classroom is physically worse than those of richer kids, for example, they might be discouraged and upset and less willing to learn (Moos, 2009).

The importance of the study emerged from the fact that certain factors may affect students' learning, one of which is physical learning environment and may influence students' learning based on the curriculum competencies. Physical learning environment pertains to physical structures, spaces, equipment, and tools within the school, which has two components: The Physical Component (classroom, teaching-learning materials, and learning facilities) and the Psychosocial Component (interaction between student-students, students with teachers, and students with environment). The study focused on the PE competencies in relation to Physical Component of the Physical Learning Environment with the following questions:

1. What are the prevailing realities in conducting PE classes in terms of physical learning environment along:
   a. Classroom/learning area
   b. Facilities
   c. Equipment

2. What strategies were employed by the teachers to enhance the competencies in terms of:
   a. Facilities and equipment
   b. Activities conducted

3. What are the PE competencies in terms of:
   a. Health-related fitness activities
   b. Skill-related fitness activities

4. What are the effects of the strategies on students' learning based on the PE competencies?

METHODOLOGY

The descriptive method of research was used in the study. The primary sources of data were the representation sample of grade 9 Public high school students who were officially enrolled and teachers in PE in Public Secondary Schools of Bulan, Sorsogon during the school year 2017–2018. The total population for grade 9 is composed of 1970 students but only 332 of them were considered as respondents and all 13 teachers handling PE. Slovin's formula was used by the researcher in identifying the number of samples in a given population for students. Frequency count, percentage, ranking, and weighted mean were used to determine the effects of physical components to students' learning in PE nine classes. For data interpretation in problem 2, likert scale was used with the following indicators and description, 3.51, 4.0 AO – always observed, 1.51–2.5 RO – rarely observed, 2.51–3.5 SO – sometimes observed, and 1.0–1.5 NO – not observed. A qualifying description was used in problem 1 for facilities and equipment, 1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, and 5 = Excellent.

RESULTS AND DISCUSSION

Prevailing Realities in Conducting PE Classes

Physical learning environment along classroom of grade 9 students

Almost all of the Public Secondary Schools meet the ratio of chairs to students per classroom excluding 10 classes of Bulan National High School and the four classes of San Francisco National High School. Each of the 33 classrooms have teacher's table and chair and 2 units of chalkboards. The classrooms of the schools did not meet the standard of 7 × 9 floor dimension except Bulan National High School. Almost all of the schools have a class belonging to large class size, except two classes from Bulan NHS and two classes from F.G. Glua NHS.

Physical learning environment along facilities and equipment

The results for facilities, the Public secondary schools of Bulan using a rating scale, falls under a rating of 2 or below average and the results for equipment, the Public secondary schools of Bulan using a rating scale, falls under a rating of 3 or average.

The respective results for the varied types of equipment in all Public Secondary Schools of Bulan, Sorsogon revealed that the 12 schools have no sufficient equipment available for students.

Strategies Employed by the Teachers to Enhance Learning Based on the PE Competencies in Terms of *Facilities and equipment*

The results revealed that five out of nine teachers used strategies such as looking for other venue suitable for their activities. They also assign students to bring equipment needed in their activities. Students from their respective schools affirm through their responses that teachers employ strategies to enhance the competencies.

Activities conducted

The results revealed that all teacher in Public Secondary schools of Bulan employed varied type of strategies in enhancing the competencies. These were all confirmed by the students in their responses too.

PE Competencies

The PE competencies are the basis from which the skills and knowledge needed by the students to learn within the curriculum were based from. The study used six competencies from the DepEd Curriculum on which the activities were health-related and skill-related fitness components.

Summary of assessment per competency (health-related and skill-related fitness activities)				
Competencies	**WM (students)**	**INTRPR**	**WM (teachers)**	**INTRPR**
Competency 1 (physical activity and physical fitness)	3.61	AO	3.08	SO
Competency 2 (officiating practice and competitive games)	1.84	RO	1.82	RO
Competency 3 (performing first aid in sports settings)	3.23	SO	3.3	SO
Competency 4 (executing skills involved in dance)	3.02	SO	3.04	SO
Competency 5 (performing first aid in dance settings)	3.40	SO	3.39	SO
Competency 6 (active recreation)	1.39	NO	1.40	NO

The responses of students and teachers in all the learning competencies in PE 9 have almost the same weighted mean and fall on the same interpretation from not observed to always observe. Thus, only competency 1 has different results from the students and teachers responses with AO and SO, respectively. It means that only in competency 1 that the students and teachers assessment vary from each other. Students' response revealed that the activities for physical activity and physical fitness tests were always observed while teachers' responses were sometimes observed.

Effects of the Intervention on the PE Competencies

The result of the interventions of the teachers in the Public Secondary Schools in both Health-related and Skill-related activities revealed that some interventions contributed to the improvement of their skills and knowledge learned in PE but based on the result, greater percentage of students fall under did not improve. The scores in nine out of 12 tests fall under did not improve; four tests in health-related (Cardiovascular endurance test, Push-up, Zipper test, and sit and reach); and five tests in skill-related fitness (Coordination, agility, speed, balance, and reaction-time tests). Only the body mass index fall under maintained and plank under strength in health-related and power test under skill-related fall under improved.

DISCUSSION

Supported by the Deped Facilities Manual, learning spaces such as classroom should contain seats/chairs, and blackboards which is deemed necessary for learning. Furniture such as mentioned are objects designed to increase comfort and convenience to pupils/students.

(Educational Facilities Manual, 2010) Magdaong *et al*. (2005) discussed about the level of effectiveness of PE Program suggesting that providing sufficient and additional equipment to PE activities would bring greater satisfaction, experience, and learning to the students. Likewise, the study of Asilo *et al*. (2015) found that limited facilities and equipment in training athletes are the problem that greatly affects learning. The study revealed that there were limited facilities and equipment in the Public Secondary Schools in Bulan, Sorsogon.

In terms of strategies, according to Andrew (2016), an instructional strategies are a specific way or set of steps to help a child improve in an area of need. They are intentional, meaning they are aimed at a particular weakness. From the responses given by the teacher and students, it revealed that the teachers set steps to help students improve the area of need through their strategies and were all confirmed by the students.

Altaweel and Alja'afreh (2017) about learning competencies mentioned that learning competencies are necessary to construct skills and knowledge needed by the students. In the same manner, teachers handling grade 9 students in Public Secondary schools of Bulan, Sorsogon, were able to utilize the learning competencies in delivering their lessons and activities in PE as observed in the responses of the students in validating their teachers' employed strategies. However, due to the limited facilities and equipment, the competencies have not been met despite the efforts made by the teachers.

CONCLUSION

The collected data indicated that the limited availability of facilities and equipment for PE classes significantly affects students' learning, leading to inadequate development of competencies and fitness skills. The study also highlighted the innovative strategies teachers used to improve the teaching-learning process, despite the absence of proper venues and equipment for PE instruction. Nevertheless, even with the instructional efforts of teachers, the findings show that only a small number of students demonstrated progress in their fitness levels. In addition, the development of essential PE competencies remained insufficient.

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Research Article

A study on the explosive power of 10–12 aged school children

Sandip Kumar Mandal

Department of Physical Education, Vivekananda Mahavidyalaya, Hooghly, West Bengal, India

ABSTRACT

The purpose of the present study was attempted to compare the explosive power among school children where the age limit is 10, 11, and 12 years. The explosive power in the school level provides various opportunities to students which related to various fundamental sports patterns, such as running, kicking, hoping, lifting, touching, and jumping. It is often referred as the ballistic movement of the final level of the exercises. The sample consisted of six hundred (n = 600) in all together where each age group is two hundred (n = 200) for the variable of explosive power. This subject was collected from different districts, such as Nadia, South 24 Parganas, Howrah, and Kolkata of West Bengal in India. The data were selected on the basis of a systematic random sampling method. The variables of the explosive power were tested by the vertical jump which is most known as the Sargent jump test. In inter-group *post hoc* test on explosive power in respect of three age groups was statistically significant (F = 19.110, $P < 0.05$) as all the "t" values were greater than the tabulated values ($t^{598} = 1.960$). Hence, it is revealed that the explosive power of children was better with the advancement of age that is EP of 12 years > EP of 11 years > EP of 10 years where "EP" indicates explosive power. From the present study, the researcher concluded that the higher the performance in explosive power with the advancement of the age of the subjects.

Keywords: Age category, Explosive power, School children

INTRODUCTION

The explosive power in the school level provides opportunity to students which related to various sports patterns, such as running, kicking, hoping, skipping, and lifting. This power was measured by the vertical jump, which is an essential motor skill in many sports (Ziv and Lidor, 2010). Many methods and tools have been used to assess vertical jump performance (Aragon, 2000; Quagliarella *et al*., 2010). The rate of force development is at the maximum for any type of muscle action is explosive power. In activities requiring high acceleration and output, explosive power training is necessary for maximum development. Explosive power exercises should be taught and supervised by fitness professionals to reduce the risk of injury. The general exerciser does not usually need to include explosive power training in a regular workout. Many athletes are explosive, but at the same time lack of power, on the other side, an athlete can be powerful, but lack of explosive strength. Power exercises should be taught and supervised by fitness professionals to reduce the risk of injury. The general exerciser does not usually need to include explosive power training in a regular workout (www.thefitmap.com/exercise).

Address for correspondence:
Sandip Kumar Mandal,
E-mail: sandipkm06@gmail.com

The researcher (Muktamath, 2010) studied on resistance training on leg explosive power and other parameter of college students. Their age range was 18–25 years. The study revealed that the leg explosive power was significantly improved due to the influence of resistance training. Explosive power drills are often used by athletes who need to generate a quick burst of maximal effort such as movements required in football, track and field, sports, court sports, and even cycling. According to (Aragon, 2000) vertical jump tests are common in physical education, fitness, and sports programs as a means to assess lower limb power.

Table 1: Mean±SD for three age groups of explosive power (cm) of the subjects

Age group	(Subjects), n=600	Mean±SD
10-years	200	18.625±5.427
11-years	200	19.780±4.857
12-years	200	21.470±5.521

Table 2: Inter-group *post hoc* test on explosive power (cm) in respect of three age groups

10-year Gr. Mean±SD	11-year Gr. Mean±SD	12-year Gr. Mean±SD	Mean difference	Standard error	t-ratio
18.625±5.427	19.780±4.857		1.155	0.327	3.532*
18.625±5.427		21.470±5.521	2.845	0.327	8.700*
	19.780±4.857	21.470±5.521	1.690	0.327	5.168*

$T_{0.05}^{598}$=1.960; *Significant at 0.05 level

MATERIALS AND METHODS

The sample consisted of six hundred (n = 600) where two hundred (n = 200) subjects for each age category of 10, 11, and 12 years group were selected for the study. The number of subjects for each age group is two hundred (n = 200) for the variable of explosive power. The subjects were selected from four different districts, such as Nadia, South 24 Parganas, Kolkata, and Howrah of West Bengal in India. In selecting a subject for the study, a systematic random sampling procedure was followed. The willing students of the schools who did fulfill the age criteria for the study were considered as subjects. The criterion measure of the explosive power variable was as vertical jump (cm) which is most known as the Sargent Jump Test (Sargent, 1921). The dates of birth of the subjects were collected from their school admission registered and then it was considered in completed years. The vertical jump (cm) is the test item of the measurable variable of the explosive power.

RESULTS AND DISCUSSION

Table 1 represents the explosive power (cm) of three age groups as 10-year, 11-year, and 12-year groups of subjects. In Table 1, it shows that the mean ± SD of the 10-year group is 18.625 ± 5.427, the 11-year group Mean ± SD is 19.780 ± 4.857, and the Mean ± SD of the 12-year group is 21.470 ± 5.521.

Table 2 shows an inter-group *post hoc* test on explosive power (cm) in respect to three age groups. In Table 2, it shows that the Mean±SD of the 10-year group is 18.625 ± 5.427, the 11-year group Mean±SD is 19.780 ± 4.857, and the Mean±SD of the 12-year group is 21.470 ± 5.521. When age was considered as the source of variation, the calculated F-value of 19.110 was greater than the tabulated F-value ($F_{0.05}^{2}$, 588 = 3.01) to be significant among the three age groups of the subjects. It also revealed that the mean difference between two consecutive age groups was significant as the three t-values were greater than the tabulated values (1.960). Here, all three means comparisons, the obtained t-values were greater than the tabulated value to be significant at 0.05 levels. Hence, there were significant differences existed in explosive power between the two mean scores of the subjects. The researcher revealed that the explosive power of children was better with the advancement of age and it can be written as explosive power of 12-year group> explosive power of 11-year group> explosive power of 10-year group.

CONCLUSION

The conclusions of the present study were as follows:

In the present study, it was confined that the measurable variable is explosive power in respect of three age groups of the subjects. From the present study, the mean score of 12-year group is greater than the mean score of 11-year group in the explosive power of the subjects. Similarly, the mean score of 11-year group is greater than the mean score of 10-year group in the explosive power of the subjects. Therefore, the study revealed that the 12- year group was better than 11-years group and the 11-year group was better than the 10-year group in the explosive power of the subjects. In concise, it would concluded that the higher the performance in the explosive power of the subjects with the advancement of age group.

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Research Article

Some physical abilities in soccer and their relationship to scoring accuracy from different distances for second-year students at Al-Mustaqbal University

Lina Mohi Hadi Ali Sharba, Al Hassan Ali Khaled, Taiba Faisal Jaber, Hassan Safaa Abbas

Faculty of Physical Education and Sports Sciences, Al-Mustaqbal University, Iraq

ABSTRACT

The research problem lies in the weakness of their physical abilities, which reduced the impact of their influence in achieving goals and improving results. This study aimed to attempt to identify the level of some physical abilities. The research assumes that there are statistically significant differences in the level of physical abilities. The researcher used the descriptive approach using a survey method on a research sample of (30) students from the second stage/College of Physical Education and Sports Sciences - Future University, randomly choosing (10) students for the exploratory experiment, and (20) students for the main experiment. The researchers used a scoring test from a standing position towards the goal from the first distance, which is (15 m) from the goal line, then scoring from a standing position towards the goal from the second distance, which is (18 m) from the goal line, and then scoring from a third distance, which is (20 m) from the goal line. The researcher concluded that there are significant relationships between the skill of scoring accuracy from (15 m) and each of the abilities (the hoop on the right leg, the hoop on the left leg, and the long jump from a standing position). The researcher recommends that measurements be conducted a periodic study of these abilities and other soccer skills was conducted on the same 2nd-year college students.

Keywords: Physical abilities, Scoring accuracy and soccer.

INTRODUCTION

There is no doubt that soccer is one of the most popular sports in the world, due to the technical skills and subtle touches it offers to both its players and the spectators, drawing them in to watch the game and encouraging the players to perform at their best. For a player to be able to perform at their best, they must possess a certain physical fitness level that enables them to perform skillfully. To do this, in addition to preparing players in terms of skills, attention must be paid to their physical preparation as well, as physical and skill preparation is the basic pillar in the game of soccer, especially in the process of linking skills to some physical abilities, and this is a must to reach the best sports levels, as this process depends on the degree of development of sports results in most cases, and the skill of scoring (scoring accuracy) is one of the most important basic skills in soccer, as through it the player can achieve the best goals and then win the match. For the player to perform this skill in a simple and skillful manner,[1] it must possess physical abilities such as speed, strength, endurance, flexibility, and agility that help him in movement, in addition to mastering this skill. From here lies the importance of research in knowing the relationship between the skill performance of the skill of scoring accuracy in soccer and physical abilities, which gives us an impression of the level of players in terms of skills and physicality,[2] and this has an impact on highlighting the level of players (students) and improving their physical and skill abilities.[3] The problem of the research lies in the field of the game, and through following local, Arab and international tournaments and leagues, he noticed a weakness in their physical abilities, which reduced the action. Impact on achieving goals and improving results. This study aimed to identify the level of some physical abilities. The study assumes that there are statistically significant differences in the level of physical abilities.

Address for correspondence:
Email: nabeelsport@yahoo.com

RESEARCH METHODOLOGY

The researcher used the descriptive approach to collect data, test hypotheses, and answer questions related to the current

or present situation of the research sample members. The descriptive approach defines and assesses the situation as it is, i.e., it describes what is present or occurring. The method used is the survey method, which seeks to collect data from sample members in an attempt to identify specific variables.

The descriptive approach was also used with correlational relationships, as it focuses on revealing the relationship between two or more variables to determine the extent of the correlation between these variables and expressing it numerically.[4]

RESEARCH COMMUNITY AND SAMPLE

The research community included (165) 2nd-year students in the Department of Physical Education and Sports Sciences at Future University for the academic year 2024/2025. A random sample of (30) students was selected from this sample, including (10) students for the pilot study and (20) students for the main study, representing 20% of the total number.

The Research Sample Included

- First: The pilot study sample: consisting of (10) students, who were subjected to a multi-purpose experiment, including:
  1. Demonstrating the validity of the tests
  2. Identifying difficulties and problems
  3. Ensuring the integrity of the tools
  4. Demonstrating the competence of the work team
- Second: The main study sample: Consisting of (20) students, randomly selected from 2nd-year students in the College of Physical Education and Sports Sciences at Future University for the academic year 2024/2025.

Tools and Equipment Used in the Research

- Data collection methods: Testing and measurement, questionnaire
- Tools and equipment used in the research:
  1. Measuring tape.
  2. White powder (Bork).
  3. (2) Legal Soccer s
  4. Stopwatch.

FIELD RESEARCH PROCEDURES

Procedures for Determining Physical Abilities:[5]

A test is (a set of questions, problems, or exercises given to an individual to assess their knowledge, abilities, readiness, and proficiency).

Due to the lack of standardized tests to measure scoring accuracy, the researcher developed a test appropriate for the problem under study. After surveying experts regarding the most dangerous scoring areas, the researcher identified the best areas, revealing that the best is those closest to the goal, that is, facing it.

Test Description

- Test: Scoring from a stationary position toward the goal from the first distance, which is 15 m from the goal line. Then, scoring from a stationary position toward the goal from the second distance, which is 18 m from the goal line. Then, scoring from a stationary position toward the goal from the third distance, which is 20 m from the goal line.
- Performance specifications: The player who will score stands behind the ball at a distance of (15 m). Upon hearing the signal, he scores at the empty goal, and so on for the remaining attempts.
- Scoring method: The number of valid goals is recorded.

Pilot Experiment

The researcher conducted the test on Thursday, December 19, 2024, at eleven o'clock in the morning, at the Future University stadium, on a group of (10) 2nd-year students. Each player had (3) attempts from different distances from the goal line.

Main Experiment

The researcher conducted the test on (20) students on Tuesday, December 24, 2024, at eleven o'clock in the morning, at the Future University College stadium. The time period between the pilot experiment and the main experiment was approximately (4) days. The researcher collected the research sample at the aforementioned location. The total number of shots for scoring was (60), with one shot per distance. This work was carried out with the assistance of the work team.

Statistical Methods

The researcher used a set of statistical methods, including:[6]

- Mean
- Standard deviation
- Correlation coefficient
- Standard error.

RESULTS AND DISCUSSIONS

Presentation, Analysis, and Discussion of Results

Level of physical abilities and skill performance of students

It is noted from [Table 1] that all the values of the arithmetic mean for all the studied variables of physical abilities and skills (scoring accuracy skill) with their different distances have different amounts from one ability to another, and even the skill of scoring accuracy according to its distances. For example, the value of the skill of scoring accuracy for a distance of (15) m reached an average of (0.90), while the skill average at the distances of (18 and 20) m reached (0.75,

0.65) respectively, and the same is true for the amount of the standard deviation for each of them, which came respectively with clear differences of (0.30, 0.43, and 0.46). However, what is calculated for these abilities and skills is that the distribution of the sample was moderate because the value of the standard error for each of them came with a value close to zero, which confirms the moderation of the distribution of the data of the physical abilities test and the skill of scoring accuracy with their different distances.[7] As shown in the table, they reached (0.41, 0.37, 0.11, 0.06, 0.60, 0.07, 0.10, and 0.10).

The Relationship between Soccer Scoring Accuracy and Students' Physical Abilities

(*) The maximum random value at a degree of freedom of (38) and a significance level of (0.05) is equal to (0.44). [Table 2] shows the values of the correlation coefficient between the skill of scoring accuracy in soccer according to its specified distances and the physical abilities of the students. The skill of scoring accuracy from a distance of (15 m) achieved significant relationships with the ability test (the jump on the right leg) with a coefficient of (0.625) and with the results of the ability test (the jump on the left leg) with an amount of (0.442) and then with (the long jump from a standstill) with a value of (0.837) and all of them are greater than the maximum random value of the correlation coefficient of (0.44). As for the rest of the relationships,[8] their coefficients were less than this value (0.44), so it came with an insignificant significance, as the relationship between scoring accuracy from a distance of (15 m) with running (150 m) achieved an amount of (0.118) and the relationship between scoring accuracy from a distance of (18 m) with the jump on the right leg (0.083) and the jump on the left leg (0.148) and with the long jump from a standstill (0.361) and with the bending and extending of the legs (0.048) and with running (150 m) (0.052) As for the skill of accuracy of scoring from (20 m), it achieved a relationship of (0.001) with the jump on the right leg, (0.093) with the jump on the left leg,[9] (0.097) with the long jump from a standstill, (0.039) with the bending and extending of the legs, and (0.004) with running (150 m).

Table 1: The statistical estimates of the student's physical abilities and accuracy of shooting skills at different distances

Abilities and skills	Mean	Std	Standard error	Notes
Partridge on the right leg	13.05	1.85	0.41	Moderate distribution
Parridge on the left leg	9.15	1.65	0.37	Moderate distribution
Long jump from standing	1.88	0.47	0.11	Moderate distribution
Bending and extending the legs	40	0.26	0.06	Moderate distribution
Running (150) meter	29.7	2.74	0.61	Moderate distribution
Shooting (15) m meter	0.90	0.30	0.07	Moderate distribution
Shooting (18) meter	0.75	0.43	0.10	Moderate distribution
Shooting (20) meter	0.65	0.46	0.10	Moderate distribution

Table 2: The correlation coefficient estimates for the relationship between scoring accuracy and the physical abilities studied

S	Accurate scoring skill	Physical abilities	Correlation coefficient (r)	Statistical significance
1	From a distance of (15) m	Partridge on the right leg	0.625	Sig.
	From a distance of (18) m		0.083	No sig.
	From a distance of (20) m		0.001	No sig.
2	From a distance of (15) m	Partridge on the left leg	0.442	Sig.
	From a distance of (18) m		0.148	No sig.
	From a distance of (20) m		0.093	No sig.
3	From a distance of (15) m	Long jump from standing	0.837	Sig.
	From a distance of (18) m		0.361	No sig.
	From a distance of (20) m		0.097	No sig.
4	From a distance of (15) m	Bend and extend the legs	0.031	No sig.
	From a distance of (18) m		0.048	No sig.
	From a distance of (20) m		0.039	No sig.
5	From a distance of (15) m	Run (150) m	0.118	No sig.
	From a distance of (18) m		0.052	No sig.
	From a distance of (20) m		0.004	No sig.

CONCLUSION

1. All results of the physical abilities and skill performance tests (for accuracy of shooting from different distances) were moderately distributed.
2. The results showed significant relationships between the accuracy of shooting from 15 m and each of the abilities (right-legged jump, left-legged jump, and standing long jump).
3. There were no significant relationships between the accuracy of shooting from 15 m and running from 150 m, the accuracy of shooting from 18 m, and the accuracy of shooting from 20 m, on the one hand, and all the abilities studied, on the other hand.

Recommendations

1. It is important to take the results of this study into consideration
2. It is not a bad idea to conduct a similar study at other academic levels
3. It is preferable to conduct periodic measurements of these abilities and other soccer skills on the same 2nd-year college students.

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Research Article

Reaction speed and its relationship to students' volleyball blocking skill

Afyaa Hussein Mezher, Mahmoud Adnan Mahmoud Kaid

College of Physical Education and Sports Sciences, University of Babylon, Iraq

ABSTRACT

The importance of the research lies in the use and development of reaction speed in training units and its adherence to scientific principles. The problem of the research lies in the use of a random training method that is not subject to scientific principles. The aim of the research is to identify the relationship between reaction speed and blocking skills among volleyball students. Hence, the hypothesis of the research was: There is a positive correlation between reaction speed and blocking skills among volleyball students. The researchers used the descriptive approach on a sample of 4th-year students from the College of Physical Education and Sports Sciences, randomly selected (lottery). The sample numbered (55) students, representing a percentage of 25%, representing the population from which the sample was drawn, which amounted to (150) students. After conducting tests on the research sample, the data were collected and statistically processed to arrive at the most important results. Through this, the most important conclusion was reached:

- Reaction speed training is one of the most important exercises that should be emphasized in blocking skill training, as it helps achieve accuracy through these conclusions.

The researchers reached a very important recommendation:

- Emphasize, when performing training, the use of exercises that develop the characteristics of motor reaction speed.

Keywords: Reaction, Speed and blocking skill

INTRODUCTION

The developed world is now witnessing significant progress in sporting achievements, thanks to the continuous efforts of scientists. Sports are no longer practiced for recreational purposes alone and haphazardly. Rather, they are now built on foundations provided by numerous sciences. Thus, the science of sports training has become a broad field, leveraging other sciences, such as physics, physiology, anatomy, psychology, and others, to raise the level of sporting achievement. The training process has made great strides due to the rapid scientific developments the world is experiencing today. Sports training has contributed effectively to these developments, shouldering the responsibility of raising the level of performance and understanding the requirements of sporting achievement to achieve the best results. Volleyball is an important sport whose popularity has increased recently, especially after the recent amendments to the rules of the game. This is confirmed by the increasing number of countries organizing volleyball championships.[1]

Address for correspondence:
Mahmoud Adnan Mahmoud Kaid,
E-mail: mahmoud.kaid@uobabylon.edu.iq

The Volleyball Federation is the second largest sports federation after the Football Federation. Volleyball is a sport characterized by its multiple basic skills, both defensive and offensive, and these skills are characterized by interconnectedness and sequencing. This interrelationship is important in emphasizing that most skills receive equal proportions of training.[2] The blocking skill is one of the important defensive skills through which one can influence the opposing team's attacks. It can also disrupt the defending team's offensive tactics or score a direct point, especially the blocking wall, which is the most used in most matches at the international and local levels due to its effective impact on the opposing team. The importance of the research lies in using elements or reaction speed exercises during training units to raise the performance level of this skill among youth.

Research Problem

Volleyball has become the focus of millions of fans today due to the development of technical performance. Its skills,

particularly offensive ones, have made great and rapid strides. Blocking is one of these skills, both defensive and offensive. By observing training sessions, the researcher found a weakness in blocking skills among 4th-year volleyball students due to a weakness in the student's reaction speed components or exercises. Therefore, the researcher decided to study this problem by examining the relationship between motor reaction speeds and blocking skills in an attempt to reach solutions that would enhance performance.

Research Objective

- To identify the relationship between reaction speed and blocking skill among volleyball students.

Research Hypothesis

- To find a positive correlation between reaction speed and blocking skill among volleyball students.

Research Areas

- Human area: Fourth-year students of the College of Physical Education and Sports Sciences, University of Babylon, for the academic year 2023–2024
- Spatial area: Indoor Sports Hall at the College of Physical Education and Sports Sciences, University of Babylon
- Time area: From November 15, 2024, to December 15, 2024.

Research Methodology

The researcher used the descriptive approach because it was appropriate for the research problem.

Research Community and Sample

The research community was defined as (150) 4th-year students in the College of Physical Education and Sports Sciences at the University of Babylon. The research sample was randomly selected (lottery), totaling (55) students. The percentage was 25%, which is truly representative of the community.

METHODS, TOOLS, AND DEVICES USED IN THE RESEARCH

- Arabic and foreign sources and references
- Observation and analysis
- Length measuring tape
- Legal volleyball court and (3) legal volleyball balls
- Volleyball net (2.43 m high)
- One (1) HP Chinese-made laptop.

Field Research Procedures

1. Tests used in the research:

- First, test name: Motor response speed for the volleyball blocking skill according to stimulus selection[3]
  - Purpose of the test: Motor response speed for the blocking skill according to stimulus selection
  - Tools: A legal volleyball court, three benches (legal volleyballs, a referee, and five assistants) (a timer, paper, and pens for recording)
  - Performance specifications: Assistants stand on benches in positions 2 and 4, each holding a ball above the net. The third assistant stands on the bench in position 3, holding a ball 20 cm above the net. The fourth and fifth assistants stand in positions 2 and 4 on the 3 m line. The test player stands in position 3 of the court, opposite, ready to perform the blocking. The referee stands 3 m behind the test player. The player jumps to touch the ball held in position 3. As he lands and touches the ground, the referee standing behind the player signals to one of the assistants while simultaneously starting the timer to throw the ball higher than the body. The other assistant throws the ball at body height. The player must move and time the ball to touch the ball. The first test demonstrates the speed of motor response of the blocking assistants according to the stimulus selection
  - Test conditions and administration: Each time the test player jumps to touch the blocking assistants, they must touch the ball with both hands. From above, assistant players must maintain the ball's height above the net throughout the test. The umpire stands behind the blocking player on the opposite court. The player calls out names and observes the performance, recording the motor response time to the blocker's movement
  - Recording method: The player records the time from the moment he touches the ground while landing in position (3) of the blocker's performance in one of the two directions. The average times of the four attempts are calculated for the tested player.
- Second, test name: Motor response to blocking wall in volleyball:[4]
  - Purpose of the test: Motor response speed for blocking wall performance in different directions
  - Equipment: Volleyball court, 50 cm high bench, three volleyballs, an electronic timer, a net of legal height for men, two colored flags (red and blue), paper, and pens for scoring. Performance specifications: The assistants stand on benches in areas (2) and (4) at a distance of 50 cm from the net and 50 cm from the sideline. The third bench is placed in the center (3), 50 cm from the net and 4 m from the two benches. Each of them holds the ball with both hands, 20 cm above the net level, taking into account not obstructing the view of the tester. The player assumes a ready position in center (3) m in the opposite half of the court. The referee stands holding the colored flags in one hand, with the red

color representing the center (4) and the blue color representing the center (2). The player jumps to touch the ball held in center (3). While landing and touching the ground, the referee displays one of the flags and at the same time starts the clock with the timer. The motor response to the blocking player's movement is then performed to reflect the referee's signal and move at maximum speed in the correct direction to reach the ball, jump, and touch it with both hands from above the ball (blocking skill). If the tester responds in the wrong direction, the referee continues to time the tester until he changes direction and returns to the correct direction. He then drops to return to position 3, and so on, as shown in. The player is given 4 random attempts at direction

- Test conditions and administration: Each time the tester jumps to perform a blocking, he must touch the ball with both hands from above. Assistant players must maintain the ball's height above the net throughout the test. The referee stands in front of the blocking player on the opposite court. The start signal is given to the tester. When the ball is touched and landed on the ground, the timer starts and stops with the response and touches the ball in one direction. The timer calls out names and observes the performance, recording the motor response time of the player standing on the blocking wall
- Recording method: The time is recorded for the player from the moment they touch the ground while landing in the (3) position until they touch the ball in one direction (blocking wall skill). The average of the four attempts is calculated for the tester.

Exploratory Experiment

The researcher conducted the first exploratory experiment in the hall of the College of Physical Education and Sports Sciences at the University of Babylon on a sample of (25) players on November 25, 2024.

The objectives of the experiment were:[5]

1. To identify the support staff
2. To ensure that the sample members fully comprehended the test vocabulary
3. To identify any difficulties that the researcher might face.

The Main Experiment

The main experiment was conducted on December 12, 2024, in the gymnasium of the College of Physical Education and Sports Sciences at the University of Babylon, where tests were conducted on the main research sample. On December 13, 2024, skill tests were conducted on the research sample. The total number of attempts reached (100), with each of the (25) players receiving four (4) attempts. The results of the physical skill tests were then processed statistically.

Table 1: The relationship between the reaction speed test and the volleyball blocking skill

Statistical significance	Accuracy Calculated value of (r)	Std	Mean	Physical characteristics
Sig.	0.941*	5.83	15.06	Motor response speed
Sig.	0.918*	5.19	17.31	Motor response to blocking in volleyball
	0.47	14.58	Accuracy	

Statistical Methods

The statistical data were processed using the Statistical Packages for the Social Sciences statistical package.

RESULTS AND DISCUSSIONS

- Presentation, analysis, and discussion of the results of the reaction speed test for the volleyball blocking skill.

[Table 1] shows a significant correlation between the two characteristics: Motor response speed.

The motor response to volleyball blocking wall performance and the accuracy of volleyball blocking wall performance. The calculated (r) value for these two characteristics reached (0.941) and (0.918), respectively. However, no correlation was found between the characteristics of flexibility and agility and the accuracy of volleyball smash performance.[6] The researchers believe that the reason for the significant correlation between the two characteristics: Motor response speed.[7]

The motor response to volleyball blocking wall performance and the accuracy of volleyball blocking wall performance is that these two characteristics work to increase the speed of approach steps during the approach phase.[8] This phase is very important for the player to acquire horizontal speed, which is then converted into vertical speed to achieve sufficient height to enable him (the player) to direct the ball to the most accurate areas based on the test (the higher the jump and the greater the accuracy).[9] This is because height gives the wall control over the accuracy areas due to its high height (1). In addition, the increased motor speed helps achieve an appropriate speed during the main section when the ball meets the arm of the striker.[10]

CONCLUSION

The researcher concluded that the characteristics of motor response speed and motor response for blocking in volleyball and the accuracy of blocking in volleyball are among the most

important characteristics that should be emphasized in blocking skill training, as they help achieve accuracy.

RECOMMENDATIONS

1. Emphasize increasing the height to help direct the ball to the most accurate areas
2. Emphasize, when performing training, the use of exercises that develop the characteristics of motor response speed and motor response for performance
3. The necessity of developing training programs that are scientific and non-random to raise the technical level of the players.

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Research Article

Effectiveness of 6-week wrist-strengthening training regimen in improving forehand smashing ability of women collegiate badminton players: Basis for a proposed training program

Noelle Therese Q. Dianzon

Polytechnic University of the Philippines - Manila, Quezon City, Philippines

ABSTRACT

"Badminton is all about the wrist" a statement that is believed by many enthusiasts, athletes, and coaches. However, it is also disapproved by some researchers. There are studies that claims that the wrist is a great contributor in having powerful and fast smashes but there are also researches that state the opposite. The forehand smash is the most essential stroke in a badminton player's repertoire. This study aimed to identify the forehand smashing ability of women collegiate badminton players in terms of speed (km/h) and power (N) before and after undergoing a 6-week wrist-strengthening training regimen. The research used a true experimental research design. The six players were divided into two groups; the controlled group and the experimental group. The controlled group underwent their regular badminton training while the experimental group integrated the 6-week wrist-strengthening training regimen in addition to their regular badminton training. The forehand smashing level of all the participants was measured using a smart sensor device which was put at the bottom of the racket's handle. Based on the findings of this research, the 6-week wrist-strengthening training regimen which includes seven exercises such as: Wrist flexion with resistance, wrist extension with resistance, wrist radial deviation with anchored resistance, wrist ulnar deviation with anchored resistance, wrist supination with resistance, wrist pronation with resistance, and Figure of 8 wrist exercise has increased the speed and power of the women collegiate badminton players' forehand smashing ability.

Keywords: Badminton, Experimental, Forehand smash, Smash power, Smash speed, Strength training, Wrist training

INTRODUCTION

Badminton is known as the world's fastest racket sport and is the second most popular sport for participation globally (Pan, 2024). In the Philippines, the sport has seen significant growth in fame, driven by a rise in both amateur and professional players. This trend is attributed to badminton's increasing appeal and accessibility (Soriano, 2024). The sport attracts individuals of all ages and skill levels, as it can be enjoyed both indoors and outdoors, whether for leisure or competitive play (Cong, 2015). A badminton game can either be played by two (singles) or four players (doubles). In a match, the players can do different shots such as drive, clear, drop, or smash. A drive is a forceful horizontal shot close to the net. A clear is a shot where the shuttlecock is hit high and deep into the opponent's court. A drop is when the shuttlecock lands near the net. The smash is the most powerful shot where the shuttlecock dives down to the opponent's court. Whether it is a singles or doubles badminton game, the most used offensive skill is the smash. To achieve success in badminton, it is obvious that a player has to develop fast and powerful smashes. It is one of the skills that every badminton athlete must master well. There is variation among research that the wrist plays a vital role in contributing speed and power in a smash. These contradictory ideas may be a good reason to examine whether strengthening your wrist may result in the improvement of a badminton player's smash. This study aimed to determine the effects of a 6-week wrist-strengthening training regimen in the forehand smashing ability of women collegiate badminton players. Specifically, it sought to: (1) What is the level of the controlled group's forehand smashing ability during the pre-test and post-test in terms of: Speed (km/h) and power (N)? (2) What is the level of the experimental group's forehand smashing ability during pre-test and post-test in terms of: Speed (km/h) and power

Address for correspondence:
Noelle Therese Q. Dianzon,
E-mail: reesedianzon@gmail.com

(N)? (3) Is there any difference on the level of the forehand smashing ability - speed of the players in the experimental and controlled group? (4) Is there any difference on the level of the forehand smashing ability - power of the players in the experimental and controlled group?

METHODOLOGY

This study used a true experimental research design and total population sampling technique. The researcher has asked all six players from the Eulogio "Amang" Rodriguez Institute of Science and Technology (EARIST) Women's Badminton Team to participate in this experimental study. They all share the following criteria; willing to be part of the study, bonafide student-athlete of the EARIST Women's Badminton Team during the time of conduction, not <18 years of age but not more than 25 years of age, has played badminton for five or more years, and have been studying and training in EARIST for at least a year. In this current study, there were two tests administered: pre-test and post-test. These tests aimed to measure the smash speed (km/h) and power (N) of the collegiate women badminton players. During the tests, a badminton sensor device is attached into the bottom of the player's rackets. This gadget was connected to the researcher's smartphone through Bluetooth and was able to project the needed data for this study in its application. To obtain an accurate statistic, the respondents performed a total of 30 smashes and executed in 3 sets of 10 repetitions with a 2-min interval for water breaks. After the pre-test, the student–athletes were divided into two groups by systematic random assignment: The controlled group and experimental group. The controlled group of this study continued to attend their regular badminton training while the participants in the experimental group performed additional wrist-strengthening exercises for 6 weeks on top of their regular badminton training. The post-test occurred after the student–athletes had undergone the 6-week writ strengthening training regimen and the same procedures during the pre-test were followed.

RESULTS AND DISCUSSION

Based on the gathered data from the controlled group's pre-test and post-test, Player 6 has gained the highest increase from her pre-test speed (mean = 154.47) to her post-test speed (mean = 172.70). On the other hand, Player 5 has considerably decreased speed in her post-test (mean = 160.63) compared to her pre-test speed (mean = 171.00). In terms of power, Player 6 is the only one who exhibited an increase in the post-test power (mean = 20.03) from the pre-test power (mean = 19.23). In contrast, the post-test power (mean = 14.50) of Player 5 has decreased from her pre-test power (mean = 14.50). Based on the findings of this study, two out of three players have improved their forehand smashing ability in terms of speed and only one player has improved in terms of power. In racket sports, wrist strength is essential (Zhang, 2023). Sears (2019) also suggests that wrist-strengthening exercises are beneficial to athletes in terms of their overall sports performance including the smashing ability.

The experimental group's score in their pre-test and post-test smash test analysis infers that Player 2 obtained the highest increase from pre-test power (mean = 11.93) to post-test power (mean = 21.53). Notably, Players 1 and 3 also showed an increase based on the result of the pre-test power and post-test power. Meanwhile, regarding the speed of the experimental players, Player 2 obtained the highest increase from pre-test speed (mean = 140.00) to post-test speed (mean = 153.13). While the post-test speed (mean = 156.93) of Player 1 is slightly higher than the pre-test speed (154.07), Player 3 showed no improvement based on the result of the pre-test speed (153.57) and post-test speed (153.80). The studies of Gawin *et al*. (2017) and Beniwal and Dhauta (2021) support the concept that the wrist movement of a badminton player is very essential in producing strong shots. They both believe that the wrist joint plays a major role in the forehand smashing ability.

The findings of the present investigation showed that the 6-week wrist-strengthening training regimen which includes seven exercises such as: Wrist flexion with resistance, wrist extension with resistance, wrist radial deviation with anchored resistance, wrist ulnar deviation with anchored resistance, wrist supination with resistance, wrist pronation with resistance, and Figure of 8 wrist exercise had a positive effect in increasing the speed of the players' smashing ability. The results of this conform with the studies of Shan *et al*. (2015). He concluded that wrist movement was one of the crucial parameters in a badminton game. In the same study, both male and female players conduct most of their energy on the wrist joint to perform the badminton smashes. Meanwhile, the findings oppose the research of Phomsoupha and Laffaye (2020) and Vora *et al*. (2018) which state that the power from a smash does not come from the wrist.

Table 1: Controlled group's pre-test and post-test data in terms of speed and power

Player	Speed (km/h)			Power (N)		
	Pre-test	Post-test	Findings	Pre-test	Post-test	Findings
Player 4	155.47	168.97	Improved	18.07	18.70	No improvement
Player 5	171.00	160.63	No improvement	17.23	14.50	No improvement
Player 6	154.47	172.70	Improved	19.23	20.03	Improved

Table 2: Experimental group's pre-test and post-test data in terms of speed and power

Player	Speed (km/h)			Power (N)		
	Pre-test	Post-test	Findings	Pre-test	Post-test	Findings
Player 1	154.07	156.93	Improved	19.57	21.73	Improved
Player 2	140.00	153.13	Improved	11.93	21.53	Improved
Player 3	153.57	153.80	No improvement	20.57	22.00	Improved

Table 3: Comparison of average increase of forehand smashing ability of experimental and controlled group in terms of speed and power

	Speed		Power	
	Experimental group	Controlled group	Experimental group	Controlled group
Mean	11.37	7.12	4.40	−0.53

CONCLUSION

Based on the findings, the following conclusions were drawn: (1) 6 weeks regular badminton training without wrist-strengthening exercises can improve the forehand smashing ability of women collegiate badminton players in terms of speed but not power, (2) Badminton training integrated with wrist-strengthening exercises improves the forehand smashing ability of women collegiate badminton players in terms of speed and power, (3) Although regular badminton training can improve the forehand smashing ability, incorporating wrist-strengthening training regimen can further improve the forehand smashing ability of women collegiate badminton players in terms of speed, and (4) The 6-week wrist-strengthening training regimen was effective in increasing the power (N) of women collegiate badminton players' forehand smashing ability compared to the regular badminton training.

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Research Article

Application of speed strength development exercises for male badminton athletes aged 14–15 in Thai Nguyen province, Vietnam

Dao Ngoc Anh

Thai Nguyen University of Education, Thai Nguyen, Vietnam

ABSTRACT

Speed strength is an important criterion in evaluating the training level of Badminton athletes. Choosing appropriate strength development exercises contributes to improving the effectiveness of training and competition for athletes. Evaluating the effectiveness of strength development exercises in Badminton is a difficult problem. The project selected exercises to develop strength and speed for male Badminton athletes aged 14–15 in Thai Nguyen province using an experimental method based on the results of application in the practice of athletes.

INTRODUCTION

In Vietnam, Badminton occupies an important position in the cultural and sports activities of the working people. Badminton is loved by everyone, who actively participates in practicing with the purpose of improving their health to participate in productive labor. That is why this sport has received attention and development from the Party, State, and the whole society.

Thai Nguyen is one of the cities with a strongly developing sports movement, including the continuously growing Badminton movement. That is the fact that there are hundreds of training grounds and clubs developing everywhere in agencies, factories, and schools. Along with that development, the Department of Sports and Physical Training of Thai Nguyen province has opened training classes in sports. Sports skills of all ages in Badminton to prepare for national competitions on an annual basis. Through observing many matches and many training sessions of the students, I realized that most of them have not yet developed their strength and speed, and are still weak. The performance of hitting the shuttlecock still lacks power, and the flight speed of the shuttlecock, and the speed of the shot are still limited.

Address for correspondence:
Dao Ngoc Anh,
E-mail: anhdn@tnue.edu.vn

RESEARCH METHODS

To Solve the above Task we used the Following Methods

Methods of analyzing and synthesizing documents; Pedagogical testing methods; Experimental method of pedagogy; Mathematical and statistical methods.

RESEARCH RESULTS AND DISCUSSION

Current Status of using Exercises to Develop Strength and Speed for Male Badminton Players Aged 14–15 in Thai Nguyen Province

The project evaluates the current status of using strength and speed development exercises at the Athlete Training Center of Thai Nguyen province, through synthesizing statistics and observing strength development exercises. The speeds used by the coaching staff are presented in Table 1.

Through Table 1, we see that the coaching staff of the badminton team in Thai Nguyen province used 14 exercises (including 06 exercises to develop arm muscles, 03 exercises to develop back and abdominal muscles, and 05 exercises to develop lower limb muscles) to develop strength and speed for male badminton athletes.

Table 1: Current status of using exercises to develop strength and speed for male badminton players aged 14–15 in Thai Nguyen province

Exercise name	Number of implementations/35 lesson plans	Percentage
Group of exercises to develop hand muscles		
1. Horizontal figure eight kettlebell (3 kg) 40 times (s)	6/35	62.85
2. Throw the shuttlecock far away	4/35	
3. Do push-ups	4/35	
4. In place, hit the ball against the wall	3/35	
5. Bend your arms on the pull-up bar for 30 (s)	3/35	
6. Push-ups on parallel bars for 30 (s)	2/35	
Group of exercises to develop back and abdominal muscles		
7. Lie on your back and do crunches	2/35	11.42
8. Interlace your legs on the parallel bar and perform continuous crunches	1/35	
9. Lie on your stomach with your legs fixed, and your back arched continuously	1/35	
Group of exercises to develop lower limb muscles		
10. Move forward and backward 13 times (s)	3/35	25.71
11. Jump rope one person, two people continuously	2/25	
12. Carry small weights and run on the back pedal continuously	1/35	
13. Run 3 times×30 m starting high	1/35	
14. Jump and hit the shuttlecock continuously on the net for 30 (s)	2/35	

Table 2: Results of speed strength test of male badminton players aged 14–15 in Thai Nguyen province (n=19)

Order	Test content	Test results	
		$\bar{X} \pm \sigma$	Cv (%)
1	Horizontal figure eight kettlebell (weight 3 kg), number of repetitions 40 times (s)	52.05±5.06	9.72
2	Move forward and backward 13 times (s)	150.86±5.06	10.64
3	Jump and hit the ball continuously 30 times (s)	11.18±1.26	11.27
4	Move from the middle of the court toward the four corners, simulating the action of smashing the shuttlecock and dropping it on the net 8 times (s).	5.64±0.57	10.11

Current Status of Strength and Speed of Male Badminton Players aged 14–15 in Thai Nguyen Province

To evaluate the current strength and speed of athletes, we conducted tests on male badminton players, and the results are presented in Table 2.

The results of Table 2 show that the level of strength and speed of male badminton players aged 14–15 in Thai Nguyen province are uneven.

The results of assessing the current strength and speed of male badminton players aged 14–15 in Thai Nguyen province are presented in Table 3.

The data in Table 3 show that the speed strength of male badminton athletes aged 14–15 in Thai Nguyen province is not good.

Table 3: Current status of speed strength of male badminton athletes aged 14–15 in Thai Nguyen province (*n*=19)

Order	Classification	*n*	Percentage
1	Good	1	5.26
2	Fair	4	21.05
3	Average	11	57.89
4	Weak	3	15.79
5	Poor	0	0

Selection and Application of a System of Speed Strength Development Exercises for Male Badminton Athletes Aged 14–15 in Thai Nguyen Province

Selecting speed strength development exercises for male badminton athletes aged 14–15 in Thai Nguyen province

We conducted interviews with teachers, trainers, and experts about the exercises and we determined the effectiveness of

Table 4: Interview results to select speed strength development exercises for male badminton athletes aged 14–15 in Thai Nguyen province (*n*=30)

Exercise name	Very important		Important		Not important	
	n	%	*n*	%	*n*	%
Exercises to develop arm muscle groups						
1. Horizontal figure eight dumbbell swing (3 kg) 40 times (in s)	30	100	0	0	0	0
2. Throw the shuttlecock far away	25	83.33	3	10	2	6.76
3. Jump and hit the shuttlecock quickly on the net	22	73.33	7	23.33	1	0.03
4. Swing the badminton racket in a low right-left stroke	26	86.66	3	10	1	0.03
5. On the spot, continuously hit the shuttlecock against the reference object	25	85.33	4	13.33	1	0,03
Group of exercises to develop back and abdominal muscles						
6. Lie on your back and stretch your stomach.	26	86.66	3	10	1	0.03
7. Cross your legs on the parallel bars, continuously stretching your abdomen.	14	46.66	8	26.76	12	40
Group of exercises to develop lower limb muscles						
8. Move back and forth 13 times (in s)	28	93.33	1	0,03	1	0,03
9. Jump and hit the ball 30 times in a row (in seconds)	27	90	2	6.76	1	0,03
10. Move from the middle to the four corners of the court, simulating the motion of hitting and releasing the shuttlecock 8 times (in s)	29	96.66	1	0.03	0	0
11. Moving the six corners of the court	27	90	3	10	0	0
12. Move the canvas across both sides	26	86.66	3	10	1	6,7
13. Three-step combination of jumping and smashing the bridge	24	80	25	83.33	1	0.03
14. Moving horizontally within the single court	27	90	2	6.76	1	0.03
15. Move back to the two corners of the court to hit the bridge.	23	76.66	5	16.76	2	6.76

Table 5: Test results of speed strength assessment of control group (A) and experimental group (B) before the experiment

Order	Test	Test results ($\bar{X}$± δ)		T	*P*
		Control group (A)	Experimental group (B)		
1	Dumbbell figure eight swings 40 times (in s)	42.59±0.08	42.73±0.09	1.1	>0.05
2	Move back and forth 13 times (in s)	41.78±0.07	41.8±0.08	0.2	>0.05
3	Jump and hit the ball 30 times in a row (in s)	62.66±0.1	62.24±0.11	0.4	>0.05
4	Move from the middle to the four corners of the court. simulating the motion of hitting and releasing the shuttlecock 8 times (in s)	41.3±0.54	41.49±0.58	0.6	>0.05

Table 6: Test results of speed strength assessment tests of control group (A) and experimental group (B) after the experimental period

tt	Test	Test results ($\bar{X}$± δ)		T	*P*
		Control group (A)	Experimental group (B)		
1	Swing the dumbbell in Figure 8 shape horizontally 40 times (s)	42.01±1.04	40.68±0.77	3.4	< 0.05
2	Move back and forth 13 times (s)	41.18±1.1	39.67±1.1	3.2	<0.05
3	Jump and hit the ball continuously for 30 times (s)	62.6±0.9	60.28±1.04	4.3	<0.05
4	Move from the middle to the four corners of the court simulating the action of smashing and dropping the shuttlecock on the net 8 times (s)	40.96±0.92	38.92±0.81	4.9	<0.05

those exercises. With 30 interview questionnaires given, we got the interview results. The interview results are presented in Table 4.

Through the interview results, we will select exercises with a very important level of agreement of 70% or more, as a result, we selected 14 exercises.

Applying Speed Strength Development Exercises for Male Badminton Athletes aged 14–15 in Thai Nguyen Province

- Test results before applying strength development exercises for male badminton athletes aged 14–15 in Thai Nguyen province.

Before conducting the experiment, we conducted a test of the selected tests to assess the level of uniformity between the experimental group and the control group. The results are presented in Table 5.

From the results obtained in Table 5, it can be seen that the test results of the evaluation tests between the experimental group and the control group are not different from each other, t(calculated) < t(table) = 2.101 at the threshold $P > 5\%$, which shows that before the experiment, the speed strength of the two groups was not different.

- Test Results after the Experiment

After 4 months of organizing the experiment for the research group, we conducted a test and evaluated the speed-strength of the subjects in the two experimental groups and the control group. The results are presented in Table 6 and from Charts 1-4. The results of the growth rate assessment of both groups are as follows:

- The Experimental Results in Table 6 show that

After processing with statistical mathematics, it shows that: in all four tests, the results of t(calculated) > t(table) are obtained. The difference is significant at the probability threshold $P < 5\%$. In other words, after applying the experimental exercises, the experimental group's performance was better than that of the control group. The results before and after the experimental period, comparing the performance of the two groups, are presented in Tables 7 and 8.

Tables 7 and 8 show that the test results of the experimental and control groups improved after two pre- and post-experiment tests.

Through Chart 1 we see the difference between the two groups has changed. After 4 months of experiment. The experimental group had better results than the control group.

Chart 2 also shows similar results: after the experiment, the control group increased by 1.45% and the experimental group increased by 5.23%.

Table 7: Comparison of test results of two groups, control group (A) and experimental group (B) before and after the experiment

NHÓM	Test											
	Swing the dumbbell in Figure 8 shape horizontally 40 times (s)			Move back and forth 13 times (s)			Jump and hit the ball continuously for 30 times (s)			Move from the middle to the 4 corners of the court simulating the action of smashing and dropping the shuttlecock on the net 8 times (s)		
	Before the experiment ($\bar{x}$)	After the experiment ($\bar{x}$)	Reduced from original ($\bar{x}$)	Before the experiment ($\bar{x}$)	After the experiment ($\bar{x}$)	Reduced from original ($\bar{x}$)	Before the experiment ($\bar{x}$)	After the experiment ($\bar{x}$)	Reduced from original ($\bar{x}$)	Before the experiment ($\bar{x}$)	After the experiment ($\bar{x}$)	Reduced from original ($\bar{x}$)
Control group (A)	42.59	42.01	0.58	41.78	41.18	0.6	62.66	62.6	0.06	41.3	40.96	0.34
Experimental group (B)	42.73	40.68	2.05	41.8	39.67	2.13	62.24	60.28	1.96	41.49	38.92	2.57
Difference between the two groups	− 0.14	1.33	−1.47	−0.02	1.51	−1.53	0.42	2.32	−1.96	−0.19	2.04	−2.23

Table 8: Growth rate of speed strength assessment tests

TT	Test	Control group (A) ($\bar{x}$)		Growth rate W (%)	Experimental group (B) ($\bar{x}$)		Growth rate W (%)
		Before the experiment	After the experiment		Before the experiment	After the experiment	
1	Swing the dumbbell in Figure 8 shape horizontally 40 times (s)	42.59	42.01	1.37	42.73	40.68	4.92
2	Move back and forth 13 times (s)	41.78	41.18	1.45	41.8	39.67	5.23
3	Jump and hit the ball continuously for 30 times (s)	62.66	62.6	0.12	62.24	60.28	3.21
4	Move from the middle to the 4 corners of the court simulating the action of smashing and dropping the shuttlecock on the net 8 times (s)	41.3	40.96	0.83	41.49	38.92	6.39

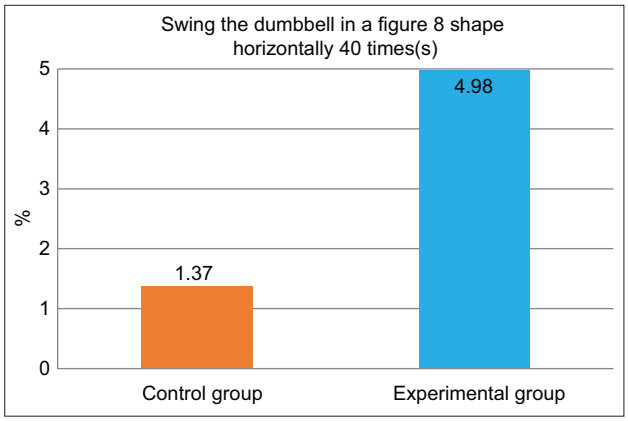

Chart 1: Performance of horizontal dumbbell swing 40 times of control group (a) and experimental group (b) during the experiment

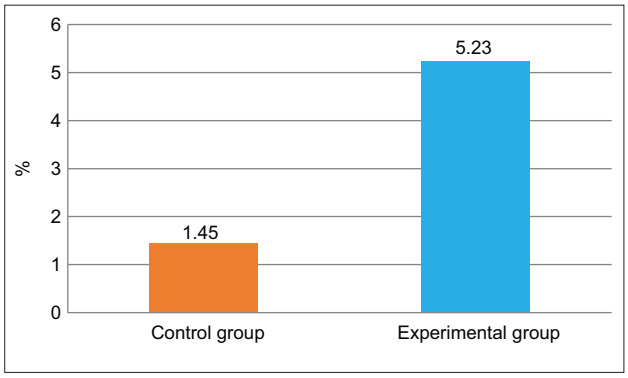

Chart 2: Performance of moving back and forth 13 times of the control group (a) and the experimental group (b) during the experiment

Through Chart 3, we see the results: the control group increased by 0.12% before the experiment increased by 3.21%. Thereby, we can see the improvement of the two groups, but the experimental group has better progress.

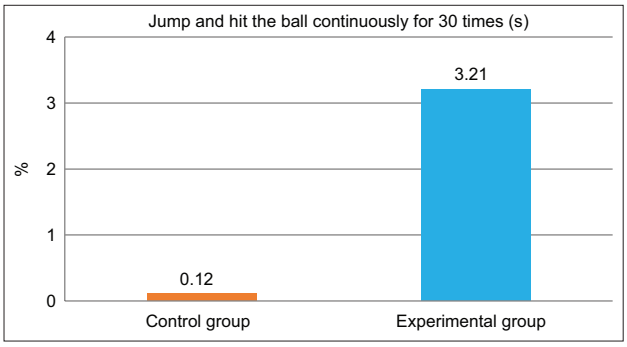

Chart 3: On-the-spot performance of jumping and hitting the shuttlecock continuously for 30 balls of the control group (a) and the experimental group (b) during the experiment

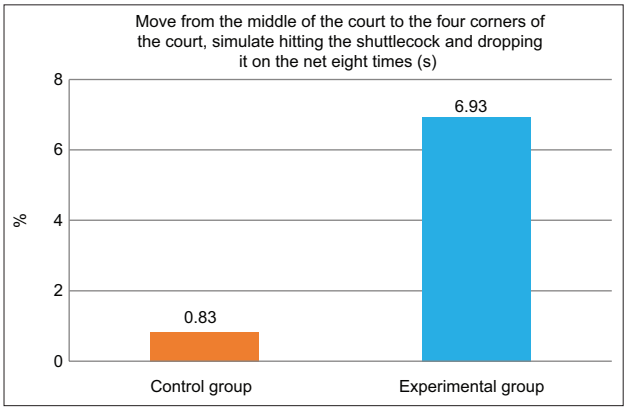

Chart 4: Performance of moving from the middle of the field to the four corners simulating the bridge smashing and bouncing of the control group (a) and the experimental group (b)

The results obtained from Tables 7 and 8 and Charts 1–4 show that: All the test contents to evaluate the speed strength of the two experimental and control groups have clear differences,

T(calculated) > T(table = 2.101) at the probability threshold $P > 0.05$.

CONCLUSION

From the research results on the topic, we can come to the following conclusions:

Through a survey of practical training combined with the method of interviewing experts, we obtained 14 exercises to develop speed strength, the exercises belong to 03 groups:

- Arm and shoulder muscle group
- Back and abdominal muscle group
- Lower limb muscle group.

This system of 14 exercises, through practical testing, has confirmed its effectiveness in developing speed-strength for the experimental group (shown through the growth rate in the test indicators of the experimental group being higher than the control group and the comparison results of speed strength after 4 months showed that the difference was significant with $P < 0.05$).

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Research Article

The study of biological age and height prediction for future female gifted volleyball athletes ages 14–15 Thai Nguyen province

Nguyen Duc Tuan, Dao Ngoc Anh

Thai Nguyen University of Education, Thai Nguyen University, Thai Nguyen, Vietnam

ABSTRACT

Across the method of determining bone age and forecasting future height based on X-ray films, we have selected and proposed the most accurate forecasting method, which is the Greulich and Pyle method. The study also evaluated the bone age status of volleyball players aged 14–15 in Thai Nguyen province, finding that their bone age was higher than their chronological age by 0.5–2.0 years. In addition, the forecasted height of these athletes was lower compared to some female volleyball teams within the country.

Keywords: Height, Biological age, Athlete, Volleyball, Thai Nguyen province

INTRODUCTION

Volleyball is an Olympic sport that has been rapidly developing worldwide. National teams with a long-standing tradition, such as those from the USA, Cuba, the Netherlands, and Brazil, always focus on selecting volleyball players with ideal height. For example, female athletes from Russia are 2.02 m tall, male athletes from the Netherlands are 2.22 m tall, female athletes from China are 2.06 m tall, and in Vietnam, there are also female athletes who are 1.95 m tall and male athletes who are 2.16 m tall. Around the world, the study of bone age and forecasting maximum height for athletes has been a topic of interest for many researchers, such as Darlin DB (1979), Greulich *et al.* (1971), Tanner *et al.* (1975), Michael (1989), Pietka *et al.* (2001), Manos *et al.* (1994), Mahmoodi *et al.* (1997), Vogelsang *et al.* (2000), Cootes *et al.* (1990), and Bocchi *et al.* (2003). In Vietnam, the selection and training of volleyball athletes have been researched by many scientists, including Dr. Phan Hong Minh (2000), Dr. Nguyen Thanh Lam (2000), Dr. Tran Đuc Phan (2001), Dr. Bùi Trọng Toại (2007), etc. However, research on bone age and forecasting the maximum height for volleyball players in Vietnam is still very limited.

Address for correspondence:
Dao Ngoc Anh,
E-mail: anhdn@tnue.edu.vn

RESEARCH METHODS

To solve the above task we used the following methods.

Methods of analyzing and synthesizing documents; Mathematical and statistical methods. Biological age testing method.

Using SPSS Software to Perform One-Way ANOVA and Student-Newman-Keuls (S-N-K) Test to Examine Pairwise Differences (Method).

Research Subjects

Ten female volleyball athletes aged 14–15 from Thai Nguyen province.

RESEARCH RESULTS AND DISCUSSION

Introduction to Some Methods of Determining Biological Age

Biological age

There are two types of age-related to determining the level of development and maturity: Chronological age and biological age. Human growth and development are influenced by factors, such as genetics, nutrition, and environment, so developmental levels vary. Therefore, chronological age does not accurately reflect the developmental and maturity levels of a person. On

Table 1: Percentiles of maximum height at different ages

Year old	Male		Female	
	Percentage	Standard deviation	Percentage	Standard deviation
13	87.32	3.02	95.96	2.15
13.5	89.22	3.57	97.17	1.7
14	91	3.96	98.27	1.24
14.5	92.6	3.85	98.74	0.93
15	94.6	3.74	99.31	0.68
15.5	96	3.31	99.54	0.48
16	97.09	2.71	99.62	0.35
16.5	97.95	2.12	99.75	0.34
17	98.79	1.43	99.9	0.25
17.5	99.28	1.01	99.91	0.25
18	99.55	1.58	99.96	0.11

Table 2: Final height prediction ratio

Bone age	Male %			Female %		
	Early	Normal	Late	Early	Normal	Late
13	88	87.6	85	96.4	95.8	95.5
13.6		90.2	87.5	97.7	97.4	96.3
14		92.7	90.5	98.3	98	97.2
14.6		94.8	93.5	98.9	98.6	98
15		96.8	95.8	99.4	99	98.6
15.6		97.6	97.1	99.6	99.3	99
16		98.2	98	99.8	99.6	99.3
16.6		98.7	98.5	99.9	99.7	99.5
17		99.7	99	100	99.9	99.8
17.6		99.4			99.95	99.95
18		99.6			100	100
18.6		100				

the other hand, biological age, which is calculated based on the actual development of bodily tissues, reflects the growth and development of adolescents and children more accurately. There are many methods for determining biological age, such as through measurements and observations of secondary sexual characteristics and assessing the degree of bone ossification.

Forecasting future height

There have been many studies on forecasting future height: Predicting the final height of adolescents based on parental height; height during childhood; based on the correlation between maximum height and other morphological indicators, such as foot length, arm length, and X and Y chromosomes. One method of forecasting future height based on bone age is through the assessment of wrist bone age. Some methods include:

Beckli method

Beckli's research identified the average values and standard deviations of experimental subjects from birth to 18 years old.

BENISE and PHINIUSE method
US research results
Chinese research results
American G-P method

Bone age Status of Female Volleyball Players in Thai Nguyen Province aged 14–15

To determine the bone age of female volleyball players in Thai Nguyen province aged 14–15, the research team conducted X-rays of the hand bones of 12 athletes.

Predicting future height

Data in Table 6 shows that the results of future height prediction of Beckli, Benise, American, or Chinese methods are statistically different from those of Greulich and Pyle methods.

The Beckli, Benise, American, or Chinese methods give results predicting maximum heights that are close to or lower than

Table 3: Female maximum height percentiles

Year old type	12–0	12–3	12–6	12–9	13–0	13–3	13–6	13–9
Normal	92,2	93,2	94,1	95,0	95,8	96,7	94,7	97,8
Late	90,1	91,3	92,4	93,5	94,5	95,5	96,3	96,8
Early	93,2	94,2	94,9	95,7	96,4	97,1	97,7	98,1
	14–0	**14–3**	**14–6**	**14–9**	**15–0**	**15–3**	**15–6**	**15–9**
Normal	98,0	98,3	98,6	98,8	99,0	99,1	99,3	99,4
Late	97,2	97,7	98,0	98,0	98,6	98,8	99,0	99,2
Early	98,3	98,6	93,0	93,0	99,4	99,5	99,6	99,7
	16–0	**16–3**	**16–6**	**16–9**	**17–0**	**17–3**	**17–6**	**18**
Normal	99,6	99,6	99,7	99,8	99,9			
Late	99,3	99,3	99,4	99,7	99,8			
Early	99,8	99,9	99,9	99,95	100			

Table 4: Percentiles of maximum female height

Year old type	13–0	13–3	13–6	13–9	14–0	14–3	14–6	14–9
Normal	95,8	96,7	97,4	97,8	98	98,3	98,6	98,8
Late	94,5	95,5	96,3	96,8	97,2	97,7	90	98,3
Early	96,4	97,1	97,7	98,1	98,3	98,6	98,9	99,2
	15–0	**15–3**	**15–6**	**15–9**	**16–0**	**16–3**	**16–6**	**16–9**
Normal	99	99,1	99,3	99,4	99,6	99,6	99,7	99,8
Late	98,6	98,8	99	99,2	99,3	99,4	99,5	99,7
Early	99,4	99,5	99,6	99,7	99,8	99,9	99,9	99,95
	17–0	**17–3**	**17–6**	**17–9**	**18–0**	**18–3**	**18–6**	**18–9**
Normal	99,9				100			
Late	99,8				100			
Early	100							

Table 5: Prediction coefficients for future height of women

Year old	Height factor	Age coefficient	Bone age coefficient	Constant
No period				
Have period				
12	0.91	−1.4	−3.2	82
12.5	0.93	−1.0	−2.7	67
13	0.95	−0.9	−2.2	55
13.5	0.96	−0.9	−1.8	48
14	0.96	−0.8	−1.4	40
14.5	0.97	−0.8	−1.3	37
15	0.98	−0.6	−1.1	30
15.5	0.99	−0.4	−0.7	20

Table 6: Predicting future height

Order	Full name	Year of birth	Initial height	Height after 1 year of training	Future height prediction				
					Greulich and pyle	Beckli	Benise và Phiniuse	America	China
1	Hoang Thi Thanh Nha	2010	161	163	166.49	161.96	161.32	161.32	161.32
2	Lo Thi Đao	2010	163	167	170.16	165.82	165.66	165.66	165.66
3	Bui Pham Hong Hanh	2010	165.5	167	171.94	167.49	166.83	167.17	167.17
4	Bui Thi Kim Hang	2010	164	166	169.46	164.98	164.33	164.66	164.66
5	Tran thi Yen Nhi	2011	167	169	171.52	170.99	168.89	168.89	168.89
6	Nguyen thi Ngoc Van	2011	165	167	171.86	170.16	169.39	169.39	169.39
7	Nguyen Thi Minh Anh	2011	162	165	171.04	170.48	168.38	168.38	168.38
8	Ban Thi Thu Trang	2011	161	167	169.5	166.83	166.67	166.67	166.67
9	Phung Thi Hanh	2010	166	169	171.44	166.98	166.33	166.67	166.67
10	Tong Ha My	2010	162	166	171.44	166.98	166.33	166.67	166.67
$\bar{X} \pm \delta$			163.7	166.6	$170.5^{\beta,\gamma,\mu,\nu}$	167.3^{α}	166.4^{α}	166.5^{α}	166.5^{α}
			±1.5	±1.8	±1.7	±2.8	±2.4	±2.3	±2.3

[α]showed statistically significant differences compared to the Greulich and Pyle method. [β]Showed statistically significant differences compared to the Beckli method. [γ]Showed statistically significant differences compared to the Benise and Phiniuse methods. [μ]Showed statistically significant differences compared with the US method. [ν]Showed statistically significant differences compared with the Chinese method

Table 7: Comparison of future average height forecast of Thai Nguyen province youth volleyball team with Vietnam national strong women's volleyball teams

Order	Team	$\bar{X} \pm \delta$	Cv %
1	Thai Nguyen	171.26±1.315	0.68
2	Quang Ninh	176.21±4.561	2.84
3	Ha Noi	176.64±4.62	2.91
4	VTV-Binh Đien long an	177.10±5.877	3.32
5	Vietinbank	174.5±4.251	2.42

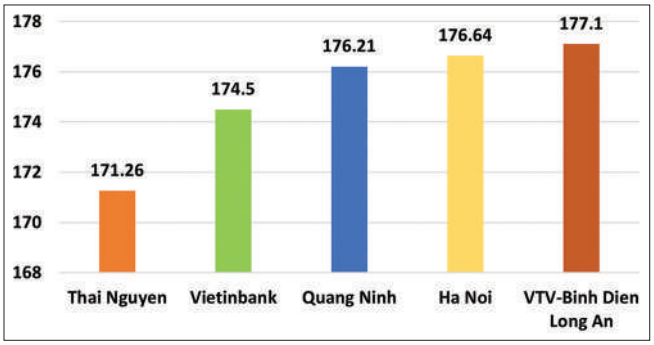

Chart 1: Chart comparing the predicted future average height of young female volleyball players in Thai Nguyen province with strong national female volleyball teams

the actual height of new athletes after nearly a year of training 166.7 cm (after 1 year) showing equivalent or higher than 167.3 cm (Beckli), 166.4 cm (Benise), 166.5 cm (American), and 166.5 cm (Chinese). On the contrary, the Greulich and Pyle method gives more suitable results (170.5 cm compared to 166.7 cm (after 1 year). Therefore, the research team boldly chose the Greulich and Pyle method to predict the future height of athletes and also compared the future height of young volleyball players in Thai Nguyen province with the height of volleyball players competing in the first division of the Vietnamese national tournament in recent years.

Height prediction is very important in selecting and training Volleyball players.

Across Table 7 and Chart 1, it can be seen that the future height of young athletes of the Thai Nguyen Province Volleyball team is not promising, lower than the height of female athletes of Quang Ninh, Hanoi, VTV-Binh Dien Long An, and Vietinbank Volleyball teams.

CONCLUSION

- The biological age of young female athletes of the Thai Nguyen Provincial Volleyball Team is higher than their calendar age.
- The height prediction methods give different results.
- The Beckli, Benise, American, or Chinese methods are not suitable for young female athletes of the Thai Nguyen Provincial Volleyball Team.
- The Greulich and Pyle method is suitable for predicting the maximum height for young female athletes of the Thai Nguyen Provincial Volleyball Team.
- The future height of young female athletes of the Thai Nguyen Provincial Volleyball Team is lower than the height of female athletes of the Quang Ninh, Hanoi, VTV-Binh Dien Long An, and Vietinbank Volleyball Teams.

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Review Article

Enhancing Sports Performance through Yoga Asana and Nutrition: A Synergistic Approach

Manisha Jaykrishan Waghmare*

Director, Department of Physical Education and Sports, Dr. Sow. Indirabai Bhaskarrao Pathak Mahila Kala Mahavidyalaya, Chhatrapati Sambhajinagar, Maharashtra, India

ABSTRACT

The pursuit of optimal sports performance has led athletes to explore complementary training methods that enhance physical and mental capabilities. This study investigates the impact of yoga asana and nutrition on sports performance, highlighting their synergistic effects. A comprehensive review of existing literature reveals that yoga asana improves flexibility, balance, strength, and cardiovascular endurance, while also reducing stress and anxiety. Conversely, optimal nutrition provides the necessary fuel for energy production, recovery, and muscle growth. When combined, yoga asana and nutrition exhibit a synergistic effect, augmenting athletic performance, accelerating recovery, and mitigating the risk of injury. The findings of this study underscore the importance of integrating yoga asana and nutrition into sports training regimens, offering a holistic approach to optimizing athletic performance.

Keywords: Athletic training, Injury prevention, Nutrition, Recovery, Sports performance, Yoga asana.

INTRODUCTION

The pursuit of excellence in sports has led athletes, coaches, and trainers to continually seek innovative methods to enhance performance, accelerate recovery, and reduce the risk of injury. As the demands of modern sports continue to escalate, athletes are increasingly turning to complementary training approaches that foster holistic development and optimize physical and mental capabilities. Among these approaches, yoga asana and nutrition have emerged as two vital components that, when integrated synergistically, can significantly enhance sports performance.

Yoga asana, with its roots in ancient Indian philosophy, has been shown to improve flexibility, balance, strength, and cardiovascular endurance, while also reducing stress and anxiety. By incorporating yoga asana into their training regimens, athletes can develop greater body awareness, enhance their proprioception, and cultivate mental focus and discipline. Conversely, optimal nutrition provides the necessary fuel for energy production, recovery, and muscle growth, allowing athletes to perform at their best and adapt to the demands of intense training.

Address for correspondence:
Manisha Jaykrishan Waghmare
E-mail:

Despite the growing recognition of yoga asana and nutrition as essential components of sports training, few studies have investigated their synergistic effects on sports performance. This knowledge gap underscores the need for a comprehensive examination of the interplay between yoga asana, nutrition, and athletic performance. By exploring the complex relationships between these variables, athletes, coaches, and trainers can unlock new avenues for optimizing sports performance and achieving a competitive edge.

This study aims to investigate the impact of yoga asana and nutrition on sports performance, with a particular focus on their synergistic effects. By integrating the principles of yoga asana and nutrition into sports training regimens, athletes can potentially enhance their physical and mental capabilities, accelerate recovery, and mitigate the risk of injury. The findings of this study will contribute to the development of evidence-based guidelines for athletes, coaches, and trainers seeking to optimize sports performance through the integration of yoga asana and nutrition.

KEY NUTRIENTS FOR YOGA ASANA PERFORMANCE

1. Complex carbohydrates: Whole grains, fruits, and vegetables provide energy, fiber, and essential nutrients.
2. Lean proteins: Lean meats, fish, eggs, dairy, and plant-based proteins support muscle growth and repair.
3. Healthy fats: Nuts, seeds, avocados, and olive oil provide energy, support heart health, and aid in nutrient absorption.
4. Hydrating foods: Water-rich foods such as fruits, vegetables, and broth-based soups support hydration and electrolyte balance.
5. Electrolyte-rich foods: Bananas (potassium), dates (potassium), and coconut water (electrolytes) help maintain electrolyte balance and support muscle function.

By integrating a well-planned diet with yoga asana practice, athletes can optimize their sports performance, accelerate recovery, and reduce the risk of injury. A balanced diet that includes essential nutrients supports physical and mental performance, allowing athletes to achieve their full potential.

SYNERGISTIC APPROACH

A synergistic approach refers to the combination of two or more components that work together to produce an effect that is greater than the sum of their individual contributions. In other words, when two or more elements are combined, they interact and enhance each other's effects, leading to a more significant outcome.

Relevance to Yoga Asana and Nutrition

In the context of yoga asana and nutrition, a synergistic approach involves combining these two components to enhance sports performance, overall health, and well-being. Here's how:

1. Enhanced physical performance: Yoga asana can improve flexibility, balance, strength, and cardiovascular endurance. When combined with optimal nutrition, athletes can experience enhanced physical performance, faster recovery, and reduced risk of injury.
2. Improved mental clarity and focus: Yoga asana has been shown to improve mental clarity, focus, and concentration. Nutrition plays a critical role in supporting brain function, and when combined with yoga asana, athletes can experience improved mental performance and reduced stress.
3. Optimized recovery: Yoga asana can aid in recovery after intense physical activity, while nutrition provides the necessary building blocks for muscle repair and growth. A synergistic approach ensures that athletes recover faster and more efficiently.
4. Holistic development: A synergistic approach to yoga asana and nutrition promotes holistic development, addressing the physical, mental, and emotional aspects of an athlete's performance.

Core Principles of a Synergistic Approach to Yoga Asana and Nutrition

1. Integrate yoga asana and nutrition for enhanced effects.
2. Balance both practices to meet individual needs.
3. Periodize for optimal performance, recovery, and adaptation.
4. Individualize the approach for specific needs and goals.

This approach can help athletes achieve optimal performance, unlock their full potential, and enjoy overall well-being.

Integrating Yoga Asana and Nutrition

To enhance sports performance, yoga asana and nutrition can be combined in the following ways:

1. Pre-workout nutrition and yoga asana: A balanced meal or snack that includes complex carbohydrates, lean protein, and healthy fats can be consumed 1–3 h before yoga asana practice. This can help provide energy, support muscle function, and enhance endurance.
2. Post-workout nutrition and yoga asana: After yoga asana practice, a meal or snack that includes carbohydrates and protein can help replenish energy stores, support muscle repair, and reduce muscle soreness.
3. Yoga asana and nutrition periodization: Yoga asana and nutrition can be periodized to optimize performance, recovery, and adaptation. For example, during intense training periods, yoga asana can focus on restorative and recovery-based practices, while nutrition can emphasize carbohydrate and protein intake to support energy production and muscle repair.
4. Yoga asana and nutrition for specific sports: Yoga asana and nutrition can be tailored to specific sports and activities. For example, yoga asana for runners may focus on hip and leg flexibility, while nutrition may emphasize complex carbohydrates and electrolyte-rich foods to support endurance and hydration.

Benefits of Combining Yoga Asana and Nutrition

The combination of yoga asana and nutrition can provide numerous benefits for sports performance, including:

1. Enhanced endurance: Yoga asana can improve cardiovascular endurance, while nutrition can provide the necessary energy and nutrients to support prolonged physical activity.
2. Improved flexibility and mobility: Yoga asana can increase flexibility and range of motion, while nutrition can support connective tissue health and reduce muscle soreness.
3. Increased strength and power: Yoga asana can improve muscular strength and power, while nutrition can provide the necessary building blocks for muscle growth and repair.

4. Better recovery: Yoga asana can aid in recovery after intense physical activity, while nutrition can provide the necessary nutrients and energy to support muscle repair and replenish energy stores.

Key Nutrients for Yoga Asana and Sports Performance

1. Complex carbohydrates: Energy, fiber, and essential nutrients
2. Lean protein: Muscle growth, repair, and recovery
3. Healthy fats: Energy, heart health, and nutrient absorption
4. Electrolytes: Hydration, muscle function, and nerve function
5. Antioxidants: Reduced oxidative stress and inflammation

These nutrients support optimal performance, recovery, and overall well-being for yoga asana and sports enthusiasts.

Psychological Effects of Yoga Asana on Mental Performance

1. Improved focus: Enhanced concentration and mental clarity
2. Enhanced mood: Reduced anxiety and depression, improved overall mood
3. Reduced stress: Lower cortisol levels, increased calm and relaxation
4. Increased self-awareness: Greater emotional intelligence and self-awareness

Yoga asana has a positive impact on mental performance, leading to improved focus, mood, and overall well-being.

Neurological Effects of Yoga Asana on Brain Function and Structure

Yoga asana has been shown to have a positive impact on brain function and structure, including:

1. Increased grey matter: Yoga asana has been shown to increase grey matter in areas of the brain associated with attention, emotion regulation, and memory.
2. Improved Neuroplasticity: Yoga asana can improve neuroplasticity, allowing the brain to adapt and change in response to new experiences.
3. Reduced Inflammation: Yoga asana has anti-inflammatory effects, which can reduce inflammation in the brain and promote overall brain health.
4. Increased neurotransmitters: Yoga asana can increase the production of neurotransmitters such as serotonin, dopamine, and GABA, which are involved in mood regulation, motivation, and relaxation.

Impact of Nutrition on Psychological and Neurological Processes

Nutrition plays a critical role in supporting psychological and neurological processes, including:

1. Neurotransmitter function: Nutrition provides the building blocks for neurotransmitter production, including amino acids, vitamins, and minerals.
2. Cognitive performance: Nutrition affects cognitive performance, including attention, memory, and executive function.
3. Mood regulation: Nutrition influences mood regulation, with certain nutrients such as omega-3 fatty acids, vitamin D, and complex carbohydrates supporting mental health.
4. Neuroprotection: Nutrition provides neuroprotection, with antioxidants and other nutrients helping to protect the brain from damage and inflammation.

Key Nutrients for Psychological and Neurological Health

1. Omega-3 fatty acids: Support brain function, mood regulation, and cognitive performance.
2. Vitamin D: Involved in mood regulation, cognitive function, and neuroprotection.
3. Complex carbohydrates: Support serotonin production, mood regulation, and cognitive function.
4. Amino acids: Provide building blocks for neurotransmitter production, including serotonin, dopamine, and GABA.
5. Antioxidants: Help protect the brain from damage and inflammation, supporting neuroprotection and cognitive function.

By understanding the psychological and neurological effects of yoga asana, as well as the impact of nutrition on these processes, individuals can take a holistic approach to supporting their mental performance and overall well-being.

Psychological Effects of Yoga Asana on Mental Performance

1. Improved focus and concentration: Yoga asana requires focus and attention, which can improve concentration and mental clarity.
2. Enhanced mood: Yoga asana has been shown to reduce symptoms of anxiety and depression, and improve overall mood.
3. Reduced stress: Yoga asana can help reduce stress and cortisol levels, leading to a sense of calm and relaxation.
4. Improved self-awareness: Yoga asana encourages self-awareness and self-reflection, which can lead to greater emotional intelligence and self-awareness.

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4. Neuroprotection: Nutrition provides neuroprotection, with antioxidants and other nutrients helping to protect the brain from damage and inflammation.

Yoga asana and nutrition have a profound impact on psychological and neurological processes, including focus, concentration, mood, and cognitive performance. By combining yoga asana with a balanced diet that includes key nutrients, individuals can support their mental health and well-being and optimize their cognitive function.

Enhancing Sports Performance through Yoga Asana and Nutrition:

1. Professional football player: A professional football player incorporated yoga asana and nutrition into his training program to improve his flexibility, balance, and endurance. He practiced yoga asana 2–3 times/week, focusing on poses that improved his hip flexibility and balance. He also worked with a sports dietitian to develop a personalized nutrition plan that included a balanced diet with plenty of complex carbohydrates, lean protein, and healthy fats. As a result, he experienced improved performance on the field, including increased speed, agility, and endurance.
2. Elite runner: An elite runner incorporated yoga asana and nutrition into her training program to improve her running efficiency and reduce her risk of injury. She practiced yoga asana 3–4 times/week, focusing on poses that improved her core strength, flexibility, and balance. She also worked with a sports dietitian to develop a personalized nutrition plan that included a balanced diet with plenty of complex carbohydrates, lean protein, and healthy fats. As a result, she experienced improved running efficiency, reduced her risk of injury, and achieved a personal best in her next marathon.
3. Collegiate basketball team: A collegiate basketball team incorporated yoga asana and nutrition into their training program to improve their teamwork, communication, and overall performance. The team practiced yoga asana 2–3 times/week, focusing on poses that improved their flexibility, balance, and core strength. They also worked with a sports dietitian to develop a personalized nutrition plan that included a balanced diet with plenty of complex carbohydrates, lean protein, and healthy fats. As a result, the team experienced improved teamwork, communication, and overall performance, leading to a successful season.

Practical Applications of the Synergistic Approach

1. Integrate yoga asana into training program: Incorporate yoga asana into your training program 2–3 times/week, focusing on poses that improve flexibility, balance, and core strength.
2. Develop a personalized nutrition plan: Work with a sports dietitian to develop a personalized nutrition plan that includes a balanced diet with plenty of complex carbohydrates, lean protein, and healthy fats.
3. Focus on recovery nutrition: Focus on recovery nutrition after intense training sessions, including a balanced meal or snack with plenty of complex carbohydrates, lean protein, and healthy fats.
4. Incorporate mindfulness and meditation: Incorporate mindfulness and meditation into your training program, focusing on techniques that improve focus, concentration, and mental clarity.
5. Monitor progress and adjust: Monitor your progress and adjust your training program as needed, incorporating feedback from coaches, trainers, and sports dietitians.

Recommendations for Integrating Yoga Asana and Nutrition into a Training Program

1. Start slow: Start with short yoga asana sessions and gradually increase the duration and intensity.
2. Focus on proper technique: Focus on proper technique when practicing yoga asana, including proper alignment, breathing, and movement.
3. Listen to your body: Listen to your body and take rest days as needed, incorporating recovery nutrition and self-myofascial release.
4. Work with a qualified coach or trainer: Work with a qualified coach or trainer who has experience with yoga asana and sports nutrition.
5. Be Patient and consistent: Be patient and consistent with your training program, incorporating yoga asana and nutrition into your daily routine.

Practical Implications

1. Yoga asana in training: Coaches should incorporate yoga to enhance flexibility, balance, strength, and endurance.
2. Personalized nutrition plans: Athletes should collaborate with sports dietitians to optimize energy, recovery, and muscle growth.
3. Emphasis on recovery nutrition: Proper post-training meals with carbohydrates, protein, and healthy fats are essential.
4. Progress Monitoring and Adjustments: Continuous assessment and modifications in training programs are necessary.

CONCLUSION

Combining yoga asana and nutrition provides a holistic approach to enhancing sports performance. Yoga improves flexibility, balance, strength, and endurance while reducing injury risk. A well-planned nutrition program supports energy production, recovery, and muscle growth. Scientific evidence highlights the benefits of this combination, leading to improved physical and mental performance, faster recovery, and lower injury risk. This integrated approach optimizes overall athletic performance

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Research Article

The effect of a training method to develop the speed strength of the lunging skill for fencers

Firas Talib Hamadi

College of Physical Education and Sports Science, Kirkuk University, Kirkuk, Iraq

ABSTRACT

The study aims to prepare and identify the training curriculum's effect on developing the speed-strength of the lunging skill among the study sample members. The investigator employed the experimental approach, utilizing both experimental and control groups, as this method best suited the research problem. The study community was chosen intentionally and consisted of (22) fencing players in Kirkuk Governorate, distributed over three clubs. The study sample was chosen randomly through a lottery and split into two groups (experimental and control), each consisting of (8) players. Therefore, the total number of participants in the study is (16) players, while (6) players were excluded after participating in the pilot study. The researcher determined that the training program positively influences the development of arm speed-strength, as well as the motor speed of the armed arm, and this enhancement has led to improvements in both the accuracy and speed of lunging among the participants in the study. The researcher recommends the necessity of using standardized training curricula in training for fencers, as well as the necessity of applying this study during training units at clubs and university teams, conducting studies represented on other samples.

Keywords: Fencing, Lunging skill, Speed-strength, Training method

INTRODUCTION

Fencing is a sport that has successfully attained great heights due to its foundation on sound scientific principles. Fencing is considered one of the oldest known sports, as it relies on the use of swords in various ways and methods during attack and defense between competitors, as each of them seeks to score touches within the target range of the sword, in addition to being a sport that requires performance skills based on the speed of a sudden attack toward the competitor. Fencing is a sport that merges offense and defense, as every fencer aims to strike their opponent before being struck themselves. The speed factor is essential in this sport, as the fencer must be able to quickly execute movements in the shortest possible time, which enables him to outperform his opponent, whether in attack or defense, and the speed factor helps the fencer to move effectively to perform offensive and defensive movements on the field, and it also plays an important role in confusing the opponent, making him unable to think or anticipate the movement of the attacking player's sword. The fencer surprises his opponent by performing quick movements to score a touch on him, and these movements must be characterized by accuracy and appropriate timing to achieve success.

Address for correspondence:
Firas Talib Hamadi,
E-mail: farastalad@uokirkuk.edu.iq

The aim of fencing is to reach the opponent's target to score a touch, and the simplest way to achieve this is to extend the armed arm to reach the pointer to the target precisely specified on the opponent's body surface, using the lunging movement by extending the back leg, "and this movement is the backbone of the attack in fencing and as the most important movement by which the player can obtain touches" (Abbas, 2000, 9) and as prediction contributes effectively in the field of sports in general and fencing in particular in setting expectations and perceptions to shed light on the extent of the progress that has occurred or is expected; therefore, this study is crucial for understanding how a training method impacts the speed-strength required for the stabbing skill in fencing.

To achieve better results in the sport of fencing, it is essential to focus on aspects that coaches may have overlooked, which are significant in fencing. Every player has these elements within them and can enhance them based on solid scientific

principles, as we notice that the motor speed was not given in a specialized form and given in general as speed, and the motor speed is necessary for the fencer as it positively affects the performance of the player's movements distinguished by fast performance along with the motor skills needed and the correct timing to execute each movement, it is essential to reach the objective of carrying it out, as the success of the attack depends on the motor speed by discovering a loophole in the opponent's defense and investing it optimally, in addition to the lack of focus by coaches and workers in the sport of fencing on the speed of performance and the lack of research in this field encouraged the researcher to study this problem and determine its dimensions and develop appropriate solutions for it to help develop the level of fencing effectiveness.

The study aims to prepare a training curriculum to develop the speed-strength of the lunging skill among fencers and identify the effect of the training curriculum in developing the speed-strength of the lunging skill among the study sample members.

RESEARCH APPROACHES AND FIELD PRACTICES

Research Approach

The investigator employed an experimental approach that included both an experimental group and a control group, as this method is the most suitable for tackling the study issue.

Study Community and Sample

The study population was deliberately selected and comprised 22 fencing athletes in Kirkuk Governorate, spread across three different clubs. The sample for the study was randomly drawn using a lottery method and split into two groups (experimental and control), with 8 athletes in each group. Therefore, the total number of participants in the study sample is 16 athletes, while 6 participants were excluded due to participation in the pilot study.

Procedures for Field Research

Assessments utilized in the study

Arm speed-strength assessment (10 s) (Ahmed, 1999, 115):

- Test objective: Measure the speed-strength of the arms
- Tools: Stopwatch
- Performance criteria: While lying face down (count the number of times the arms are bent and straightened in a span of 10 s)
- Recording method: Count the number of times the arms are flexed and extended for 10 s.

Lunging motor speed test (Al Hassou, 2003, 98).

- Test objective: Measure the lunging motor speed
- Tools: Foil weapon, a sign hanging on the wall, a manual electronic stopwatch.

Performance Criteria

The participant begins in a prepared stance, positioned at a proper distance from the suspended sign to ensure that its height is suitable for their own stature. Upon receiving the starting signal, the participant executes (10) uninterrupted lunges at the sign while the judge measures the duration taken to complete the lunges.

Recording Procedure

- The athlete is timed while completing (10) lunges on the designated marker
- The participant is allowed two trials, and the best performance is documented.

Pilot study

The initial study took place in the fencing hall located in the Kirkuk District, the heart of the city, at precisely 2:30 pm on Monday, March 11, 2024, involving six players who were not part of the main study sample and were therefore excluded from the primary experiment. The aim of this study was to assess the validity of the tools and devices utilized in the research as well as to evaluate the efficiency of the research team, identify obstacles and challenges faced by the researcher during the execution of the main experiment, measure the time required to carry out the tests used, and determine the appropriateness of the test for the sample participants.

Pre-test

After ensuring the integrity of the tests and calculating the time taken to implement them, the researcher conducted the pre-test on the members of the experimental and control groups at exactly 2:30 pm on Monday, March 18, 2024, in the fencing hall. All variables were fixed and data were recorded to conduct them in the post-test.

Training curriculum

After recording all preliminary results from the pre-test, the researcher conducted a training curriculum for the study sample (experimental group) starting on March 24, 2024. This training lasted for 6 weeks, with two training sessions each week, resulting in a total of 12 training sessions. The implementation of the training continued until May 2, 2024.

The training program focused on physical and skill development during its main segment, following the required intensity outlined as follows:

- Duration of the training curriculum: 6 weeks
- Number of training sessions per week: 2 sessions (Total: 12 sessions)
- Nature of the undulation: 2–1
- Intensity during the training sessions: 65–95%
- Duration of each training session: 90 min, with 60 min dedicated to developing speed-strength and lunging skills in fencing.

Post-test

Upon finishing the implementation of the training curriculum, the researcher initiated the post-test at precisely 2:30 pm on Monday, May 6, 2024. The researcher made sure to replicate the same conditions that were used for the pre-tests. This included maintaining the same location, time, tools, testing methods, grading calculations, and ensuring the presence of the same assistant team that participated in the pre-test.

Statistical Methods

The researcher utilized the statistical software (the Statistical Packages for the Social Sciences) to analyze the data and derive the results.

PRESENTATION, EXAMINATION, AND CONVERSATION REGARDING THE FINDINGS

- Display of Outcomes from the Two Assessments (Pre and Post) for Both the Experimental and Control Groups in the Study Variables
- Presenting the Outcomes of the Post-Tests Conducted between the Experimental Group and the Control Group Regarding the Study Variables

DISCUSSION OF THE RESULTS

The findings presented in Tables 1 and 2 indicate that there are statistically significant differences between the pre-tests and post-tests for speed-strength, accuracy, and speed of lunging in both the experimental and control groups, favoring the results of the post-test, in addition to the superiority of the experimental group in the value of the arithmetic mean, and through the results of Table 3 which showed the difference in the means in the post-tests between the experimental and control groups, the results showed the presence of significant differences in favor of the experimental group in (speed-strength, accuracy, and speed of lunging) among the individuals of the research sample, and the researcher attributes these results to the fact that the application of a scientifically studied training method that takes into account the individual characteristics of fencing players, and is based on organizing the training load accurately in terms of intensity, volume and density, plays a crucial role in enhancing speed-strength. The value of this method is in concentrating on executing exercises that are highly effective and appropriate for fencing, which stimulate the nervous system and train it to respond very quickly. In this regard, Abu Al-ola Ahmed states, "Energetics training requires high speed during exercises to obtain better motor performance during competitions" (Abdel-Fattah, 1992, 78).

Table 1: Presents the outcomes of the two assessments (pre and post) for the experimental group in the study variables

No.	Variable	Test	Mean	Std.	Standard error	Error rate	Significance level
1	Speed-strength	Pre	10.83	1.941	0.792	0.012	Significant
		Post	14.52	1.048	0.428		
2	Accuracy and speed of lunging	Pre	5.33	1.211	0.494	0.006	Significant
		Post	9.16	1.471	0.601		

Table 2: Outcomes from the two assessments (pre-post) for the control group related to the study variables

No.	Variable	Test	Mean	Std.	Standard error	Error rate	Significance level
1	Speed-strength	Pre	10.67	1.861	0.761	0.069	Not significant
		Post	12.54	1.048	0.428		
2	Accuracy and speed of lunging	Pre	4.83	1.471	0.601	0.067	Not significant
		Post	6.83	0.752	0.307		

Table 3: Displays the outcomes of the (post) test conducted on the experimental and control groups regarding the study variables

Variable	Groups	Arithmetic mean	Std.	Standard error	Mean diff.	Std. of differences	t value	Error rate	Sig. level
Speed-strength	Experimental	14.52	1.048	0.428	2.01	1.26	3.87	0.012	Significant
	Control	12.54	1.048	0.428					
Accuracy and speed of lunging	Experimental	9.16	1.471	0.601	2.33	1.75	3.26	0.022	Significant
	Control	6.83	0.752	0.307					

The training curriculum included a series of exercises dedicated to developing the accuracy of the lunge, which ranged between slow exercises aimed at analyzing the movement and correcting errors, and medium and fast exercises that simulate the conditions of actual competitions, which contributes to improving performance and developing the skill gradually (Helmy and Bariqa, 1997, 135). These exercises were performed to touch the target (target hanging on the wall) from different positions and with high repetitions of 8–12 repetitions in each training unit, due to the importance of the element of accuracy in fencing (Abbas, 2000, 23), as the possibility of developing motor speed through training, whether for a short or long period, and training for several months to raise the rate of motor speed could be reached and achieved within the limits of 20–60% (Al-Obaidi, 2005, 50).

The results indicate that the training program focused on developing kinematic variables related to lunging was effective in improving both the accuracy and speed of lunging among players. Comparisons of pre- and post-test results showed statistically significant differences in these variables, demonstrating a causal relationship between the training and improved performance. This development contributed to the acquisition of motor skills, which enhanced the ability to control performance throughout the technical stages, ultimately leading to increased speed and accuracy in the lunging movement. This outcome is what every fencer aspires to achieve. The training was organized and structured with appropriate intensity and sufficient rest periods, allowing it to be performed in simple locations at any time (Majeed and Mahdi, 2022, p. 214).

CONCLUSION

The researcher concluded that the training method positively affects the development of arm speed-strength and motor speed of the dominant arm. This enhancement has contributed to improved accuracy and speed during lunges among the individuals in the research sample. The researcher recommends utilizing standardized training methods for fencers and emphasizes the need to apply the findings of this study during training sessions with clubs and university teams. In addition, conducting further studies with different samples is advised.

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Research Article

The effect of using educational aids according to the random method in learning the performance of the hurdle step for the 400 m hurdles event

Murad Ahmed Yass[1], Ali Abdulaleem Mohammed Saber[1], Omar Owaid Saleh[2]

[1]College of Physical Education and Sports Sciences, University of Kirkuk, Kirkuk, Iraq, [2]College of Physical Education and Sports Sciences, University of Tikrit, Tikrit, Iraq

ABSTRACT

The purpose of this study was to investigate the effects of learning aid exercises on 400 m hurdles learning among 2nd year students of the Faculty of Sports Sciences. Post-race comparison differences between the experimental and control groups of the 2nd year students of the Faculty of Sports Sciences in 400 m hurdles were determined. The researcher chose the experimental method because it suited the type of study. The study sample consisted of 40 s year students of the Faculty of Sports Sciences, University of Kirkuk. They were divided into two equal groups of 20 students each. The influencing variables were equivalent. The researcher used questionnaires, personal interviews, measurements, and tests to collect information. The educational program consisted of eight classes, 2/week, and each class lasted for 90 min. Before implementing the educational program, the researcher conducted an exploratory experiment with the assistance of the support team to identify potential barriers before conducting the main experiment. The educational project was conducted every Sunday and Tuesday between November 8, 2022 and December 28, 2022. The researchers used a statistical program (Statistical Packages for the Social Sciences). They concluded that the use of randomized learning aids has a positive impact on the learning process. In the 400 m hurdles, effective practice and the random use of learning aids are the best ways to make the learning process result-oriented, as incorporating multiple variables into the learning process can lead to more positive results.

Keywords: Educational, Hurdles event, Learning, Performance

INTRODUCTION

Since the basic process of learning in the personal and social life arises as a result of interaction with the environment, which helps in acquiring new behaviors that increase their adaptation to that environment, this process always accompanies and continues with the individual through the stages of development. Each day, they acquire new methods and techniques that modify their old behaviors, behaviors that are observable externally.

Learning is a psychological activity undertaken by the player, involving selection, reinforcement, generalization, and differentiation, which leads to a change in their behavior on the field. This is what Al-Dulaimi (2005) indicated: The continuous improvement in the scientific and practical aspects of skill performance, which comes through training, allowing the learner to modify their previous experiences and acquire new ones. She also added that it is a process of correcting errors and gaining experience. Exercise is considered the smallest educational unit, so it is necessary to maintain the material learned through it. Therefore, exercises are one of the important things that must be followed in learning, improving and developing physical and motor abilities for every sporting activity. Therefore, they are selected and distributed in order to obtain diverse motor solutions to achieve good motor performance. This is what (Zahran, 1997) indicated that exercises with a specific goal work to prepare and develop specific motor skills in various sports activities. Therefore, they are a contributing factor in developing the sports level in which they specialize (Zahran, 1997, 87). From a general

Address for correspondence:
Ali Abdulaleem Mohammed Saber,
E-mail: m.alyass@uokirkuk.edu.iq/ali.abdulaleem@uokirkuk.edu.iq/o.abdullah.h@tu.edu.iq

perspective, educational aids are integral to the teaching of various sciences and cannot be overlooked, given their role in providing students with diverse experiences, stimulating and renewing their activities. Educational aids also play an important role in the educational process, making the process of motor learning more effective in particular. They aid in memory, accelerate learning, and retention through the proper scientific organization of practical exercises for motor skills, the proper way to learn them, and the mastery of these skills to reach a good level. Therefore, the optimal use of aids is no less important scientifically and educationally if they are used properly to provide alternative experiences, as indicated by (Abdul Rahman, 1990). Exercise scheduling methods are also important in the field of motor learning, as they are one of the main components in learning activities, skills, and movements, the use of which depends on the type of skill and the nature of its performance. One of the methods often used is the random method, which supports the formation of motor programs in the brain and the possibility of using them when needed.

One of the factors that raises the level of learning in sports is the use of educational tools that assist in the process of learning skills and help improve performance and speed in completing various motor programs. These tools can be summarized at each educational stage (Abdul Rahman, 1990, 293). Since athletics includes a large group of sports, which are referred to as the bride of games, there are track and field events that require a great deal of effort to reach a high level in achieving results. This cannot be achieved without searching for tools that help in quickly learning movements in general. As for the 400 m event, it is one of the games that requires a player with high motor skills that help him achieve a proper crossing of the hurdle in accordance with the mechanics of movement. Therefore, The importance of research lies in preparing a set of exercises and using educational tools to help, through which an educational environment can be created that seeks to improve the hurdle step and provide us with beauty and fluidity in the player's movement and advancement.

RESEARCH PROBLEM

The focus of attention for achieving a path to success is to begin learning and advancing motor skills, which are considered the cornerstone on which the educational process is based and built. Despite the distinguished results achieved by studies and research, motor skills continue to suffer from the presence of numerous obstacles, and little attention is given to the means that aid the learning process and improve athletic skills, which can be used as an alternative to the established method. The process of conveying Information provided by teachers to learners was and still is based on the method followed, which relies primarily on explanation and model presentation by the teacher without using tools. This is on the one hand, and on the other hand, it is the lack of use of those exercises and educational tools in accordance with the random method, which is one of the most important methods when planning practice. This is what researchers have noticed from many teachers of Sport and Exercise Science University Student, whether they are 1st-year students or 4th-year students. Therefore, today, it should be noted that use of educational tools to help in the possibility of implementing exercises specific to the 400 m hurdles event. Through the researchers' field experience as an athletics teacher, and after conducting numerous personal interviews with teachers and documenting a number of observations, they found a lack of use of assistive devices when learning events in general, and specifically the 400 m hurdles event, in addition to a lack of randomized training during instructional units. This, according to the researchers' knowledge, has not been addressed previously in this event. The researchers' search for the possibility of achieving a better level of instruction in the educational process is considered an important topic requiring study, research, and investigation. Hence, the research problem stems from this.

The Research Problem Lies in the Following Question

Will the use of exercises with assistive devices yield better results in learning the hurdle step for the 400 m hurdles event, or will the exercises used within the established program yield better results in learning the hurdle step for the 400 m hurdles event for 2nd-year student at the School of Sports Science?.

Research objectives

1. To ascertain how teaching aid practice affects 2nd-year School of Sports Science students' learning of the 400-m hurdles.
2. After the School of Sports Science 2nd-year students took the 400-m hurdle exam, the differences between the experimental and control groups were compared.

Research hypothesis

1. The experimental group and the control group vary statistically significantly in the pre- and post-tests of the 2nd-year School of Sports Science students learning the 400-m hurdles.
2. When 2nd-year School of Sports Science students master the 400-m hurdles, there is a statistically significant difference between the experimental and control groups on the post-test.

Research areas

- Human domain: Second year student at the Faculty of Physical Education and Sports Sciences, University of Kirkuk
- Time frame: November 8, 2022–December 28, 2022
- Spatial frame: Sports and School Activities Department.

Research Procedures

Research methodology

The researchers used the experimental method using the equivalent groups method, as it is appropriate for the nature of the research.

Research Community and its Sample

This research group was carefully selected. These are students of the second period of the 2022/2023 academic year of the Faculty of Physical Education and Sports Sciences of the University of Kirkuk. There are 191 students. The sample consists of parts (A, C) and is randomly selected. Their number is 108 and they are divided into two groups. The first group randomly exercises with teaching aids and includes 20 students. The control group exercises according to the prescribed procedure and includes 20 students. After excluding a group of students for various reasons, the sample ratio reaches 37.03%:

- To conduct the exploratory experiment (15) students
- Absence from the pre- and post-tests (25) students
- Failed students (7) students
- Students who were absent for more than two lectures (26) students
- Students who had an injury (8) students.

Experimental Design

The researchers used the experimental design called (randomized equivalent groups design) (pre- and post-observation) (Van Dalin, 1984, 384-398) as shown in Figure 1.

The researchers found homogeneity (height, mass and age) and equivalence between the two research groups in learning performance [Table 1].

Data Collection Methods, Devices and Tools Used in the Research

1. Arabic and foreign sources
2. The Internet
3. Scientific observation
4. Sony camera
5. Measuring tape (1)
6. Box with a height of 40 cm (4)
7. Designed barriers with a height of 60 cm (6)
8. Rings with a diameter of 50 cm (5)
9. Whistle (1).

Educational Program

Educational program for the 400 m hurdles event

The researchers conducted a survey of physical education teachers at the Faculty of Physical Education and Sports Sciences at the University of Kirkuk regarding the 400-m hurdles educational program and after reviewing scientific information, developed the educational and applied components of the main body of the program, which consists of (8) educational units, Appendix (2), for learning the hurdle step for the 400 m hurdles event, with regard to the independent variable, which is related to the use of exercises with educational aids according to the random method was implemented.

Time plan for the educational program

The time distribution of the educational program was divided into the experimental and control groups. The experimental group, Section (A), used exercises with assistive devices according to the random method, while the control group, Section (C), used the established method, consisting of eight educational units, each with a duration of (90) min, as shown in Figure 2.

Groups	Pretest	Independent variable	Posttest
Experimental group	Learn to perform the hurdle step for the 400 m hurdles event.	Educational aids according to the random method	Learn to perform the hurdle step for the 400 m hurdles event.
Control group		The method followed	

Figure 1: The experimental design

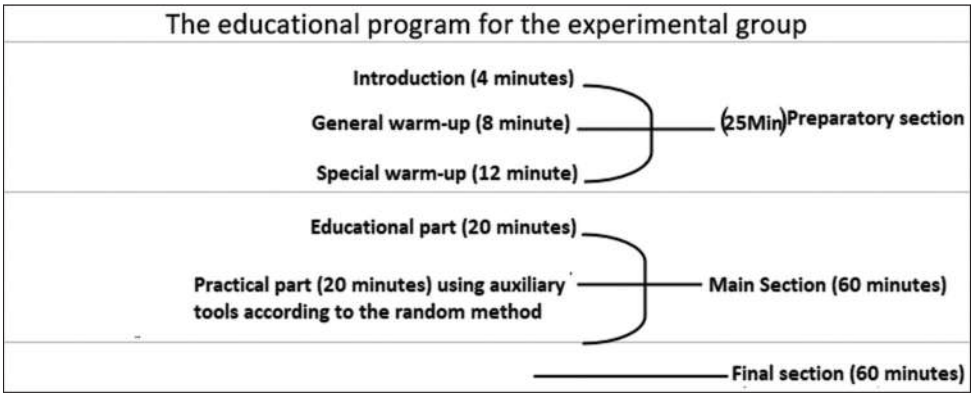

Figure 2: The distribution of programs for the experimental and control groups

Table 1: Homogeneity (height, mass, and age) and equivalence between the two research groups

Variables	Mean	Std	Indication	
Height	1.756	4.480	0.953	No sig.
Mass	73.100	4.459	0.142	No sig.
Age	20.225	0.973	1.461	No sig.
Hurdle step learning for the first experimental group	3.157	0.721	0.503	No sig.
Learning the barrier step for the control group	3	0.718		

The three sections, their parts and times are the same in the two educational programs. The mixed learning method (partial and complete) was used in learning to perform the hurdle step for the 400 m hurdles event during the educational units, which combines the advantages of the two partial and complete methods, as the partial method was used with the experimental group, which used the auxiliary tools according to the random method at the beginning of learning to perform the hurdle step for the event, and then after that the performance was completed in full. As for the control group, which used the method followed to learn to perform the hurdle step, noting that at the beginning of the educational unit for the experimental group, the presentation and performance are repeated. For the exercises preceding the educational unit and linking them to the stage to be learned.

Research Variables and How to Control Them

Research independent variables

The independent variable is the factor or cause that is applied for the purpose of knowing its effect on the outcome (Al-Assaf, 1989, 306).

The independent variables are represented by the following:

- Educational tools according to the random method.

Research dependent variables

The dependent variable is the factor that results from the influence of the independent variable (Obaidat, 1996, 281).

These are as follows:

- Learning the hurdle step performance for the 400 m hurdles event.

External variables

These are variables that must be controlled to an equal degree in both experimental groups, such as (gender, height, intelligence) (Al-Assaf, 1989, 307).

- Experimental validity: This is divided into two important types, one related to the validity of the experimental treatment, and the other related to the possibility of generalizing the experimental results.

There are two types:

- Internal validity
- External validity

Internal Validity

Experimental conditions

The study did not address any factors or incidents that influenced the experiment throughout its implementation.

Maturation-related processes

This refers to the factors of time, physical, mental, or social growth, and fatigue that affect the research sample members after the pre-test and post-test. This maturity may have an impact on the dependent variable (Al-Doski, 2006, 98). Since all students in both groups are exposed to the same growth processes, in addition to the use of numerical distribution and the achievement of equivalence in chronological age, these factors reduced the impact of this variable on the dependent variables.

Measurement tools

This factor was controlled using the same tools and devices for each group.

The interaction between maturity and selection

This factor was controlled by having the researchers select the study group from individuals at the same age level (Atwi, 2000, 198-200).

External Validity

Design validity is achieved when researchers are able to generalize their research findings beyond the scope of the research sample and in similar experimental situations (Awda and Malkawi, 1987, 172). To ensure the integrity and external validity of the design, the research experiment must be free of the following errors:

Interaction of the independent (experimental) variable with selection bias

This factor has no effect because the research sample was deliberately selected from the research community.

Effect experimental procedures

The researchers did not inform the students of the research objectives. The exercises were implemented using educational aids in a randomized manner by the subject teacher, who implemented all activities related to the program's educational units. Thus, the effect of this variable was eliminated.

Educational material

The researchers prepared the educational and practical parts of the main section of the applied section for the experimental group.

Teacher
The athletics teacher taught the entire educational program.

Duration of the experiment
This variable was controlled by subjecting the research sample to a single educational period, starting on November 8, 2022, and ending on December 28, 2022, with (8) educational units for each group.

Location of the lecture
The experimental and control groups were taught at the playground of the Department of Sports and School Activities, Kirkuk Education Directorate.

Scientific Observation
Technical scientific observation was conducted to evaluate the performance of the hurdle step in the 400 m hurdles event by specialists (*) in the field of athletics and athletics, and for both the pre- and post-tests of the research sample.

Scientific observation was conducted by photographing the event's performance with a camera, and then the performance was displayed on a computer for the evaluators of the pre-test on Sunday, November 6, 2022, while the scientific observation of the post-test was conducted on Sunday, January 5, 2023.

Performance Evaluation form for the 400 m Hurdles Event
The performance evaluation form for the 4 × 100 m event was designed after reviewing scientific sources and previous studies.

Experiments and Tests
Experimental experiment
The experiment was conducted before the start of the preliminary tests to determine the height and distance of the camera, as well as the test location, to learn the performance of the hurdle step for the 400 m hurdles event. The experiment was conducted on a group of (12) students, who agreed to participate on November 1, 2022, in order to identify any negatives that could hinder the main experiment during the preliminary test.

Pre-tests
The researchers conducted the test on November 3, 2022, on the two research groups after providing no more than two instructional units. This provided students with an idea of how to perform the hurdle step in the 400 m hurdles event. The researchers' goal of the test was to assess the students' performance level before beginning the main experiment, which included video recording of the performance.

The main experiment
The main experiment began on Novebmer 8, 2022, with two units per week for both the experimental and control groups. After conducting a pilot experiment to learn about the workflow through it and with the help of the support team (*), the duration of the educational unit was 90 min, as the experimental group applied the support tools according to the random method on Mondays and Wednesdays, while the control group applied the method followed on Sundays and Tuesdays. The educational program lasted a month, as the number of eight learning units.

Post-tests
Post-tests to learn the hurdle step performance for the 400 m hurdles event were conducted for both groups on Sunday, December 29, 2022. The hurdle step performance was accompanied by video recording, using the same method used in the pre-tests.

The Researchers Used the Following Statistical Methods
1. Mean
2. Standard deviation
3. *t*-test for two related arithmetic means and two equal samples
4. *t*-test for unrelated arithmetic means and two equal samples (Al-Takriti, 1999, 183)
5. Presentation and discussion of the results.

RESULTS AND DISCUSSIONS

Presentation of the Results
- Present and discuss the pre- and post-test results of the 400-m hurdles learning hurdles performance of the experimental and control groups:

As can be seen from Table 2, the arithmetic mean of the experimental group using teaching aids according to the random method is (3300) and the standard deviation is (0.489); the arithmetic mean of the post-test is (7750) and the standard deviation is (0.35). The (sig) value used to determine the difference between the pre-test and the post-test is (0.000),

Table 2: The mean, standard deviation, and (Sig) values for learning 400-m hurdles performance

Variables	Pretest		Posttest		Sig. value	Indications
	Mean	Std	Mean	Std		
The experimental group used the educational aids according to the random method	3.3	0.489	7.75	0.35	0.000	Sig.
The control group that used the established method	3.35	0.47	5.7	0.51	0.001	Sig.

Table 3: The means, standard deviations, and calculated Sig value for the post-test for learning the performance of the hurdle step in the 400 m hurdles event

Variable	Experimental group		Control group		Sig. value	Indications
	Mean	Std	Mean	Std		
Learning to perform the barrier step	7.750	0.353	5.700	0.510	0.002	Sig.

which is <(0.05), indicating that there is a significant difference between the pre-test and the post-test, which is in favor of the post-test. The arithmetic mean of the control group using the established method is (3.35) and the standard deviation is (0.470) for the pre-test, and the arithmetic mean of the post-test is (5.700) and the standard deviation is (0.510). The (sig) value for understanding the difference between the pre-test and the post-test is (0.001), This corresponds to a value < (0.05), which indicates a significant difference between the pre-test and post-test in favor of the post-test. The researchers attributed this finding to the fact that incorporating multiple learning types into the learning process produces more positive results, which can have a positive impact on learning performance, especially if the learning process tends to improve performance. This happened to the members of the experimental group who were randomly assigned to practice with aids. The members of this group were given the same learning program. The responses of this sample in the study revealed positive results in learning performance in the 400 m hurdles race (Hossam El-Din, 1994, 296), which led to the development of this variable in the members of the research sample and the group members. As for the control group, the reason for learning and the results it obtained, especially in the post-test, was the result of using the exercises according to the established program, through which positive results were achieved. The response of the individuals of the two research samples and both groups, the experimental group that used exercises with educational aids according to the random method for the educational program variable and specific to learning the performance of the hurdle step for the 400 m hurdles event, gave a positive result in the practical part of the main section, in addition to the exercises and repetitions that the students performed during the educational units designated for learning the performance of the hurdle step for the event, as the participation of more than one variable within the independent variables and their employment together in learning the performance during the practical application helped in the acquisition (Ali, 2002, 45), which led to learning the hurdle step among the individuals of the research sample, and the control group used the followed method that gave a positive return despite it not rising to the results obtained by the experimental group.

- Present and discuss the post-test results of the 400-m hurdles performance of the two research groups:

From Table 3, it can be seen that the arithmetic mean of the post-test learning disability step performance of the experimental group is (7.750) and the standard deviation is (0.353), while the arithmetic mean of the post-test learning disability step performance of the control group is (5.7) and the standard deviation is (0.510). The (sig) value that determines the difference between the two groups is (0.002), and the corresponding value is < (0.05). This indicates that there is a significant difference between the two groups in favor of the experimental group, who practiced using teaching aids according to the random method. The researchers attribute the reason for obtaining this result to the student's interaction in using these educational tools according to the random method of exercises, which caused the formation of various motor programs that enable the student to recall them when needed in the motor performance during the application in the practical part of the program, which facilitates the process of understanding, comprehension and awareness of what is required to be accomplished through repetition of the performance and information that was given to the student learner the opportunity to focus on observing the motor performance accurately. To modify his performance, this was confirmed by Thompson (1996): "No matter what method is used to teach the skill, practice alone is not sufficient for the student to learn the skill correctly" (Thompson, 1996, 18). Thus, the student has developed the correct movement path for the hurdle stride for the 400 m hurdles event and created a movement program appropriate for the performance of the event.

CONCLUSION

1. The use of educational aids according to the random method has a positive impact on the learning process for the hurdle step in the 400 m hurdles event
2. The effectiveness of exercises and their use according to the random method and using educational aids is the best method for the learning process through results
3. The involvement of more than one variable during educational units may yield more positive results.

RECOMMENDATIONS

1. Emphasize the involvement of more than one variable together in the learning process
2. The necessity of taking into account the type of activity or motor performance along with the student's level and orientations in the learning process, as this is the shortest path to achieving good results

3. The necessity of selecting independent variables that are optimal for learning for each activity or skill and for each age group.

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