Volume - 57 No. 1
QUARTERLY
April 2025 to June 2025

International Federation of Physical Education, Fitness and Sports Science Association

www.ifpefssa.org

IFCSS

ISSN 2231-3265
(Online and Print)

International Journal of Health, Physical Education & Computer Science in Sports

A Peer Reviewed (Refereed) International Research Journal

Published by :
Indian Federation of Computer Science in Sports
www.ijhpecss.org & www.ifcss.in

ISRA Journal Impact Factor 7.217
Index Journal of

INTERNATIONAL STANDARD SERIAL NUMBER INTERNATIONAL CENTRE

INTERNATIONAL Scientific Indexing

J-Gate largest E-Journal Gateway

ISRA JIF

I2OR

DRJI

EDITORIAL BOARD

ABOUT THE JOURNAL

International Journal of Health, Physical Education and Computer Science in sports ISSN 2231-3265 (On-line and Print) ISRA Journal Impact factor is 6.997. Journal published Quarterly for the months of March, June, September and December. IJHPECSS is refereed Journal. Index Journal of Directory of Research Journal Indexing, J-Gate, 120R etc.

International Journal of Health, Physical Education and Computer Science in Sports is multidisciplinary peer reviewed journal, mainly publishes original research articles on Health, Physical Education and Computer Science in Sports, including applied papers on sports sciences and sports engineering, computer and information, health managements, sports medicine etc. The International Journal of Health, Physical Education and Computer Science in sports is an open access and print International journal devoted to the promotion of health, fitness, physical Education and computer sciences involved in sports. It also provides an International forum for the communication and evaluation of data, methods and findings in Health, Physical education and Computer science in sports. The Journal publishes original research papers and all manuscripts are peer review. Index Journal of Directory of Research Journal Indexing and J-Gate etc. The Indian Federation of Computer Science in Sports has been set up the objectives of Dissemination of scientific knowledge concerning computer science in sport and Physical Education. Providing a forum for the exchange of ideas among the Physical Educationists,Coaches,Sports Experts Etc. It is a Peer Reviewed (Refereed) International Research Journal.

Publisher

Indian Federation of Computer Science in sports,
www.ijhpecss.org and www.ifcss.in under the auspices of International Association of Computer Science in sports.
E-mail: rajesh2sports@gmail.com

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265
Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal
International Federation of Physical Education, Fitness and Sports Science Association

CONTENTS

Research Articles

Review Article

Research Article

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

The electrical activity of the lower extremity muscles and its relationship to the accuracy of defending court skill in Volleyball

Omar Sabah Jameel

College of Literature, Aliraqia University, Iraq

ABSTRACT

The research objectives are to identify the relationship between the electrical activity of the lower limb muscles and the accuracy of the field defense skill for volleyball players. The research hypothesized the existence of a statistically significant correlation between the variables. The descriptive approach was used to suit the research problem, with the sample consisting of (10) players from the National Center for Talented Athletes in volleyball. To implement the research steps, appropriate tests were used for the research variables. The researcher concluded that there is a statistically significant relationship between the electrical activity of the lower limb muscles and the accuracy of the field defense skill for volleyball players. In the recommendations, the researcher emphasized the importance of electrical activity, as it has a direct impact on the skill performance of the field defense skill.

Keywords: Activity, Electrical, Muscles, Volleyball

INTRODUCTION

In recent years, the field of sports training has been profoundly influenced by advances in science and technology. The structure, organization, and methodology of the training process have evolved to align with these developments, integrating modern techniques specifically tailored to the age and capabilities of trainees. Coaches continuously seek the most effective and up-to-date methods suitable for specialized activities, aiming to harness the specificity of training associated with each sport to achieve measurable improvements in athletic performance.

Volleyball holds a prominent position globally, maintaining widespread popularity and admiration among sports enthusiasts. Researchers in the field of physical education have devoted considerable attention to this sport, contributing to elevated performance standards, increased participation, and enhanced public appeal. Volleyball is distinguished by its rapidly changing dynamics, with swift transitions between offensive and defensive phases.[1] This calls for meticulous preparation on the physical, technical, tactical, and psychological fronts, enabling players to effectively control the court and smoothly adjust to shifting game dynamics. Volleyball performance is distinguished by its speed, unpredictability, and the fluid execution of consecutive, interconnected skills that require sharp precision. Consequently, players must develop physical, technical, and cognitive abilities to navigate the pressures and changing conditions of competition, especially during high-stakes or closely contested moments. While extensive research has already been conducted on volleyball performance, there remains a need to uncover innovative methods for identifying deficiencies and faults in motor performance and associated muscle electrical activity.[2] In this context, electromyography (EMG) devices and their related software play a crucial role in capturing and analyzing the electrical signals produced by skeletal muscles. These tools track and evaluate how frequently and strongly muscles contract, which is very important in a game like volleyball that requires much neuromuscular coordination. An accurate evaluation of the condition of the neuromuscular system and the speed at which neural impulses reach the muscles is essential for making accurate defensive actions on the court and for knowing and

Address for correspondence:
Omar Sabah Jameel
E-mail:

predicting the way in which motor units within the muscles activate. Volleyball requires quick changes between various movements; therefore, neuromuscular response speed becomes very crucial. Hence, this study attempts to relate electrical activity in lower limb muscles to the accuracy of defense skills in volleyball players.

Research Problem

Volleyball is played more off the fast switching of play between attack and defense and quick transitions from one skill to the next. Hence, it calls for intense focus and quick execution. While watching athletes at the National Center for Talented Sports, in particular on the accuracy of their defensive skills, there was a clear deficiency in both focus and speed when sliding into defense. From this observation, a problem was born. Therefore, the researcher opted to use an EMG device to detect electric activity as well as signals that are wavefronts created when lower limb muscle action takes place. This signifies impulse nerve transmission speed which consequently relates to how fast muscles move; hence, this applies in terms of required accurate defense skills.

Research Objective

- To identify the relationship between the electrical activity of the lower-limb muscles and the accuracy of the defense skills of volleyball players.

Research Hypothesis

- There is a statistically significant correlation between the electrical activity of the lower-limb muscles and the accuracy of the defense skills of volleyball players.

Research Areas

- Human area: A sample from the National Center for Volleyball Talent Care, Baghdad Governorate
- Temporal area: From January 04, 2025, to March 27, 2025
- Spatial area: The sports hall of the National Center for Volleyball Talent Care, Baghdad Governorate.

Research Methodology and Study Design

The descriptive approach was used to suit the research problem, "as the descriptive approach represents an accurate perception of the interrelationships between society, trends, inclinations, desires, and development, providing a picture of the reality of life, establishing influences, and constructing future predictions" (1: 40).

Research Community and Sample

The research community was intentionally selected, representing (18) volleyball players from the National Center for Talent Care in Baghdad Governorate. The research sample consisted of (10) players, representing 55.55% of the research community. Players were selected for the pilot experiment from outside the research sample.

DEVICES, RESEARCH TOOLS, AND DATA COLLECTION METHODS

Devices and Research Tools

- EMG device
- Sensors for transmitting the electrical signal during the EMG
- Electrical cable for transmitting the electrical signal from the sensors to the calculator
- Dell calculator
- Volleyball court
- (5) volleyballs
- Stopwatch.

Metric Tape Measure and Colored Tape

1. Data collection methods
    - Arab and foreign sources
    - Tests used
    - The Internet.

TESTS USED IN THE RESEARCH

First Test: EMG[3]

The researcher employed an EMG device that operates wirelessly through Wi-Fi. The system components included a Dell processing unit, a rechargeable battery designed to receive and interpret electrical signals, a connection cable, and small batteries integrated with the probes. These probes were carefully positioned on the target muscle using adhesive tape to ensure stable contact for electrical signal acquisition. For this study, the probes were attached specifically to the rectus femoris and gastrocnemius muscles. Each muscle was equipped with one signal battery and two probes, ensuring that the batteries were fully charged and capable of maintaining a stable connection with the processing unit over a maximum range of 45 m. Once the probes were properly affixed and the signal calibration between the probes and the processing unit was confirmed, the player prepared for the testing procedure. The test protocol involved the player performing a defensive volleyball skill on the court following an auditory cue (whistle), with the ball being served from the opposite side of the court. The procedure was repeated after a 30-s rest interval, and the best performance out of the attempts was selected for analysis.

The processing unit was equipped with software that read, analyzed, and converted the collected analog data into digital outputs, allowing the extraction of the specific electrical muscle activity variables under investigation. The researcher's responsibility included properly positioning the surface electrodes on the apex and midsection of the target muscle to capture precise electrical signals transmitted from the brain to the activated muscles. These signals were relayed to the conversion unit, which displayed the signal's amplitude and

waveform. Before electrode placement, the target skin area was prepared by shaving any hair, cleansing the surface, and wiping it with a disinfectant solution (Dettol) to remove skin oils and secretions. This preparatory step minimized skin resistance and ensured optimal signal conductivity, thereby enhancing the quality of the EMG recordings. Once the preparation was complete, the electrodes were securely attached to the designated muscle for measurement of electrical activity.

Second Test

Accuracy for the skill of defending the field from the backcourt.[4]

- Purpose of the test: To measure accuracy for the skill of defending the field.
- Equipment used: A legal volleyball court, (5) balls, and colored tape to divide the court, as shown in Figure 1.
- Performance specifications: The player stands ready to defend against smashes in center (1). The coach stands on the opposite court at a table to perform smashes toward the backcourt. The player performs the defense as required by the situation.
- Performance conditions: Each player is given (3) attempts for each zone (1, 6, 5), with a maximum score of (27). If the defended ball goes outside, a (0) is given for the attempt.
- Scoring: The player is given the score for the zone in which the ball lands.

The Exploratory Experiment

The exploratory experiment serves as a scaled-down version of the main experiment, designed to replicate its conditions and circumstances to ensure the validity of subsequent results. To achieve this, the research support team carried out the exploratory phase at the National Center for Talented Sports in Baghdad Governorate at 4:00 p.m. on Saturday, January 04, 2025, using a group of players who were not included in the main research sample. The aim of this preliminary experiment was to determine whether the chosen tests were suitable for the participants' individual performance levels, to estimate how much time would be needed to conduct the tests, and to assess the research support team's capability and preparedness in effectively overseeing the testing procedures.

The Main Experiment

After carrying out the exploratory experiment to prove that the tests were right and the team suitable, ready main experimental procedures could be conducted to evaluate the studied variables through a research sample. These evaluated tests were carried out in the sports hall at the National Center for Talented Sports located in Baghdad Governorate on Saturday, January 11, 2025, at 4:00 p.m. The researcher ensured that both spatial and timing conditions matched those during the exploratory phase so as to maintain as much uniformity and control within the experiment as possible. Immediately after testing had been done, all data collected were assembled and cleaned up ready for statistical analysis in line with addressing the research objectives of study.

Statistical Methods (3)

- Percentage.
- Mean.
- Standard deviation.
- Pearson's correlation coefficient (r).

RESULTS

- Presentation, analysis, and discussion of results.

Based on the data presented in Table 2, the mean for the peak variable of the rectus femoris muscle during the test was recorded at 818.21, while the mean accuracy score for the defensive skill on the court was 15.70. Following statistical analysis, the calculated Pearson correlation coefficient (r) between these variables was determined to be 0.730. Given that the critical (tabular) value of (r) at a degree of freedom (df) of 8 and a significance level of 0.05 is 0.632, the calculated r-value exceeds the tabular threshold, indicating the presence of a statistically significant correlation between these variables.

In the same vein, the table shows that the average for the area under the curve (AUC) of the rectus femoris muscle was 459.75, while the mean defensive skill accuracy stayed at 15.70. The statistical analysis yielded a calculated r-value of 0.665, surpassing the tabular r-value of 0.632 for the given degree of freedom and significance level, confirming a significant correlation. Moreover, the average peak value for the gastrocnemius (hamstring) muscle was 697.18, with the defensive skill accuracy score also at 15.70. The computed r-value was 0.729, which is greater than the tabular value, and hence, it can be said that there exists a meaningful relationship between these variables. The mean AUC recorded for the gastrocnemius (hamstring) muscle was 524.67 and that of defensive skill accuracy score was kept at 15.70. The computed r-value was 0.754 which exceeded the tabular threshold of

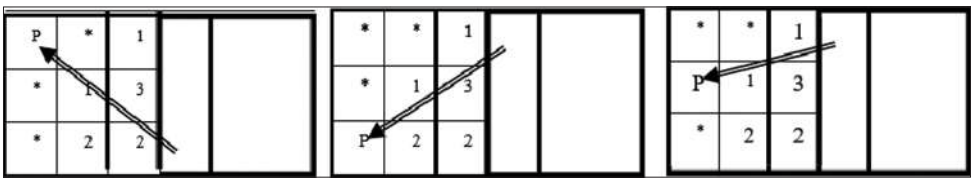


Figure 1: Illustrates the accuracy test for field defense skills

Table 1: The research community and sample

Research community	Experimental research sample	Research sample percentage	Exploratory trial players
18 players	10 players	55.55	2 players

Table 2: The values of the means, standard deviations, and correlation coefficients calculated for the variables of electrical muscle activity and the accuracy of the defensive skill on the field for the research sample

Variables	Mean	(r) value*	Significance of differences
Rectus femoris (amplitude)	818.21	0.730	Sig.
Defensive skill accuracy	15.70		
Rectus femoris (area)	459.75	0.665	Sig.
Defensive skill accuracy	15.70		
Galves muscle (Geminis) amplitude	697.18	0.729	Sig.
Defensive skill accuracy	15.70		
Galves muscle (Geminis) area	524.67	0.754	Sig.
Defensive skill accuracy	15.70		

*The tabular value of (r) is (0.632) with a degree of freedom of (8) and a significance level of (0.05)

0.632 so it can therefore be confirmed that there is a statistically significant correlation between these measures.

DISCUSSION

From [Table 2], we note that there is a significant correlation between muscle electrical activity and the accuracy of defensive skills on the field. In light of this, any improvement in muscle electrical activity leads to improved skill performance.[5] The researcher attributes this relationship to the fact that electrical mapping of the working muscles gives us a clear understanding of the nature of movement occurring in the muscles, "because motor effort is not a fixed, localized activity, but rather moves along the muscle fiber until it reaches its ends and disappears there. During its movement, it creates an electromagnetic field around the fiber that can be recorded by an EMG device."[6] This electromagnetic field is small in the material. When a group of fibers, or all of them, of the same muscle, are working as a result of excitation, the electric field becomes much larger, and recording it by the devices becomes easier.

The more organized the motor units are, the more improved the nerves' work is to stimulate the muscles to perform their work continuously. This also provides information related to the length of the activity period associated with the temporal execution of the performance, as "there is a short period of time between the appearance of electrical activity within the muscle and the appearance of movement of one part of the body, as this period lasts." About (30) fractions of a second, which is insignificant when it comes to the interval analysis of muscle activity."[7]

We attribute part of the reason for this period to "the chemical changes that occur before the muscle can contract, in addition to the muscle's need to remove slack before the joint movement or part of the body's movement appears."[7]

CONCLUSION

1. There is a high statistical connection between the electric action of the lower leg muscles and the players' talent to make exact guard moves on the court.
2. Growths in the electric action of these muscles help raise skill performance.

RECOMMENDATIONS

1. The study suggests using an EMG tool and doing the same studies to look into links between the electric action of upper leg muscles and their effect on volleyball skill performance.
2. Investigate new and effective strategies for enhancing skill performance in volleyball.
3. Apply the study's conclusions to improve the accuracy of defensive skill performance on the court at the National Center for Talented Volleyball.

REFERENCES

1. Zahra HA. Emotional Response and Its Relationship to the Skill Self of Volleyball Players, Master's Thesis. Baghdad: College of Physical Education, University of Babylon; 2002.
2. Daim AA, Am T. Volleyball Coach's Guide - Tests, Planning, Records. Cairo: Dar Al-Fikr Al-Arabi; 1999.
3. Al-Tikriti WY, Al-Ubaidi HM. Statistical Applications and Uses of Computers in Physical Education Research. Mosul: Dar Al-Kutub; 1999.
4. Al-Talib DM, Abdullah AM. The percent contribution of some aspects of muscle strength in the legs to the achievement of the 100, 200, and 400-meter runs, In: Presented at the Thirteenth Conference of Colleges of Physical Education in Iraq, held by the College of Physical Education at the University of Diyala; 2002.
5. Basmajian J, Luca G. Muscles Alive- Biltm Ore. United States: Williams and Wilkins; 1985.
6. Criswell E. Introduction to Surface Electromyo Graehy. 2nd ed. United States: Jones and Bartlett Publisher; 2011.
7. Waters RL, Morris JM. Electrical activity of muscles of the trunk during walking. J Anat 1972;111:191-9.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

The effect of lactate resistance training with sodium bicarbonate on speed endurance, blood pH, and 800 m performance in under - 20 years

Hussein Allawi Abed[1], Wathiq Raheem Eakat[2], Ali AbdulAmir Hussein[1]

[1]College of Physical Education and Sports Sciences, University of Karbala, Iraq, [2]Ministry of Education, General Directorate of Education in Karbala, Iraq

ABSTRACT

Improving the efficiency of muscle fibers when there is a large accumulation of lactic acid In muscles and improving The ability of these fibers to break down and break down lactic acid to produce the energy needed during intense exercise, are the keys to increasing speed endurance and improving physical ability function efficiently at a low pH, which is a high indicator of the efficient physical functions organs and systems. Furthermore, providing a high base reserve in a scientifically precise manner by consuming doses of sodium bicarbonate helps increase the physical ability to resist the increase in hydrogen ions, which causes a decrease in blood pH. This reserve increases physical ability to withstand training doses, this in turn is reflected in improved athletic performance during the competition. The study objectives to: (1) Identify the effect of lactate resistance exercises accompanied by sodium bicarbonate on speed endurance, blood pH, and 800 m performance in under-20 athletes. (2) Determine the strengths of the two experimental groups with respect to the study variable. The researchers used an experimental method and formed two equal experimental groups that were consistent with the research objectives and hypotheses. The subjects included runners in the 800-m U20 event from the Middle Euphrates Governorates (Karbala, Babylon, Najaf, Diwaniyah) and the capital Baghdad. The researchers randomly selected 10 runners as the study sample, which accounted for 62.5% of the study population. The main conclusions of the researchers: (1) The exercises prepared by the researchers for the second experimental group members, combined with scientifically regulated sodium bicarbonate administration, had a positive impact on the development of the study variables.

Keywords: Endurance and blood pH, Lactate, Resistance

INTRODUCTION

Track and field are a sport that is popular all over the world. It is distinguished from other sports by the wide variety of competitions that take place. The 800-m race is one of the most exciting, thrilling, and competitive events in running. This competition is based on the production of energy through the anaerobic lactic acid system. The uniqueness of this event places considerable stress on the body's functional systems, as lactic acid accumulates in muscle fibers during training and competition. Therefore, as the amount of lactic acid/lactate and hydrogen ions accumulate in the blood, athletes experience muscle pain, slow down, and eventually stop exercising altogether. Improving the efficiency of muscle fibers when large amounts of lactic acid accumulate in muscles and improving their ability to break down and clear lactic acid to produce the energy needed during intense exercise, is key to developing speed endurance and improving physical performance. It works effectively at low pH, which is a good indicator of organ and system performance in the body. In addition, providing a high alkaline reserve in a scientifically precise manner through the intake of sodium bicarbonate helps improve physical performance and counteract the increase in hydrogen ions that causes the blood pH to drop.[1]

This reserve increases the body's ability to adapt to the training load, which is reflected in the development of sports performance during competitions. This requires professionals and experts in training and sports physiology to prepare

Address for correspondence:
Ali AbdulAmir Hussein,
E-mail: ali.abdulamir@uokerbala.edu.iq

various exercises based on lactate accumulation in order to develop muscle fiber function during periods of high lactate accumulation. The most important exercises for creating such conditions are lactate resistance exercises during training, the variations of which depend on the intensity, volume, and duration of the stimulus. Their goal is to increase accumulation by injecting bicarbonate before training. This helps to accept the excessive increase in hydrogen ions that accompanies the increase in lactate, contributes to the development of speed endurance, and improves the body's adaptation. Even if the pH value drops, the performance remains efficient, which this is reflected in the development of motor skills.

Research Problem

Through field observations and experience of researchers who have been engaged in research in this field for a long time, as well as interviews with coaches, they found that young people's performance in middle-distance running, especially in the 800-m run, was significantly reduced. This prompted them to investigate the reasons for the poor performance. They attributed this to the fact that many training plans developed by experts did not pursue clear goals. These training plans are not precisely prescribed but are based on the amount of lactic acid accumulated muscle fibers after training, depending on how the runner trains. The primary system for this activity is the lactic acid system. In order to develop this capacity, training is required to change the level and amount of lactic acid accumulated during the weekly training cycle. In addition, many coaches avoid the use of sodium bicarbonate due to the lack of accurate scientific evidence on this dietary supplement and its effectiveness.

Research Objectives

1. To identify the effect of lactate resistance exercises combined with sodium bicarbonate on speed endurance, blood pH, and 800 m performance in under-20 s
2. To identify the superiority of the two experimental groups in the studied research variables.

Research Hypotheses

1. Lactate resistance exercises combined with sodium bicarbonate have a positive effect on speed endurance, blood pH, and 800 m performance in under-20 s.
2. The second experimental group has an advantage over the first experimental group in terms of the research variables examined.

Research Areas

- Human area: Middle Euphrates and Baghdad runners in the 800 m event under-20 s.
- Time area: From October 10, 2024–February 11, 2025.
- Spatial area: The Euphrates River and the stadium in Baghdad.

Research Methodology

The nature of the problem to be investigated determines the research method to be used. Since the research problem was experimental in nature and required the application of a training program, the researcher adopted an experimental approach and designed two equal experimental groups that were in line with the objectives and hypotheses of the study.

Research Population and Sample

The study subjects included runners participating in the 800 m U20 event from the Middle Euphrates Governorates (Karbala, Babylon, Najaf, Diwaniyah) and the capital Baghdad. The researchers randomly selected 10 runners as the study sample, accounting for 62.5% of the study population. The sample was divided into two experimental groups in the same way, with five runners in each group.

The researchers processed the homogeneity of the research sample members using variables such as height, weight, and training age, and used Levene's law to conduct statistical analysis on the above variables, as shown in Table 1.

Table 1 shows that the significance level for all variables was greater than the significance level of (0.05), indicating the absence of significant differences among the research sample members, indicating their homogeneity in these variables.

METHODS, DEVICES, AND TOOLS EMPLOYED IN THE RESEARCH

- Observation
- Personal interview
- Experiments and measurements
- Electronic device for the measuring of height and weigth
- (2) The Sony cameras (Japanese)
- ACER electronic calculator. Medical cotton
- Sterile material
- (12) Blood storage tubes
- (12) Blood drawing syringes
- (2) Chinese whistles
- (4) Chinese stopwatches
- (4) 30 cm cones.

Field Research Procedures

Determining the method of using sodium bicarbonate

Available evidence suggests that blood bicarbonate concentrations above +5 and +6 mmoL/L are necessary for potential or near-definite improvements in exercise performance. Intake The typical daily dosage of 0.3 g/kg of body weight (BM) is the most common dose that is sufficient to increase the absolute concentration of blood bicarbonate to this value. Despite the significant increase in bicarbonate, doses >0.3 g BM have not demonstrated additional benefits when

Table 1: Indicates the uniformity of the research participant's samples

Variables	Units	df between groups	df inside groups	Levene's value of the mean	Morale level	Type of statistical significance
Height	Cm	1	8	1.100	376.	Sig.
Mass	Kg	1	8	148.	741.	Sig.
Training age	Month	1	8	638.	469.	Sig.

df: degree of freedom

compared to the base level. Doses of 0.1 g BM are insufficient to increase circulating blood bicarbonate concentrations and do not appear to improve training effects. Some researchers have reported similar maximum absolute increases in circulating bicarbonate and similar training effects following intake of 0.2 and 0.3 g/kg BM. This suggests that timing supplementation to coincide with peak alkalosis may be beneficial to maximize the effectiveness of sodium bicarbonate supplementation and improve exercise performance.[2]

It appears logical to believe that the greatest ergonomic effect is caused by the administration of sodium bicarbonate. For the most severe cases of alkalosis, the most common strategy is to give sodium bicarbonate 60–180 min before exercise. Despite the fact that these numbers have been questioned in multiple studies, some studies have demonstrated that the ingestion of 0.3 g/kg sodium bicarbonate results in the highest concentrations of blood within 10–180 min of ingestion. As a result, a singular strategy of sodium bicarbonate intake that is designed to align the peak of alkalosis with the onset of exercise may be more beneficial than a general approach. Individualized strategies have demonstrated a high degree of consistency in the time required to achieve the greatest possible blood pH and bicarbonate responses. However, individuals who take this approach require an understanding of the blood pH response to be able to adjust the time frame dynamically in order to achieve optimal performance. This may be challenging for athletes who participate in recurring activities throughout the day or who have a strict schedule.

Defining tests and measuring research variables

The researcher surveyed scientific sources and some dissertations and theses related to the research topic and identified the following tests:

1. Kosmin's 1 × 2 run test to measure speed endurance
2. Blood pH measurement after the achievement test.

Test description

First: Kosmin's test.[3]

- Purpose of test: To measure speed endurance.
- Test requirements: Field - Stopwatch - Whistle – 50 m metal tape measure - Cones - Registration form - Recorder - Timekeeper - Absolute value.
- Performance description: 1 min × 2 sprints, with (3) min rest between each repetition. Each pair of runners is tested together after warming up. The test begins from a high starting position. At the start signal, the runners run for a full minute. After the timekeeper blows the whistle, the runners stand and rest for 3 min. After the rest period, the referee signals the start of the second rerun.
- Recording method: The distance traveled by the runners during each iteration is documented on a form that the researcher creates, this form is accurate to meters.

Second: 800 m achievement test[4]

- Purpose of the test: To measure blood pH and study sample performance.
- Test requirements: A legal field, stopwatch, starter, three timekeepers, recording equipment, phlebotomist, blood collection tubes, blood collection syringes, and registration form.
- Performance description after the warm-up: After this phase, the study sample is subjected to an 800-m run. Each pair of athletes begins the competition. The trial begins by standing. After the instruction to "sit down" was given to both test subjects, they were prepared to begin. The starter then whiffs out the starting signal, and the two test subjects are allowed to complete two laps of the field at the greatest speed possible. After completing the 800 m run, the timers stop their clocks and take the midpoint to ensure the objectivity of the test. A 5-min rest period is then given, as this time is considered the optimal time for measuring physiological variables after physical exertion. Blood is then drawn by specialists, and placed in a special tube for transport to the laboratory to measure blood pH.[5] The same procedure is followed. Each pair of test subjects is tested separately, and the data is collected and recorded.
- Recording method: The time to completion is estimated using a wristwatch that is accurate to within the hundredth of a second.

Pretests

Before the practice sessions prepared by the researcher began, he conducted preliminary tests on the subjects on 2 days, 1 day apart. The preliminary tests were conducted on Tuesday, December 10, and Thursday, December 12, 2024. The preliminary tests measured speed endurance, and the 800-m test measured performance and blood pH. The experiments were conducted on the trail of the Olympic Stadium in Karbala. The researcher attempted to create all of

the conditions associated with the tests, including location, time, and method of implementation, as well as the support team, in order to standardize the conditions for the posttest. The testing distribution was as follows:

- Tuesday, December 10, 2024
- 9:00 am/cosmin test to measure speed endurance
- Thursday, December 12, 2024
- 9:00 am/800 m test and blood pH measurement.

Equivalence procedures

In order for researchers to detect differences between two experimental groups and attribute them to experimental factors, "the two group variables under study must be identical and homogeneous under all conditions except for the experimental variable affecting that group."[6]

As a result, the researchers conducted a comparison of the two groups using metrics like speed endurance, blood pH, and performance. Next, based on the outcomes of the initial measurements and experiments, the researchers employed parametric statistical principles (*t*-tests) to conduct an equivalence test between the control group and the experimental group for two independent and equal samples, as shown in Table 2.

Main experiment

After conducting preliminary testing, the researcher created exercises that used sodium bicarbonate as their sole source of energy, these were incorporated into the weekly training regimen for 800-m runners to create variables that would be used in the experimental group's study. This was derived from the analysis of multiple scientific documents and sources. The researcher considered the educational background and physical capabilities of the participants in the experimental group. He also had control over the experimental variables by working with the trainers to make sure that the training objectives of all participants in the experimental group were consistent. The training's primary characteristics were:

- Training units were implemented during the special preparation phase
- Exercises began on Sunday, December 15, 2024
- The exercises that were part of the training regimen were continued for a period of (8 weeks)
- The quantity of training units per week was 2 units, which totaled 16 units for the prepared exercises
- The training unit's days were: Sunday and Wednesday
- The researcher employed the high-intensity period and repetitive training approach
- The training duration was between 80 and 115% of the intended duration for each sample member, based on the results of the pre-tests. The practice of the exercises intended for the training program was completed on Sunday, February 16th, 2025.

Post-tests

After completing the exercises designed by the researchers and incorporated into the training regimen, the researchers conducted a pretest on February 18 and 20, 2025 (Tuesday and Thursday) at the same location and time, with the control and experimental groups following the same steps as the pretest of the study variables, and did so as much as possible.

Statistical Methods

The researcher chose relevant statistical methods to compare the results of the pre- and post-test measurements. He used the Statistical Packages for the Social Sciences statistical package, which included the following:

- Mean
- Skewness coefficient, coefficient of variation
- Standard deviation
- *t*-test for independent and matched samples.

RESULTS

- The presentation and analysis of the results of the pre- and post-tests on variables like speed endurance, blood pH, and performance for the first experimental group (lactic acid resistance training):

Table 3 shows the statistical parameters of the pre-test and post-test results for variables such as speed endurance, blood pH, and strength before and after lactate resistance training for the participants of the first experimental group. The results show that the average scores in the post-test were better depending on the level of measurement of the variables (speed

Table 2: The equivalence of the two research groups in terms of tests and measurements of the studied variables

Variables	Groups	Mean	Std	(*t*) value	Morale level	Type of statistical significance
Speed tolerance	Experimental 1	783.8	6.301	1.65	0.139	No sig.
	Experimental 2	777.6	5.595			
Ph blood	Experimental 1	7.042	0.016	0.196	0.849	No sig.
	Experimental 2	7.04	0.0158			
Achievement	Experimental 1	2.032	0.013	−0.87	0.412	No sig.
	Experimental 2	2.038	0.0084			

Table 3: Displays the average, standard deviation, mean difference, standard error of the difference, calculated *t*-value, significance level, and the statistical significance type of the first set of experimental studies

Variables	Teste	Mean	Std	Mean diff.	Std diff.	(*t*) value	Morale level	Type of indication
Speed tolerance	Pre	783.8	6.301	−6	1.414	−4.243	0.013	Sig.
	Post	789.8	3.8341					
Ph blood	Pre	7.042	0.01643	0.01	0.011	1.633	0.18	No sig.
	Post	7.034	0.0114					
Achievement	Pre	2.032	0.01304	0120	0.0040	3.207	0.03	Sig.
	Post	2.02	0.00707					

endurance and strength). This can be demonstrated by using the significance level of the statistical law of related samples (T), because all these variables were below the significance level (0.05), This indicates that the two tests had significant benefits towards the post-test. The results also demonstrated that there was no significant difference between the pre- and post-tests regarding the blood pH variable. This can be proved by using the significance level of the statistical law of dependent samples (*t*) because the variable was greater than the significance level (0.05), indicating that there was no significant difference between the two tests.

- Present and analyze pre- and post-test results for speed endurance, blood pH, and performance variables for the second experimental group (lactic acid resistance training with baking soda):

Table 4 shows the statistical parameters of the pre-test and post-test results of the speed and power variables of the second experimental group using sodium bicarbonate for lactic acid resistance training. The results show that the mean values of the variables (aerobic capacity, lactate threshold speed, speed, and power) in the post-test and according to the measurement level are good. This is confirmed by the significance level of the *t*-test for related samples. All of these variables were below the significance level (0.05). This indicates that the second test was more successful than the first, which suggests that there were significant differences between the two tests. The results demonstrated that there were no significant differences between the pre- and post-tests or between the levels of blood pH in regard to measurement. This was substantiated by the degree to which the *t*-test for associated samples was significant. This variable was significant ($P < 0.05$), which indicates that the two tests were not significantly different.

- Discussion of the pre- and post-test results of the two test groups on variables such as speed endurance, blood pH, and performance:

Tables 3 and 4 show that there were significant differences between the pre- and post-test results of the two experimental groups, with the post-test results being better for variables such as speed, endurance and power. The researchers attributed the significant differences between the two groups to the effectiveness of the exercises developed and executed by the participants of both groups, as well as good planning. Ahmed Yusuf emphasized the following points: "Planning is one of predictive procedures based on a large body of real-life research, which takes into account experience, existing material and moral possibilities, and the results that can be achieved in order to achieve a specific goal, namely, to prepare the athlete to perform at the highest level." This is consistent with Jamal Sabri's statement that "an appropriate training program enables the athlete to reach the highest level of physical, athletic, technical and psychological preparation in training and competition and to maintain this level for as long as possible through organized training."[7] The first experimental group members performed lactic acid resistance exercises. These exercises were characterized by the correct regulation of the intensity, volume, and duration of the stimulus. Their goal was to improve physical performance in highly acidic conditions, thereby increasing the ability of fast-twitch muscle fibers to work in the presence of high lactic acid accumulation in the muscles. This contributed to the development of speed endurance, which, in turn, was reflected in the development of performance. In the second experimental group, the researchers emphasized lactate resistance training in a scientifically standardized manner and administered sodium bicarbonate supplementation doses, as indicated by the researchers in the field study procedures during training. This had a significant effect on increasing the basal reserve of blood pH, thereby increasing the body's acid resistance and lowering pH due to the increase in hydrogen ions associated with lactate accumulation during exercise. The researchers' practice is also characterized by the diversification of training cycles and the variation of intensity, training volume and rest time between each training session. In order to complete the tasks of the training plan or training cycle in accordance with the training objectives of each phase, the ratio between training volume and rest must be considered when designing or arranging training sessions and training loads in weekly cycles to reach monthly and ultimately annual levels. The adaptation process requires high-load training, but it is impossible to continue the same high load every day, which will lead to a

Table 4: Displays the mean, standard deviation, mean difference, standard error of difference, calculated *t*-value, significance level, and statistical significance type for the pre-test and post-test of the second set of experimental study variables

Variables	Teste	Mean	Std	Mean diff.	Std diff.	(*t*) value	Morale level	Type of indication
Speed tolerance	Pre	777.6	5.595	−18	2.2804	−7.894	0.001	Sig.
	Post	795.6	2.702					
Ph blood	Pre	7.04	0.016	0.01	0.0152	0.885	0.43	No sig.
	Post	7.046	0.0114					
Achievement	Pre	2.038	0.0084	0.032	0.004	8.552	0.001	Sig.
	Post	2.006	0.0055					

drop in level and overload symptoms. The researchers believe that based on the above research, we can say that the reason why the two groups of athletes made progress in the post-test is due to the systematic and continuous training plan because the sports training process is an organized and continuous process aimed at improving the level of athletes and reaching the highest level. This has been confirmed by (Eddington and Edgerton): "When a person performs physical exercise for days, weeks, or months, the structured training can improve his performance by adapting the body's systems to optimal performance of those exercises."[8] Tables 3 and 4 show the results of the blood pH measurements of the participants in the two experimental groups. It was found that the measurements before and after exercise did not change significantly, and there was no significant difference between the two measurements. The researchers attributed the lack of changes to the fact that the measurements were taken after physical exertion. Therefore, the researchers confirmed that the participants in the experimental group were able to run the 800-m test distance at a higher speed than in the pretest, and the phenomenon of speed reduction was the same as in the pretest. This indicates that the physical and functional capabilities of the participants in the experimental group have developed, improving the body's resistance to high lactate accumulation and the resulting increase in hydrogen ions.

- Presentation of the results of the post-tests regarding the variables of speed endurance, blood pH, and the achievement of the two experimental groups.

Table 5 illustrates the statistical data regarding the degree of tolerance to speed and the performance of the two experimental groups following the post-test. The results demonstrate that the average value of the variable "speed tolerance" of the second experimental group is greater than that of the first experimental group, because the variable is based on the distance traveled. The greater the distance, the more effective the communication. The results also demonstrate that the average performance of the second experimental group is less than that of the first experimental group, the variable's value is negative. This implies that the lower the average, the better the quality because the time component is considered when calculating. This is the level of significance associated with the application of the statistical law (*t*) for independent samples because all variables are smaller than (0.05), which indicates that the two groups have a significant difference in favor of the experimental group.

DISCUSSION

First: Speed Endurance

When we want to alter or improve a variable, we must consider the degree to which training and exercise are associated with it, as well as the specific nature of the variable and the degree to which it can be affected by specialists in the field, all of this is based on scientific sources, as well as the opinions of experts. As a result, the researcher confirms that the lactate resistance training he prepared, which aimed to force muscles, particularly fast twitch fibers, to work at high speeds when lactate levels accumulated in the muscles and blood, in addition to administering doses of sodium bicarbonate, which contributed to providing a high base reserve to absorb hydrogen ions associated with increased lactate accumulation, had a significant impact on developing Physical ability function in highly acidic conditions. This helped develop the speed endurance variable, as the individuals in the second experimental research sample were able to cover a greater distance in the post-test, confirming the increased ability of functional systems to cope with the large accumulation of lactate and the significant drop in blood pH caused by increased acidity. Middle-distance coaches often focus their training on the principles of external load, while relatively little attention is paid to the body's responses to external loads, as they represent internal loads. Consequently, many of today's 800 m runners may lack the mechanical and metabolic efficiency necessary to achieve the good race speed required for success, resulting in limited ability to handle sudden increases in tempo, run faster in the first lap, or finish quickly. Mechanical efficiency may refer to the high coordination of the neuromuscular system, while metabolic efficiency represents the physical ability provide the efficiency requirements necessary to maintain the pace of the 800 m race and adapt to tempo increases effectively.[9] As a result, the researcher emphasized the value of the exercises he

Table 5: Shows the means, standard deviation, calculated *t*-value, significance level, and type of statistical significance for the post-tests between the two groups for the studied research variables

Variables	Groups	Mean	Std	(*t*) value	Morale level	Type of indication
Speed tolerance	Experimental 1	789.8	3.8341	−2.765	0.024	Sig.
	Experimental 2	795.6	2.70185			
Ph blood	Experimental 1	7.034	0.0114	1.664	0.135	No sig.
	Experimental 2	7.046	0.0114			
Achievement	Experimental 1	2.02	0.0071	3.500	0.008	Sig.
	Experimental 2	2.006	0.00548			

designed, as they had a significant impact on the development of the speed of both groups. These exercises utilized the high concentration of lactate in muscle fibers during training sessions. This, in turn, had a significant impact on the body's anaerobic metabolic capacity, as well as increasing the muscles' capacity to deal with the amount of lactate produced. However, the beneficial effect was for the second experimental group, as the doses of sodium bicarbonate that were provided before conducting these exercises were regulated according to the weight of the person. This helped to create a significant reserve by increasing the stock of bicarbonate, which is considered one of the most important vital regulators in the body for repelling hydrogen ions. This led to an increase in the body's and muscles' resistance to working in strongly acidic conditions. This helps to increase the body's resistance to such training loads, which is reflected in performance development. The researcher claims that the high training intensity he applied during standardized exercises, as well as the duration of the stimulus and the control of lactate levels and lactate accumulation, made a significant contribution to the functional adaptation of the body's systems. This is reflected in the increased ability to mobilize as many fast-twitch muscle fibers as possible and improve their resistance to fatigue, thereby increasing speed, endurance, and performance. "In order to improve endurance in runners, functional adaptations need to occur that help the body become more resistant to fatigue," Buchheit stressed. "This requires the mobilization and conditioning of fast-twitch muscle fibers. This helps improve performance in a specific activity on a mechanical, physiological, and psychological level. To achieve this adaptation, the stimulus time must consist of short, repetitive training cycles of, for example, 15–120 s, with a recovery period of 2–5 min, and a training intensity of 90–120% of the target time, while maintaining constant lactate levels."[10]

Second: Achievement

One of the most complicated tasks in the field of physiology of training and sports is to elucidate the accurate relationship between the external and internal components of training load. This necessitates a scientific understanding of the nature of the requirements and the specific nature of the activity involved. In order to participate in athletic competitions, a sportsman must understand the physiological requirements of athletes, recognize their physical attributes, and develop training that is appropriate for the event and that promotes the growth and improvement of physiological and physical variables that are associated with the development of sports performance. Based on the data, the researcher emphasized the significance of the exercises conducted in the experimental groups, as they are closely associated with the specific event. These activities are intended to enhance the body's capacity to create and consume lactic acid, this is the primary energy source in this contest. They facilitate an increase in physical performance in extremely acidic environments. Earlier, it was mentioned that the purpose of exercise following each training session is to have a large amount of lactic acid built up in the muscle fibers and blood. By regulating the amount of sodium bicarbonate consumed before exercise, the capacity for lactic acid can be augmented, this increases the efficiency of the muscular tissue. This facilitates an increase in the capacity of muscle fibers to withstand intense training. Other than improving the participants' tolerance to speed, lactate levels were drastically reduced near the performance peak. Increasing these variables has a significant impact on improving sports performance, as the ultimate outcome of sports training is the improvement of these variables. Conversely, the researchers advocate that an accurate understanding of the connection between external and internal stress is considered paramount to the scientific foundation of sports success because the latter is the body's response to exercise. Based on the information, the researchers create training plans that alter the intensity and length of the stimulus and the amount of time between repetitions in order to match the athlete's abilities and physical and physiological performance requirements, according to the specific goals during training.[11]

White-Gregory states that athletes competing in 20-s to 4-min events should work on developing the ability to tolerate high lactate concentrations to improve performance. This can be achieved through repeated exercises lasting 10–120 seconds, during which the pH is reduced and very high levels of lactate (e.g., 12 mmoL/L) are produced in the blood. For this reason, this type of anaerobic endurance training is often referred to as "lactic resistance training." For athletes who have high

demands on anaerobic energy production and the ability to generate their own energy, this style of training offers an effective performance goal because it develops the body's bioenergetic capacity and improves their performance while developing the ability of muscle fibers to work at high lactate levels. This training is very demanding on the body and on the bioenergetic inside and outside the muscles. The recovery period between repetitions must allow for the restoration of cellular balance, including the return of pH to resting levels and the removal of lactate. And its oxidation, that is, the ratio of work to rest, should be in the range of (1:4) for this type of training (researchers rely on this ratio for exercise).

CONCLUSION

1. The exercises designed by the researchers for the members of the research sample in both experimental groups had a positive effect on the development of the research variables. The second experimental group had a advantage due to the standardized and scientifically conceived administration of sodium bicarbonate in the exercises.
2. The exercises accompanied by sodium bicarbonate contributed to the development of speed endurance and threshold, which in turn was reflected in improved performance.
3. Blood pH did not improve in the post-test because the performance test was not constant, which demonstrated that the sample members were able to improve performance by the same amount as the decrease caused by the increase in hydrogen ions associated with increased blood acidity.

RECOMMENDATIONS

1. The researchers recommend that the exercises used in the study be part of an expert 800-m training program because they help develop variables related to effectiveness
2. The need to provide certain supplements that increase the ability of vital organs to resist changes in pH that occur as a result of high-intensity exercise.

REFERENCES

1. Yousef A. Mutab: Sports Training Skills. 1st ed. Amman: Safaa Publishing and Distribution House; 2014.
2. Sabry J. Faraj: Strength, Power, and Modern Sports Training. Amman: Dijlah Publishing House; 2012.
3. Abdul HA. The effect of lactic capacity and lactate resistance exercises on speed. In: Reserve, Some Vital Regulators, Lactate Threshold and Level of Concentration, and the Achievement of the 800m run in Advanced Sprints, PhD Thesis. Kerala: University of Karbala, College of Physical Education and Sports Sciences; 2023.
4. Obaidat DI, *et al*. Scientific Research, its Concept, Tools, and Methods. Amman: Dar Al-Fikr Al-Arabi Publishing and Distribution House; p. 252.
5. Ali M. Musa: Modern Sports Training. 1st ed. Basra: Al-Nakhil Press; 2009.
6. Ali M. Al-Qat: Organ Functions and Training. Cairo: Dar Al-Fikr Al-Arabi; 1999. p. 27.
7. Saunders B, Artioli GG. Biochemistry of Buffering Capacity and Ingestion of Buffers in Exercise and Athletic Performance, School of Physical Education and Sport; Rheumatology Division. Brazil, Sao Paulo, SP: Faculdade de Medicina FMUSP, University of São Paulo; 2021.
8. Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. Part II: Anaerobic energy, neuromuscular load and practical applications. Sports Med 2013;43:927-54.
9. Edington DW, Edgerton VR. The Biology of Physical Activity. Boston: Houghton Mifflin Company; 1976.
10. Brian M. 101 Performance Evaluation Tests. London: British Library; 2015.
11. Gregory W. The Physiology of Training. British: British Library Cataloging; 2006.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

The effect of using the combined and distributed method of exercises in learning the technical performance of the discus throw event

Murad Ahmed Yass

University of Kirkuk/The College of Physical Education and Sport Sciences, Kirkuk, Iraq

ABSTRACT

Improving motor performance learning is one of the major challenges facing teachers and trainers in the field of physical education, especially when dealing with events that require complex technical skills, such as the discus throw. The research problem is that organizing training and rest periods within the educational unit is often left to personal discretion, negatively impacting student learning efficiency. Through his field experience, the researcher observed that there is a difference in the ease and difficulty of learning the technical performance stages of the discus throw. Some of these stages require precise division within the exercise, whereas others require sequential connection to achieve integrated motor performance. The researcher adopted an experimental approach to test these hypotheses. A sample of 40 second-year students from the College of Physical Education and Sports Sciences at the University of Kirkuk was selected and divided equally into two groups: an experimental group that received an educational program based on a combination of combined and distributed exercise methods and a control group that received a traditional program based on partial and total exercise methods without precise timetables for rest and work periods. The educational program included eight educational units, implemented over a month, two units per week. These included precise stages of skill presentation, division, and interactive reassembly, with planned rest periods allocated during the exercises. The results of the pre- and post-tests showed a significant superiority for the experimental group, who achieved significant progress in technical performance compared to the control group. The researcher attributed this improvement to the meticulous time management of the training, which contributed to improving motor skill consolidation and reducing mental load. As also noted, that combining the two training methods created a stimulating learning environment, enhancing student engagement and accelerating skill acquisition. In light of the results, the researcher recommended adopting this integrated educational method in teaching motor skills, not only in discus throw but also in other individual and group activities, given its proven effectiveness in improving the quality of learning.

Keywords: Exercises, Learning, performance and throw event, Technical

INTRODUCTION

Improving the level of motor skill learning and achieving optimal motor skill learning is always a primary concern for teachers and trainers in the field of learning and mastering sports skills. To achieve this goal, numerous methods and approaches have been explored to help teach motor skills. Among these approaches and approaches is exercise scheduling, a method for organizing learners' movement within the educational unit. The researcher has achieved outstanding results in this vital area of motor skill learning in various sports activities.

Address for correspondence:
Murad Ahmed Yass,
E-mail: m.alyass@uokirkuk.edu.iq

The method of implementing exercises and components of the educational unit is carried out through various procedures followed by the teacher, who uses various methods and approaches to implement the exercise, which is highly relied upon to achieve the desired skill development. Some have used the partial or total method as an educational approach, while others have used the method of random, sequential, fixed, and variable exercises, among others. Others have combined two methods in a specific way. We must clarify that the process of selecting an exercise implementation method and combining methods is subject to controls that depend primarily on the type of exercise, the specificity of the chosen skill or sports activity, the level of learners' abilities, and the teaching method or style. The discus throw activity includes technical stages of varying degrees of difficulty.[1]

This requires segmentation and integration of these stages when learning it in light of the specified ceiling within the curriculum. It also requires a balance between practice and rest periods for these technical stages to achieve multiple goals within the learning period. This maximizes the investment of time and effort through the process of combining the combined and distributed methods. Scientific evidence from studies and research confirms that the use of a combination of scheduling methods is one of the fundamental methods that yield effective educational results in learning motor skills.[2] The importance of this research lies in finding educational alternatives based on the integration of exercise scheduling methods and the two teaching methods that are appropriate for the discus throw activity and are compatible with its stages. Furthermore, it will enrich studies and research with scientific experimental attempts to achieve effective motor learning and perhaps enhance the evaluation of this activity within the college program, which plays a role in how the stages of the activity are learned, with some requiring segmentation, others requiring complete learning, and others requiring significant effort.

Research Problem

One of the essential foundations that teachers must follow when teaching sports games and activities is planning and organizing the learning method and techniques, scheduling the organization of the exercise and its distribution within the educational units in a manner that suits the learners' abilities, available capabilities, the type and class of skill, and the required effectiveness. There are considerations that play an important role in teaching the discus throw activity and the technical stages that this activity includes, which requires the use of exercise scheduling methods, which requires the learner to organize a balance between work, rest, and practice periods in a way that ensures the learner's comfort and safety, in light of the ease and difficulty of performing the technical stage of the activity.

Through the researcher's field observation as a teacher of athletics, he found that learning the technical stages of the discus throw and the ease and difficulty of learning the movements for the technical stages depend on the teacher's personal experience in how to deliver learning with little effort by paying attention to organizing practice periods and rest ratios between them. Some of them may need to be divided and others to link between the stages when performing them and the degree of their cohesion. The purpose of this is to address the problem. The researcher resorted to organizing rest periods between practice periods within the use of the grouped and distributed method and merging them together for the purpose of arriving at the best appropriate rest that is compatible with the discus throw effectiveness by choosing the best combination and using performance evaluation tests to know the effect of combining the two exercise methods.

Research Objectives

1. To identify the effect of using a combination of exercises using the clustered and distributed methods on learning the technical performance of the discus throw for second-year students at the College of Physical Education and Sports Sciences, University of Kirkuk.
2. To compare the experimental and control groups in the post-test on learning the technical performance of the discus throw for second-year students at the College of Physical Education and Sports Sciences, University of Kirkuk.

Research Hypotheses

1. There are significant differences between the pre- and post-tests of the two research groups regarding the technical performance of the discus throw for second-year students at the College of Physical Education and Sports Sciences, University of Kirkuk.
2. There are significant differences between the two research groups in the post-test regarding the effect of combining exercises using the clustered and distributed methods on learning the technical performance of the discus throw for second-year students at the College of Physical Education and Sports Sciences, University of Kirkuk.

Research Areas

- Human Area: Second-year students in the College of Physical Education and Sports Sciences, University of Kirkuk, for the academic year 2023–2024
- Time Area: March 20, 2024 to April 25, 2024
- Spatial Area: School and Sports Activities Department Stadium, Kirkuk.

Research Methodology

The researcher used the experimental method, designing two equivalent groups, one experimental and the other a control group, to suit the nature and problem of the research.

Research Population and Sample

The research population was selected from second-year students at the College of Physical Education and Sports Sciences, University of Kirkuk, for the academic year (2023/2024). The population was limited to both sections (C and D), totaling (92) students. The research sample, which was randomly selected, consisted of (40) students and was divided into two groups (a control group and an experimental group). A group of students were excluded for reasons including absenteeism and injuries, who were included in the pilot study. The sample percentage was (39.21%), as shown in Table 1.

Experimental Design

The researcher used the design called "the design of randomly selected equivalent groups with carefully controlled pre- and post-observation" (), and Figure 1 illustrates this.

METHODS OF COLLECTING INFORMATION AND DATA

1. Arab and foreign sources
2. The internet
3. Measurements, tests, and scientific observation
4. Questionnaire:

- A questionnaire to determine some of the components of physical and motor fitness that influence learning the technical performance of the discus throw event and the appropriate tests for it:

The percentage of (75%) or more was adopted as expert opinions, "The researcher must obtain an approval rate of (75%) or more from the experts' opinions,"[3] and Table 2 shows this:

Questionnaire to Determine Mental Abilities

The questionnaire was designed for the purpose of equality between the two groups. After it was completed, it was found that the percentage of agreement between (0% and 100%) of the experts' opinions is shown in Table 3.

Accordingly, the mental abilities that achieved an agreement rate of (75%) or more were taken into account.

Questionnaire to Determine the Scores of the Apparent Motor Construction Sections for the Technical Performance of the Discus Throw Event

A questionnaire was designed for the apparent motor construction sections of the event after reviewing scientific sources, and some similar studies were distributed to the experts[4] and the percentages of experts who achieved agreement (75%) or more were relied upon, as shown in Table 4.

Table 1: The statistics for the research community and its sample

Variables	Number of students	Exclusion
Total number	92	52
Experimental group, Section C	20	18
Control group, Section D	20	16
Number of experimental students		10
Number of infected students		6
Number of absentees		10
Number of participants in the activity		2

Questionnaire for the Educational Program for the Control Group and the Experimental Group

The educational program for the control group, which is considered (the educational program followed), was designed for eight educational units and distributed in the form of a questionnaire to a group of experts in the field of (motor learning, sports training, teaching methods, and athletics). After the experts agreed on the educational program for the control group, the clustered and distributed methods were introduced to it, and then the educational program was distributed to a group of experts in the field of (motor learning, sports psychology, and teaching methods) After the program was agreed upon in general, the researcher made the modifications that were fixed on the two programs.

Personal Interviews

A personal interview was conducted with experts in the field of motor learning and athletics. The interview addressed:

1. How the educational program was implemented and its suitability for the research sample
2. The timing of each exercise and the extent to which the exercise was appropriate for the research sample
3. How blended learning was implemented and the program's components.

Exploratory Experiments

An exploratory experiment is "a preliminary pilot study conducted by the researcher on a small sample prior to conducting his research, with the goal of selecting research methods and tools."[5] The researcher, the subject teacher, and the support team conducted the filming process for the educational program on students from outside the research sample and from the same research community, totaling (10) students, prior to implementing the educational program. The exploratory experiments included:

1. The first exploratory experiment for the filming process of the artistic performance of the discus throw event: The researcher conducted a exploratory experiment with the support team for the filming process of the artistic performance of the discus throw event, which was approved on March 17, 2024.

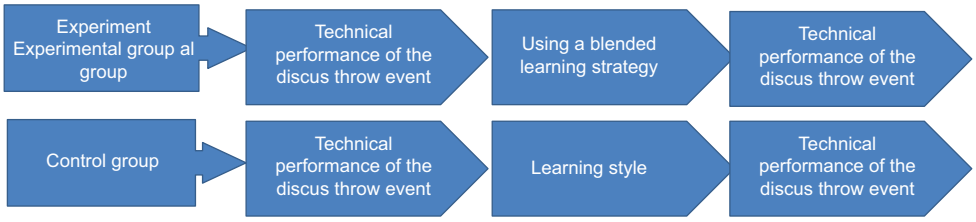


Figure 1: Illustrates the experimental design of the research

Table 2: The percentage of agreement among specialists regarding the most important elements of physical and motor fitness that influence learning the performance of the discus throw and its tests

S. No.	Elements of physical and motor fitness	Appropriate tests	Number of specialists		Percentage of agreement
			Total	Agreed	
1.	Explosive power of the throwing arm	Medicine ball throw test (3) kg	7	7	100
2.	Speed-power of the arms	Arm flexion and extension test (Shnow) from the prone position in (10 s)	7	6	85.71
3.	Speed-power of the trunk	Sit-up test (from a bent knee position)	7	7	100
4.	Flexibility	Front-down trunk flexion test from a standing platform	7	7	100
5.	Agility	Shuttle Run Test (4×10) m	7	6	85.71
6.	Static balance	Static balance test (stork stand)	7	7	100
7.	Coordination	Numbered circles test	7	7	100

Table 3: The percentage of agreement of the experts regarding the identification of the most important mental abilities

S. No.	Mental abilities	Number of specialists		Percentage of agreement
		Total	Agreed	
1.	Attention	7	6	85
2.	Concentration	7	6	85
3.	Reaction	7	1	14
4.	Perception	7	3	42
5.	Visualization	7	6	85
6.	Thinking	7	0	0
7.	Remembering	7	3	42
8.	Creativity	7	3	42
9.	Intelligence	7	6	85

Table 4: The average scores of the apparent motor construction sections for the technical performance of the discus throw according to the experts' opinions are shown

Apparent motor construction	Estimating grades (%)	Notes
Preparatory section	20	
A. Discus Hold	10	
B. Ready Stance	5	
C. Preliminary Swings	5	
Main Section	70	
A. Spinning	28	
B. Throwing Position	19	
C. Throwing	23	
Final Section	10	
A. Balance	10	
Total	100	

The purpose of the experiment was as follows:

- To identify the distance and height of the camera and the quality of its performance
- To determine the angle of the camera and choose the best location
- To assess the efficiency of the support team.

One of the outcomes of this experiment was to avoid errors that might occur during the initial filming experiment.

2. The Second Exploratory Experiment: The researcher conducted the second exploratory experiment on March 18, 2024, at 8:30 a.m., applying the educational program for the control group.
3. The Third Exploratory Experiment: The researcher also conducted the third exploratory experiment, which was on March 18, 2024, at 10:30 a.m., applying the educational program for the experimental group. The objectives of the second and third exploratory experiments were to:

- Verify the validity of the educational program for the control and experimental groups
- The duration of the educational unit and its sections and their suitability for the specified time
- The extent to which the exercises in the educational program are appropriate and valid for the research objectives
- Identify and prepare for any errors, difficulties, and problems expected in implementing the program.

Homogeneity and Equivalence of the Two Groups of the Research Sample:

1. Homogeneity: Homogeneity was achieved between some variables, namely (height measured in centimeters, mass measured in kilograms, and age measured in years), as shown in Table 5:

Table 5: The homogeneity in the variables of age, height, and mass for the individuals in the research sample

Variables	Units	Mean	Standard deviation	Mode	Skewness
Height	cm	174.577	5.258	174	0.109
Mass	kg	66.473	11.062	68.6	0.192
Age	year	20.244	0.712	20	0.342

2. Equivalence in some mental abilities: "The researcher should form equivalent groups with respect to at least the variables relevant to the research." Therefore, the researcher conducted equivalence in some mental abilities that distinguish humans and are considered important factors in the process of learning mathematical skills. The mental abilities were determined through questionnaires distributed to experts, including:

- Equivalence in mathematical mental imagery: The standardized mathematical mental imagery scale of (Reiner Martins, 1992) and Arabized by (Osama, 2000) was used
- Equivalence in some aspects of attention: The modified Borden-Anfimov Attention Test was used
- Equivalence in perception (sensory-motor): The horizontal kinesthetic perception test was used with a space distance[6]
- Equivalence in intelligence: The Raven Progressive Matrices test was used to measure intelligence.[7]

Raven, (1986) based on Murad, (2015). These variables were tested on the two research groups from March 17 to 19, 2024. To ensure the equivalence of the two groups, the researcher used a t-test.[8]

3. Equivalence in some elements of physical and motor fitness affecting the learning of technical performance: The researcher used the content analysis method of scientific sources on track and field (Madigesh and Madigesh, 2024) (Awis, 2000) to achieve equivalence between the experimental and control groups in some elements of physical and motor fitness and the following tests:

- Explosive strength of the throwing arm: This was measured using a (3) kg medicine ball throw test[8]
- Speed-characterized strength of the arms: This was measured using a flexion and extension test (Shnau) from a prone position in 20 s
- Trunk speed-specific strength: measured using the knee-bent sit-up test
- Trunk and hamstring flexibility: measured using the front-down trunk flexion test
- Agility: measured using the 4 × 10 m shuttle run test[9]
- Static balance: measured using the one-legged stork stand test
- Coordination: numbered circles test.

Tests were conducted for some physical and motor fitness elements that influence learning the technical performance of the discus throw. Table 7 illustrates this.

Table 7 shows the presence of insignificant differences between the two groups in some elements of physical and motor fitness that influence learning technical performance, indicating the equivalence of the two research groups.

Pre-tests, Scientific Observation, and Equivalence

1. Pre-tests: Tests represent one of the important conditions for judging the validity of a test and distinguishing between individuals. The researcher conducted the pre-tests on the two research groups on March 20, 2024, with the assistance of the support team. Before beginning the pre-test, a teacher explained and demonstrated the technical stages to give the students an idea of the performance of the event. Each student then performed two trial attempts. The pre-test was then conducted, giving each student three attempts in accordance with the International Amateur Athletics Law. A weight weighing (1) kg was used, as the objective was educational. The performance of each attempt was recorded with a video camera.
2. Scientific observation and method of evaluating motor performance: Scientific observation was conducted to evaluate the technical performance of the discus throw by two experts in the field of athletics for both the pre- and post-tests of the research sample. Scientific observation of the pre-test was conducted on 4/25/2024, while scientific observation of the post-test will be conducted in the same manner.
3. Equivalence in technical performance for the discus throw event: Equivalence in performance came after the motor performance evaluation form was designed and the experts agreed on the grades of the apparent motor construction sections and after the research sample was videotaped for the pre-test by giving three attempts to each student and in accordance with the international law that "indicates that if the number of competitors is more than eight, each competitor is given three attempts."[10] Then, a discus weighing (2) kg was thrown and the camera was fixed at a distance of (4.90) m from the performance location and at a height of (1.35) m. After completing the filming of the technical performance test, the evaluation form was distributed to the evaluators on March 20, 2024 and the videotaping was sent to be displayed on the computer. This was with the supervisor's knowledge of the procedures, as the best attempt was chosen from the three attempts by choosing the highest grade for both experts. Then, the researcher worked on extracting the simple correlation coefficient, which reached (91.8) between the evaluators' grades for technical performance, which is a significant correlation. Then, equivalence was conducted using the (t) test. Table 8 shows this.

The Educational Program

1. The Educational Program Using the Blended Learning Strategy: The educational program was prepared by incorporating two methods of exercise scheduling and integrating exercises using the clustered and distributed methods. After reviewing scientific sources and conducting personal interviews with experts on how to employ these methods during the educational units, the validity of the educational program was agreed upon. Appendix (2) illustrates an educational unit for the experimental group
2. The Educational Program Timeline: The educational program is divided into two groups: the control group and the experimental group, consisting of eight educational units for each, with each unit lasting 90 min.

As noted, the duration of the educational unit is fixed, but the content of the time division within the educational units varies due to the specificity of the use of the combined exercises using the aggregate and distributed methods, which were taken from the time of the preparatory section and the final section and added to the time of the main section of the educational program for the experimental group. The mixed learning method (holistic and partial) was used to learn the technical performance of the discus throw activity, which combines the

Table 6: The results of the t-test between the two groups for the variables (mental perception and some aspects of attention and perception, sensory-motor, and intelligence)

S. No.	Variables	Units	Experimental group		Control group		Sig. value*
			Mean	Standard deviation	Mean	Standard deviation	
1.	Mathematical mental imagery Visual dimension	Degree	14.75	2.01	15.40	2.71	0.32
2.	Auditory Dimension	Degree	15.380	2.08	15.30	2.36	0.88
3.	Kinesthetic Dimension	Degree	15.14	2.43	14.80	2.46	0.65
4.	Emotional Dimension	Degree	15.09	2.42	15.40	2.81	0.72
5.	Attention Manifestations Attention	Degree	1.13	5.75	1.14	4.65	0.89
6.	Focusing on attention	Degree	21.10	6.82	21.78	6.30	0.75
7.	Kinesthetic perception Sense of spatial distance	Cm	9.27	3.39	8.75	1.63	0.53
8.	Intelligence	Degree	23.45	4.72	23.75	2.93	0.81

*Since the sig value is greater than (0.05), there were non-significant differences between the two groups in each of (mental perception, some aspects of attention, sensory-motor perception, and intelligence), indicating the equivalence of the two groups

Table 7: The results of the t-test between the two groups in some elements of physical and motor fitness that affect learning the technical performance of the discus throw event

S. No.	Variables	Units	Experimental group		Control group		Sig. value*
			Mean	Standard deviation	Mean	Standard deviation	
1.	Explosive power of the throwing arm	Meter	9.81	1.22	9.85	1.59	0.92
2	Speed-characteristic power of the arms	Sec.	12.05	4.78	12	4.47	0.97
3.	Speed-characteristic power of the trunk	Sec.	34.07	4.74	32.9	4.55	0.22
4.	Flexibility	Cm	12.07	2.77	12.08	2.05	0.09
5.	Agility	Sec.	14.12	2.02	13.97	2.03	0.82
6.	Stable Balance	Sec.	1.92	0.97	2.06	0.89	0.65
7.	Coordination	Sec.	13.73	2.01	14	1.94	0.67

*All sig values are greater than (0.05)

Table 8: The results of the t-test between the two groups in the technical performance of the discus throw event

S. No.	Variables	Units	Experimental group		Control group		Sig. value*
			Mean	Standard deviation	Mean	Standard deviation	
1.	Artistic performance	Degree	17.08	1.67	18.45	1.35	0.81

*Since the sig value is greater than (0.05), there are insignificant differences between the two groups in the technical performance variable

advantages of both the aggregate and partial methods. In this method, the technical performance is presented as a whole, and then the students perform it. After that, this performance is divided into large and small units.

The Main Experiment

The educational program for the two groups began on March 20, 2024, with two educational units per week for each group, which were implemented on Mondays and Wednesdays of each week. The mixed method (holistic and partial) was used by the subject teacher under the supervision of the researcher to teach the technical performance of the discus throw activity for the two groups in the playground of the Department of Sports and School Activities - Kirkuk. The program was implemented on the experimental group using the combination of exercises using the aggregate and distributed methods within the educational unit. While the clustered method lacks rest periods between repetitions, there are rest periods when using the distributed method. The educational program for both groups was completed on April 20, 2024.

Post-tests

The post-tests were conducted to learn the technical performance of both groups using the same method as the pre-test on April 25, 2024. Each student was given three attempts, and the performer was videotaped. The technical performance was then evaluated by presenting the videotaped recording to two experts.

RESULTS AND DISCUSSIONS

- Display and analysis of the results of the differences between the two tests (pre- and post-tests) in the technical performance of the experimental and control groups.

The results of Table 9 show that there are significant differences between the pre- and post-tests of the two groups in learning the technical performance of the discus throw in favor of the post-test. The researcher attributes this to the influence of the educational program and the method used, as well as the use of exercises, as well as the suitability of these exercises to the level of the research sample, their repetitions, and their timing.[11] These exercises were organized throughout the educational unit and suited to the purpose for which they were intended, facilitating optimal use of time and, consequently, achieving good learning outcomes. The optimal use of the educational program's vocabulary and the use of learning methods at the appropriate time helped store information and led to the accumulation of experience in motor memory. The success of learning any athletic movement depends on extensive training and the correct method. The process of learning a specific skill cannot be achieved solely through motivation to learn it. Rather, the learner must practice and repeat it in order to properly control their movements. This is what was indicated by (Saudi *et al*., 2018) that learning motor skills depends on many aspects, the most important of which are practice and repetition of performance until the learning is mastered. Learning cannot be accomplished by simply watching someone throw a javelin, discus, or throw a weight but rather through practice and repetition of correct movements.[12] As for the experimental group, the exercises were integrated according to two methods: grouped and distributed exercise scheduling and the proper application of units in the educational program. They also benefited from the development of variables to serve the educational process, combining the advantages of both grouped and distributed methods and employing them to serve learners, making them more interesting and exciting with the material to be taught and making the learner not just a recipient. In addition, the educational methods were combined to serve and facilitate the process of delivering the material to the learner and the possibility of reviewing the content of the educational material and the topics related to the motor performance of the discus throw activity, which makes the learner more interactive with the required material and more eager. This is achieved by employing the advantages and steps of each method in learning the performance, along with reading the motor description in the educational section for performing the discus throw activity within the educational program units, because observing the movement flow contributes to learning the technical performance well after learners practice and imitate the motor skill, identify areas of strength and weakness, and work to eliminate incorrect movements and reinforce the correct movement.[13] As for the control group that used the educational program followed to learn the technical performance of the discus throw activity, each technical stage of the performance of the activity was explained and presented, and then the sample members of this group worked on applying it, which resulted in the first application reaching better results in the post-test, as the subject teacher used during the application of the educational units the partial and comprehensive method in employing exercises, combining them with the two methods used in the learning process for the technical performance of the discus throw activity and benefiting from the advantages of the two methods in order to reach effective learning. It has become necessary to oblige the school to follow the educational and teaching methods in an integrated and balanced educational program in order to qualify the learner and improve his performance.[14] Al-Hamri (1998) believes that no skill can be performed except through practicing the performance, and that practice means learning through training and motor organization and within the motor duty, which leads to an increase in experience and the development of mental and physical abilities and the possession of a store of information in the motor memory that can be referred to.[15]

- Presentation and analysis of the results of the post-test differences between the experimental and control groups in the technical performance of the discus throw:

Table 9: The results of the differences between the two tests (pre- and post-tests) in the technical performance of the experimental and control groups

Groups	Pre-test		Posttest		Sig.	Significance*
	Mean	Standard deviation	Mean	Standard deviation		
Experimental group	18.08	1.42	56.20	2.02	0.000	Sig.
Control group	18.45	1.25	51.09	3.11	0.000	Sig.

*Significant because the Sig value is less than (0.05)

Table 10: The results of the post-test differences between the experimental and control groups in the technical performance of the discus throw

Variables	Experimental group		Control group		Sig.	Indication
	Mean	Standard deviation	Mean	Standard deviation		
Technical performance of the discus throw event	56.20	2.02	51.09	3.11	0.000	Sig.

*Significant because the (Sig) value is less than (0.05).

From the presentation of the results of the post-test and Table 10, it is clear that there were significant differences between the experimental and control groups in favor of the experimental group. The researcher attributes these differences in learning to the result of integrating exercises using the grouped and distributed methods used in teaching students in the experimental group, which had an impact on the harmony in implementing the technical performance according to the movement data and each technical stage of the activity,[16] and responding to it practically and theoretically. It also provided students with the opportunity to interact by explaining information that was difficult for them, which provided learners with the opportunity to access information in a civilized and scientific manner and to learn about all the developments taking place at the sports level regarding the discus throw activity,[17] and to serve the learning process. Furthermore, the promises carried by the exercise scheduling methods of all kinds worked to bring about a transformation in the learning process by motivating all students to interact in how to present the technical performance from a motor perspective, common errors, and methods for correcting them according to the legal rules of the activity.[18] All of this contributed to the development of self-learning, positive scientific performance, and the involvement of the senses, which assist the learner and the progress of the educational process according to their desire. The learner and their ability, which increases the speed of their effectiveness and enthusiasm to learn the motor stages of the discus throw, and this is what distinguishes this variable in employing the positives of each method in the learning process from what is followed with the control group,[19] which relied on explanation and presentation by the subject teacher for each technical stage of the discus throw during the educational units, which contributed to improving motor performance in the post-test compared to what is in the pre-test. This is what (Shalash, 2011) indicated. The period of practice and continuous repetitions are necessary in the learning process in how to control one's movements and achieve motor coordination in performance,[20] and this is what (Mortada, 2017) indicated: "Presenting the most common mistakes of the skill and correcting them to reach the best performance helped the student avoid falling into these mistakes during motor performance and became more clear during the correct performance of the skill."[21] Accordingly, motor learning is the learner's transition from randomness to stability in motor performance as a result of accumulating experience and the ability to correct mistakes.[22] Majed Hussein and indicate: "It is noted from the educational system from which cognitive training is launched that the thought The learner and his mental processes in cognitive learning processes are considered the first experimental and are restricted.[23]

CONCLUSIONS

1. There was a positive impact of the educational program for both groups on learning the technical performance of the discus throw for students in the College of Physical Education and Sports Sciences
2. The experimental group, which used the clustered and distributed exercise combination, outperformed the control group, which used the standard program
3. The use of the clustered and distributed exercise combination contributed significantly to positive results, while creating a new learning environment for the subject teacher to learn the technical performance of the discus throw.

RECOMMENDATIONS

1. Emphasize the possibility of applying the clustered and distributed exercise combinations in the learning process for the technical performance of the discus throw for students in the College of Physical Education and Sports Sciences.
2. Reapply this program, which contains two variables, to other individual and group activities.

3. Provide other exercise scheduling variables and make them available in educational settings and at various academic levels.

REFERENCES

1. Al-Fattah AA, Hassanein MS. Physiology and Morphology of Athletes and Measurement Methods for Evaluation. 1st ed. Cairo: Dar Al-Fikr Al-Arabi; 1997. p. 182.
2. Khater AM, Al-Beik AF. Measurement in the Field of Sports. 1st ed. Egypt: Dar Al-Maaref; 1978. p. 492.
3. Rateb OK. Sports Psychology: Concepts and Applications. 4th ed. Cairo: Dar Al-Fikr Al-Arabi; 2000. p. 117.
4. Ismail KA. Measurement Tests and Performance Evaluation Associated with Human Kinetics. 1st ed. Cairo: Kitab Center for Publishing; 2016. p. 171-2.
5. Farag EW. Experiences in Games for Children and Adults. 2nd ed. Alexandria: Manshaat Al-Maaref; 2002. p. 194.
6. Bloom B, *et al*. Mufid MA, Translator. Assessing Student Learning: Collective and Formative. Cairo; 1983. p. 126.
7. Ghafoor TW, Nouri AM. Motor Learning: Theoretical Foundations and Practical Applications. 1st ed. Iraq: University of Sulaymaniyah; 2024. p. 293.
8. Al-Shamaa HF, Katea A. International Athletics Law. Baghdad: Dar Al-Hikma; 2019. p. 143.
9. Van Dalen DB, *et al*. Noufal MN, Translator. Scientific Research Methods in Education and Psychology. 3rd ed. Cairo: Anglo-Egyptian Library; 1984. p. 384.
10. Kamal AH, Hassanein MS. Physical Fitness and Its Components: Theoretical Foundations, Physical Preparation, and Measurement Methods. 3rd ed. Cairo: Dar Al-Fikr Al-Arabi; 1997. p. 204.
11. Al-Dhamd AS. Physiology of Mental Processes in Sports: Analysis, Training, Measurement. Amman: Dar Al-Fikr for Printing, Publishing, and Distribution; 2000. p. 21.
12. Al-Araji AY. The Effect of Using Constructive, Preliminary, and Compound Exercises on Learning Technical Performance and Achieving the Digital Level in the Weight Throwing Activity. University of Mosul, College of Physical Education. [Unpublished PhD Thesis]; 2006.
13. Al-Hakim AS. Tests, Measurement, and Statistics in the Field of Sports Ministry of Higher Education and Scientific Research. Iraq: Al-Qadisiyah University; 2004. p. 94.
14. Al-Jabali A. Sports Training, Theory and Application. 1st ed. Cairo: G.M.S. House; 2000.
15. Ismail KA, Al-Azmi AM. Measurement and Evaluation in School Physical Education. 1st ed. Cairo: Dar Al-Fikr Al-Arabi; 2011. p. 90.
16. Asad MK. Statistics and Measurement in Sports and Its Applications. Amman: Ghaida Publishing and Distribution House; 2019. p. 51-133.
17. Hassanein MS. Measurement and Evaluation in Physical Education and Sports. 6th ed., Vol. 1. Cairo: Dar Al-Fikr Al-Arabi; 2004. p. 321.
18. Madigesh AA, Madigesh MA. Guide to Field Competitions: Jumping and Throwing. 1st ed. New Delhi: Kitab Publishing Center; 2024.
19. Al-Jubouri MA. The Effect of Scheduling Sequential and Random Practice Accompanied by Direct and Indirect Mental Training on Learning, Retention, and Level of Achievement in the Triple Jump. University of Mosul, College of Physical Education [Unpublished PhD Thesis]; 2015. p. 106-7.
20. Saleh MA. The Effect of Different Mental Training Methods on Technical Performance and Achievement Level in Learning the Weight Throw. University of Mosul, College of Physical Education [Unpublished Master's Thesis]; 2009. p. 66.
21. Ibrahim ML. The Effect of Selective and Cooperative Methods on Learning the Smash Skill in Volleyball. College of Physical Education, University of Babylon [Unpublished Master's Thesis]; 2004. p. 10.
22. Al-Humairi MM. The Effect of an Introductory-Educational Program Using the Intensive and Distributed Training Method on the Acquisition and Retention of Some Distinct Tennis Skills. College of Physical Education, University of Baghdad. [Unpublished Master's Thesis]; 1998. p. 32.
23. Mahjoub W. Motor Control and Learning. 1st ed. Amman: Dar Al-Radwan for Publishing and Distribution.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

Exploring mental imagery: Targeted goals, strategies, and challenges of selected national coaches in the Philippines

Martin Abraham A. Mejia

Department of Education, Gregorio Perfecto High School, Metro Manila, Philippines

ABSTRACT

This study explores the targeted goals, strategies, and challenges associated with the use of mental imagery among selected national coaches in the Philippines. Mental imagery, often described as "seeing with the mind's eye," is a cognitive technique that enhances athletic performance by simulating physical experiences through visualization. The research highlights how coaches integrate mental imagery into training to improve athletes' focus, confidence, and skill execution. Utilizing the PETTLEP model – Physical, Environment, Task, Timing, Learning, Emotion, and Perspective – coaches guide athletes in visualizing specific movements and scenarios to reinforce muscle memory and strategic thinking. Through qualitative narrative analysis and focus group discussions with 10 national coaches, the study identifies key strategies such as reflective visualization, scenario planning, and the use of sensory cues. However, it also uncovers significant challenges, including athletes' mental and physical unpreparedness, financial and familial stressors, and skepticism about the effectiveness of imagery. These barriers often hinder the consistent application of mental imagery in training programs. The findings underscore the importance of structured mental training, coach–athlete communication, and institutional support in maximizing the benefits of visualization. The study recommends the development of tailored mental imagery programs, increased awareness among stakeholders, and the integration of psychological training in grassroots to elite-level sports. Ultimately, the research contributes to the growing body of knowledge in sports psychology and offers practical insights for enhancing athletic performance through cognitive strategies.

Keywords: Challenges, Mental imagery, Sports psychology, Strategies, Targeted goals, Visualization

INTRODUCTION

Mental imagery, often described as "seeing with the mind's eye," is a cognitive technique that enables athletes to simulate physical experiences mentally, enhancing focus, confidence, and performance (Cumming, n.d.; Quinton, 2021). It is widely used in elite sports to manage stress, improve skills, and maintain motivation (Carpentier and Mageau, 2017). Despite its benefits, mental training remains underutilized in the Philippine sports context, where physical preparation is often prioritized.

This study investigates how selected national coaches in the Philippines apply mental imagery to support athletes' performance. It explores their targeted goals, strategies, and the challenges they face in implementing imagery techniques. By examining these experiences, the research aims to contribute to the development of holistic training programs that integrate both physical and psychological preparation. The study sought to answer the following questions:

1. What are the targeted goals and objectives being achieved in utilizing mental imagery?
2. What are the strategies employed by the coaches in the implementation of mental imagery intervention?
3. How do the challenges encountered by the coaches contribute significantly to the implementation of mental imagery?
4. How do the coaches implement visualization in their training program?

Address for correspondence:
Martin Abraham A. Mejia,
E-mail: martinabraham.mejia@deped.gov.ph

REVIEW OF LITERATURE

Mental imagery is a widely recognized psychological technique used by athletes to enhance performance, manage anxiety, and improve focus (Cumming and Williams, 2013; Lakhiani, 2018). It involves creating vivid mental simulations of physical

actions, which can activate neural pathways similar to actual movement (Robertson, 2019). Athletes use imagery for training, competition, and recovery, often integrating it with self-talk, relaxation, and goal-setting (Abraham *et al*., 2018).

The PETTLEP model – Physical, Environment, Task, Timing, Learning, Emotion, and Perspective – provides a structured approach to imagery, ensuring it closely mirrors real-life performance (Smith *et al*., 2007). Research shows that consistent imagery practice enhances motivation, confidence, and emotional regulation (Anuar *et al*., 2016; Simonsmeier, 2020).

Despite its benefits, challenges such as lack of awareness, emotional distractions, and skepticism about its effectiveness hinder its widespread use, especially in developing sports systems such as the Philippines. This study addresses the gap by examining how national coaches apply mental imagery in local contexts.

METHODS

This study employed a qualitative-narrative approach to explore the targeted goals, strategies, and challenges of national coaches in using mental imagery. Data were collected through in-depth interviews and focus group discussions with ten purposively selected national coaches who had participated in international or national competitions.

Open-ended interview questions, validated by experts, guided the data collection. Interviews were conducted both online and in person, depending on availability. Responses were transcribed, coded, and analyzed using thematic analysis and Wolcott's (1994) method of transforming qualitative data.

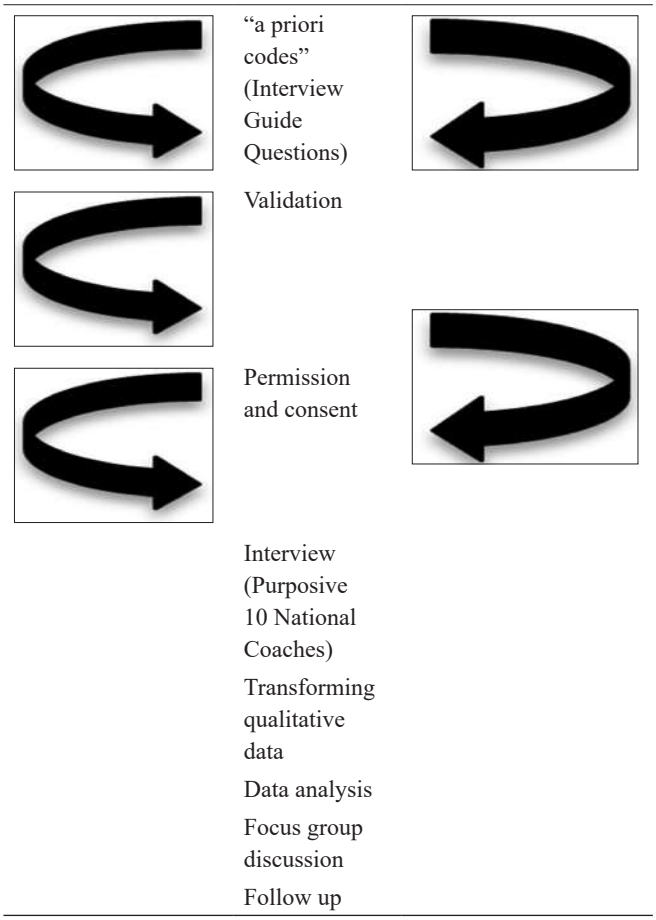
Triangulation of data sources and theoretical saturation ensured credibility and depth. Ethical clearance was obtained, and informed consent was secured from all participants. The study focused on coaches based in the National Capital Region (NCR) from November 2021 to June 2023.

Data Gathering

Despite the researcher's limited resources, time, and money, renowned PSC national team sports coaches participated in the study.

The interviews were done on predetermined dates in the months of February and June 2023 – remotely or in person.

The researcher collected and examined data from emails, interviews, and focus group discussions that were crucial to the understanding of the current problem. The researcher conducted a scientific analysis of the experiences of national and PSC coaches who compete in international and domestic competitions. The researcher exposed the coaches to



information on targeted goals (motivational benchmarks), strategies, challenges, and motivation based on mental imagery. The data gathered were coded and analyzed.

Ten informants were included in this study who had either competed in or would be competing in international athletic or sporting events. The informants all lived in the NCR because face-to-face and online interviews were both considered due to the subject matter and the study's scope. The informants were 18 years of age or older. They were chosen based on their participation as national coaches in international sports tournaments or having engaged in national and international level tournaments and competitions. Men and women were represented equally regardless of height and weight.

Located in the NCR, primarily in the area of individual, dual, and team sports, from November 2021 to June 2023, this study had 10 informants who have participated or would participate in international athletic/sports events, and the informants live in the NCR, with recognition for face-to-face and online interviews as part of the procedure and availability.

Due to the voluntary nature of the data collection for this study, only those who had free time and were able to respond to the

interview were selected. The voluntary involvement of national coaches as informants is made clear on the informed consent form. The said form was an agreement. It indicated the roles and responsibilities of both the researcher and the participants.

To provide the necessary, acceptable, and desirable answers for the study, a consent form was given to ensure the confidentiality of the identity of the participants. The form also ensures that they can withdraw their participation during the research process. The informants were made to understand the research objectives and that their participation is voluntary.

The study went through proper communication channels, following also the guidelines and procedures of the PUP University Research Ethics Board. This also enabled the researcher to get an ethics clearance.

RESULTS AND DISCUSSION

The following are the findings based on the analysis and interpretation of data presented in the previous chapter.

1. The coaches prepare athletes for competitions by creating a plan for what to expect and how to handle the unforeseen. This is done in order to visualize and practice mentally what athletes want to do physically. By focusing on positive images and thoughts, individuals can enhance their overall attitude and well-being. It helps them prepare for various situations, thereby improving decision-making and performance. Similarly, reliving previous events through imagery can aid in emotions, learning from past experiences, and gaining insights for future actions, including foreseeing and realizing the potential outcomes, staying confident, mind pictures to improve performance, and practicing skills in mind.
2. The coaches provide athletes with a platform for contemplation, reflection, and critical thinking. They use "PETTELEP," which is a technique used to visualize different strategies, game plans, and scenarios, allowing them to analyze the potential outcomes and make informed decisions. The strategy is a popular approach used by athletes in mental imagery. It stands for Physical, Environment, Task, Timing, Learning, Emotion, and Perspective. Athletes consider each of these factors in their mental imagery practice to create a comprehensive and holistic mental representation of their performance goals. For evaluation of previous games using prior knowledge and background experience to connect with a personal picture to allow them to form an anticipatory representation of strategies. Uses senses to enable athletes to picture and maintain a winning attitude with contemplation, reflection, and thinking.
3. Family and financial issues are cited by national coaches as the main obstacles to their success and objectives. Therefore, achieving mental calm through imagery intervention is challenging. One obstacle to using imagery intervention is the potential for uncertainty. Athletes may visualize their desired outcomes but cannot control all variables, leading to uncertainty about whether those outcomes will be achieved. This can affect their confidence and motivation, requiring them to develop strategies to manage and embrace the uncertainty. Overcoming this obstacle requires education, communication, and building trust to help athletes understand the value and relevance of imagery intervention to their performance. Including imagery's ability to contribute to its effectiveness, imagery speed (pacing), unfocused athletes and coaches, athletes not in the best condition mentally and physically, imagery incorporates performance errors and unwanted outcomes and demotivation, negative or uncooperative, unruly attitude, and personal emotions of coaches and athletes.
4. Coaches and athletes may be asked to decide how they want to see themselves. Athletes should be deliberate, focused, and planned when using visualization techniques, focusing on particular maneuvers or circumstances important to their sport. Athletes can visualize themselves executing precise movements, techniques, or plays associated with their position or role. This targeted visualization helps enhance muscle memory, coordination, and overall skill development. Visualization is a skill that can be developed through progressive training and practice. Consistent and dedicated practice helps athletes strengthen their visualization abilities and optimize the benefits of this training technique. Including forming images, reflecting on mental images, developing and elaborating the imagery, controlling emotional arousal and anxiety, and watching sample videos and games of top-tier teams.

Summary of Themes

SOP	Family theme	Axial codes
1	Mental imagery in targeted goals	Foreseeing and realizing potential outcomes, staying confident, focused, and mentally tough. Mind picture to improve performance, Positive thinking or attitude, and practice skills in mind.
2	Strategies through mental imagery	Evaluation of previous games using prior knowledge and background experience to connect with personal pictures allows to form an anticipatory representation of strategies; uses senses to scene that athletes are picturing as possible, maintain a winning attitude, contemplation, reflection, and thinking using picture stimuli, concrete verbal stimuli, and imagery instruction.

3	Challenges using mental imagery	Imagery ability to contribute to its effectiveness, imagery speed (pacing), unfocused athletes and coaches, athletes not in the best condition mentally and physically, negative or uncooperative, unruly attitude, personal financial matters, personal emotions of coaches and athletes, imagery that incorporates performance errors, unwanted outcomes, and demotivation.
4	Mental imagery practice	Form images, reflect on a mental image, develop and elaborate the imagery, control emotional arousal and anxiety, sample videos and games of top-tier teams, skill-focused for better results, and game planning.

The Table above shows the general or summary matrix that is divided into four family themes, which are mental imagery in targeted goals, strategies through mental imagery, challenges using mental imagery, and mental imagery practice with axial codes that correspond to the significant codes from the responses of the informants, see the table above.

CONCLUSION

Based on the analysis and interpretation of gathered data, the following conclusions were drawn:

1. Based on the results, mental imagery is a powerful cognitive tool that allows individuals to identify targeted goals as behavioral and performance outcomes in order to identify values, anxiety, and mistakes to recreate sensory experiences through visualization. It can serve different purposes, such as enhancing memory, improving skills, reducing anxiety, and promoting relaxation. In general, mental imagery aims to create a vivid mental representation of a sensory experience that can simulate an actual experience and produce similar psychological and physiological effects as well as mental stamina, positive attitude, reactivation, and manipulation of external representation. Readiness to compete, and to avoid mistakes.
2. Coaches consider the following to be a best practice when it comes to using mental images: a clear connection can be made between the visualization and the desired result with the aid of precise and vivid mental images. It makes for a more engaging and realistic experience for the person who routinely practices mental imagery benefits from regular practice just like any other skill. To reap the full rewards, improvised training, and visualization exercises should be incorporated into the person's regular training regimen.
3. National coaches stated that financial concerns, uncooperative, unruly, unstable, low self-esteem, not receptive athletes with busy schedules, and lack of familiarity, including family and financial problems are the ones who hindered the goal of achieving their success and objectives. Hence, peace of mind is difficult to achieve with imagery intervention.
4. Athletes can practice visualization or mental imagery by watching sample videos and games, planning, drills and exercises, facilities and equipment, concentration and attention, and environment using the coaching techniques to summarize the entire response of the coaches. Creating consistency and streamlining the process can be achieved by establishing a mental imagery routine. Athletes can establish a dedicated time and location for mental training. Furthermore, when practicing visualization techniques, athletes should be deliberate and focused, concentrating on specific techniques or situations crucial to their sport. Finally, visualization of successful outcomes and positive experiences can help an athlete feel more motivated and confident and identify components of coaching in relation to coping, emotion, alternatives, motivation, and components of training which include, skills program performance, motion, competitive condition, self-control, sportsmanship, and self-confidence.

Recommendations

Based on the conclusions, the following are hereby recommended:

1. This study recommends that mental imagery's a key role in training for sports with proper communication for both athletes and coaches. Mentally rehearsing the experience in the mind – the specific event or activity – is suggested. Moreover, to achieve effective mental imagery, it is suggested to seek help from the Philippine Sports Commission to take the therapists and other relevant professionals that they could experiment to find the best method for each athlete to achieve mental imagery because it needs a combination of approaches and strategies. Coaches and therapists can aid athletes in developing their mental imagery abilities and maximizing the efficacy of imagery intervention by promoting practice, employing illustrative language, and strategies, and leveraging technology to avoid problems and achieve the goals.
2. It is recommended that the creation of a mental imagery strategy based on the national coach responses suggest that the first goal must be decided; the use of self-talk and other mental imagery tools for mind training by sports stakeholders. Moreover, the use of social proof in addition to visualization assists athletes with their emotional experiences. Coaches tend to imitate athletes' actions due to psychological phenomena. Use social proof in athletes' content by including endorsements from social media, user reviews, and testimonials to give viewers a sense of connection and belonging that will enhance their emotional experience.

3. It is suggested that concentrating on one task at a time can yield the desired results. Providing coaches and athletes with the right training facility, setting, and equipment would enhance mental imagery as a powerful strategy that can put forward and boost an athlete's performance, confidence, and goal-achieving abilities. It is advised that athletes utilize mental visualization techniques during training sessions to strengthen their proper form and develop muscle memory.
4. Since the selection of visualization techniques depends on the type of data and the narrative that coaches intend to tell, using a graphing method is the ideal option. Consider infographics, which are a type of visual information display that mixes text, pictures, and graphics to create a story. They are helpful for conveying complicated information in a clear and interesting manner. Moreover, it is recommended that institutions create a platform to intensify mental imagery in sports to make it an effective tool and method for performance improvement for all periods of the competition – from pre-, actual, and post-event – to evaluate its utilization and identify challenges to minimize mistakes in crucial points in any match.

REFERENCES

1. A Coach's Responsibility: Learning How to Prepare Athletes for Peak Performance. The Sport Journal. https://thesportjournal.org/article/a/coachs/responsibility/learning/how/to/prepare/athletes-for-peak-performance [Last accessed on 2018 Oct 22].
2. Abraham A, Gose R, Schindler R, Nelson BH, Hackney ME. Dynamic neuro-cognitive imagery (DNITM) improves developpé performance, kinematics, and mental imagery ability in university-level dance students. Front Psychol 2019;10:382.
3. Abdin JM, Bel R. Imagery for Sport Performance; 2010. Available from: https://cardinalscholar.bsu.edu/bitstream/handle/123456789/193355/abdinj_20103_body.p df;sequence=1
4. Beilock SL, Afremow JA, Rabe AL, Carr TH. "Don't miss!" The debilitating effects of suppressive imagery on golf putting performance. J Sport Exerc Psychol 2001;23:200-21.
5. Bernier M, Fournier JF. Functions of mental imagery in expert golfers. Psychol Sport Exerc 2010;11:444-52.
6. Braden AM, Osborne MS, Wilson SJ. Psychological intervention reduces self-reported performance anxiety in high school music students. Front Psychol 2015;6:195.
7. Carpentier J, Mageau GA. Predicting Sport Experience During Training: The Role of Change-Oriented Feedback in Athletes' Motivation, Self-Confidence and Needs Satisfaction Fluctuations; 2017. Available from: https://selfdeterminationtheory.org/wpcontent/uploads/2016/11/2016_carpentier_mageau_jofsportexepsych.pdf
8. Catenacci KL, Harris BS, Langdon J, Scott MK, Czech DR. Using a MG-M imagery intervention to enhance the sport competence of young special Olympics athletes. J Imag Res Sport Phys Act 2016;11:1-12.
9. Cumming J, Williams SE. Introducing the revised applied model of deliberate imagery use for sport, dance, exercise, and rehabilitation. Mov Sport Sci 2013;82:69-81.
10. Duncan LR, Hall CR, Wilson PM, Rodgers WM. The use of a mental imagery intervention to enhance integrated regulation for exercise among women commencing an exercise program. Motiv Emot 2012;36:452-64.
11. Eriksson K. Visualization: How Mental Imagery Can Make You Better at Life. Medium. Available from: https://medium.com/better/humans/visualization/how/mental-imagery-can-make-you-better-at-life2360661870c [Last accessed on 2019 Oct 01].
12. Frank Niles PD. Why Goal Visualization Works. HuffPost. Available from: https://www.huffpost.com/entry/visualization-goals_b_878424 [Last accessed on 2011 Aug 17].
13. Giacobbi PR Jr., Tuccitto DE, Buman MP, Munroe-Chandler KM. A measurement and conceptual investigation of exercise imagery establishing construct validity. Res Q Exerc Sport 2010;18:485-93.
14. Hall CR, Martin KA. Measuring movement imagery abilities: A revision of the movement imagery questionnaire. J Ment Imag 1997;21:143-54.
15. Ignacio J, Dolmans D, Scherpbier A, Rethans JJ, Lopez V, Ying Liaw S. Development, implementation, and evaluation of a mental rehearsal strategy to improve clinical performance and reduce stress: A mixed methods study. Nurse Educ Today 2016;37:27-32.
16. Isaac A, Marks DF, Russell DG. An instrument for assessing imagery or movement: The vividness of movement imagery questionnaire (VMIQ). J Ment Image 1986;10:23-30.
17. Jacobson E. Electrical measurement of neuromuscular states during mental activities. Am J Physiol 1930;94:24-34.
18. Kosslyn SM, Margolis JA, Barrett AM, Goldknopf EJ, Daly PF. Age differences in imagery abilities. Child Dev 1990;61:995-1010.
19. Lang PJ. Presidential address, 1978. A bio-informational theory of emotional imagery. Psychophysiology 1979;16:495-512.
20. Malouin F, Richards CL, Durand A, Doyon J. Reliability of mental chronometry for assessing motor imagery ability after stroke. Arch Phys Med Rehabil 2008;89:311-9.
21. Markland D, Hall CR, Duncan LR, Simatovic J. The effects of an imagery intervention on implicit and explicit exercise attitudes. Psychol Sport Exerc 2015;17:24-31.
22. Mellalieu SD, Hanton S, Thomas O. The effects of a motivational general-arousal imagery intervention upon preperformance symptoms in male rugby union players. Psychol Sport Exerc 2009;10:175-85.
23. Milne MI, Burke SM, Hall C, Nederhof E, Gammage KL. Comparing the imagery use of younger older and adult exercisers. Imagin Cogn Pers 2006;25:59-67.
24. Najafabadi MG, Memari A, Kordi R, Shayestehfar M, Eshghi M. Mental training can improve physical activity behavior in adolescent girls. J Sport Health Sci 2015;6:327-32.
25. Nicholls AR, Polman RC, Holt NL. The effects of individualized imagery interventions on golf performance and flow States. Athl Insight Online J Sport Psychol 2005;7:43-66.
26. Peterson MA. The Ambiguity of Mental Images: Insights Regarding the Structure of Shape Memory and Its Function in Creativity. Stanford Encyclopedia of Philosophy. Ch. 6. 1993. Available from: https://plato.stanford.edu/entes/mental-imagery
27. Roberts R, Callow N, Hardy L, Markland D, Bringer J.

Movement imagery ability: Development and assessment of a revised version of the vividness of movement imagery questionnaire. J Sport Exerc Psychol 2008;30:200-21.
28. Roberts R, Callow N, Hardy L, Woodman T, Thomas L. Interactive effects of different visual imagery perspectives and narcissism on motor performance. J Sport Exerc Psychol 2010;32:499-517.
29. Robin N, Dominique L, Toussaint L, Blandin Y, Guillot A, Le Her M. Effects of motor imagery training on service return accuracy in tennis: The role of imagery ability. J Sport Exerc Psychol 2007;2:175-86.
30. Sanders CW, Sadoski M, Van Walsum K, Bramson R, Wiprud R, Fossum TW. Learning basic surgical skills with mental imagery: Using the simulation centre in the mind. Med Educ 2008;42:607-12.
31. Semantics Scholar. Available from: https://pdfs.semanticscholar.org/b545/ e8f450097edf374658d7f0fa4333edab 000b.pdf?ga=2.98142877.3007246 12.1616670614-183941743.1611758450
32. Smith D, Wright C, Allsopp A, Westhead H. It's all in the mind: PETTLEP-based imagery and sports performance. J Appl Sport Psychol 2007;19:80-92.
33. Stephens TL. Encouraging Positive Student Engagement and Motivation: Tips for Teachers: Pearson Blog. USA. Available from: https://www.pearsoned.com/encouraging/positive/student/engagement/and/motivation-tips-for-teachers [Last accessed on 2016 Jun 06].
34. Seven (7) Olympic Swimmers Who Use Visualization. SwimSwam. Available from: https://swimswam.com/7-olympic-swimmers-who-use-visualization/support [Last accessed on 2016 Apr 07]. Use Imagery Techniques to Improve your Performance! My PT Hub Support. https://support.mypthub.net/use/imagery/techniques/to/improve/your-performance
35. Thomas O, Maynard I, Hanton S. Psychological preparation for elite performance II: A temporal multimodal intervention with athletes debilitated by their preperformance symptoms. J Appl Sport Psychol 2007;19:398-418.
36. Tobin D, Nadalin E, Munroe-Chandler KJ, Hall CR. Children's active play imagery. Psychol Sport Exerc 2013;14:371-8.
37. Tod D, Edwards C, McGuigan M, Lovell G. A systematic review of the effect of cognitive strategies on strength performance. Sports Med 2015;11:1589-602.
38. Vasquez NA, Buehler R. Seeing future success: Does imagery perspective influence achievement motivation? Pers Soc Psychol Bull 2007;33:1392-405.
39. Weibull F, Cumming J, Cooley SJ, Williams SE, Burns VE. Walk this way: A brief exercise imagery intervention increases barrier self-efficacy in women. Curr Psychol 2015;34:477-90.
40. White A, Hardy L. Use of different imagery perspectives on the learning and performance of different motor skills. Br J Psychol 1995;86:169-80.
41. White A, Hardy L. An in-depth analysis of the uses of imagery by high-level. Hum Kinet J 1998;12:387-403.
42. Thomas NJ. Mental Imagery. Stanford Encyclopedia of Philosophy. Available from: https://plato.stanford.edu/entries/mental-imagery/index.html [Last accessed on 2014 Sep 12].
43. Thorp T. How to use Meditation to Visualize Your Goals. Available from: https://chopra.com/articles/how-to-use-meditation-to-visualize-your-goals [Last accessed on 2016 Apr 15].
44. Wanzer DL, Azzam T, Jones ND, Skousen D. The role of titles in enhancing data visualization. Eval Program Plan 2021;84:101896.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

Fear of missing out, self-esteem, and screen-time: A correlational study among youth of Odisha

Moona Queen, Mousumi Sethy

Student, Department of Psychology, Utkal University, Bhubaneswar, Odisha, India

ABSTRACT

Fear of missing out (FoMO) is a constant apprehension that others are having more rewarding experiences leading to constant engagement with social media (SM) platforms to stay "updated," which has been found to be related to mental health concerns and esteem needs, wherein, self-esteem (SE) is an individual's overall evaluation of self. As FoMO is related to SM, we wanted to check if there exists an association between the levels of FoMO, SE, and screen-time (St) among the youth, who under the scope of present study, are students of which adolescents (n = 75; Mean age = 16.51, standard deviation [SD] = 1.30) and young adults (n = 77; Mean age = 21.43, SD = 1.06). The results from a sample of 152 participants in the age group of 14–24 years indicate that FoMO is significantly related to SE (r = −0.249, $P < 0.01$) and age (r = −0.239, $P < 0.01$) but not with St. Results of a regression analysis found that SE and age could predict 8.8% variation in FoMO among youth.

Keywords: Correlation, Fear of missing out, Screen-time, Self-esteem, Social media, Youth

INTRODUCTION

Fear of Missing Out (FoMo), Self-esteem (SE), and Screen-time (St): A Correlational Study among Youth

In January 2024, there were 462 million social media (SM) users in India, which is 32.2% of the population, whereas the global SM user count stands at 5.04 billion, representing nearly 62.3% of the total world population (Kepios, 2024). GWI (2024) revealing that the "typical" SM user now spends 2 h and 23 min a day using SM also gave the reasons people in the age group of 16–64 years used SM, the survey found that they "keep in touch with family and friends," "filling spare time, finding content," "sharing and discussing opinions with others," spending record time SM platform with Instagram, WhatsApp, Facebook coming on top; in a report published by them in 2022, the "FoMO" was among the top reasons with 20% of SM users responding using SM because of it. The youth or those in the age range of 14–25 (the World Health Organization), are thought to be most likely to be affected by these digital stressors when it comes to their overall health.

Address for correspondence:
Mousumi Sethy,
E-mail: mousumi.psy@utkaluniversity.ac.in

FoMO

FoMO is defined as "a pervasive apprehension that others might be having rewarding experiences from which one is absent" and "a desire to stay continually connected with what others are doing" (Przybylski *et al*., 2013, p. 1841). The constant awareness of missing out can create distorted perceptions of others' lives that look perfect on SM platforms, while they are stuck and lonely, which leads to a vicious cycle of compulsive checking and engagement. FoMO has been associated with intensive SM use, such as decreased SE (Buglass *et al*., 2017), smartphone addiction (Wolniewicz *et al*., 2018), depression (Elhai *et al*., 2016), anxiety (Elhai *et al*., 2016). FoMO can be managed by practicing mindfulness so as to track the negative thoughts and choose positive thoughts, taking regular breaks, socializing in the real world or engaging oneself in hobbies, and accepting that more times than not SM posts are tip of the iceberg and appearances can be deceiving as the person on the "other" side of posts could also be experiencing FoMO too!

SE

According to Rosenberg (1965), SE refers to an individual's overall evaluation of the self. SE explains self-acceptance,

self-respect, and satisfaction with oneself, but it's not the feelings of superiority and perfection. SE is dependent upon family environment, personality, autonomy, and it is positively associated with happiness, hope, life satisfaction, resilience, and optimism, and negatively related to emotional instability, depression, aggression, etc. Longitudinal studies, as part of a meta-analysis, have identified substantial cross-lagged effects, indicating that low SE is a significant predictor of subsequent depression and anxiety (Orth and Robins, 2013).

St and SM Usage

St defined by the time spent on phones, computers, and other digital devices. In the current study, it is operationalized on the basis of time spent online on phone or computer/laptop. While it averages at 2 h in the globe, while 8 h/day is recommended for those working, and the lesser the hours, the better for children, survey findings show mixed results about the hours of usage. Studies show that St has been associated with mental health-related problems such as a decrease in sleep quality, irritability, anxiety, etc. Students spend more time on the Internet, leading to less time spent on socializing in real life. Use of AI tools takes away their platform to develop creative writing skills, a warped sense of time due to mindless scrolling, and anxiety and apprehension about other living better life than them, that is, FoMO.

REVIEW OF LITERATURE

A study by Gori, *et al*. (2023) suggests SE, FoMO, and the time spent on SM (TSSM) mediate the relationships between preoccupied and fearful attachment patterns and problematic SM use, whereas Febriani and Ansyah (2023) found that there was no relationship between self-regulation and SE with FoMO in the age of emerging adults using SM. Garg (2023) found a positive correlation between social networking addiction and FoMO, but no relation was found between FoMO and SE. Uram and Skalski (2022) found that FoMO combines deficits in mental well-being with addiction to Facebook, with SE and loneliness as mediators explaining the relationship. Wisudawati and Aqmarina (2022) found that a negative and significant relationship between FoMO with SE in teenagers on SM users. Brian *et al*. (2017) found that in young adults of the US, between the ages of 19 and 32, the increase in TSSM has been related with depression and anxiety, the independent role of using multiple SM platforms is clear as compared to those who spent <2 h on such platform, those who spent above 7 h were more likely to get depression and anxiety.

Rationale of the Study

Research findings suggest that teenagers in general are among the most susceptible to FoMO because they highly value social acceptance and popularity among their peer groups. SE has been used as a predictor of FoMO among different samples but the results obtained are mixed. Literature reveals that SE is expected to decline in late adolescence, a target population of the current study, and gradually increases during adulthood, which is the other target population. St has also been found to be associated with mental health issues and detachment from real-world needs. We couldn't find many studies that checked for the associations among the variables in Odisha, as such, the current study intends to check for the association among the variables for the current sample.

Objective

The objective of this study was to check for the associations between FoMO, SE, St, and age among youth of Odisha.

METHOD OF STUDY

Design

We used a cross-sectional correlational design to find the relationship between study variables, i.e., FoMO, SE, and St; furthermore, the predictive ability of variables which were found to be significantly related was checked.

Participants

A total of 152 individuals voluntarily participated in the study in the age group of 14–24 years of age from across Odisha using a mix of purposeful and area sampling.

Inclusion criteria**:** Students in the given age group; must have an account in at least one SM platform.

Exclusion criteria**:** Individuals who are not enrolled in an institution in the given age group; those outside Odisha.

Measures

Demographic and personal details form

We asked participants to read the instruction and sign on the consent form before filling in basic demographic details, including age, gender, class, and course of study, location of institute, type of institute studying in, and the TSSM applications.

FoMO scale

The FoMOs developed by Przybylski *et al*. (2013) was used to find the levels of FoMO in participants. The scale consists of 10 items; the response anchors are in a 5-point Likert scale (1 for not at all true of me, 2 for slightly true of me, 3 for moderately true of me, 4 for very true of me, and 5 for extremely true of me). Scores ranging from 10 to 50; higher score indicates a higher level of FoMO. The authors of the scale have provided a high value of Chronbach's alpha (0.87–0.90) for the scale, and studies indicate satisfactory validity.

Rosenberg SE scale

The Rosenberg SE Scale was developed by Rosenberg (1965). The scale has 10 items that measure global self-worth. The

items are to be responded to in a 4-point scale ranging from strongly agree to strongly disagree. The method used in the current study to measure SE is summing up scores after reverse scoring to get total score, the maximum score being 40 and minimum score being 10; scored in a continuous scale, higher scores indicating higher SE, with a score between 25 and 35 meaning average SE and a score below or above indicating lower levels and higher levels of SE, respectively. The scale has satisfactory internal consistency ($\alpha = 0.92$) and test–retest reliability of 0.88. The scale has satisfactory concurrent, predictive, and construct validity based on the data given by the author of the scale.

Procedure

We made a form that consisted of the demographic and personal details form, which contained the consent form, Rosenberg's SE scale, and FoMOs. We approached youth from across Odisha and while following protocols and abiding by ethical standards, the participants were briefed about the objectives of the study, their rights, matters regarding the confidentiality of the information they were sharing, a need to give their assent and also their choice to withdraw and/or not wanting to provide information at any stage of filling the form. None of the participants received any form of remuneration or incentives for participating in this study.

The data, so obtained, were organized using Microsoft Excel software. The raw data were converted to standardized data following the scoring key provided in the manuals, and the data was uploaded to IBM Statistical Package for the Social Sciences statistics version 20 for further analysis. The results obtained were discussed and compared to the current literature. The limitations, implications, and feedback for future studies were provided.

RESULTS

Table 1 shows the descriptive statistics of study variables. Table 2 reveals the correlation matrix obtained through bi-variate correlations for associations between the variables of interest, namely FoMO, SE, Age, self-deprecation (SD), self-confidence (SC), and St. A significant relationship was established between FoMO, age, and SE after data obtained from participants were analyzed in a correlational matrix. It was found that SE and age ($R^2 = 0.088$, $P < 0.01$) contributed to 8.8% of the variation in FoMO.

The equation for FoMO as the criterion and SE, and age as predictors will be;

$$(\text{FoMO}) = 38.60 + (-0.188)\,(\text{SE}) + (-0.172)\,(\text{age})$$

Table 1: Means, standard deviation and values of Pearson's coefficient among the study variables (*n*=152)

	Mean	SD	FoMO	SE	Age
FoMO	26.03	6.026	–		
SE	25.38	5.382	−0.249**	–	
Age	19.02	2.727	−0.239**	0.354**	–
Screen-time	4.377	2.54	0.063	−0.050	−0.072

Significance level: *P<0.05, **P<0.001. SE: Self-esteem, SD: Self-deprecation, SC: Self-confidence, Screen-time in hours, FoMo: Fear of missing out

Table 2: Regression analysis with self-esteem and age as predictors of FoMO

	B	Standard Error	Beta	*t*	Sig.
(Constant)	38.604	3.512		10.991	0.000
Self-esteem	−0.210	0.094	−0.188	−2.243	0.026
Age	−0.381	0.185	−0.172	−2.059	0.041
R=0.296	R^2=0.088	Adjusted R^2=0.076		SE=5.794	P<0.01

SE: Standard error of estimate, FoMo: Fear of missing out

DISCUSSION AND CONCLUSION

It has been revealed by some studies (e.g., Elhai et al., 2018) that FoMO was associated with younger age, which is true for the current sample with high-school students who are in the younger age bracket scoring higher in the FoMOs and was negatively related to SE, which is in tandem with the literature. Although there was no significant association with ST, the average of ST of over over 4 h itself is quite large, and with studies showing an increase risk to depression, anxiety (Brian et al, 2017) and physical strain with higher ST is a matter of concern, especially for the younger group.

The current study aimed to check for the association between levels of FoMO, SE and ST among the youth of Odisha. Both SE and age were negatively and significantly related to age, which suggests that teenagers are more likely to have higher levels of FoMO, whereas those who have more SE are less likely to feel FoMO, and that the average ST of the sample was higher than the global average by 2 h. It is important for parents and institutions to foster a safe environment for students to feel empowered and develop better self-concepts, so that they can build real-world connection rather than seeking for companionship online, which many a times, is not safe. The consumption of content on the Internet and the time spent on them needs to be regulated by both SM platforms and parents, as earlier studies indicate negative effects on mental health.

The study was unable to take into account a majority of youth who are not students. The results were based on self-report and taken up through voluntary participation, which could have confounded the outcome. A larger and more representative sample, especially of students from autonomous and degree colleges of Odisha, could have been taken, but due to limited resources could not be achieved.

Future studies can look more into the consequences of being exposed to SM, whereas the discussed variables are affecting them and steps to mitigate their affect, like it was found that perceiving higher parental support was related to lower levels of FoMO (Bloemen and Connick, 2020). They could also check for the difference in FoMO, SE, and SM experiences in students of various streams and subjects; furthermore, among students and non-students in the age group. A comparative study between rural and urban youth can be done to check if this predominantly digital phenomenon is affecting individuals at different strata, whereas qualitative data on the experience and role of SM in the life of youth can be obtained and analyzed.

REFERENCES

1. Bloemen N, De Coninck D. Social media and fear of missing out in adolescents: The role of family characteristics. Social media + society. Sage J 2020;6:1-11.
2. Buglass SL, Binder JF, Betts LR, Underwood JD. Motivators of online vulnerability: The impact of social network site use and FOMO. Comput Hum Behav 2017;66:248-55.
3. Elhai JD, Levine JC, Alghraibeh AM, Alafnan AA, Aldraiweesh AA, Hall BJ. Fear of missing out: Testing relationships with negative affectivity, online social engagement, and problematic smartphone use. Comput Hum Behav 2018;89:289-98.
4. Elhai JD, Levine JC, Dvorak RD, Hall BJ. Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. Comput Hum Behav 2016;63:509-16.
5. Febriani M, Ansyah EH. Relationship between self-regulation and self-esteem with fear of missing out (FOMO) in emerging adulthood of social media users. 2023.
6. Garg G. A Study of Social Networking Addiction, Fomo and Self-Esteem among Young Adults. International Journal of Interdisciplinary Approaches in Psychology; 2023. Available from: https://www.psychopediajournals.com/index.php/ijiap/article/view/97
7. Gori A, Topino E, Griffiths MD. The associations between attachment, self-esteem, fear of missing out, daily time expenditure, and problematic social media use: A path analysis model. Addict Behav 2023;141:107633.
8. GWI. Connecting the Dots: 2024 Consumer Trends. GWI; 2024. Available from: https://www.gwi.com/connecting-the-dots?utm-campaign=fy24-cc-all-gl-ctd&utm-source=kepios-articles&utm-medium=web
9. Majeed S, Ateeque A, Rehman M, Riaz A, Paul A. The relationship between social media usage and mental well-being among young adults. Pak J Med Health Sci 2022;16:128-31.
10. Orth U, Robins RW. Understanding the link between low self-esteem and depression. Curr Dir Psychol Sci 2013;22:455-60.
11. Patel VK, Chaudhary P, Kumar P, Vasavada DA, Tiwari DS. A study of correlates of social networking site addiction among the undergraduate health professionals. Asian J Soc Health Behav 2021;4:30.
12. Primack BA, Shensa A, Sidani JE, Whaite EO, Lin LY, Rosen D, *et al*. Social media use and perceived social isolation among young adults in the U.S. Am J Prev Med 2017;53:1-8.
13. Przybylski AK, Murayama K, DeHaan CR, Gladwell V. Motivational, emotional, and behavioral correlates of fear of missing out. Comput Hum Behav 2013;29:1841-8.
14. Przybylski AK, Murayama K, DeHaan CR, Gladwell V. Fear of missing out scale. Am Psychol Assoc 2013.
15. Rosenberg M. Conceiving the Self. New York: Basic Books; 1979.
16. Rosenberg M. Society and the Adolescent Self-Image. United States: Princeton University Press; 1965.
17. Tsai I, Ying YW, Lee PA. Cultural predictors of self-esteem: A study of Chinese American female and male young adults. Cultur Divers Ethnic Minor Psychol 2001;7:284-97.
18. Uram P, Skalski S. Still logged in? The link between Facebook addiction, FoMO, self-esteem, life satisfaction and loneliness in social media users. Psychol Rep 2022;125:218-31.
19. World Health Organization - SEARO. Retrieved from Child and Adolescent Health and Development; 2019. Available from: http://www.searo.who.int/entity/child-adolescent/topics/adolescent-health/en
20. Wisudawati WN, Aqmarina FN. Self Esteem and Fear of Missing Out in the Use of Social Media in Adolescent. The 19th International Postgraduate Research Colloquium (IPRC); 2022. Available from: https://publikasi.mercubuana.ac.id/index.php/iprc/article/view/16882
21. Wolniewicz CA, Tiamiyu MF, Weeks JW, Elhai JD. Problematic smartphone use and relations with negative affect, fear of missing out, and fear of negative and positive evaluation. Psychiatry Res 2018;262:618-23.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

Sport law: A conceptual framework for global implementation

Anoma Rathnayaka

Department of Sport Science and Physical Education, Faculty of Social Sciences, University of Kelaniya, Sri Lanka

ABSTRACT

Sport law has emerged as a specialized area of legal inquiry, addressing the complex intersection between legal principles and the governance of sport. This concept paper offers a general thematic overview of sport law, developed through a review of open-source secondary data, with the goal of providing a foundational understanding for students, educators, and early-career researchers. Rather than focusing on the jurisprudence of a specific country, the paper outlines key legal domains that influence sport globally, such as contract law, labor law, human rights, and dispute resolution mechanisms, while also highlighting the regulatory structures and governance models common across international sport systems. Across a thematic analysis of sport law characteristics, the study constructs a conceptual framework that serves as an entry point for further country-specific legal exploration. The paper contributes to the pedagogical discourse by offering a structured, accessible resource that facilitates comparative understanding and encourages deeper inquiry into the legal dimensions of sport worldwide.

Keywords: International sport law, Sport law characteristics, Sport law

INTRODUCTION

In the contemporary field of sport management, understanding the legal frameworks governing sport is fundamental to ensuring effective and efficient administration. Sport law provides the necessary foundation to secure sport integrity, protect the rights of stakeholders, and contribute to the overall development of sport at various levels (Mitten *et al*., 2017). As sport evolves into a complex global industry, legal, ethical, and operational considerations have become increasingly critical in managing sport organizations and events (Gardiner *et al*., 2012). Despite the evident importance, sport law remains an underexplored area compared to other established academic domains within sport management, such as organizational behavior, sport marketing, human resource management, sport finance, governance, and sport media (Woods and Paton, 2014).

The study of sport law is not only relevant for legal professionals but also for a broader audience, including athletes, administrators, coaches, and even spectators. Knowledge of sport law helps stakeholders navigate issues related to contracts, disciplinary procedures, anti-doping regulations, athlete rights, and dispute resolution mechanisms, which are essential for maintaining fair play and safeguarding the interests of all parties involved (Gerrard, 2016). Furthermore, sport law promotes transparency and accountability within sport organizations, thereby fostering a culture of integrity and ethical conduct (Geeraert and Scheerder, 2018).

Despite its critical role, sport law often receives limited attention, particularly in developing countries. For example, in nations, such as Sri Lanka, there is a scarcity of academic resources and research focused on this area, which impedes the advancement of legal knowledge and best practices in sport management. The tendency to prioritize sport science and other fields of sport management over legal studies reflects a broader gap in holistic sport education and governance frameworks. This neglect may expose sport organizations and athletes to legal vulnerabilities and hinder sustainable sport development (Pielke, 2016).

Therefore, it is imperative for scholars, practitioners, and policymakers to acknowledge and promote sport law as an essential pillar of sport management. A deeper understanding of sport law contributes not only to the protection of individual rights and organizational integrity but also to the enhancement of sport development strategies on and off the field (Parrish and McArdle, 2014). As such, research and education in sport law should be encouraged to address the existing knowledge gaps, particularly in underrepresented regions, thereby enabling

Address for correspondence:
Anoma Rathnayaka,
E-mail: anomar@kln.ac.lk

sport systems to function more effectively within their legal and ethical contexts.

This paper aims to provide a conceptual foundation on sport law, highlighting its significance in the broader sport management landscape. By elucidating the key aspects of sport law, this study hopes to inspire further academic inquiry and practical application, ultimately contributing to the professionalization and governance of sport worldwide.

NATURE AND SCOPE OF SPORT LAW

Sport law is an evolving legal discipline that addresses legal issues specific to the world of sport, drawing on general legal areas, such as contract, tort, labor, and intellectual property (IP) law, while incorporating sport-specific regulations and ethical considerations (Gardiner *et al*., 2012). It functions at the intersection of law, policy, and governance, aiming to regulate behaviors, resolve disputes, and safeguard stakeholder rights. The nature of sport law is both general and specialized. It applies conventional doctrines, such as enforcing athlete contracts or managing liability for injuries, while also introducing unique principles, such as anti-doping regulations, arbitration systems, and disciplinary codes (Mitten *et al*., 2017). For instance, the World Anti-Doping Agency Code (WADA Code) serves as a global legal framework for regulating doping, overriding national legal differences in many instances (Pielke, 2016).

A defining feature of sport law is its dual structure: national and international. National law governs local clubs, educational institutions, and domestic leagues, ensuring compliance with labor laws and public policies. Meanwhile, international sport law is shaped by global entities, such as the International Olympic Committee, FIFA, and the Court of Arbitration for Sport (CAS), which establish rules that often transcend national jurisdictions (Parrish and McArdle, 2014). This interplay can generate legal tensions concerning jurisdiction and the balance between national sovereignty and international governance. The scope of sport law is expanding with the increasing professionalization and commercialization of sport. Contract law governs essential agreements, including athlete contracts, sponsorships, broadcasting rights, and endorsements, which sustain the industry's economic infrastructure (Gerrard, 2016). Labor and employment law address issues, such as anti-discrimination, job security, and collective bargaining, enhancing legal protections for athletes as workers (Hassan and McClelland, 2017).

Tort law is also central, particularly in adjudicating personal injury claims and negligence in sport contexts. Courts must weigh the duty of care against the accepted risks inherent in sports participation (Beloff *et al*., 1999). IP law protects sport brands and media rights through trademarks and copyrights. The legal safeguarding of assets, such as the Olympic symbols and FIFA trademarks is crucial to commercial success (Mitten *et al*., 2017). Ethical governance and accountability are increasingly emphasized in sport law due to scandals, such as corruption in FIFA and systemic doping. Legal frameworks now address conflict of interest, transparency, and codes of conduct to uphold integrity (Geeraert, 2016). CAS provides a key dispute resolution forum, delivering binding decisions on issues, such as doping and eligibility in a more efficient manner than traditional courts (Blackshaw, 2003).

Furthermore, sport law intersects with social justice, protecting rights to participate regardless of gender, ability, or background. For example, Title IX mandates gender equity in U.S. federally funded sport programs (Anderson and Osborne, 2008), while global standards promote inclusion for disabled and youth athletes (UNESCO, 2015). Education in sport law is increasingly important. Sport administrators, coaches, and policymakers require legal literacy to navigate modern sport governance (Woods and Paton, 2014). Thus, sport law is both a regulatory and educational pillar, vital to the integrity and future development of sport.

MATERIALS AND METHODS

This study adopted a qualitative research approach, aimed at exploring the conceptual and thematic dimensions of sport law through an interpretivist lens. The primary purpose of the research was pedagogical to construct a foundational teaching resource in sport law, a domain underrepresented in sport management literature, especially in non-Western and developing contexts (Anderson and White, 2017). A qualitative design enabled deep engagement with open-source academic literature to map definitions, characteristics, and legal themes at domestic and international levels (Creswell and Poth, 2018).

Data were collected through purposive sampling of secondary sources, focusing on research articles with "sport law" in their titles. The selection process was unconcerned with journal rankings or geographic origin, prioritizing thematic relevance over empirical generalizability (Patton, 2015). Forty articles were chosen as the sample size, based on feasibility within the time limits for developing the teaching material. Selected articles were labeled A1, A2, etc.

The selection followed a stepwise method. First, articles were listed by order of appearance. Second, they were categorized by publication year to identify temporal trends in the discourse (Gratton and Jones, 2010). Third, abstracts were screened to assess alignment with the study's focus on legal, ethical, and governance dimensions of sport law. Fourth, brief notes were written based on the abstract contents. Fifth, full texts of the most relevant articles were read in detail, with key insights captured using sticky notes. In the sixth step, these

notes were organized into thematic categories: definitions, characteristics, types, and jurisdictional distinctions in sport law. In step seven, thematic clusters were formed, and in step eight, they were developed into narrative form to support the research text. This process aligned with thematic analysis procedures defined by Braun and Clarke (2006). In the ninth step, a keyword-based thematic map was created to visually synthesize the findings and enhance pedagogical clarity. The tenth and final step involved a peer review by a legal expert with a sport background. Their dual expertise ensured clarity, accuracy, and contextual relevance of legal interpretations (Yin, 2014). Their feedback contributed to refining legal terminology and example selection.

Ultimately, the methodology was guided by the learning objectives of a model sport law curriculum, making the findings not only academically rigorous but also practically valuable for students and early-career researchers. This process illustrates the effectiveness of qualitative synthesis in developing teaching materials within emerging fields.

RESULTS AND DISCUSSION

Discussion of the Demographic Profile of Reviewed Sport Law Research

The demographic analysis of the 40 selected sport law research articles provides valuable insight into the academic landscape, scope, and geographical reach of sport law scholarship [Table 1]. This profile offers a nuanced understanding of how sport law is conceptualized and investigated globally, with implications for both research and practice in sport management, governance, and regulation. First, the geographic distribution of research reveals a growing international interest in sport law. Studies span countries from Asia (e.g., China and India), Africa (e.g., Nigeria and South Africa), Europe (e.g., the United Kingdom and Germany), and North America (e.g., the United States and Canada). This reflects the globalization of sport and the legal frameworks necessary to manage its complexities (Gardiner *et al*., 2021; Nafziger, 2004). However, the dominance of English-language sources suggests that scholarly discourse in non-English-speaking regions may be underrepresented in global sport law literature.

Thematically, the review indicates that sport law is a multidimensional and interdisciplinary field, with key focus areas including anti-doping regulations (Houlihan, 2004), athlete contract and labor law (Foster, 2006), image rights (James, 2010), discrimination and equality in sport (McArdle, 2012), and arbitration procedures, particularly through the CAS (Blackshaw, 2003). These themes point to the growing complexity of legal issues in sport and highlight the need for robust legal mechanisms to ensure fairness, integrity, and justice in sporting contexts. Another key observation is the interdisciplinary character of sport law research. Articles frequently appear not only in legal journals but also in sport management, governance, and ethics publications. This trend is consistent with findings by Simon and Torres (2007), who argue that legal reasoning must be integrated into broader sport policy and administrative frameworks to improve outcomes for athletes and organizations alike. Such integration enhances understanding of legal challenges not only at the elite level but also within grassroots sport.

Despite this growth, the review also reveals that empirical legal studies are relatively limited, with a strong leaning toward doctrinal and case study approaches. This aligns with the critique by Nafziger (2004), who called for more empirical and comparative work to bridge theory and practice in international sport law. The lack of empirical data limits the practical applicability of existing research, especially in jurisdictions undergoing legal and institutional reform in sport. The increase in publications after 2017 suggests a growing academic interest in sport law, possibly driven by high-profile global events and legal controversies, such as doping scandals, athlete protests, and governance failures (Pielke, 2016). Emerging areas, such as esports law, gender identity rights, and environmental accountability in mega-events, are expanding the boundaries of the field (Cranmer *et al*., 2020). In conclusion, this demographic profile suggests that sport law is evolving into a dynamic field that supports the legal, ethical, and operational dimensions of sport. It underlines the need for further interdisciplinary, context-sensitive, and empirical research to support the sustainable governance of sport in a globalized world.

The Role of Sport Law

Sport law plays an essential role in shaping the governance, ethical conduct, and operational structure of modern sport systems. An analysis of the 40 reviewed research articles indicates that sport law functions across multiple dimensions, from safeguarding athlete rights to regulating governing bodies, revealing their interdisciplinary scope and increasing relevance in global and national contexts. One of the most frequently highlighted roles in the reviewed literature is ensuring fairness and justice in sport participation and competition. Several articles (e.g., Article 3, 9, and 17) focused on the role of legal frameworks in adjudicating disputes, ensuring due process, and maintaining the integrity of competition. Dispute resolution mechanisms, such as the CAS were discussed as vital for settling international conflicts involving athletes and federations (Duval, 2018). These frameworks ensure procedural fairness, particularly in cases involving doping (Article 6) or contractual disagreements (Article 20).

Another major theme identified is governance and institutional accountability. Articles 2, 4, 8, and 21 emphasized how legal instruments are used to ensure transparency, ethical leadership, and compliance in sport federations. For example, the use of

Table 1: Summary of reviewed research articles on sport law

Label article/year	Title	Region/ country	Type of publication	Focus area	Key themes
A1 (2017)	Legal Responsibilities in Professional Sport	USA	Peer-reviewed Journal	Tort Law, Liability	Negligence, Duty of Care
A2 (2019)	Evolution of Sport Law in China	China	Academic Journal	Domestic Sport Law	Reform, Regulation
A3 (2020)	Contractual Rights of Athletes	UK	Journal Article	Employment Law	Player Contracts, Freedom of Movement
A4 (2018)	Sport Law and Athlete Protection in India	India	Conference Paper	Athlete Welfare	Legal Protection, Injury Compensation
A5 (2020)	Challenges in African Sport Governance	Nigeria	Journal Article	Governance, Law	Ethics, Rule of Law
A6 (2021)	Doping Law in International Sports	Global	Book Chapter	Anti-Doping Regulations	World Anti-Doping Agency Code, CAS
A7 (2017)	Legal Education for Sports Managers	USA	Open Access Journal	Education, Curriculum	Knowledge Gap, Training Needs
A8 (2019)	Role of Sport Arbitration in Global Disputes	Switzerland	Peer-reviewed Journal	Arbitration, CAS	Dispute Resolution, Fairness
A9 (2021)	Sport Law in the Middle East: An Overview	Kuwait	Academic Journal	Domestic Legislation	Policy Development
A10 (2020)	Image Rights and Commercial Law in Football	Spain	Journal Article	Commercial Law	Sponsorship, Media Rights
A11 (2022)	Legal Reforms in Eastern European Sports	Bulgaria	Peer-reviewed Journal	Legal Systems	Transition, EU Compliance
A12 (2021)	Sport Safety Laws in South Korea	South Korea	Journal Article	Sport Safety, Regulation	Legal Standards, Enforcement
A13 (2019)	Historical Development of Sport Law	UK	Book Chapter	History of Law	Common Law, Institutional Role
A14 (2020)	Human Rights and Sport Law	Global	Conference Proceeding	Rights and Freedoms	Discrimination, Inclusion
A15 (2018)	Legal Mechanisms for Match Fixing Prevention	Brazil	Journal Article	Integrity in Sport	Criminal Law, Ethics
A16 (2022)	Sports Agents and Legal Regulation	USA	Peer-reviewed Journal	Contract Law	Representation, Regulation
A17 (2019)	Legal Structures in Olympic Sport	Japan	Book Chapter	Olympic Governance	International Olympic Committee Rules, Compliance
A18 (2021)	Domestic versus International Sport Law	Vietnam	Academic Journal	Comparative Law	Legal Harmonization, Gaps
A19 (2020)	Employment Law and Discrimination in Sports	Australia	Journal Article	Equal Opportunity	Gender, Race, Legal Access
A20 (2021)	Social Media, Athletes, and Defamation Law	Canada	Open Access Journal	Media Law	Online Speech, Libel
A21 (2023)	Sport Law Pedagogy: Challenges in Teaching	India	Teaching Resource Paper	Education	Curriculum Design, Case Study Use
A22 (2018)	Anti-Doping Policy Effectiveness	UK	Journal Article	Policy Analysis	Sanctions, Compliance

(Contd...)

Table 1: ***(Continued)***

Label article/year	Title	Region/ country	Type of publication	Focus area	Key themes
A23 (2022)	Comparative Study of Sport Tribunals	Latin America	Peer-reviewed Journal	Legal Procedure	Judicial Independence, Efficiency
A24 (2021)	Sport Law and Youth Sport Protection	Ghana	Academic Journal	Child Protection	Abuse Prevention, Policy Gaps
A25 (2020)	Muslim Athletes and Legal Accommodation in Sport	Middle East	Journal Article	Religious Rights	Inclusion, Policy Adjustment
A26 (2018)	Sport Law and Sponsorship Contract Disputes	Germany	Academic Journal	Commercial Contracts	Enforcement, Arbitration
A27 (2019)	Sport Law Education in Sub-Saharan Africa	South Africa	Teaching Resource	Legal Education	Awareness, Curriculum Development
A28 (2020)	Gender Identity and Legal Issues in Sport	Philippines	Peer-reviewed Journal	Gender Law	Transgender Rights, Eligibility Rules
A29 (2019)	Licensing and Sport Facility Law	Italy	Legal Commentary	Property, Infrastructure	Ownership, Zoning Laws
A30 (2022)	Gambling Regulation in Sport	UK	Journal Article	Betting Law	Integrity, Corruption
A31 (2021)	Sport Ethics and Law: A Theoretical Analysis	Pakistan	Book Chapter	Ethics	Norms, Law Theory
A32 (2017)	Violence in Sport: Legal Responses	Ireland	Academic Journal	Criminal Law	Prosecution, Stadium Safety
A33 (2023)	Legal Challenges in Hosting Mega Sport Events	Vietnam	Peer-reviewed Journal	Event Law	Liability, Contracts
A34 (2020)	Corruption and Sport Law in Africa	Nigeria	Journal Article	Governance	Legal Remedies, Compliance
A35 (2021)	Sport Law in EU Countries: Commonalities and Gaps	EU	Comparative Study	Harmonization	Legal Convergence
A36 (2022)	Employment Contracts in Sport: A South African Perspective	South Africa	Journal Article	Labor Law	Fair Dismissal, Player Rights
A37 (2020)	Sport Law and Environmental Responsibility	Germany	Academic Journal	Sustainability Law	Green Standards, Mega Events
A38 (2021)	Digital Rights and Broadcasting Law in Esports	China	Peer-reviewed Journal	Digital Sport Law	Licensing, Access
A39 (2019)	Legal Interpretation of Fair Play Principles	Mexico	Book Chapter	Ethics and Law	Spirit of the Game
A40 (2022)	Toward a Global Sport Law Curriculum	Global	Teaching Resource	Education Reform	Curriculum, Learning Objectives

CAS: Court of arbitration for sport

sport law in addressing corruption and lack of accountability in international federations (e.g., FIFA or IAAF) has been a growing concern in the literature (Geeraert, 2016). Legal tools play a preventive role in organizational conduct, protecting stakeholders and ensuring that sport institutions adhere to both internal and external accountability standards.

The role of sport law in protecting athletes' legal rights is also a recurring subject in articles 1, 10, and 25. These works address issues of labor rights, image rights, anti-discrimination protections, and safeguarding of minors. Notably, the role of legal education in empowering athletes and administrators is discussed in Article 5, suggesting a broader societal function for sport law in building legal literacy within the field (Foster, 2006). In addition, the table reveals that many studies focus on the integration of law into sport management education and practice (e.g., Articles 11, 14, and 33). These findings underscore sport law's increasing significance not just

in courts or federations, but as a core component of effective and ethical sport management.

CHARACTERISTICS OF SPORT LAW

Sport law is a distinctive and evolving field that integrates traditional legal disciplines with the unique structures and demands of sport. A thematic review of 40 selected research articles reveals eight core characteristics that define its theoretical and practical scope [Figure 1]. First, sport law is inherently multidisciplinary, encompassing areas, such as contract, tort, labor, criminal, and IP law (Gardiner *et al*., 2021). Legal issues in sport often intersect multiple domains, for example, athlete contracts, injury liability, and doping offenses, demanding sport-specific legal interpretation. Second, it operates through specialized regulatory frameworks, such as the CAS and the WADA, which function independently from traditional legal systems. These institutions enforce internal legal orders tailored to sport's ethical and performance needs (Duval, 2018; Foster, 2006). Third, sport law emphasizes governance and ethics, aligning legal mechanisms with principles, such as transparency, accountability, and integrity (Geeraert, 2018). It helps regulate organizational behavior and leadership practices in the sport sector. Fourth, it is a dynamic and evolving field, responding to contemporary developments, such as social media, virtual competitions, and data privacy. Issues, such as name, image, and likeness (NIL) rights illustrate how legal norms in sport continuously adapt (James, 2010). Fifth, sport law is rights-based, prioritizing athlete welfare through labor protections, anti-discrimination laws, and grievance procedures (McArdle, 2012). Sixth, it serves both preventive and remedial functions. While policies and codes of conduct aim to prevent violations, mechanisms, such as arbitration and disciplinary action address misconduct effectively. Seventh, sport law is embedded in international contexts, operating within transnational legal frameworks, such as the Olympic Charter and FIFA regulations (Duval, 2018). Finally, it influences education and policy, reinforcing the importance of legal literacy in sport curricula and governance systems (Foster, 2006). Collectively, these characteristics establish sport law as a foundational component in global sport governance.

How Sport Law Works

Sport Law functions as a specialized domain of legal practice that operates at the intersection of general legal principles and the unique environment of the sports industry. It encompasses various legal disciplines, such as contract law, tort law, labor law, antitrust law, and IP law applied to sports-related issues (James, 2017). The functionality of sport law lies in its regulatory capacity to govern disputes, contracts, athlete conduct, governance structures, and organizational responsibilities across different levels of sport, from amateur to professional. The infographic titled *"Functionality of Sport Law"* [Figure 2] visually outlines the core dimensions through which sport law operates in the modern sports ecosystem. Structured in a flat design format, the infographic is divided into three primary sections: Legal Application, Institutional

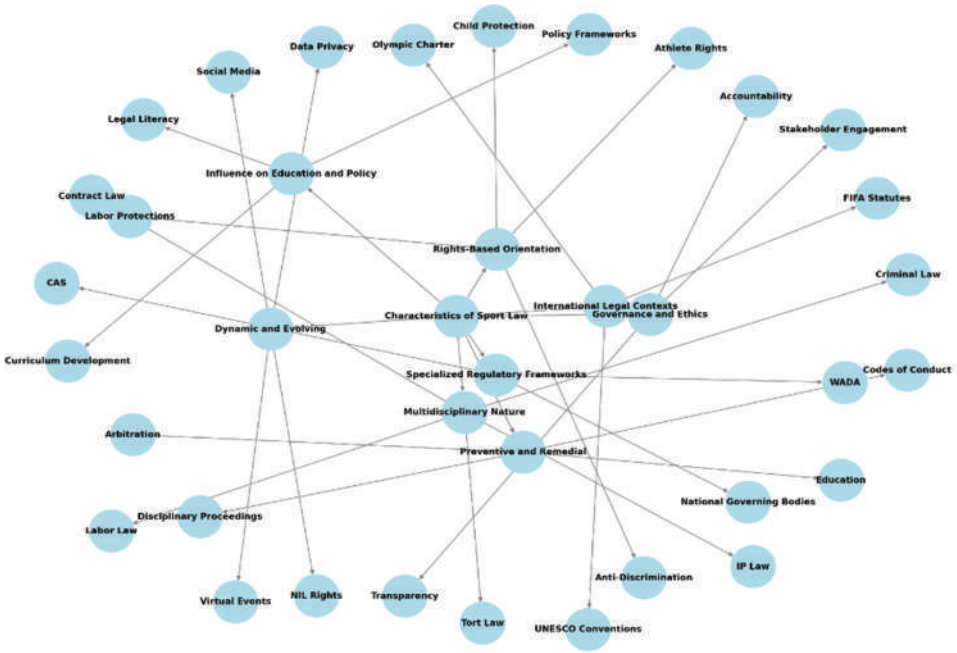


Figure 1: Characteristics of sport law
Source: Based on thematic analysis of 40 peer-reviewed research articles on sport law

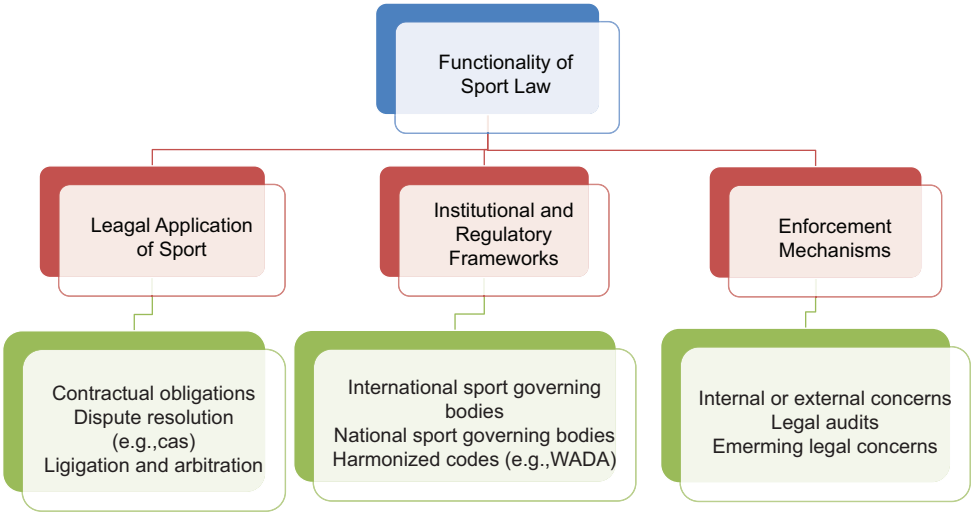


Figure 2: Understanding the functionality of sport law
Source: Based on thematic analysis of 40 peer-reviewed research articles on sport law

Frameworks, and Enforcement Mechanisms. Each section is represented with a distinct icon and color scheme for clarity.

The Legal Application section emphasizes contract management, dispute resolution, and regulatory control in areas, such as doping and sponsorship. Institutional and Regulatory Frameworks highlight key bodies, such as CAS, FIFA, and WADA, showcasing how both international and national laws interact to create a hybrid governance structure. Finally, the Enforcement Mechanisms section presents tools, such as arbitration panels, legal audits, and civil litigation, emphasizing accountability and athlete protection. Overall, the infographic serves as a concise educational tool, summarizing the multidisciplinary and operational scope of sport law in governing modern athletic and organizational conduct.

Operational Themes and Functional Emphases of Sport Law [Table 2] outlined insights from the reviewed article database ($n = 40$) highlight the functional emphasis of sport law across key themes. The following is a synthesis of how these studies contribute to our understanding of the practical operation of sport law.

Table 2: Operational themes and functional emphases of sport law: Insights from reviewed literature

Key function	No. of articles supporting	Examples/focus areas
Contractual Enforcement	16	Player agreements, club-sponsor contracts
Dispute Resolution	14	Arbitration, CAS decisions
Governance & Compliance	11	Code of conduct, anti-doping compliance
Athlete Rights and Safety	9	Injury protocols, safeguarding, and medical consent
Regulatory Alignment	10	Harmonization with international sport law standards
Education and Awareness	7	Sport law curriculum, legal training for administrators

Source: Based on thematic analysis of 40 peer-reviewed research articles on sport law

Multilevel Framework of Sport Law

Sport law operates across multiple layers of the sport ecosystem, offering legal governance and protection at the individual, organizational, and systemic levels. This multilevel framework illustrates the breadth of its functionality, responding to diverse legal challenges that arise from both domestic and international sport contexts.

1. Individual level: At this level, sport law plays a crucial role in protecting the rights of athletes. It provides legal mechanisms to address issues, such as liability for injuries, contract disputes, anti-doping violations, and employment rights. Athletes are increasingly recognized not just as performers, but as workers and rights holders, with legal protections akin to those in other industries.
2. Organizational level: Within sport organizations, sport law ensures legal accountability and governance. It helps maintain transparency in decision-making, enforces ethical standards, regulates financial conduct, and safeguards the interests of stakeholders. Legal frameworks guide board behavior, conflict-of-interest management, and compliance with international standards.
3. Systemic level: At the highest level, sport law engages with national and international legal systems. It aligns domestic regulations with global legal instruments, such as the Olympic Charter or WADA Code, and addresses complex

cross-border issues, such as player transfers, IP rights, and media contracts. This systemic role is especially significant as sport becomes more globalized and commercialized (Gardiner *et al*., 2019).

In many developing jurisdictions, sport law is still emerging. The literature indicates that some sport organizations operate with inadequate legal oversight or under vague regulatory frameworks (Reviewed Article No. 21, 30, and 35). As global sport continues to evolve, legal systems must adapt to new challenges, including integrity in sports betting, athlete data privacy, and regulation of digital broadcasting rights. Thus, sport law must remain dynamic and responsive to maintain fairness and order across all levels of sport.

Limitations and Opportunities

One key challenge in the way sport law functions is the fragmentation of legal authority between international bodies and national courts. Sometimes this results in conflicting decisions, especially in athlete eligibility and disciplinary cases (Foster, 2006). However, this also opens avenues for legal harmonization and capacity building through education and policy development. Another limitation highlighted in the tabled research is the lack of legal literacy among stakeholders. Seven studies (Reviewed Article No. 2, 6, 15, 19, 22, 27, and 38) emphasized the need for greater awareness among coaches, athletes, and administrators to effectively leverage legal mechanisms. Sport Law functions as a robust, multi-layered framework designed to govern the legal, ethical, and administrative dimensions of sport. It connects general legal principles with specialized sport-specific regulations, operating through contracts, regulations, enforcement mechanisms, and educational structures. The data collected from the literature review confirms that sport law is not merely a legal silo, but a dynamic system integrated into every functional aspect of modern sport. Thus, understanding how sport law works is essential for anyone involved in sport management, policy, or practice.

CONCLUSION

The exploration of sport law through this concept paper underscores its critical significance as an academic and professional domain within the broader field of sport management. Sport law is not simply a legal discipline in isolation; it operates as a structural backbone for regulating and safeguarding the diverse activities, relationships, and transactions within the sporting ecosystem. From contractual enforcement and dispute resolution to governance compliance and athlete protection, sport law facilitates the ethical and operational integrity of sport, both on and off the field.

Across a thematic review of 40 research articles, this study has provided a foundational understanding of the characteristics, scope, and practical applications of sport law. The data revealed that contractual agreements, dispute resolution mechanisms, and regulatory compliance were the most frequently addressed themes. This highlights how sport law serves as a multi-functional tool, simultaneously guiding institutional behavior, protecting individual rights, and supporting equitable governance practices. In addition, this paper constructed a thematic map to represent the conceptual framework of sport law, enabling a clearer visualization of its diverse components and interconnections.

Importantly, the findings also reveal existing gaps in research and practice. Despite its relevance, sport law remains relatively underexplored in academic literature, particularly in developing regions where legal literacy among sport stakeholders is limited, and institutional support for sport law education and enforcement is weak. These gaps present both challenges and opportunities. For scholars, it is an invitation to investigate sport law more rigorously, especially as global sport continues to grow in complexity and commercial value. For practitioners, including sport administrators, athletes, and coaches, it is a call to build legal awareness and embed sport law principles into everyday decision-making.

Furthermore, sport law should not be viewed as the exclusive domain of lawyers or legal professionals. Its relevance spans all levels of sport stakeholders from grassroots participants and fans to elite administrators and policymakers. This reinforces the argument that sport law education should be integrated into sport science, sport management, and physical education curricula, equipping future professionals with the knowledge to navigate legal frameworks effectively.

The qualitative approach used in this paper, based on secondary data and thematic analysis, helped identify key areas of concern and development in the sport law discourse. The methodological steps ensured a structured understanding of diverse legal aspects by organizing themes around learning objectives and pedagogical goals. The consultation with a legal expert who is also a sport practitioner added value to the conceptual framework, ensuring its practical relevance and accuracy.

In conclusion, sport law plays a pivotal role in shaping fair, transparent, and accountable sporting environments. As this paper has demonstrated, the field deserves greater academic and institutional attention, especially in countries where its development remains minimal. Strengthening sport law education and research is not only a step toward enhancing governance and fairness in sport but also a necessary investment in the long-term sustainability and credibility of the global sporting industry. By laying this conceptual foundation, this paper aims to motivate future inquiry and action in the field, ensuring that sport continues to thrive as a legally secure and ethically guided domain.

REFERENCES

1. Anderson P, Osborne B. A historical review of title IX litigation. J Legal Aspects Sports 2008;18:127-52.
2. Anderson J, White J. Sports Law: A Global Perspective. United Kingdom: Routledge; 2017.
3. Beloff M, Kerr T, Demetriou M. Sports Law. Oxford: Hart Publishing; 1999.
4. Blackshaw I. Sport, Mediation and Arbitration. Netherlands: T.M.C. Asser Press; 2003.
5. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol 2006;3:77-101.
6. Cranmer EE, Hanold M, Sanderson J. Esports and the NCAA: Legitimacy, ownership, and professionalization. Commun Sport 2020;8:682-707.
7. Creswell JW, Poth CN. Qualitative Inquiry and Research Design: Choosing among Five Approaches. 4th ed. United States: Sage Publications; 2018.
8. Demetriou D. Disciplinary sanctions and fairness in sports law: Principles and practice. Int Sports Law J 1999;3:45-58.
9. Duval A. The court of arbitration for sport and its jurisprudence. Int Sports Law J 2018;18:1-21.
10. Fernando S, Perera M. Challenges in sports governance in developing countries. J Sport Manag 2020;12:45-58.
11. Findlay M. Sport Law: A Managerial Approach. United Kingdom: Routledge; 2020.
12. Foster K. Global sports law revisited. Entertain Law 2006;5:1-36.
13. Foster K. Is there a global sports law? Entertain Law 2006;3:1-18.
14. Gardiner S, O'Leary J, Welch R, Boyes S, Naidoo U, Tannsjo T. Sports Law. 5th ed. United Kingdom: Routledge; 2021.
15. Gardiner S, O'Leary J, Welch R, Boyes S, Naidoo U. Sports Law. 4th ed. United Kingdom: Routledge; 2012.
16. Geeraert A. The Governance of International Sport: Ethics, Transparency and Effectiveness. London: Palgrave Macmillan; 2016.
17. Gerrard D. Sport, Law and Society: A Socio-Legal Perspective. United Kingdom: Routledge; 2016.
18. Geeraert A. Sports Governance Observer 2018: An Assessment of Good Governance in Five International Sports Federations. Denmark: Play the Game, Danish Institute for Sports Studies; 2018.
19. Geeraert A, Scheerder J. Sport governance and integrity: The role of transparency and accountability. Eur Sport Manag Q 2018;18:167-84.
20. Gerrard B. The Olympic Movement and the Law. United Kingdom: Palgrave Macmillan; 2016.
21. Gratton C, Jones I. Research Methods for Sports Studies. 2nd ed. United Kingdom: Routledge; 2010.
22. Greenfield S, Osborn G. Law and Sport: Contemporary Issues. United Kingdom: Routledge; 2018.
23. Hassan D, McClelland C. Athlete rights and legal protection in sport. Int J Sport Policy Polit 2017;9:553-70.
24. Houlihan B. Civil rights, doping control and the world anti-doping code. Sport Soc 2004;7:420-37.
25. James M. Sports image rights in the UK: An overview. Entertain Sports Law J 2010;8:1-12.
26. James M. Sports Law. London: Palgrave Macmillan; 2017.
27. McArdle D. Dispute Resolution in Sport: Athletes, Law and Arbitration. United Kingdom: Routledge; 2012.
28. Miller M, Sweeney M, Goldsmith H. Sports safety and the law: Legal responsibilities and athlete welfare. J Leg Aspects Sport 2020;30:113-30.
29. Mitten MJ, Davis T, Smith RC, Berry R. Sports Law and Regulation: Cases, Materials, and Problems. 5th ed. Netherlands: Wolters Kluwer; 2017.
30. Mitten MJ, Davis T, Smith RC, Berry D. Sports Law and Regulation: Cases, Materials, and Problems. Boston, MA: Aspen Publishers; 2016.
31. Nafziger JA. International Sports Law. London: Transnational Publishers; 2004.
32. Parrish R, McArdle D. Beyond the Spectacle: The Governance of Sport. Netherlands: Elsevier; 2014.
33. Patton MQ. Qualitative Research and Evaluation Methods. 4th ed. United States: Sage Publications. 2015.
34. Pielke R. Sports governance failures: Consequences and responses. Sport Soc 2016;19:679-90.
35. Pielke R. The Edge: The War against Cheating and Corruption in the Cutthroat World of Elite Sports. Hobart: Roaring Forties Press; 2016.
36. Simon RL, Torres CR. Fair Play: The Ethics of Sport. United States: Westview Press; 2007.
37. UNESCO. International Charter of Physical Education, Physical Activity and Sport. United States: United Nations Educational, Scientific and Cultural Organization; 2015.
38. Woods R, Paton G. Managing Sport Facilities and Major Events. United Kingdom: Routledge; 2014.
39. World Anti-Doping Agency (WADA). World Anti-Doping Code; 2021. Available from: https://www.wada-ama.org
40. Yin RK. Case Study Research: Design and Methods. 5th ed. United States: SAGE Publications; 2014.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

Achievement and its relationship to the most important anthropometric measurements in the triple jump event for 1st-year students at Al-Najaf preparatory school for sports sciences

Mohammed Salman Jabir Al-Khazali

Assistant Professor, Directorate of Education, Najaf Governorate, Iraq

ABSTRACT

The abstract contained the introduction and the importance of the research. It addressed the study of achievement and its relationship to the most important anthropometric measurements in the triple jump event for 1st-year students at Al-Najaf Preparatory School for Sports Sciences. The research problem emerged in understanding some anthropometric measurements due to their great importance in achieving performance in the triple jump event, especially since the developed world has shown distinguished results by isolating the effect of skill performance from these measurements, given that each sports event has its own requirements. The study aimed to identify the relationship between achievement and the most important anthropometric measurements in the triple jump event for students. The researcher hypothesized a statistically significant correlation between achievement and the most important anthropometric measurements in the triple jump event. The research fields included: (1) Human field: 1st-year students at Al-Najaf Preparatory School for Sports Sciences. (2) Time field: 10/12/2024 to (unspecified). The researcher used the descriptive method for its suitability to the nature of the research. The sample was purposively chosen and consisted of 47 1st-year students. The researcher distributed a questionnaire to experts and specialists in the field of track and field to identify the most important anthropometric measurements and used statistical tools that served the research. The researcher found statistically significant results between achievement and the selected anthropometric measurements (weight, height, and leg length), and these results were presented and discussed. Hence, the researcher concluded that: (1) There is a statistically significant correlation between achievement and anthropometric measurements in the triple jump event. (2) Players should be selected based on the anthropometric measurements they possess for the triple jump event.

Keywords: Achievement anthropometric, Measurements and sports sciences

INTRODUCTION

The development achieved in all sports records and the accomplishments we witness daily in preliminary championships and events are the result of joint scientific effort, experience, and supporting sciences.

Advanced countries in the sports field constantly seek new scientific methods to achieve desired goals by relying on various sciences and benefiting from results, research, and studies. This development includes track and field events in particular and the achievements realized in Olympic and world championships.

Anthropometric measurements are among the basic requirements that relate body shape to physical performance, helping athletes reach high fitness levels. A structurally unsuitable individual, or in other words, an athlete lacking proper body measurements, may face several problems during skill performance due to the demands of the event. Therefore, more effort and time are needed compared to peers who possess suitable body measurements that help them achieve effective performance. Hence, the researcher decided to study the most important anthropometric measurements for students in the triple jump event, especially at the learner level, to see how these measurements clearly appear in their achievement.

Address for correspondence:
Mohammed Salman Jabir Al-Khazali,
E-mail:

Research Problem

Track and field events include many varied activities, including the triple jump, where the goal is to achieve optimal performance and results.

Through observation of teaching and training steps in this event, the researcher noticed differences in the performance level of beginner students, due to the influence of body measurements on skill performance, which in turn affects achievement in jumping.

Therefore, the researcher selected this problem to understand the relationship between achievement and the most important anthropometric measurements in the triple jump, isolating the effect of skill performance to better guide the teaching and training of students with suitable measurements toward improved achievement in this event.

Research Objectives

1. Identify the relationship between achievement and anthropometric measurements in the triple jump event for students at Al-Najaf Preparatory School for Sports Sciences
2. Identify the most important anthropometric measurements in the triple jump event for the same students.

Research Hypotheses

There is a statistically significant correlation between achievement and anthropometric measurements in the triple jump event for students at Al-Najaf Preparatory School for Sports Sciences.

Research Fields

- Human field: 1st-year students of Al-Najaf Preparatory School for Sports Sciences
- Time field: November 10, 2024–April 15, 2025
- Place field: Al-Najaf Preparatory School for Sports Field.

Research Method

The researcher used the descriptive method as it fits the nature of the problem and is aligned with the research objectives in a scientifically correct manner.

Research Population and Sample

The research population consisted of 53 students from Al-Najaf Preparatory School for Sports Sciences. A random sample of 47 1st-year students was selected, and a pilot sample of 5 students was also determined.

Tools and Equipment Used

Research means

- Questionnaire
- Expert opinions
- Observation
- Internet resources.

Tools used in the research

- Legal running field
- Measuring tape
- Take-off board
- Magnesium powder (chalk)
- Sand-filled jump pit
- Medical scale
- Two manual stopwatches with calculator.

Field Procedures

Identifying the most important anthropometric measurements

The researcher identified the most important anthropometric measurements for the triple jump event through references and included them in a questionnaire presented to experts. Measurements scoring <40 points or <57% were excluded. Based on 7 experts' opinions, 3 out of 6 measurements were approved.

Measuring technical performance and achievement

Technical performance was evaluated by judges who assessed performance form. The researcher recorded students' triple jump performance and transferred it to CDs, which were reviewed by experts using a form. The maximum skill performance score was 10, covering the approach to the end of the performance. Achievement was measured by actual jump distance.

Pilot Study

The pilot study is a vital step conducted before the main experiment to identify pros and cons in test procedures. It was carried out on January 25, 2025 with 10 randomly selected students to:

- Ensure device and tool readiness
- Estimate the time for each test and total testing duration
- Evaluate the assistant team adequacy
- Validate data recording forms
- Ensure test suitability for the sample level
- Identify challenges to be avoided later
- Establish scientific bases for tests.

Test Validity

The researcher presented the test content to experts, establishing content validity by confirming that the measurement tool effectively measures the intended attribute or skill.

Test Reliability

To ensure test reliability, the researcher conducted a second pilot on 10 students on February 3, 2025. Pearson's correlation coefficient was calculated between the two trials. The *t*-test value exceeded the tabulated value (2.16) at 13° of freedom and 0.05 significance, confirming test reliability.

Main Experiment

After completing the pilot, expert-approved tests were conducted on the sample in the sports hall. Anthropometric

measurements were taken first, followed by triple jump tests. Data were recorded and analyzed using the Statistical Package for the Social Sciences software.

Presentation of Results

RESULTS AND DISCUSSION

Presentation and Discussion of Results

After obtaining results, the researcher discussed the statistical significance and correlation with achievement.

Weight and Achievement

Across [Table 2], we observe the relationship between the two variables: weight and achievement. The mean value for the weight variable was (72.57) with a standard deviation of (7.85), while the mean value for the achievement variable was (9.72) with a standard deviation of (1.79). The correlation coefficient between the two research variables was (0.77).

Since the correlation coefficient value (0.77) is greater than the critical value at the significance level (0.05), which is (0.28) with a degree of freedom (46), this indicates a statistically significant relationship, thus confirming the research hypothesis.

Weight is one of the anthropometric measurements that influence both sprinting speed and motor ability in triple jumpers. An increase in weight contributes to an increase in distance covered during the sprinting phase, which is represented by the athlete's speed-strength. Accordingly, an athlete with a weight that is proportional to other anthropometric measurements will be able to achieve a longer jump distance compared to another athlete whose body weight is not proportionate to their anthropometric measurements.

Table 1: To identify statistical significance, the researcher analyzed the variables by calculating means and standard deviations

Number	Variables	Mean	Standard
1	Weight	72.57	7.58
2	Height	175.51	6.28
3	Leg length	91.36	4.59
4	Achievement	9.72	1.79

Height and Achievement

Through [Table 3], we observe the relationship between the two variables: Body height and achievement. The mean value for the body height variable was (175.51) with a standard deviation of (6.58), while the mean value for the achievement variable was (9.72) with a standard deviation of (1.79). The correlation coefficient between the two research variables was (0.48).

Since the correlation coefficient value (0.48) is greater than the critical value at the significance level (0.05), which is (0.28) with a degree of freedom (46), this indicates a statistically significant relationship. Thus, the research hypothesis is confirmed, as body height is considered one of the important and influential measurements, especially during the flight phase of the triple jump. An increase in the center of body mass positively affects speed during the three phases of the jump, and all of this impacts time calculation.

Leg Length and Achievement

The researcher calculated the mean and standard deviation for the two research variables. The mean value for leg length was (91.23) with a standard deviation of (4.83), while the mean value for achievement was (9.72) with a standard deviation of (1.79). The correlation coefficient between the two variables was (0.52).

Table 4 presents the results of the statistical analysis conducted on the variables of leg length and performance in the triple jump. The mean leg length was (91.23) with a standard deviation of (4.83), while the mean achievement was (9.73) with a standard deviation of (1.79). The correlation coefficient between the two variables reached (0.52), which is higher than the critical value of (0.28) at a significance level of (0.05)

Table 2: A correlation coefficient of 0.77, which is greater than the tabulated value of 0.28 at 46° of freedom and 0.05 significance, indicating a significant relationship

Number	Variables	Mean	STD.	Correlation	Statistical significance
1	Weight	72.57	7.58	0.77	Significant
2	Achievement	9.72	1.79		

Table 3: A correlation coefficient of 0.48, which exceeds 0.28 at 46° of freedom and 0.05 significance

Number	Variables	Mean	Standard	Correlation	Statistical significance
1	Height	175.51	6.28	0.48	Significant
2	Achievement	9.72	1.79		

Table 4: A correlation coefficient of 0.52, higher than the 0.28 threshold, indicating significance

Number	Variables	Mean	Standard	Correlation	Statistical significance
1	Leg length	91.36	4.59	0.52	Significant
2	Achievement	9.72	1.79		

and a degree of freedom (46). This indicates a statistically significant relationship between leg length and performance level in the triple jump.

This result shows that leg length is a positively influential factor in triple jump performance. The event requires dynamic transitions across three interconnected phases (take-off - step - jump), and longer lower limbs contribute to increased stride length and elevation of the body's center of mass, granting the athlete better balance and control during transitions between jumping phases.

Since the triple jump fundamentally depends on the athlete's ability to generate long horizontal momentum and partially convert it into vertical force at each phase, leg length contributes to:

- Increasing the horizontal distance in each phase of the jump (hop, step, jump)
- Reducing ground contact time through efficient extension and flexion of the hip, knee, and ankle joints
- Improving the take-off angle, which results in an optimal trajectory for the center of mass, thereby increasing the total distance achieved.

This result is consistent with previous studies in biomechanics that have demonstrated that anthropometric characteristics – especially lower limb length – are vital variables that contribute to enhanced performance in events requiring rapid and extensive dynamic movement, such as the triple jump.

CONCLUSION

- There is a statistically significant correlation between weight and achievement
- There is a statistically significant correlation between height and achievement
- There is a statistically significant correlation between leg length and achievement.

RECOMMENDATIONS

- Select triple jump athletes based on anthropometric traits
- Extend such anthropometric studies to other sports
- Choose athletes based on the physical traits required by each event.

REFERENCES

1. Allawi, R. (2000). *Measurement in physical education, sports psychology*. Dar Al-Fikr Al-Arabi.
2. Allawi, T. Y. (1990). *Relationship of some body measurements with physical fitness elements in handball* (Unpublished master's thesis). University of Mosul.
3. Al-Taie, N., & Al-Samarrai, M. (1981). *Principles of statistics and physical fitness tests*. University of Mosul.
4. Fadhl, S., & Faisal, T. (2001). *Track and field games* (2nd ed.). Dar Al-Thaqafa.
5. Hassanien, M. S. (n.d.). *Methods of constructing and standardizing tests and measures in physical education* (2nd ed.). Dar Al-Fikr Al-Arabi.
6. Hussein, H. A. (2007). *Predictive value of motor time based on traits of football players* (Master's thesis). College of Physical Education, University of Babylon.
7. Kamel, O., & Zaki, A. M. (1983). *Scientific foundations for fitness training*. Dar Al-Fikr Al-Arabi.
8. Kharibit, R., & Mustafa, A. R. (2002). *Track and field games* (1st ed.). Dar Al-Thaqafa.
9. Radwan, M. N. (n.d.). *Reference in body measurements* (1st ed.). Dar Al-Fikr Al-Arabi.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

The effect of a flipped and blended learning program using QR Code on learning the technical stages of the long jump

Ihsan Qaddoori Ameen

University of Kirkuk/College of Physical Education and Sports Sciences/Iraq

ABSTRACT

This research aims to identify the effect of a blended flipped learning program using QR codes on learning the technical stages of the long jump by improving the level of skill performance in the long jump skill stages and the level of digital achievement. The researcher used the experimental method due to its suitability for the nature of the research. He utilized an experimental design with pre- and post-tests for two groups, one experimental and the other control. The researcher selected a random sample of 36 students from the fourth-grade students of Al-Shaheed Ibrahim Secondary School in Kirkuk Governorate. One of the most important results was that the experimental group outperformed the control group in the level of skill performance in the long jump skill stages and the level of achievement. This is due to the implementation of the blended flipped learning program using QR codes. One of the most important recommendations was the necessity of using the proposed program to learn the technical steps of the long jump, and an effort to move away from traditional methods in the educational process.

Keywords: Flipped learning, QR code an long jump

INTRODUCTION

Technology has pervaded various aspects of life, and technological development has become one of the most important measures of a nation's progress. Technology has also permeated various educational systems, leading to a new concept called educational technology (Metwally, 2020: 11). Following the repercussions of the novel coronavirus and the changes taking place worldwide, the methods of teaching students in classrooms have changed to suit the new circumstances. Among the most important of these changes is the use of modern teaching strategies compatible with distance e-learning, and the utilization of available resources, such as communication networks and the development of smart device capabilities. This has helped ensure the continuity of learning in its digital form, amid the flood of information, the rapid pace. The rapid growth of change and knowledge has led to the information revolution. We are currently experiencing. The world is undergoing a major technological revolution that is affecting every aspect of our lives. The education sector must explore new educational methods and models to address many global challenges, including the growing demand for education, the lack of educational facilities, and the surge in the amount of information in all fields of knowledge. In addition, we need to use the development of educational technology to enable learners to learn at a time and place that suits them best, thereby creating an interactive e-learning model (Ghazi, 2022: 55)

Jonathan (2014). It also states that blended learning describes a hybrid model of e-learning that allows traditional teaching methods to coexist with modern e-learning resources and activities in a single course (Jonathan) (2014: 35).

Integrating technology into the educational process has become a modern necessity, not a choice. This requires serious work to make technology a fundamental element of education. We find that traditional education is not suitable for the new generation, and that traditional teaching methods have become ineffective and do not stimulate their passion for learning, as they are inconsistent with their living environment outside of school, where technology occupies a large space. Therefore, there is a need to harness technology to add excitement, suspense, and curiosity. One of the best practices for adapting

Address for correspondence:
Ihsan Qaddoori Ameen,
E-mail: ehsannajar@uokirkuk.edu.iq

modern technologies to develop teaching is flipped learning (Metwally, 2020: 81).

Haitham Atef (2016) points out that flipped learning is one of the most prominent modern trends in the field of education to overcome traditional education. This strategy relies on reversing what happens in the traditional classroom environment by moving the initial learning process outside the classroom. (Atef, 2016: 26) Hanan Al-Zein (2015) defines it as a form of blended learning that includes any use of technology to enhance learning in the classroom, allowing teachers to spend more time interacting with students instead of giving lectures. (Al-Zein, 2015: 177) Karmi Badawi (2014) refers to it as "an educational strategy based on the teacher's use of modern technologies to develop teaching methods, motivate, and communicate with students in the form of a recorded lesson that students listen to anywhere outside the classroom. They then apply what they have learned from the recording in practice inside the classroom. Thus, the roles of the classroom and home are reversed and exchanged." (Badawi, 2014: 80)

Flipped learning involves students attending class having prepared at home for the subject by watching educational videos or other activities assigned by the teacher. They take notes, record any questions they have, and summarize their learning. The teacher then helps students build on what they have learned through distance learning and then teaches them face-to-face (Metwally, 2020: 82). Jonathan (2014) states that flipped learning is the reversal of the educational process, with teaching taking place outside the classroom using modern technological means such as videos or any other means that students can use individually at home before arriving in the classroom. Therefore, the use of flipped learning can benefit from QR codes (Jonathan, 2014: 8). Mash and Marai (2015). Blended learning is an integrated mode of education that combines features of traditional classroom teaching and online teaching, making full use of the technology available in each field. (Mash, 2015, 44)

Muhammad Jaber Khalaf Allah (2010) defined it as an approach based on the use of e-learning and its advantages over traditional education systems, allowing direct interaction and skills training to achieve maximum benefits from the educational process. (Khalaf Allah, 2010: 51) Gulsun Kurubacak (2016) believes that blended learning is the integration of several methods into educational processes that involve the deployment of a variety of methods, resources, and learning experiences obtained from more than one type of information source. She also believes that the options available for blended learning go beyond traditional classrooms. (Gulsun, 2016: 25). Muhammad Asim Ghazi (2022) described the Quick Response Code, or a QR code is a two-dimensional code that has become widely used in most fields due to its advantages and the amount of data it can store. It consists of black cells arranged in a specific order on a square white background. Scanning these cells reveals the data they represent (Ghazi, 2022: 40).

One of the projects that utilized QR codes in the sports and scientific fields to inform theoretical sections and record absences is the Pluckers program. Muhammad Asim Ghazi (2022) explained that the Pluckers application is a learner assessment program that ensures the participation of all learners, allowing them to answer questions simultaneously and receive feedback in seconds. Formative assessment data is also quickly collected by scanning a smart device camera on a student's special card (Ghazi, 2022: 95).

The long jump is one of the essential athletics events, included in the Olympic and World Games. It requires a high degree of mastery of the sequence of steps and technical stages, including approach, takeoff, flight, and landing. However, field experience indicates that students face multiple difficulties in mastering this skill. These difficulties are often due to the adoption of traditional teaching methods, which rely on direct explanation and repetition, without the real use of modern technology that contributes to enhancing understanding and consolidating technical performance. With rapid technological advancements, modern educational methods have emerged, such as flipped learning, which reverses the roles of teacher and learner. Students interact with content outside of class (through videos, visual presentations, and interactive activities), and class time is allocated for practical application and discussion. Blended learning has also emerged as a model that combines traditional and digital education, allowing for a variety of knowledge sources and presentation methods.

Among the tools supporting these modern educational models are Quick Response Codes (QR Codes), which allow quick access to visual or interactive content, enhancing learner autonomy and facilitating flexible and simplified review of performance and learning steps.

Despite the availability of these technologies, their use in learning skills and activities, specifically in the long jump, remains limited. This creates a gap in the use of technology in line with the nature of practical learning in physical education, whether in schools, institutes, or colleges of physical education and sports science.

Based on the above, the researcher's research problem stems from the need to select a program based on flipped and blended learning using QR codes to determine its impact on improving students' learning of the technical stages of the long jump, compared to traditional methods.

RESEARCH OBJECTIVES

1. Develop an educational program based on flipped and blended learning using QR codes to learn the technical stages of the long jump
2. Identify the effect of a flipped and blended learning program using QR codes on learning the technical stages of the long jump.

RESEARCH HYPOTHESES

1. There was a statistically significant difference between the mean values of the long jump phase scores and numerical scores of the control group in the pre-test and post-test, with the post-test being more favorable to the experimental group
2. There was a statistically significant difference between the mean values of the long jump phase scores and numerical scores of the experimental group in the pre-test and post-test, with the post-test being more favorable to the experimental group
3. There was a statistically significant difference between the mean values of the long jump phase scores and numerical scores of the control group and the experimental group in the post-test.

RESEARCH METHODOLOGY

The researcher chose the experimental method because it was suitable for this type of research. He used an experimental design with pre-test and post-test criteria and divided the subjects into two groups: experimental group and control group.

RESEARCH POPULATION AND SAMPLE

Research Population

The research population consists of 60 4th-year secondary school students at Al-Shaheed Ibrahim Secondary School in Kirkuk Governorate for the 2024/2025 academic year.

Research Sample

The researcher selected a random sample of 36 4th-year secondary school students at Al-Shaheed Ibrahim Secondary School in Kirkuk Governorate. They were divided as follows:

- The exploratory study sample: consisting of 16 students, to calculate the scientific coefficients of validity and reliability of the research variables.
- The primary study sample: consisting of 20 students, who were divided into:
- The experimental group: consisting of 10 students, who were subjected to the application of the flipped and blended learning program using a QR code
- The control group: It consists of 10 students who are subjected to the program prescribed by the school, as shown in Table 1.

Reasons for Selecting the Research Sample

- That they were required to take the athletics course.
- Their desire to participate in the program.
- They owned an Android phone.

Statistical Description of the Research Sample

The basic variables of the sample were measured in the variables (age, weight, and height) to control the variables that may affect the research process. This is illustrated in the following Table 2.

From Table 2 on the homogeneity of the basic initial measurement data of the research sample, it can be seen that the data distribution of the entire research sample is moderate and not dispersed, with the characteristics of a normal distribution of samples. The values of the skewness coefficient range from (0.14 to 0.54), which is close to zero, and the flatness coefficient ranges from (−1.14 to 1.88), which means that the fluctuation of the moderate curve is considered acceptable and will not fluctuate up and down on average. This confirms the similarity of individuals in the research group on basic variables before the experiment.

Measurements and Tests used in the Research

Measuring the skill performance level for the stages of the long jump event under study

The researcher measured the skill performance level using a committee of experts consisting of three physical education professors. A skill performance evaluation form for the long jump event was used after consulting the experts and specialists, with a 90% agreement on how to distribute scores according to the technical stages. The form included the skill stages (approach, takeoff, flight, and landing). For each stage, 10 evaluation scores were assigned in the form based on the experts' opinions. The researcher then calculated the arithmetic mean of the experts' scores for each stage of the skill performance for the long jump skill under study.

Measuring the digital achievement level for the long jump skill under study

The digital achievement level for the long jump skill is calculated from the end of the takeoff board to the

Table 1: Description of the research sample

Classification	Number of students	Percentage
Exploratory study sample	16	44.44
Primary study sample		
Experimental	10	27.78
Officer	10	27.78
Total sample number	36	100

nearest part of the body in the sand pit. Thre–four exploratory study:

The survey study was conducted from February 3, 2025, to February 10, 2025, on a sample of 16 students from the fourth-grade secondary school at Martyr Ibrahim High School in Kirkuk Governorate, and from outside the primary sample. The purpose of the study was to calculate the scientific coefficients for the tests under study (validity reliability).

Scientific Coefficients for the Skill Performance Level for the Long Jump Skill Stages and the Digital Achievement Level under Study

Validity

To find the validity coefficient for the skill performance level for the long jump stages and the digital achievement level under study, the researcher used discriminant validity using a one-way comparison by calculating the mean values of the differences between the upper and lower quarters of the results of the survey sample, which numbered 16 students from the research community and outside the primary research sample. Table 3 illustrates this.

Table 3 shows that there are statistically significant differences between the upper and lower quartiles of long jump skill level and numerical performance level. The calculated *t*-values range from (4.60 to 7.35), which are greater than the *t*-values in the table at a significance level of 0.05, indicating the validity of the variables studied.

Reliability

To determine the reliability coefficients of the long jump skill level and numerical ability level studied, the researchers used the application and reapplication method on the same exploratory study sample (16 students). The variables were reapplied one week after the first application to determine the correlation coefficients between the first and second applications of the exploratory sample studied, as shown in Table 4.

Table 2: Statistical significance of baseline variables in the sample before the experiment (*n*=36)

Variables	Units	Mean	Median	Std	Skewness	Flattening coefficient
Age	Year	15.84	15.50	1.20	0.17	1.88
Weight	kg	63.74	64.00	2.54	054	−1.14
Height	cm	167.30	167	2.36	0.14	−0.47

Table 3: The significance of the differences between the upper and lower quarters to determine the validity of the discriminant in the level of skill performance for the long jump skill stages and the level of digital achievement under study

Technical stages	Units	The highest spring *n*=4		Lower spring *n*=4		The difference between the two averages	*t*-value
		Mean	Std	Mean	Std		
Approaching	Degree	6.10	0.91	4.25	0.81	1.85	6.21*
Ascension	Degree	5.80	0.84	3.90	0.75	1.90	7.35*
Aviation	Degree	5.35	0.67	3.85	0.58	1.50	5.50*
Landing	Degree	5.50	1.51	3.90	1.24	1.60	4.60*
Digital achievement level	Meter	2.80	1.25	1.95	1.05	2.20	6.05*

The tabular *t*-value at a significance level of (0.05)=3.182 * D.

Table 4: The reliability coefficient was determined by determining the correlation between the long jump skill level and the performance level of the examined digits in the first and second applications (*n*=16)

Variables	Units	First application		Re-apply		R-value
		Mean	Std	Mean	Std	
Approaching	Degree	5.25	0.87	5.32	0.92	0.92*
Ascension	Degree	5.04	0.74	4.99	0.69	0.94*
Aviation	Degree	4.86	0.74	4.62	0.68	0.84*
landing	Degree	4.57	0.57	4.39	0.47	0.81*
Digital achievement level	Meter	2.35	1.36	2.25	1.32	0.92*

*The tabular value of (r) at a significance level of (0.05) 0.482. *Statistically significant

Table 4 shows that there is a statistically significant correlation between the performance level of the long jump skill level and the numerical performance level in the first application and the reapplication. The calculated (r) values are between (0.81 and 0.94) and are greater than the (*t*) values in the table at a significance level of 0.05, indicating the stability of the ability variables studied.

Flipped and Blended Learning Program Using QR Code

Educational program objective

The program aims to teach the technical steps of the long jump to fourth-year secondary school students at Al-Shahid Ibrahim Secondary School in Kirkuk Governorate, such as (approach, ascent, flight, and landing), using flipped and blended learning, using QR Code and the Pluckers program.

Principles for developing the program

- The program content must be appropriate to the students' level
- The individual differences among students must be taken into account
- The program content must challenge the abilities of beginners
- The program content must be consistent with its objectives
- The program must be free of boredom and engage students' interest in the learning process
- Considering safety and security factors
- Providing students with immediate feedback to support their correct or incorrect responses.

Timeline of the proposed educational program

The researcher developed a timeline for implementing the proposed educational program and distributed it to 10 experts to survey their opinions on the duration of the proposed program and the number of weekly units. This is illustrated in Table 5.

It is clear from Table 5 that it included 12 educational units divided over 6 weeks, and each week contained two educational units, and the duration of the educational unit was 90 min. The following Table 6 shows the time distribution of the program as well as the parts of the educational unit for the individuals of the research sample.

Table 6 shows that the duration of the program implemented in this study was 6 weeks, which is the specified period for learning the skills under study. It included 12 educational units, with two educational units per week, with the unit duration being 45 min. Thus, the total duration of the program became 540 min. The researcher developed a program for the research sample. The researcher sends a QR code specific to the activity and the theoretical part that will be explained in detail in the next teaching unit in advance. The students scan the QR code sent to them via the WhatsApp group, then take the theoretical

Table 5: Experts' opinions on the duration of the proposed program (*n*=10 experts)

T		Proposed duration	Experts	
			Number	%
1	Program duration	Weeks 4	0	0.00
2		Weeks 6	9	90
3		Weeks 8	1	10
4		Weeks 12	0	0.00
1	Number of weekly units	Two units	10	100
2		Units 3	0	0.00
3		Units 4	0	0.00

Table 6: Time distribution of educational units in the proposed educational program

T	Statement	Time distribution
1	Number of weeks	Weeks (6)
2	Number of educational units in the program	(12) Educational unit
3	Number of educational units per week	(2) Educational unit
4	Application time per unit	Min (45)
5	Application time per week	Min (90)
6	Total time to implement the program	Min (540)

information and view the practical videos via the QR code. Thus, they have a prior background on the program that will be implemented in the teaching unit and then in the part specified for the theoretical part of the unit. The researcher then quickly explains the theoretical part and answers the students' questions regarding the theoretical part. He then distributes the QR code to each student and then presents the question to the research sample. Each student answers the question using her own QR code, holding it in her hands and moving it based on her answer. The question is divided into two parts: (A-B-C-D), with the answer being the letter above. The researcher then scans their QR code using their mobile phone and connects it to their laptop using the BlackBerry app. This displays a sheet for each QR code, showing correct and incorrect answers, and showing each student's percentage of answer to the question. This is done in the theoretical part, noting that the theoretical part is only five minutes of research, so students have prior knowledge of the theoretical part, which is sent to them before the unit via the QR code. In the practical part, the prescribed teaching units are implemented. They also have prior knowledge of the technical stage taught in this unit, as the researcher sends them the QR code for a video for the stage in advance, which includes a detailed explanation of the stage. The researcher performs the technical stage as a correct model, then provides a detailed explanation of the components of the activity, as well as general and specific physical preparation and skill preparation.

The final part concludes with the exercises indicated in the attachments and prescribed teaching units. The researcher implemented the program during the following periods:

- Academic year (2024–2025)
- The program was implemented from February 11, 2025, to March 30, 2025
- The exploratory study was implemented from February 3, 2025, to February 10, 2025
- Pre-test measurements were conducted on February 11, 2025
- The program was implemented from February 12, 2025, to March 28, 2025
- Post-test measurements were conducted on March 30, 2025.

The Baseline Study

The baseline study was conducted from February 11, 2025, to March 30, 2025, as follows:

Pre-test

Pre-test measurements were conducted on February 11, 2025, for the variables under study on individuals. The research sample consisted of 20 students, 10 of whom were divided into the experimental group and 10 of whom were divided into the control group. The preliminary study was conducted at Al-Shaheed Ibrahim Talaba Secondary School in Kirkuk Governorate.

Equivalence between the Two Groups (Control–Experimental)

Table 7 shows the statistical significance values of the experimental and control groups in the baseline variables before the experiment. The results show that there are no significant differences between the experimental and control groups in terms of variables (age, weight, height) at the 0.05 level. The calculated *t*-values range from 0.74 to 1.01. These values are lower than the table *t*-value = 2.101 at the 0.05 level, and the significance level is higher than 0.05, indicating that the two groups were equivalent in terms of baseline variables before the experiment.

Table 8 shows the statistical significance values of the long jump scores and digital scores of the experimental group and the control group before the experiment. The results show that there is no significant difference between the experimental group and the control group in long jump scores and digital scores at the 0.05 level. The calculated *t*-test values are between 0.89 and 1.63. These values are lower than the *t*-test value in the table at the 0.05 level = (2.101), and the significance level is >0.05, indicating that the two groups are equal in ability variables before the experiment.

Program implementation

The proposed program was applied to the experimental group, consisting of 10 students. The program developed by the school was applied to the control group, consisting of 10 students. The proposed educational program was implemented over a period of 6 weeks, from February 12, 2025, to March 28, 2025, at a rate of 2 units/week for the primary sample (the experimental group).

Post-measurement

Post-measurements of the variables under study were conducted on the research sample members on March 30, 2025. The measurements were conducted at the Martyr Ibrahim Talaba Secondary School in Kirkuk Governorate.

RESULTS AND DISCUSSIONS

Presentation and Discussion of Results

- Present and discuss the results of the first hypothesis: There was a statistically significant difference between the pre- and post-test means of the performance level of the long jump skill level and the numerical performance level of the control group in favor of the post-test.

The results of Table 9 show that there are statistically significant differences at a level of 0.05 between the average scores of the pre- and post-tests for the control group, in favor of the post-test average, in terms of the skill performance level for the long jump skill stages and the achievement level. The calculated *t*-test value ranged between (3.94:4.95), with an improvement rate ranging between (18.92% and 29.20%).

- Present and discuss the results of the second hypothesis: There are statistically significant differences between the means of the pre-test and post-test in favor of the post-test in terms of long jump ability level and numerical performance level.

Table 7: Equivalence between the control and experimental groups in the basic variables before the experiment (*n*1=*n*2=10)

Variables	Control group		Experimental group		The difference between the two averages	T-value	Sig.
	Mean	Std	Mean	Std			
Age	15.63	2.07	15.72	2.08	−0.09	0.74	0.41
Weight	63.47	2.87	63.00	2.61	−0.53	1.01	0.31
Height	167.94	1.71	167.83	1.03	0.11	0.81	0.76

*Significant at the 0.05 level=2.101

The results in Table 10 show that in terms of long jump skill level and digital skill level, there is a statistically significant difference between the pre-test and post-test average scores of the experimental group at the 0.05 level, and the experimental group is better than the post-test average. The calculated *t*-test value is (7.84: 14.21), and the improvement rate is (47.16%: 76.14%).

- The results of the third hypothesis are presented and discussed: In terms of long jump skill level and digital skill level, there is a statistically significant difference between the control group and the experimental group at the 0.05 level, and the experimental group is better than the pre-test average.

Table 8: Equivalence between the control and experimental groups in the level of skill performance for the long jump skill stages and the level of digital achievement before the experiment (*n*1=*n*2=10)

Variables	Units	Control group		Experimental group		*t*-value*
		Mean	Std	Mean	Std	
Approaching	Degree	5.39	0.84	5.28	082	1.21
Ascension	Degree	5.41	0.69	5.45	0.75	1.63
Aviation	Degree	5.31	0.74	5.25	0.69	0.89
landing	Degree	4.71	0.91	4.61	0.84	1.01
Digital achievement level	Meter	2.26	1.42	2.18	1.40	0.84

*The *t*-test value at a significance level of (0.05)=2.101

The results of Table 11 show the following:

There were significant differences (0.05) in the mean scores of the post-test between the experimental group and the control group in terms of long jump skill level and digital performance level, with the experimental group outperforming the control group. The calculated "*t*" value ranged between (3.45 and 7.21), and the percentage of improvement ranged between (18.15% and 38.33%). The researcher attributes the reason for the improvement to the vocabulary of the educational units in which the flipped and blended learning was applied using QR Code to learn the technical steps of the long jump, which provided an element of excitement for the participants due to their use of mobile devices in the learning process, which played a role, especially since we live in a world of modern technology where there is a variety of exercises and they have a prior idea of the effectiveness and the method of performance, and thus they have formed a prior drawing of the motor program, as the prepared program included the participation of all learners, allowing them to answer the question by the program implementer at the same time and obtain an evaluation of the answers in seconds and collect formative evaluation data quickly by scanning the camera

Table 9: Statistical significance of the differences in the control group's long jump skill level, digital performance level, and improvement percentage in the *t*-test between the pre- and post-tests (*n*=10)

Technical stages	Units	Control group				*t*-value	Improvement rate (%)
		Pre-measurement		Dimensional measurement			
		Mean	Std	Mean	Std		
Approaching	Degree	5.39	0.84	6.41	0.94	4.21*	18.92
Ascension	Degree	5.41	0.69	6.49	0.78	3.94*	19.96
Aviation	Degree	5.31	0.74	6.55	0.71	4.81*	23.35
Landing	Degree	4.71	0.91	5.87	1.02	4.95*	24.63
Digital achievement level	Meter	2.26	1.42	2.92	1.74	3.99*	29.20

*The *t*-test value at a significance level of (0.05)=2.262

Table 10: Statistical significance of the pre- and post-test *t*-test differences in long jump skill level, digital performance level, and performance percentage (*n*=11)

Technical stages	Units	Experimental group				*t*-value*	Improvement rate (%)
		Pre-measurement		Dimensional measurement			
		Mean	Std	Mean	Std		
Approaching	Degree	5.28	082	8.59	0.74	12.64	62.69%
Ascension	Degree	5.45	0.75	8.02	0.69	10.54	47.16%
Aviation	Degree	5.25	0.69	7.94	0.81	9.86	51.24%
Landing	Degree	4.61	0.84	8.12	0.91	14.21	76.14%
Digital achievement level	Meter	2.18	1.40	3.45	1.83	7.84	58.26%

*The *t*-test value at a significance level of (0.05)=2.262

Table 11: Statistical significance of the *t*-test differences in the post-test in terms of the skill performance level for the long jump skill stages, the digital achievement level, and the percentage improvement between the control and experimental groups ($n1=n2=10$)

Technical stages	Units	Control group		Experimental group		*t*-value	Improvement rate (%)
		Mean	Std	Mean	Std		
Approaching	Degree	6.41	0.94	8.59	0.74	4.21*	34.01
Ascension	Degree	6.49	0.78	8.02	0.69	5.74*	23.57
Aviation	Degree	6.55	0.71	7.94	0.81	4.91*	21.22
Landing	Degree	5.87	1.02	8.12	0.91	7.21*	38.33
Digital achievement level	Meter	2.92	1.74	3.45	1.83	3.45*	18.1

*The value of (*t*) at a significance level of (0.05)=2.101

of the smart device. This is what Schmidt confirms, that the learning that occurs among learners who practice several variations in the exercise of skill forms will have the ability to perceive the stimuli that they encounter and thus activate the process of learning the skills (Schmidt, 2000, p. 267). This is confirmed by Ihsan, who states that exercise is the fundamental characteristic of the educational unit. Through it, the level of learning or performance can be measured and developed, in addition to providing the learner with fluidity and aesthetics in performance (Ihsan 2023, p. 7).

The results of a study by Badran and Hamid (2022) indicated that there were statistically significant differences between the post-test averages of the experimental and control groups in the level of skill performance (under study), in favor of the post-test for the experimental group.

CONCLUSIONS

1. The control group achieved a significant increase in the level of skill performance in the long jump skill stages and the level of achievement. This is due to the implementation of the contents of the traditional program implemented by the school. The percentage of improvement between the pre- and post-tests in the skill performance level for the long jump skill stages and the achievement level under study for the control group ranged between (18.92% and 29.20%)
2. The experimental group achieved a significant increase in the skill performance level for the long jump skill stages and achievement level. This is due to the application of the flipped and blended learning program using QR codes
3. The percentage of improvement between the pre- and post-tests in the skill performance level for the long jump skill stages and achievement level under study for the experimental group ranged between (47.16% and 76.14%)
4. The experimental group outperformed the control group in the skill performance level for the long jump skill stages and achievement level. This is due to the application of the flipped and blended learning program using QR codes
5. The percentage of improvement between both (the experimental group and the control group) in the post-test in the skill performance level for the long jump skill stages and achievement levels under study, the percentage ranged between (18.15% and 38.33%) in favor of the experimental group.

Recommendations

1. Use the proposed program to teach the technical steps of the long jump to all grade levels
2. -Use the flipped and blended learning method to enhance cognitive and skill acquisition in other sports
3. Use modern technological means in the educational process, especially those that rely on self-directed learning
4. Try to move away from traditional methods in the educational process
5. Use the Pluckers program to develop and accelerate cognitive learning and cognitive tests
6. Use QR codes in blended and flipped learning for all grade levels.

REFERENCES

1. Saeed A, Shaheen K. The Effect of Flipped Learning using Telegram on Learning Some Basic Skills for Beginner Handball Players. Assiut: Faculty of Physical Education, Assiut University; 2022.
2. Badran AF, Hamid A. A Psychological Health Education Program Using QR Codes on Learning Some Basic Skills and Health and Psychological Behavior in Handball; 2022.
3. El-Zein H. The effectiveness of a training program to develop the skills of designing and producing electronic assessment tools among faculty members and their satisfaction with It. J Islam Univ Educ Psychol Stud 2015.
4. El-Din Metwally E, *et al*. Teaching and Learning Technology. Riyadh: Alam Al-Riyadh Publishing House; 2020.
5. Taha FM, Rahim A. The Effect of using Flipped Learning Strategy on Some Learning Outcomes of Motor Education for Female Students at the Faculty of Physical Education. Helwan University, Helwan University, Faculty of Physical Education for Girls. [Thesis]; 2018.

6. Badawi K. Middle school social studies teachers' attitudes towards flipped classroom teaching and their training needs for its use. J Arab Stud Educ Psychol 2014.
7. Gaber M, Allah K. The Effectiveness of Using E-Learning and Blended Learning in Developing the Skills of Creating Educational Models among Students in the Educational Technology Department. Dakahlia: Faculty of Education, Al-Azhar University; 2010.
8. Ghazi MA. QoR and Physical Education Sciences. Jordan: Safaa Publishing and Distribution House; 2022.
9. Farag M, El-Sayed G. The effect of flipped learning supported by social communication on learning outcomes of Al-Azhar preparatory school Students; 2022.
10. Atef H. Flipped Learning. Cairo: Dar Al-Sahab Publishing and Distribution; 2016.
11. Kurubacak G. Cirtical curriculum design for blended learning in higher education. J Interact Classroom Manag 2016;16-25.
12. Bergmann J, Sams A. Flipped Learning Gateway to Student Engagement. United States: ISTE; 2014.
13. Mash RJ, Marais D, Van Der Walt S, Van Deventer I, Steyn M, Labadarios D. Assessment of the quality of interaction in distance learning programmes utilising the internet (WebCT) or interactive television (ITV). Med Educ 2005;39:1093-100.
14. Ameen IQ. Effectiveness of educational units using the thought acceleration model on the learning of table tennis forehand and backhand in 13-15-year-old. SPORT TK Eur Am J Sport Sci 2023;12:18.
15. Ameen IQ, Mohammed MQ. The effect of an educational program according to the reigeluth model on reflective thinking and the digital level of high jump among students of the faculty of physical education and sports sciences. Rev Iberoamericana Psicol Ejercicio l Deporte 2023;18:127-31.

APPENDIX

Appendix 1: Skill performance level evaluation form for the long jump skill

Technical stages	Technical points	Maximum degree	Student's grade
Approaching	- Gaining near-maximum horizontal speed - Good preparation for advancement - Land the take-off foot on the take-off board accurately and with minimal loss	10	
Ascension	- Achieving the most appropriate flight angle for the center of gravity - Jumping with the highest possible take-off speed as a result of the jumping force applied during take-off - Achieving a center of gravity flight altitude during departure due to approach speed and liftoff force	10	
Aviation	- Maintaining balance - Preparing for a good landing - Use arm movement to balance and prepare for landing	10	
Landing	- Utilizing flight movements to land while gaining distance due to the extension of the jumper's legs - The jumper's feet touch the sand in front of the intersection of the center of gravity curve with the ground, if possible, and the body is received in a flexible manner that absorbs the forces of the body's descent.	10	

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Review Article

Motor speed and its relationship to the speed of performing the football dribbling skill for students

Humam Abbas Saihood

Ministry of Education, General Directorate of Education in Najaf Governorate, Najaf, Iraq

ABSTRACT

The first chapter introduces the research, the problem, objectives, and hypotheses. Learning and its types involve preparing the learner in physical and skill aspects. The basis for complete performance is the link between biokinetics and skill. Hence, the importance of the study lies in combining certain physical muscles with a skill considered one of the most important skills in football, namely the dribbling skill. The second chapter includes the study methodology and field procedures, using the descriptive approach on a sample of 20 students from the University of Kufa, College of Physical Education and Sports Sciences. The researcher conducted an exploratory experiment on a sample of 5 students to determine the validity of the tests. He then administered his own measurements of the physical and skill aspects of the target group. The results were analyzed, presented, and discussed scientifically based on scientific sources and references that support the researcher's findings. A significant relationship emerged between the variables under study. In the third chapter, the researcher reached several conclusions, based on which he made a set of recommendations.

Keywords: Motor, Performing and football, Speed

INTRODUCTION

Sports are one of the most important sectors in the lives of modern societies, given its special importance in promoting the health and productivity of these societies, ensuring the development of all the qualities that constitute personality, sublime community relations, and ways to enhance them.

The abilities and capabilities possessed by individuals, including the sport of football, are one of the developments that have occurred in football. It is a new style of performance. Modern football is a new style of play that has formed an important foundation in the development of traditional football, due to its speed, excitement, and renewed performance, as well as its great ability to attract audiences and arouse their enthusiasm with a greater level of enjoyment and excitement.[1]

A student who plays football possesses a set of biomotor abilities at different levels, which constitute the foundation for practicing the game, given its specifications that require high speed in performance within the current development. In addition, there are a number of skilled and high-quality students who are required to maintain constant movement and remain relatively still under high pressure during performance. This is because the demands of the game often require students to assume both defensive and offensive duties simultaneously. From this standpoint, the importance of this research study emerges in linking bio-kinetic and skill aspects by understanding the relationship between motor speed and rolling speed among football students.

Address for correspondence:
Humam Abbas Saihood,
E-mail: humamabass0780@gmail.com

RESEARCH PROBLEM

Based on the researcher's extensive knowledge of most football matches and observation of practical lessons for students in the Department of Physical Education, he observed a weakness and slowness in the performance of the dribbling skill, which he believes results from a lack of motor speed capabilities. Therefore, the researcher sought to understand the relationship between motor speed and dribbling skill in football and to find specific methods for developing aspects related to physical and skill factors, thereby developing the skill from all aspects.

RESEARCH OBJECTIVE

- To determine the level of correlation between motor speed and the speed of performance of the dribbling skill in football for students in the study sample.

RESEARCH HYPOTHESIS

- There is a statistically significant correlation between the level of rapid movement compared to the dribbling performance of football for students in the study sample.

RESEARCH AREAS

- Human area: First-year students at the College of Physical Education and Sports Sciences, University of Kufa, for the academic year 2024–2025.
- Time area: October 01, 2024–May 01, 2025.
- Spatial area: Open Football Field of the College of Physical Education and Sports Sciences, University of Kufa.

RESEARCH METHODOLOGY

To align the methodology with the requirements of the research problem, the researcher adopted a descriptive approach using a survey method, extracting relationships between the variables under study.

RESEARCH SAMPLE

The research community was defined as students in the 1st year of study at the College of Physical Education/University of Kufa for the academic year 2024–2025, numbering 90 students. A random drawing of lots was used to select the research sample from the academic divisions, consisting of 20 students, who were all subjects to the tests and measurements to be administered by the researcher.

DATA COLLECTION METHODS AND TOOLS

To achieve the desired results consistent with the study objectives, data were collected as follows:

Data Collection Methods

- References and sources
- Observation
- Tests and measurements
- Personal interview with experts.

Equipment and Tools

- Football field
- Footballs
- Tests and measurements
- Whistle
- Signals
- Electronic clock
- Registration form
- Tape measurement tool.

FIELD RESEARCH PROCEDURES

To identify the research variables within the tests used, the researcher surveyed relevant scientific sources and interviewed experts and specialists involved in motor learning and football. The researcher identified his research variables according to the curriculum for the 1st academic year of the College of Physical Education and Sports Sciences at the University of Kufa. This included a focus on the dribbling skill, given its importance as a final outcome of football performance. The researcher also found that the priority to be taken into account was the speed of performing the dribbling skill. Regarding the tests related to these variables, they are:[2]

Approved Tests

The tests adopted by the researcher in this study are:

The 20 m standing run test[3]

- Name of choice: 20 m standing run
- Test objective: To determine the level of motor speed
- Requirements: Running track, whistle, tape measure, electronic clock, data entry form
- Performance method: After the subject stands at the starting line, a whistle is heard, prompting them to run the specified distance of 20 m
- Measurement method: To measure the time taken by the student to complete the distance in a single attempt.

Test name: Rolling test with a ball 20 m back and back[4]

- Purpose of the test: To determine the speed level of ball rolling performance
- Required supplies: Tape measure, 2 footballs, electronic clock, 2 indicators, whistle, results entry form
- Test method: After the student stands with the ball behind the first indicator, and upon hearing the whistle, he begins rolling the ball, covering a distance of 20 m to reach the second indicator. He then turns around to return to the starting point of the first indicator, as shown in [Figure 1] and as shown in [Figure 2].
- Measurement method: The time taken by the student to cover a distance of 20 m is used when performing the ball rolling skill back and forth (two attempts are given, with the best being calculated).

Exploratory Experiment

The researcher conducted his exploratory experiment on October 01, 2024, on an exploratory sample of 10 students,

outside the primary research sample. The purpose was to determine the best method for implementing the identified tests, review all required requirements, and ensure the appropriateness of the tests for the study sample. With the assistance of the support team, the researcher conducted the main research experiment on October 13, 2024. This included all tests measuring the speed of movement and speed of dribbling skills with a soccer ball among the students in the research sample. This was to determine the current level of these two skills, with the aim of addressing the researcher's findings and processing them statistically to determine the correlation coefficient between these variables.

Statistical Methods

The researcher used the statistical package (Statistical Package for the Social Sciences) to process the research results.

RESULTS

Presentation, Analysis, and Discussion of Results

Based on the data presented in [Table 2], the correlation coefficient between the skill variable (rolling speed) and the physical variable (kinetic speed) reached 0.676 below a significance level of 0.05 and within a degree of freedom of 18. This is greater than the table value of 0.521 at the same significance level and degree of freedom. This indicates a significant correlation between the motor speed possessed by the research sample of students and the speed at which they performed the ball rolling skill.

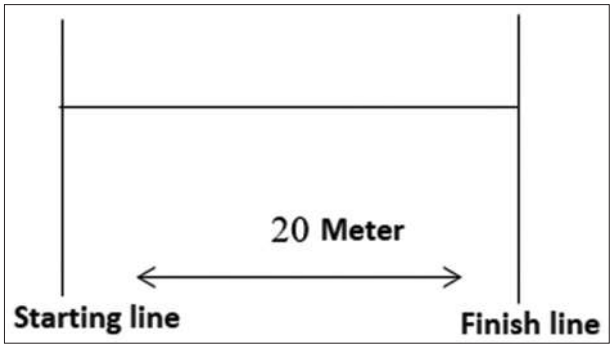


Figure 1: The motor speed test

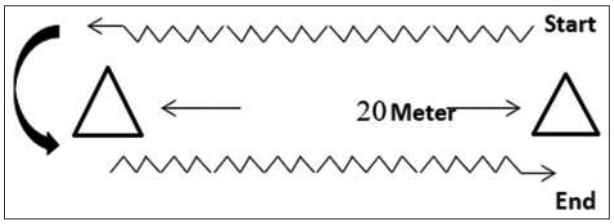


Figure 2: Illustrates the performance of the ball rolling task 20 m back and forth

Table 1: The division of the research samples, numbers, and percentages

Number	Research community	Pilot study sample	Sample	Total
	90	5	20	25
Percentage	100	5.55	22.22	27.77

DISCUSSION OF THE RESULTS

From what was observed in the presentation and analysis of the results of the correlation between the two skill-related attributes (dribbling speed) and physical attributes (kinetic speed), it was found that the correlation coefficient between the two tests, which amounted to 0.676, was higher than its tabular value of 0.521, below the significance level of 0.05 and with a degree of freedom of 18. This indicates the presence of a significant correlation. The researcher concluded that the reason for this correlation is that kinetic speed effectively contributes to increasing dribbling speed, and that the relationship between dribbling speed and kinetic speed is directly proportional. Their control of the ball is very high, and it remains to control the physical component, i.e., speed, to fully develop the skill.[5]

Kinetic speed plays an important and effective role in football, given the game's requirement of high physical fitness and skill due to the intense pressure and technical and tactical proficiency during the course of matches, including covering, intercepting, and attacking within a short period of time. Herein lies the importance of kinetic speed in this game.[6] The researcher points out that motor speed is the key element in developing players' basic skills. A student who possesses proficient motor speed must perform the dribbling skill well and skillfully, as they possess the ability to control their performance, have a high reaction speed, and the ability to make decisions in the shortest possible time. It is essential to develop motor speed in students, given its direct impact on improving their skills, including dribbling.[7] This provides a positive and positive outcome for the team as a whole and helps achieve goals. A student's ability to perform a specific movement in the fastest possible time depends on developing muscle strength combined with speed, such as leg speed, in mastering basic skills. Motor speed in football also plays an important role in performing passing and receiving movements between players, scoring, and dribbling. All of these movements require the student to possess motor speed, which is what modern play requires to deal with match conditions and unexpected playing situations during the course of a match.[8] The researcher also believes that improving nerve impulses to quickly transmit signals from the brain to the muscles enables them to take appropriate action under pressure as quickly as possible, in the shortest possible time, and in a precise manner. The time period between the moment of stimulation and the appropriate full response is an

Table 2: The degree of correlation achieved between movement speed and rolling speed and the tabular score and significance between the two variables

Variables	Mean	Standard	Correlation coefficient	R tabular*	Significance
Kinetic velocity	3.65	0.48	0.676	0.521	Sig.
Rolling velocity	11.32	1.412			

*Below a significance level of 0.05 and within a degree of freedom of 18

important indicator that depends on the efficiency of nerve impulses and the muscular system's ability to execute the movement in the shortest possible time. Mental performance must be improved to relieve the pressure of matches, to reach sound decisions, and to think logically during matches. Football is characterized by continuous movement between offensive and defensive duties in all playing positions, almost non-stop, especially in matches that require high pressure and in the final knockout stages.[9]

CONCLUSION

1. There is a significant correlation between dribbling speed and motor speed
2. Skill development is achieved through developing the physical aspect, ensuring a comprehensive skill
3. Improving the functioning of the nervous system to perform skills quickly and proficiently.

Recommendations

1. The need to focus on establishing correlations related to physical and skill aspects to integrate skills
2. The need for soccer educational units to include exercises specifically designed to develop the biomotor aspects to ensure optimal performance
3. Conduct similar studies on the variables studied in other sports and games.

REFERENCES

1. Lazam Q. Theories of Preparation and Training in Specific Zones in Football. 3rd ed. Baghdad: Sports Library; 2013.
2. Alawi MH, Radwan MN. Motor Performance Tests. 1st ed. Cairo: Dar Al-Fikr Al-Arabi; 1982.
3. Salman TA. Statistical Analysis of Nonparametric Tests Using IBM SPSS Statistics Version 24. Baghdad: College of Medicine, University of Baghdad; 2018.
4. Al-Khashab ZQ. Football. 2nd ed. Mosul: Dar Al-Kutub for Printing and Publishing; 1999.
5. Ibrahim MR. Field Application of Sports Training Theories and Methods. 1st ed. Baghdad: Dar Al-Kutub Wa Al-Watha'iq; 2008.
6. Makadada FA. Relationship between Speed and Agility and Dribbling Skills in Football Games in Students of SMK Negeri 1 Modoinding. In: International Conference on Physical Education, Sport, and Health. Atlantis Press; 2022. p. 67-74.
7. Hidayat N, Syahruddin S, Hudain MA, Suyudi I, Sudiadharma S, Siswanto W The influence of speed, agility, and confidence on extracurricular students' football dribbling ability. J Coach Educ Sports 2024;5:53-64.
8. Kuswoyo DD, Betaubun P. Relationship between speed with dribbling skills on the students of physical education department in playing football at Universitas Musamus. Int J Adv Res Eng Technol 2019;10:49-52.
9. Jawad HK, Ahmed MA, Alrazaq AH. The effectiveness of the educational field to developing the skills of dribbling and shooting of football for youth. Indian J Forensic Med Toxicol 2021;15:1318-25.

International Journal of Health, Physical Education and Computer Science in Sports
ISSN 2231-3265 Volume 57; Issue 1
ISRA Journal Impact Factor 7.217
A Peer Reviewed (Refereed) International Research Journal

International Federation of Physical Education, Fitness and Sports Science Association

Research Article

Educational motivation and its relationship to achievement (theoretical and practical) in basketball among students of the College of Physical Education and Sports Sciences

Hussein Rashid Ghyaidh

Ministry of Education, General Directorate of Education, Al-Qadisiyah Governorate, Iraq

ABSTRACT

The research addressed the concept of educational motivation, which, from an educational perspective, is considered one of the educational goals. Stimulating and directing students' motivation and generating specific interests within them motivate them to study and engage in cognitive activities outside the classroom and in their future lives. Motivation plays a significant role in achieving the objectives of physical education lessons and the objectives of the basketball curriculum in particular. Attention must be paid to the process of preparing students from many aspects, most notably the psychological aspects represented in stimulating students' motivation and considering it one of the determining factors in students' ability to achieve and accomplish, especially in basketball. The problem of the research lies in the fact that one of the most important basic variables affecting the level of achievement is motivation, which plays a crucial role in learning and remembering. The greater the motivation, the stronger the brain's activity in learning and remembering.

Keywords: Educational, Motivation, Achievement and basketball

INTRODUCTION

Physical education is one of the most important fields that play an effective role in educational development in all its dimensions. Physical education studies hold a scientific status and importance no less important than other curricular studies. Through them, many educational and learning objectives can be achieved, including cognitive, emotional, and skill-based learning. These objectives can be achieved through various activities, whether physical, skill-based, mental, or social. These activities contribute significantly to preparing students and enabling them to serve their country with high efficiency.

Physical education studies are important in the educational process and are considered a fundamental foundation that helps students improve their motor, cognitive, and skill-based performance. Through them, students acquire a wealth of information, skills, and rules specific to each game, particularly team games, the most important of which is basketball. From an educational perspective, motivation is considered one of the educational goals. "Stimulating and directing students' motivation and generating specific interests within them motivate them to study and perform cognitive activities outside the academic environment and in their future lives. Motivation is closely related to the processes of perception, memory, imagination, thinking, learning, and adaptation. It is also the basis for the study of personality. Moreover, motives are essential to explain all behavior, as there is no behavior without motives. Motivation is an important factor that addresses student determinants to influence the student's performance during the lesson" (Al-Najihi, Morsi, 1983: 102). It represents the force that moves and stimulates the student to perform academic work with enthusiasm and desire. This force is reflected in the amount of effort the student exerts, the degree of their perseverance and persistence in practical performance, and the extent to which they provide the best of their abilities and skills during the physical education lesson. It also helps predict future human behavior. If we know a person's motivations, we can predict their behavior in certain circumstances. We can also use our knowledge of people's motivations to control and direct their behavior toward specific directions and goals by preparing specific educational situations

Address for correspondence:
Hussein Rashid Ghyaidh
E-mail:

that will arouse specific motivations in them, motivating them to perform the tasks we want them to perform and preventing them from performing other tasks we do not want them to perform. Therefore, the importance of motivation appears in various scientific and applied fields, such as physical education and others. Therefore, motivation can play a significant role as a means of achieving the objectives of physical education lessons, and the objectives of the basketball curriculum in particular. Attention must be paid to the process of preparing students from many aspects, most notably psychological aspects, represented by stimulating student motivation and considering it one of the determining factors in students' ability to achieve and accomplish, especially in basketball. The problem of this research lies in the fact that one of the most important fundamental variables affecting achievement levels is motivation, which plays a crucial role in learning and remembering. The greater the motivation, the stronger the brain's activity in learning and remembering. Learning material that stimulates an individual's interests, the way it stimulates their motivation, and links it to their previous experience and goals, is likely to be more quickly and accurately recalled. What stimulates an individual's motivation to learn is their knowledge of their progress and the success they achieve in the context of the learning process. Motivation is one of the fundamental conditions upon which achieving the goal of the learning process depends in any of its various fields, whether in acquiring knowledge and information, forming attitudes, or thinking styles.

Research Problem

"The current research problem is represented by answering the following questions:

1. What is the level of educational motivation among students in the College of Physical Education and Sports Sciences?
2. What is the nature of the relationship between educational motivation and achievement level among students in the College of Physical Education and Sports Sciences?
3. What is the extent of the impact of educational motivation on students' achievement (theoretical and practical)? Does someone with high academic motivation have high achievement proficiency? Does someone with low academic motivation have a weak academic level?"

Purpose of the Study

The purpose of this research lies in the importance of motivation in general from an educational perspective and its direct connection to students' educational lives. Educational motivation, in particular, is an individual, self-directed activity through which the learner strives to exert his utmost effort to achieve distinguished academic knowledge and with an intrinsic desire to satisfy himself in pursuit of a sense of excitement and the joy of learning. It also addresses an important topic that has a significant connection to students' educational lives and their academic achievement level, "namely (educational motivation and its relationship to the level of theoretical and practical achievement among students in the College of Physical Education and Sports Sciences) (Al-Najihi, Morsi, 1983: 102)." Knowing these aspects enables instructors and students to adopt specific strategies aimed at increasing students' efficiency in the level of achievement and increasing their motivation to achieve their desired goals. The educational motivation scale also helps teachers identify students who are characterized by perseverance, competence, excellence, curiosity, and the challenge of difficult tasks in their field of study. This enables teachers to place them in appropriate positions for them in terms of sporting activities and events that are compatible with their physical, skill, and psychological abilities.

METHODS AND PROCEDURES

The researcher used the descriptive approach, using survey and correlational methods, which is consistent with the nature of this study.

Research Community

"The research community included 1st-year students in the College of Physical Education and Sports Sciences at Al-Qadisiyah University for the academic year (2023–2024), totaling 212 male and female students. The number of female students was 26 students, and the number of male students was 186 students."

Research Samples

Exploratory sample

The experimental sample of 32 students from the College of Physical Education and Sports Sciences was randomly selected from the research community, outside the research sample.

Construction and application sample

"The selection of the sample must be representative of the original community and "this sample must have a main condition, which is the possibility of generalizing its results to the group from which it was taken" (Al-Najihi, Morsi, 1983: 102). The research sample reached 85% of the research community, which amounted to 212 male and female students. Accordingly, the number of the sample reached 180 male and female students, with 154 male students, which constitutes 85% of the research sample, compared to 26 female students, which constitutes 15% of the research sample, noting that the construction sample was adopted as an application sample (Al-Najihi, Morsi, 1983: 102)."

MAIN RESEARCH PROCEDURES

Research tools vary depending on the objectives and nature of the data required. "Since the current research aims to

uncover the relationship between educational motivation and achievement (theoretical and practical) in basketball among students at the College of Physical Education and Sports Sciences, this requires the use of two tools to measure the variables of educational motivation and achievement (theoretical and practical)." The following are the procedures used to develop the two tools:

Achievement (Theoretical and Practical)

The researcher used the basketball score sheet in the final examination for the first semester of the academic year (2023–2024) as a measure of achievement (theoretical and practical) for the students in the research sample.

Educational Motivation

The researcher constructed an educational motivation scale using the following procedures:

Purpose of constructing the scale

"To identify the level of educational motivation and its relationship to the level of theoretical and practical achievement among students at the College of Physical Education and Sports Sciences at Al-Qadisiyah University."

Preparing the initial formula for the educational motivation scale

After reviewing the psychological scales that were built in this field, the researcher was able to collect a number of paragraphs, and after excluding similar and unclear paragraphs, the number of paragraphs reached 62 paragraphs (Appendix 1), and they were presented to experts in educational and sports psychology, testing and measurement, and after the researcher retrieved the questionnaire forms from the experts, he collected the data and unpacked it, where the Chi-square test was used to identify the valid paragraphs, and the results showed the validity of all paragraphs, and Table 1 shows as follows:

Preparing instructions for the educational motivation scale

The instructions for the scale are clarified before beginning its application to the research sample, noting that these instructions and the conditions for implementing the test are clear, simple, and objective so that adherence to them can be avoided without any discrepancies that could affect the test results.

Keys for correcting the educational motivation scale

"Calculating the score obtained by each individual in the research sample on the scale is an important step. The score depends on the method of constructing the items and the number of answer alternatives. After the experts approved the answer alternatives, they were as follows: "Always applies to me," "Sometimes applies to me," and "Never applies to me." Note that this scale includes positive and negative items, with positive items being assigned the following values: (2) For the "Always applies to me" alternative, (1) for the "Sometimes applies to me" alternative, and (0) for the "Never applies to me" alternative. These values are reflected when answering the negative paragraphs, so the following values are given: 0 for the alternative "Always applies to me," 1 mark for the alternative "sometimes applies to me," and 2 marks for the alternative "never applies to me." Then, the marks for all paragraphs (positive and negative) are added together to obtain the total score for the scale, and Table 2 shows as follows:

Exploratory experiment for the educational motivation scale

"The researcher conducted an exploratory experiment on a sample of 32 students. The sample was randomly selected on 1/9/2024. It was concluded that all the scale paragraphs and answer alternatives were clear and understandable to the research sample. It became clear through the exploratory experiment that the time to answer the scale paragraphs ranged between 15 and 25 with an average of 20 minutes and that all paragraphs were clear and understandable to the research sample (Al-Kubaisi, 1995:25)."

Main application of the educational motivation scale

"After the educational motivation scale, with its instructions and items, was ready for application, the researcher began applying the scale to the research sample, which numbered 180 male and female students from the College of Physical Education and Sports Sciences at Al-Qadisiyah University. The research sample percentage was 85% of the research community for the period from January 19, 2024, to February 1, 2024. After sorting the questionnaires for the construction sample, it became clear that all questionnaires were valid for response. Accordingly, the researcher retained all 180 questionnaires, which were relied upon in the statistical

Table 1: The validity of the educational motivation scale items

Paragraphs	Number of approvers	Agreement rate	Calculated Chi-square value	Chi-square value of the table	Statistical significance
1-2-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22-24-25-26-28-30-31-32-33-35-36-38-39-40-41-42-43-45-46-47-48-49-50-51-52-53-55-56-57-58-59-60-61	11	100%	11	3.84	0.05 Statistically significant
3-21-23-27-29-34-37-44-54-62	10	90.9	7.36		

The tabular value of Chi-square is 3.84 at a degree of freedom (n-1)=2-1=1 and a significance level of 0.05

Table 2: The numbers of the positive and negative paragraphs in the educational motivation scale

Positive paragraph numbers	Negative paragraph numbers
1-2-4-5-6-7-8-9-10-11-13-14-15-16-17-18-20-22-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-41-42-43-44-45-46-47-48-49-50-51-52-53-54-56-57-58-59-60-61-62	3-12-19-21-23-40-55

analysis of the paragraphs of the educational motivation scale, which consists of 62 paragraphs, for the purpose of extracting the discriminating power, validity, and reliability (Al-Kubaisi, 1995:25)."

Statistical analysis of the educational motivation scale paragraphs

"Statistical analysis of paragraphs is more important than logical analysis, as it verifies the content of the paragraph in measuring what it was designed to measure, relying on certain indicators, such as its ability to distinguish between respondents and its validity and difficulty coefficients" (Al-Kubaisi, 1995:25). The statistical analysis sample consisted of 180 male and female students." The researcher followed the following procedures after correcting the questionnaires and transcribing their data."

The Two Extreme Groups Method (External Consistency)

To calculate the discriminatory power of the educational motivation scale items, "the scores were arranged in descending order from the highest score to the lowest total score for the analysis sample, which numbered 180 male and female students. The two extreme groups were then identified in terms of the total score, with 27% for the highest scores and 27% for the lowest scores. The number of individuals in each group was 48 male and female students. A t-test was applied to two independent samples to determine the statistical significance of the difference between the means of the highest and lowest groups. The t-value was considered an indicator of the validity of the item by comparing it to the tabular value, which amounted to 1.98 at a degree of freedom of 95 and a significance level of 0.05." The analysis results showed that all paragraphs are distinct, as shown in Table 3.

Internal Consistency (Ratio of Item Score to Total Scale Score)

"This method is primarily based on ensuring that each item of the scale follows the same path as the scale itself. A high correlation between each item of the scale and its total score indicates that this item belongs to the scale, thus obtaining a homogeneous scale (Awad, 1984: 104)." Therefore, the researchers used the Pearson correlation coefficient to determine the correlation coefficient between the value of each item on the scale and each person's total score. The number of questionnaires analyzed was 180, the same as the questionnaires analyzed using the two-way method. The values of all items in the list were significant. The number of items was 62, the significance level was 0.05, and the degrees of freedom were 178. Table 4 shows as follows:

Calculating the Total Score for the Educational Motivation Scale

The final version of the scale contains 62 items. Each item is scored using a three-point rating scale: Always applies to me, Sometimes applies to me, and Never applies to me. It is important to note that the scale contains both positive and negative items. Positive items are scored as follows: 2 points for "Always applies to me," 1 point for "Sometimes applies to me," and 0 points for "Never applies to me." These scores are taken into account when answering negative items. The scores of all items (positive and negative) are added together to obtain the total score of the scale. The range of corrected values is 2-0. Therefore, the highest score that a respondent can score is 124 points, and the lowest score is 0 points. The hypothesized mean of the scale is 62 points. 9. Standard (psychometric) characteristics of the scale:

Validity

The current scale has the following validity indicators:

Content validity

This type of validity was achieved when the researcher defined educational motivation and wrote a number of items consistent with the definition, the research objective, and the sample. He then presented the items to a group of experts and specialists in educational and sports psychology and testing. After statistically analyzing their opinions using chi-square, all items achieved an acceptable level of agreement.

Construct validity

This validity was achieved using two-group method, maintaining the individual items of the scale through paragraph analysis procedure (discrimination power) and correlating these items with the total score of the scale as described in Tables 3 and 4. This validity indicates that all the items of the scale are able to discriminate the students of the School of Physical Education and Sports Science on the Educational Motivation Scale. 2 – Reliability: Reliability is one of the basic components of a test and one of the most important characteristics of a good test. To determine the reliability of the educational motivation scale, the researchers used the Cronbach's internal consistency method. The Cronbach's equation was applied to the responses of 180 students (Al-Kubaisi, 1995:25). The reliability of the scale reached 94.70 and about 95, respectively, indicating a high reliability, with a significance level of 0.05 and a degree of freedom of n-2 = 180-2 = 178 = 0.14.

Table 3: The values of the discrimination coefficient t-test for the educational motivation scale using the two extreme groups method

S	T-value	S	T-value	S	T-value	S	T-value	S	T-value	S	T-value
1	3.52	11	4.77	21	5.54	31	3.18	41	4.36	51	6.62
2	3.61	12	3.77	22	5.54	32	8.80	42	4.08	52	3.44
3	4.09	13	2.64	23	3.05	33	3.83	43	5.88	53	2.52
4	3.40	14	4.13	24	4.68	34	2.49	44	6.26	54	2.53
5	2.53	15	3.40*	25	2.87	35	3.13	45	3.08	55	2.95
6	3.69	16	4.02	26	3.12	36	3.13	46	7.18	56	3.31
7	5.18	17	3.45	27	4.45	37	2.08	47	3.92	57	3.09
8	3.86	18	3.42	28	6.67	38	2.73	48	5.14*	58	2.02
9	4.95	19	7.36	29	3.69	39	6.94	49	2.87	59	2.53
10	6.13	20	4.08	30	3.41	40	3.41	50	3.98	60	3.78
										61	3.90
										62	2.80

Tabular t-value at a significance level of 0.05 and degrees of freedom (n1+n2)−2 (48.6+48.6)−2=97.2−2 = 95.2=1.98

Table 4: The correlation between the paragraph score and the total score of the educational motivation scale

S	Degree of correlation	S	Degree of correlation	S	Degree of correlation	S	Degree of correlation	S	Degree of correlation	S	Degree of correlation
1	0.39	11	0.48	21	0.47	31	0.37	41	0.39	51	0.55
2	0.43	12	0.40	22	0.51	32	0.75	42	0.47	52	0.41
3	0.42	13	0.35	23	0.38	33	0.34	43	0.59	53	0.39
4	0.44	14	0.42	24	0.44	34	0.60	44	0.47	54	038
5	0.37	15	0.72	25	0.44	35	0.35	45	0.30	55	0.40
6	0.41	16	0.33	26	0.39	36	0.35	46	0.62	56	0.40
7	0.71	17	0.39	27	0.38	37	0.37	47	0.38	57	0.53
8	0.48	18	0.72	28	0.61	38	0.64	48	0.42	58	0.30
9	0.44	19	0.46	29	0.32	39	0.64	49	0.36	59	0.67
10	0.62	20	0.51	30	0.32	40	0.30	50	0.38	60	0.66
										61	0.45
										62	0.33

Table value of (r) with a significance level of 0.05 and degrees of freedom of (n-2) = 180-2=178=0.14

RESULTS AND DISCUSSION

This section presents the results of the current study and their interpretation in light of its objectives. This required constructing a scale of educational motivation using the procedures followed in constructing psychological scales, which were presented for this tool in the third section. As for achievement (theoretical and practical), the researcher relied on the basketball score sheet in the final examination for the first semester of the academic year 2016−2017 as a measure of achievement (theoretical and practical) for the research sample written by a student at the Faculty of Physical Education and Sports Sciences, Qadisiya University.

Identifying the Level of Educational Motivation among Students of the College of Physical Education and Sports Sciences

To achieve this goal, the researchers measured the educational motivation of the sample members. After statistical processing, the mean score of the sample members (180 male and female students) was 73.610 and the standard deviation was 14.023. To determine the statistical significance of the significant difference between the mean and the hypothesized mean, the researchers used a one-sample t-test, as shown in Table 5.

Table 5 shows that the calculated t-value is 17.2 which is greater than the tabulated value 1.97 with a significance level of 0.05 and a degree of freedom of 179, which means that

there is a statistically significant difference between the mean of educational motivation and the hypothesized mean (62), which means that students at the Faculty of Physical Education and Sports Sciences, Qadisiya University, enjoy a higher level of educational motivation. This result can be interpreted as students being driven by the goal of self-realization, which is evident in students investing their maximum energies, and that they achieve self-realization by demonstrating their multiple abilities in the situations they interact with, which can be reflected in their academic learning performance. "Educational motivation produces persistent effort in students, which leads them to overcome difficulties and obstacles and undertake work with enthusiasm. They also focus their thinking on the requirements and challenges of the task and respond to these challenges with enthusiastic and active performance. Furthermore, students with high educational motivation usually set high goals for themselves, preferring new tasks and exerting effort, and view previous successful experiences as an indicator of their high abilities. They also view failure as a challenge that they must face, which makes these students exert and persevere in their efforts in difficult tasks, which makes them more focused and energetic" (Sehunck, 1997, p. 17).

Determining the Significance of Gender Differences in Educational Motivation Levels among Students in the Faculty of Sports Science

The results indicated that there were statistically significant differences among students in the level of educational motivation according to the gender variable, in favor of females. Table 6 illustrates as follows:

The table above shows that the mean for males is 124.56, the standard deviation is 13.43, the mean for females is 132.70, the standard deviation is 16.68, and the calculated t value is 5.29. After using the t-test of two independent samples to test the significance of the difference between the two means, it was found that the calculated t values for males and females were higher than the t values in the table, indicating that there was a statistically significant difference in females.

This result can be explained by the guidance provided by the family and society regarding certification and the importance of learning and education to obtain a certification, which is a weapon in their hands, as well as to obtain a job through which girls can realize their potential and excel. Females are also more likely to put in effort than males, perhaps due to the girl's attempt to prove herself in an Eastern society that tends to glorify the role of men. The researcher believes that educational motivation appears very clear in females, as it is higher than it is in males. However, society's view of females as less competent than males may serve as a challenge for females to prove to others that this view is wrong by persevering to achieve a prestigious position and trying to prove that females are not inferior to males but rather may excel them by competing with them in all fields.

Presentation and Analysis of the Results of Comparing the Theoretical Achievement Level with the Practical Achievement Level of Male and Female Students

Table 7 lists the mean, standard deviation, t-test value, and significance level of the research variables (for students' theoretical and practical performance). It can be seen that the mean of students' theoretical performance is 56.32 and the standard deviation is 9.31. The mean of practical performance is 65.24 and the standard deviation is 10.29. The calculated result of the t-test value is 3.21, which is higher than the tabular t-test value (1.97), with a significance level of 0.05 and a degree of freedom of 178. This shows that the difference is significant and is in favor of practical performance. The mean of students' theoretical performance is 67.48 and the standard deviation is 8.79, while the mean of practical performance is 58.24 and the standard deviation is 7.73. When calculating the (t) value, we found that it reached (3.94), which is higher than the (t)

Table 5: The results of the t-test for the significance of the difference between the mean and the hypothetical average for the educational motivation scale

Variable	Number of sample members	Mean	Standard	Hypothetical mean	T-value		Significance level
					The calculated	Tabular	
Educational motivation	180	73.610	14.023	62	17.2	1.97	0.05

Table 6: The t-value for the significance of the difference in the level of educational motivation according to the gender variable

Scale	Males		Females		Calculated value of (t)	Table (t) value	Significance
	Mean	Standard	Mean	Standard			
Educational motivation	124.56	13.43	132.70	16.68	5.29	1.97	Sig.

The tabular t-value at a degree of freedom of 180–2=178 and a significance level of 0.05 equals (1.97)

Table 7: The means, standard deviations, calculated and tabulated (t) values, and significance levels for the theoretical and practical achievement of male and female students

Variables	Theoretical attainment		Practical achievement		Calculated value of (t)	Significance level
	Mean	Standard	Mean	Standard		
Male students	56.32	9.31	65.24	10.29	3.21	Moral in favor of practical achievement
Female students	67.48	8.79	58.24	7.73	3.94	Moral in favor of theoretical achievement

The value of the table (t) at a degree of freedom of 180-2=178 and under a significance level of 0.05 is equal to 1.97

value (1.97) in the table, with a significance level of 0.05 and a degree of freedom of 178. This indicates that the difference is significant, and the theoretical performance is more obvious. " Looking at Table 7, we found that the (t) value of calculating the variables of students' practical and theoretical performance reached 3.21, which is higher than the value (1.97) in the table. This indicates that the difference is significant. When comparing the mean values of theoretical and practical performance, it is clear that the mean value of practical performance is higher than the mean value of theoretical performance, which indicates that the difference is significant, and the practical performance is more obvious." The researchers attributed this to students preferring practical subjects over theoretical subjects as these are more in line with their physical abilities. Since the students have prior knowledge and practical experience, most of them are likely basketball players, amateur athletes, or recreational athletes. This provides students with valuable experience and a broad range of subject knowledge. "Each learner learns according to their specific skills and abilities. The more they practice than other learners, the more skills and experiences they gain, which qualifies them to learn other skills and experiences." (Marai and Al-Hila: 2004, 271)

We find that the calculated t-value for the theoretical and practical achievement variables for female students reached 3.94, which is greater than the tabulated value of 1.97. This means that the difference is significant and favors theoretical achievement. This may be explained by the fact that female students prefer theoretical lessons to practical lessons. They prefer subjects that involve lower-level mental processes, such as memorization and comprehension, and they prefer lessons that do not require significant physical effort. Perhaps the reason is the physical makeup and social, environmental, and psychological upbringing of women." Women spend most of their time at home, due to customs, traditions, and accepted norms. This has led women, or female students, to study their lessons and acquire information, spending most of their time at home. Most families do not allow women to go out or engage in physical activities at home or in designated sports facilities." This has led female students to excel in theoretical achievement more than practical achievement.

Presenting, Analyzing, and Discussing the Results of Comparing the Achievement Levels of Theoretical and Practical Vocabulary between Male and Female Students (Theoretical Male Students vs. Theoretical Female Students; Practical Male Students vs. Practical Female Students)

Table 8 shows that the average theoretical score of boys is 56.32 with a standard deviation of 9.31, and the average theoretical score of girls is 67.48 with a standard deviation of 8.79. The calculated t value shows that it reaches 4.35, which is higher than the t value (1.97) in the table, with a significance level of 0.05 and a degree of freedom of 178. This shows that the difference is significant and is in favor of girls. The average practical score of boys is 65.24 with a standard deviation of 10.29, and the average practical score of girls is 58.24 with a standard deviation of 7.73. After calculating the t-value, we found that it reached −2.72, which is higher than the t-value of −1.97 in the table, with a significance level of −0.05 and a degree of freedom of −178. This shows that the difference is significant and in favor of students.

Table 8 shows that within the theoretical score range, the calculated t-value of male and female students reached −4.35, which is higher than the t-value of −1.97 in the table. This means that the difference is significant. Comparing the means of male and female students in theoretical achievement, we note the superiority of female students. The reason is that girls are more interested in theoretical subjects than practical subjects. Girls are naturally fond of reading and memorizing, which not only increases the amount of theoretical information, but also improves memory. "The more meaningful, simple, and close to students' lives and reality the learning content is, the easier it is to learn and remember. Research on memory and recall shows that the content learned is easier to remember and will leave a lasting impression in memory." (Badir: 2008, 25). Table 8 shows that the calculated t value (2.72) for male and female students in the practical field is higher than the t value in the table (1.97). This means that the difference is significant. Comparing the means of male and female students in practical achievement, we note the superiority of male and female students. This is due to students' prior experience, as basketball is a popular and beloved sport, and most students are either

practitioners, fans, or amateurs. Through practicing sports, students gain experience and information about it, which they can use when needed. "Students prefer to learn through practical lessons because in practical lessons, the senses of hearing and sight are involved in receiving information, and learning occurs through observing movements and forming perceptions of them and the method of performing skills. This is what Kurt Meinl emphasized" (Kurt Meinl: 1987).

Identifying the Correlational Relationship among Students in the College of Physical Education and Sports Sciences

To achieve this goal, we calculated the correlation coefficient between the scores of 180 male and female students of the Faculty of Physical Education and Sports Sciences at Qadisiya University on the educational motivation scale and their theoretical and practical performance in basketball using the Pearson correlation coefficient. The value of the correlation coefficient reached 0.55. To determine the significance of the correlation coefficient, the value of the Pearson's correlation coefficient was converted to the corresponding t-value using the t-test for the Pearson's correlation coefficient test, as shown in Table 9.

Table 9 shows the existence of a statistically significant correlation between educational motivation and theoretical and practical achievement at a significance level of 0.05 and a degree of freedom of 178, as the calculated (t) value for the correlation coefficient reached (13.77), which is greater than the tabular t value of 1.97. This result can be attributed to the researcher's findings in the first objective of increasing the level of educational motivation. This leads to a corresponding level of theoretical and practical achievement due to the excitement and drive to perform academic assignments and achieve high grades in both theoretical and practical subjects in basketball. In other words, high motivation is behind the process of high efficiency in theoretical and practical achievement, and they devote all their energies to thinking and achieving. In this case, most students consider this problem a challenge, and solving it brings them to a state of cognitive balance and meets their internal needs. This inevitably leads to improving and raising their academic level, thus advancing their academic achievement and enabling them to excel in academic work. "Educational motivation includes the process of enjoying school learning, which is characterized by curiosity, a drive toward mastery, and perseverance in learning tasks characterized by difficulty, challenge, and novelty. In addition, curiosity is one of the methods of self-motivated learning. Therefore, the teacher who stimulates curiosity in his students works to activate their mental abilities to the maximum extent possible" (Nashwati, 2005, 210).

Identifying the Differences in the Correlation between Educational Motivation and Theoretical and Practical Achievement among Students in the College of Physical Education and Sports Sciences According to the Following Variables

A. Gender (males-females).
B. Achievement (theoretical-practical).

The results achieved for this objective were as follows:

A. Gender: To identify the significance of the differences between the correlation coefficients for cognitive information representation efficiency and educational motivation according to the gender variable (males-females), the researcher used the Z-value test to determine the significance of the differences between the correlation coefficients, as shown in Table 10.
B. Achievement: "To determine the significance of the differences between the correlation coefficients for educational motivation and achievement according to the achievement variable (theoretical-practical), the researcher used the Z-value test to determine the significance of the differences between the correlation coefficients," as shown in Table 11.

Table 8: The means, standard deviations, calculated, and tabulated t-values and significance levels for the theoretical and practical achievement of male and female students

Variables	Males student		Females students		Calculated value of (t)	Significance
	Mean	Standard	Mean	Standard		
Theoretical Achievement	56.32	9.31	67.48	8.79	4.35	Moral support for female students
Practical Achievement	65.24	10.29	58.24	7.73	2.72	Moral support for male students

The value of the table (t) at a degree of freedom of 180-2=178 and under a significance level of 0.05 is equal to 1.97

Table 9: The value of the t-test for testing the significance of the Pearson's correlation coefficient between educational motivation and theoretical and practical achievement

Number	Calculated correlation coefficient value	T-value		Significance level
		The calculated	Tabular	
180	0.55	13.77	1.97	0.05 significant

Table 10: The Z-value for the significance of the differences between the correlation coefficients for educational motivation and achievement according to the gender variable (males-females)

Gender	Sample number	Calculated correlation coefficient value	Fisher's norm value	Z-value		Significance level
				The calculated	Tabular	
Males	154	0.490	0.536	0.51	1.97	0.05 Not significant
Females	26	0.450	0.485			

Table 11: The Z-value for the significance of the differences between the correlation coefficients for educational motivation and achievement according to the achievement variable (theoretical-practical)

Cognitive achievement	Sample number	Calculated correlation coefficient value	Fisher's norm value	Z-value		Significance level
				The calculated	Tabular	
Theoretical	180	0.605	0.701	0.23	1.97	0.05 Not significant
Practical	180	0.590	0.678			

Table 11 shows that the calculated Z-value (0.23) is smaller than the tabulated value of 1.97 at a significance level of 0.05. This is not statistically significant, meaning that there are no differences between the two correlation coefficients according to the achievement variable (theoretical-practical). The lack of statistically significant differences in the correlation coefficients for the variables of gender (male-female) and achievement (theoretical-practical) for educational motivation and achievement may be due to the fact that both genders are exposed to the same activities in both theoretical and practical achievement. Furthermore, they are at the same age, the first stage of university. Therefore, awareness is somewhat present between them, and both genders attempt to complete the tasks assigned to them. Furthermore, as students advance in the educational ladder, they become more aware and cognizant of their professional desires and academic ambitions, as they seek to compete with others.

CONCLUSION

1. The level of educational motivation is high among students in the College of Physical Education and Sports Sciences. 2. Females had higher levels of educational motivation than males.
2. Students' scores on the practical test were better than their scores on the theoretical test.
3. Female students' scores on the theoretical test were better than their scores on the practical test.
4. Male students' scores on the practical test were better than female students
5. Female students' scores on the theoretical test in basketball were better than their scores on the theoretical test.
6. There was a positive correlation between the level of educational motivation and the level of achievement (theoretical and practical).
7. There were no statistically significant differences in the correlation between educational motivation and the level of achievement among students in the College of Physical Education and Sports Sciences according to the variables (gender – theoretical and practical achievement).

RECOMMENDATIONS

1. Families should strive to create a suitable psychological environment conducive to stability that helps raise the level of educational motivation among their students.
2. The need to guide and motivate students to increase their study time before practical and theoretical examinations.
3. Teachers should use activities that take into account individual differences and satisfy their needs and interests.

REFERENCES

1. Al-Jamil MA. Educational Evaluation of the Educational System, Trends and Applications. Cairo, Egypt: Dar al-Fikr al-Arabi; 2000.
2. Al-Jubouri ZM. Academic Achievement and Its Relationship to Some Social Variables, Unpublished Master's Thesis. Faculty of Arts, Al-Qadisiyah University; 2004.
3. Hussein MA. Studies in Motives and Incentives. Cairo: Dar al-Maaref; 1988.
4. Al-Nial AA. The motivation for achievement and its relationship to anxiety and extroversion. Egypt Educ J 1991;4.
5. Al-Tawab SM. The Interaction of Achievement Motivation Level, Intelligence, and Gender on Academic Achievement among Male and Female Students at the United Arab Emirates University. Egypt Educ Psychol J 1990;3. Al-Sayed A. Motivation in Life and Levels of Commitment: A Theoretical Analysis and Field Research, Cairo: Dar Al-Maaref; 1990.
6. Al-Kubaisi KT. The Effect of Differences in Sample and Community Size on the Discriminating Power of Psychological Scale Items, An Experimental Study. Baghdad: College of Education (Ibn Rushd), University of Baghdad; 1995.
7. Al-Najihi ML, Morsi MM. Educational Research - Its Origins – Methods. Cairo: Alam Al-Kutub.
8. Awad AM. Statistical Psychology. Beirut: University House for

Printing and Publishing; 1984.
9. Marai TA, Al-Hila M. Educational Curricula: Concepts, Elements, Foundations, and Operations. 5th ed. Amman, Jordan: Dar Al-Maysarah for Publishing and Distribution; 2004.
10. Meinl K. In: Abdul Ali Naseef DA, Translator. Kinesthetic Learning. Mosul: Printing and Publishing; 1987.
11. Nashawati AM. Educational Psychology. 10th ed. Beirut, Lebanon: Al-Resalah Foundation for Printing, Publishing and Distribution; 2005.
12. Gottfried AE. Academic Intrinsic motivation in elementary and junior high school, Students. J Educ Psychol 1985;77:613-45.
13. Atkinson JW. Introduction to Motivation. New Jersey: Van Nostrand Reinhold; 1964.
14. Webster's Third New International Dictionary of English Language unabridged with seven language dictionary. Chicago: William Bentiony; 1971.
15. Schunck D. The influence of intrinsic goals of intrinsic academic motivation. J Educ 1997;18.

APPENDIX

Appendix 1: Educational motivation scale

S. No.	Paragraphs	Alternatives		
		Always applies to me	sometimes applies to me	It never applies to me
1	I enjoy challenging practical lectures because I find them more engaging.			
2	I try to overcome the daily challenges I encounter in my studies.			
3	I feel tired and bored with my university studies.			
4	I crave more knowledge and understanding when I encounter situations I cannot explain during lectures.			
5	I put in effort and perseverance in my studies.			
6	I focus on new basketball skills that excite my interest in lectures.			
7	I believe that what happens to a student in their future academics depends on what they plan today.			
8	I want to explore the various aspects of physical education, even if it requires me to travel abroad.			
9	I have a strong desire to acquire knowledge and learning.			
10	When someone is better than me in my class, it motivates me to double my efforts to achieve the best.			
11	I tend to compete with the top students in my class.			
12	I do not prefer performing difficult basketball skills.			
13	I prefer to spend my free time practicing basketball skills.			
14	I perform physical activities with seriousness and interest, even if they are simple.			
15	I feel upset when I receive a low grade in basketball.			
16	I always try to overcome my academic problems.			
17	If a professor asks me to write a research paper on basketball, I work to complete it on time.			
18	My main goal in teaching is to have a bright future.			
19	I feel that the efforts and energy I put into basketball classes do not show results.			
20	I participate in discussions related to basketball with other intelligent and outstanding students.			
21	I complete part of the difficult and complex academic work assigned to me by my professor.			
22	I continue to complete difficult assignments regardless of the obstacles and challenges I encounter.			
23	I feel hopeless and pessimistic if I don’t achieve my academic goals.			
24	I accept criticism and feedback from my professor during class.			
25	I turn to others when I encounter a problem in my academic life.			
26	I prefer studying for and excelling in an examination to going on an outing that may never happen again.			
27	I criticize students who cheat on basketball tests.			
28	I like to travel to places where I can learn useful information about basketball.			
29	I do not enjoy studying new and complex topics related to basketball.			
30	I tend to prioritize my work and academic achievements over everything else.			

(Contd...)

Appendix 1: ***(Continued)***

S. No.	Paragraphs	Alternatives		
		Always applies to me	sometimes applies to me	It never applies to me
31	I do my homework extremely well.			
32	I focus on all subjects well.			
33	I approach studying every day with enthusiasm and energy.			
34	I love the sports environment.			
35	I love studying and excelling, and no one forces me to do so.			
36	I complete my homework independently.			
37	I create new and useful things for my fellow students.			
38	Uninteresting educational materials do not affect my academic achievement.			
39	My family has a significant influence on my high grades.			
40	I do not trust my abilities and capabilities when doing schoolwork.			
41	I prefer to complete assignments without the help of a teacher.			
42	I read the prescribed basketball textbooks, not summaries.			
43	My personal problems do not interfere with my schoolwork.			
44	I feel dissatisfied with myself to achieving better.			
45	I like to read outside books on physical education.			
46	I prefer classes where I excel over other students.			
47	When performing a task, I prefer students who work efficiently in school.			
48	I enjoy competition and challenges to see who is the best.			
49	I feel energetic and lively when I study.			
50	I perform my schoolwork better than other students.			
51	I devote great effort to achieving my future academic goals.			
52	I don’t feel satisfied unless I complete my assigned assignments.			
53	I enjoy educational activities that involve unusual and unfamiliar things.			
54	I don’t feel truly successful unless it comes from my own inner desire.			
55	I view my academic future with pessimism.			
56	I take responsibility for completing assignments without hesitation or fear.			
57	I do my best to get the highest grades in basketball.			
58	I love learning about new and unusual areas of knowledge.			
59	I prefer to complete my assignments and schoolwork on time and without delay.			
60	I complete all assignments, even when I have a lot of homework to do during the day.			
61	I follow scientific, cognitive, and mathematical topics published in journals.			
62	My abilities play a major role in my studies, not luck.			