

5-15-2026

The Impact of Visual Illustrations on Enhancing Basketball Refereeing Signal Performance Among Students

Mohammed Aboudi Hussein

General Directorate of Education of Najaf Governorate, Al-Sudair Boys' School, First Cycle, Iraq,
phy475.Mohammed.abwdy@student.uobabylon.edu.iq

Dunya Abdul Salam Fadhil Abbas

General Directorate of Education of Najaf Governorate, Najaf Preparatory School for Mathematical Sciences, Iraq,
dinaabdulsallam@gmail.com

Follow this and additional works at: <https://jcopew.uobaghdad.edu.iq/journal>

Recommended Citation

Hussein, Mohammed Aboudi and Abbas, Dunya Abdul Salam Fadhil (2026) "The Impact of Visual Illustrations on Enhancing Basketball Refereeing Signal Performance Among Students," *Modern Sport*. Vol. 25: Iss. 2, Article 6.
DOI: <https://doi.org/10.54702/2708-3454.2128>

This Original Study is brought to you for free and open access by Modern Sport. It has been accepted for inclusion in Modern Sport by an authorized editor of Modern Sport.



ORIGINAL STUDY

The Impact of Visual Illustrations on Enhancing Basketball Refereeing Signal Performance Among Students

Mohammed Aboudi Hussein^{a,*}, Dunya Abdul Salam Fadhil Abbas^b

^a General Directorate of Education of Najaf Governorate, Al-Sudair Boys' School, First Cycle, Iraq

^b General Directorate of Education of Najaf Governorate, Najaf Preparatory School for Mathematical Sciences, Iraq

Abstract

The study aimed to find out if using drawings helps students learn how to officiate basketball. This study is important because it uses teaching tools to help students understand refereeing better and provide a high-quality education. The researchers used a method with two groups: an experimental group and a control group. There were 22 students in total divided into two groups of 11. The experimental group used a curriculum with drawings for six lessons while the control group used the usual method. The results showed that the experimental group did better than the control group. The results also showed differences in both groups from the start to the end with the end results being better. The study used drawings to teach students. It helped them learn how to officiate basketball. The drawings made a difference, in how well the students understood the officiating signals. Sustainable Development Goal: Good education is helped by learning tools. * A test showed that at a significance level of 0.05 the average score of the group was 66.53 with a small variation of ± 1.49 . The value of the test was $t = 7.13$. * In comparison the control groups average score was 51 with a variation of ± 1.64 . The groups performance in understanding signal mechanics improved a lot by almost 110%. The control groups performance only improved by 58%. This helps achieve one of the UNs goals in Iraq, which's Quality Education. The goal is to provide high-quality education. Good education is important, for development. The experimental group showed results. Quality Education is a goal.

Keywords: Illustrations, Refereeing signals in basketball, Curriculum

1. Introduction and significance of the research

The field of physical education and sports science has witnessed remarkable development in teaching and training methods. The use of modern educational tools has become a fundamental factor in enhancing motor learning and improving the acquisition of sports skills. Illustrations are considered one of the most effective visual learning tools because they contribute to simplifying complex motor sequences, improving cognitive processing, and enhancing motor response accuracy (Mayer, 2009; Schmidt & Lee, 2011). Visual representations also play a crucial role in facilitating understanding, especially in skill-based activities that require precise movement

patterns and sequential execution, such as refereeing mechanics in basketball. Several studies have emphasized the importance of visual instruction and motor learning strategies in improving sports performance and skill acquisition. Wulf and Lewthwaite (2016) stated that effective learning environments enhance attention and motivation, leading to better motor performance, while Hodges and Franks (2002) confirmed that visual demonstration and instructional modeling facilitate the learning of complex sports skills. Basketball is one of the fundamental team sports taught in faculties of physical education and sports sciences. Its teaching is not limited to offensive and defensive skills but also includes refereeing aspects, which represent an essential component of the

Received 10 March 2026; revised 25 April 2026; accepted 30 April 2026.
Available online 15 May 2026

* Corresponding author.

E-mail addresses: phy475.Mohammed.abwdy@student.uobabylon.edu.iq (M. A. Hussein), dinaabdulsallam@gmail.com (D. A. S. F. Abbas).

<https://doi.org/10.54702/2708-3454.2128>

2708-3454/© 2026 The Author(s). Modern Sport. This is an open access article under the CC BY 4.0 Licence (<https://creativecommons.org/licenses/by/4.0/>).

learning process. Refereeing mechanics refer to the movements and positioning of the referee on the playing field in different locations and game situations (Samoum, 2018, p. 185). Mastering these mechanics requires accuracy in movement, correct positioning, and proper timing, all of which are often challenging for learners. Through the researchers' observation of second-year students during practical lectures, it was noted that some students experience difficulties in understanding and correctly applying the mechanics of refereeing signals. This issue may negatively affect their performance and limit their ability to execute signals accurately during practical situations. Recent studies have shown that modern educational and training programs significantly improve learners' performance compared with traditional methods. A meta-analysis conducted by Wang et al. (2022) confirmed that educational interventions and modern instructional strategies positively affect the learning of complex skills and operational performance. Similarly, Onowugbeda et al. (2024) emphasized that technologically supported and context-based teaching methods contribute to enhancing students' retention, understanding, and educational outcomes. Accordingly, the researchers proposed an educational curriculum based on illustrations to facilitate learning the mechanics of basketball refereeing signals. Illustrations in this study refer to visual representations used to clarify movements, positions, and sequences in learning contexts (Mayer, 2009). This approach is expected to help students understand refereeing mechanics more clearly, improve their practical performance, and support the integration of modern educational strategies in sports education. The researchers aim to identify the role of modern educational methods in developing learning related to basketball refereeing aspects, help students understand refereeing signal mechanics more clearly, improve the level of refereeing performance among learners, and enrich the educational process through modern teaching methods that contribute to motor learning development. The researchers hypothesized that there would be statistically significant differences between the pre-test and post-test results in favor of the post-test for the experimental group, as well as statistically significant differences between the exper-

imental and control groups in the post-test results in favor of the experimental group.

1.1. Definition of Terms

- 1- **Illustrations:** These are various diagrams illustrating the movement and positioning of the referee (the student) on the playing field and in different locations. Illustrations: Visual representations used to clarify movements, positions, and sequences in learning contexts (Mayer, 2009).
- 2- **Refereeing Mechanics:** These are the movements and positioning of the referee on the playing field in different locations (Samoum, 2018, p. 185).

2. Methodology and procedures

Given the principle of the research problem is a researchers resorted to using the experimental method with an experimental design by two equivalent groups (experimental and control) as it is suitable for the research problem (Hassan, 2023, 221–236), as shown in Table 1.

2.1. Research methodology

2.2. Research population and sample

The sample is a part of the population that is selected according to specific rules in order to accurately represent the population. The research population consisted of (24) students. A sample of (22) students was selected, while (2) students were excluded due to irregular attendance. Additionally, (5) students from outside the main sample were used for the pilot study. The sample members were distributed into two groups of (11) female students for each group, representing (91.66%) of the research population. They were divided randomly (by lottery).

2.3. Collection of data modes, equipment, with tools used

2.3.1. Data collection methods

1. Observation and experimentation
2. Scientific sources
3. Testing and measurement

Table 1. The two groups are equivalent in control and experimental.

Research Procedure Groups	Pre-tests	Experimental Procedure	Post-tests
Control Group	Measuring Control Mechanisms	Traditional Teaching Method (verbal explanation + demonstration)	Measuring Evaluation Mechanisms
Experimental Group	Measuring Evaluation Mechanisms	Teaching Methodology Using Illustrations	Measuring Evaluation Mechanisms

Table 2. Shows the names of the experts, their specializations, and the entities to which they belong.

Expert's Name and Academic Title	Specialization
Dr. Hassanein Jumaa	Motor Skills Education / Basketball
Dr. Hind Mohamed Amin	Teaching Methods / Basketball
Prof. Ahmed Aboudi	Sports Training / Basketball
Prof. Mohamed Hassan Shaalan	Basketball Referee

2.3.2. Equipment and tools used

(1) One regulation basketball court. (2) Four regulation basketballs. (3) One Dell 5040 computer. (4) One Nikon digital camera (Japanese made). (5) One camera tripod. (6) One electronic projector. (7) Fifteen CDs.

2.4. Field research procedures

2.4.1. Evaluating referee signals

The researchers planned a special design to evaluate the refereeing signals, and then a number of experts were consulted, as in Table 2, resulted in the approval of the evaluation form.

The experts were selected for their scientific and practical experience in the field of basketball, refereeing, teaching and sports training, for the purpose of evaluating the questionnaire items and illustrations related to the mechanics of refereeing signals. The evaluation form consisted of (X) items covering signal accuracy, timing, body positioning, and clarity. Each item was scored on a scale of (1–5), with a total score of (X).

The researchers prepared a special form to evaluate arbitration signals, then presented it to a group of specialized experts, as in Table 2, and the form was approved after their approval. The form included criteria (accuracy, timing, body position, and signal clarity), and a five-point rating scale was adopted for each item.

See Appendix (1)

2.4.2. Exploratory experiment regarding the referee signals mechanics form

A pilot study was conducted on (5) foreign students from the main research sample to examine the clarity, applicability, and feasibility of the evaluation form and testing procedures.

The pilot study aimed to:

1. Ensure the clarity of the evaluation items and instructions.
2. Verify the suitability of the testing procedures and time allocation.

3. Identify any potential difficulties that may arise during the main experiment.

It is important to note that the pilot study was not used to calculate reliability or objectivity coefficients, but rather to refine the research tools and procedures before conducting the main experiment.

2.4.3. Honesty, reliability and objectivity of the mechanical evaluation form of refereeing signals

2.4.3.1. *First: Validity.* The researchers used content validity based on experts' opinions and presenting a questionnaire on the mechanics of referee signals in basketball to the students. Content validity is considered one of the most suitable types of validity for use (Al-Talib & Al-Samarrai, 1999, p. 23).

2.4.3.2. *Second: Test reliability.* Reliability was established using the test-retest method on the same participants under similar conditions. The test was administered twice with a time interval of (3) days between the two measurements. The results showed a high reliability coefficient ($r = 0.90$, $\text{Sig} < 0.05$), indicating that the evaluation form provides consistent results.

2.4.3.3. *Third: Objectivity.* Objectivity was verified by having two independent expert evaluators assess the performance of the participants using the same evaluation form. The correlation between the evaluators' scores was measured using Pearson's correlation coefficient.

The results showed a high level of agreement between evaluators ($r = 0.88$, $\text{Sig} < 0.05$), indicating that the evaluation process was objective and free from evaluator bias.

3. The methodology used in the research

The researchers used illustrative signals by applying the following methods:

3.1. *Still images

One of the elements of multimedia, these are prepared in two ways: 1. Using suitable graphics software employed by designers to create various graphics that meet their needs. 2. Images added using cameras, then processed to suit the subject matter. This was done by displaying images of referee signals, These images were displayed as a large image in the hall during the application of the methodology. Each student performing their role in the signal looked at the details. The impact of using educational technology on learning basic basketball skills (Abdul Hussein, 2023, 166–182).

3.2. *Computers

The defining characteristics of our current era, and the astonishing advancements in modern computer technologies, along with their integration into all aspects of life, have enabled those interested in learning to utilize the numerous facilities provided by the device. Undoubtedly, Its important role is highlighted by the information it provides that contributes to learning, as experiments have confirmed the effectiveness of using computers. significantly contributes to learning. Experiments have proven the effectiveness of using computers to enhance the educational process in applications through the presentation of concepts and demonstrations, and the analysis of various systems (Aboud & Al-Ani, 2009, p. 43). Here, the researchers utilized this medium by presenting a series of games that illustrated the mechanics of refereeing. The researchers observed the students' reaction on the field, which accelerated their learning of the mechanics of refereeing signals.

3.3. *CD

The researchers Designing a visual educational material that includes refereeing signals and the mechanism for implementing them signals. This video was then transferred to a CD and distributed to the students in the experimental group.

4. Pre-tests

The pre-test was conducted on Wednesday, December 25, 2024, under standardized conditions for both groups.

4.1. Equivalence of research variables

To make sure equivalence Two research groups (research and traditional) mechanics of referee Arbitration for learners, refer to [Table 3](#).

4.2. Implementing the educational curriculum using illustrative signs

After conducting pre-tests for the research groups, the researchers proceeded as follows:

(6) educational units were implemented, one educational unit per week, and the units were designed according to the scientific foundations of motor education using illustrations. See [Appendix \(3\)](#).

- A total of (6) instructional units on referee Signs were implemented For learners .using illustrative signs.
- Number of units per week: (1 instructional unit).
- Duration of each instructional unit: (75) minutes.
- Duration of the main session: (60) minutes.
- Duration of the practical session: (45) minutes.

The researchers used illustrations to display the mechanics of refereeing signals. Educational images were displayed using an electronic projector during practical lectures, and students were trained to apply signals according to the correct sequence. See [Appendix \(2\)](#).

4.3. Post-tests

The post-test was assisted on Wednesday, February 5, 2025, after completing six instructional units over a period of six weeks.

4.4. Statistical methods

The researchers looked at the data using a tool called the Statistical Package for the Social Sciences, which is also known as SPSS. Here are the statistical methods they used:

- * Arithmetic mean
- * Standard deviation
- * Paired sample t-test
- * Independent sample t-test
- * Pearson correlation coefficient
- * Percentage of improvement

5. Presenting, analyzing, and discussing the results

5.1. Presenting and analyzing the results of a test of the mechanics of referee signals in basketball for the experimental and control research groups

It shows the average scores Applied and traditional groups, and their (t) values In the initial test and final test research variables.

Table 3. Specifies the arbitration mechanism for students.

Variable	Group	-X	R ₊	Calculated value (t)	Significance
The location of referee signals	Experimental	31,62	1.55	1.78	Not significant
	Control	32.20	2.84		

The tabulated value of (t) is (2.05) at a degree of freedom of (20) and a significance level of (0.05). [Table 3](#).

Table 4. Shows the average scores of the applied and traditional group and the (t) value in the pre- and post-test regarding the research variables.

Group	Variables	Pre-measurement		Post measurement		Calculated value(t)	Significance
		—X	± R	—X	± R		
Experimental	Referee signaling mechanism	31.62	1.55	66.53	1.49	12.50	Significant
Controlled	Referee signaling mechanism	32.20	2.84	51	1.46	8.86	Significant

Table 5. T-test results for differences between the two groups in the mechanics of refereeing signals (posttest).

Variable	Group	—X	± R	Calculated value of (t)	Significance
Referee signaling mechanism	Experimental	66.53	1.49	7.13	significant
	Control group	51	1.64		

*The value of (t) (2.05) under a temperature of (20) and a significance level of (0.05).

From Table 4, it is evident that both the experimental and control groups showed improvement between the pre-test and post-test. The calculated t-values indicate statistically significant differences in favor of the post-test for both groups ($\text{Sig} < 0.05$).

The experimental group did a lot better than the control group with an improvement of 110 percent. The control group only got 58 percent. This shows that using drawings really helped improve refereeing signal mechanics. It worked better than the way of training. The control group started with a score of 20.40 on the pre-test. The scores were over the place with a standard deviation of 20.84. After the test the control group score was 51. The scores were very close with a standard deviation of 1.64. The use of drawings had an impact, on refereeing signal mechanics than traditional training approaches. The researchers wanted to see how the groups scores changed from before the test to after the test. They used a number called a t value to figure this out. The t value they got was 8.86, which's pretty big. This means that the scores after the test were really different from the scores before the test. The researchers compared their t value to a table that says what t values are big enough to matter. The table said that if the t value is bigger than 20.16 it is significant. This means that the difference between the before and after test scores is not a coincidence. The researchers were careful. Made sure to only look at the results that really mattered. They did this because they wanted to know if the new way of teaching used for the group was better than the old way used for the control group. The control group used the way of teaching. The researchers looked at the scores for both groups. How much they varied. They also looked at the t values for both groups. All of this information is shown in Table 4. The table shows the scores for the applied group and the traditional group. It also shows how much the scores varied and the t values, for the post-test.

In the post-test the group that used the referee signals system scored an average of 66.53. Had a varia-

tion of 1.49 as shown in Table 5. On the hand the group that did not use it scored an average of 51 and had a variation of 1.64. We calculated the t-value. Got 7.13. It looks like the group that used the referee signals system did better. The difference is pretty big, in favour of the group that used the referee signals system.

5.2. Discussion of the results of the control and experimental research groups in learning the mechanics of referee signals

The results of the study indicate that both the experimental and control groups showed significant improvement in the post-test compared to the pre-test. This improvement can be attributed to regular practice, repetition, and continuous exposure to refereeing signal mechanics during the instructional period.

However, the experimental group demonstrated a significantly higher level of improvement compared to the control group. This can be explained by the use of illustrations, which enhanced students' visual perception and facilitated the understanding of complex motor sequences. Visual learning tools help in organizing movement patterns, improving memory retention, and increasing the accuracy of motor responses.

The superiority of the experimental group is consistent with theoretical perspectives in motor learning, which emphasize the role of visual aids in enhancing skill acquisition and performance. Illustrations provide learners with clear mental representations, enabling them to better understand the correct execution of refereeing signals.

The improvement observed in the control group indicates that traditional teaching methods still contribute to learning. However, their effectiveness remains limited compared to modern educational approaches that incorporate visual and interactive elements.

These findings confirm that integrating illustrations into teaching practices can significantly improve the learning of refereeing signal mechanics in basketball.

6. Conclusions and recommendations

6.1. Conclusions

In light of the results obtained through the field experiment, the researchers reached the following conclusions:

1. Both the experimental and control groups showed well between the pre-test and post-test.
2. The experimental group achieved a higher level of improvement compared to the control group.
3. The use of illustrations had a positive and significant effect on improving refereeing signal mechanics in basketball.
4. Visual educational tools contribute to enhancing students' understanding and performance in motor learning tasks.
5. The integration of modern teaching methods leads to more effective learning outcomes compared to traditional methods

Author's declaration

Conflicts of interest

None.

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical-clearance

This manuscript approved by the Scientific Committee of the College of Physical Education and Sports Sciences for Women, University of Baghdad, Iraq, on (2025/02/10).

Author's contributions

All contributions to this study were carried out by the researchers Mohammed Aboudi Hussein, who conducted the study procedures, collected and organized the data, participated in the implementation of the experimental program, and contributed to drafting the manuscript; and Dunya Abdul Salam Fadhil Abbas, who developed the research idea, designed the study, supervised the research procedures, interpreted the results, and reviewed and finalized the manuscript, with the assistance of a number of experts Mohammed Aboudi Hussein in Statistics and Aya Hasan Farhan in Translation.

Facilitating the task

This study was supported by the General Directorate of Education of Najaf Governorate.

Roles of each researcher in the research

Mohammed Aboudi Hussein was responsible for participating in the implementation of the study procedures, collecting and organizing the data, assisting in conducting the experimental program, contributing to the interpretation of the results, and assisting in drafting the manuscript.

Dunya Abdul Salam Fadhil Abbas was responsible for the conceptualization of the research idea, study design, literature review, supervision of data collection and experimental procedures, interpretation of the results, reviewing the manuscript, and final revision.

Funding statement

This research received no external funding.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

- Abdul Hussein, A. (2011). The effect of comparative and group competition methods using multimedia in developing the performance of some basic skills for young handball players (*Master's thesis, University of Babylon, College of Physical Education*).
- Abdul Hussein, A. (2023). The impact of using educational technology on learning basic skills in basketball. *Journal of Educational and Sports Studies*, 11(2), 45–58.
- Aboud, A., & Al-Ani, A. (2009). *Future educational technology* (1st ed.). Dar Wael for Publishing and Distribution.
- Ahmed, A. (2024). The impact of using modern educational tools on learning basic basketball skills among physical education students. *Journal of Sports Sciences*, 16(2), 66–79.
- Ali, M. (2022). The effectiveness of multimedia in learning basic basketball skills among university students. *Journal of Sports Sciences*, 15(3), 112–126.
- Al-Fartousi, H. (2018). *International basketball law* (1st ed.). Dar Al-Fikr Al-Arabi.
- Al-Jubouri, K. (2021). The effect of an educational program using visual aids on learning the basketball shooting skill. *Journal of Contemporary Physical Education*, 20(2), 91–104.
- Al-Jumaili, S. (2023). The effect of the active learning strategy on learning basic basketball skills. *Journal of Physical Education Sciences*, 18(1), 37–50.
- Al-Kaabi, R. (2020). The use of modern technologies in teaching physical education and their impact on motor learning. *Journal of Sports Sciences*, 14(4), 55–68.
- Al-Ta'i, Y. (2024). The effect of using educational videos on developing students' basketball skills performance. *Journal of Educational and Sports Studies*, 12(1), 72–85.
- Al-Talib, N., & Al-Samarrai, M. (1999). *Scientific transactions between theory and application*. The Book Center for Publishing.
- Al-Yassiri, A. M. (2002). *Measurement and evaluation in physical education and sports*. Al-Warraq Foundation for Publishing.
- Hassan, H. (2023). The effect of the cooperative learning strategy on learning some basic basketball skills for students. *Journal of Studies and Research in Physical Education*, 33(2), 101–115.

- Hodges, N. J., & Franks, I. M. (2002). Modelling coaching practice: The role of instruction and demonstration. *Journal of Sports Sciences*, 20(10), 793–811. <https://doi.org/10.1080/026404102320675648>.
- Kara, M., & Çetin, M. Ç. (2025). The role of the jigsaw technique in basketball development of middle school students. *International Journal of Recreation and Sports Science*, 9(2), 44–58.
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
- Neldi, H., Aziz, I., & Erita, Y. (2025). Augmented reality in basketball education: A systematic review on teaching and skill development. *International Journal of Human Movement and Sports Sciences*, 13(1), 25–39.
- Rekik, G., Belkhir, Y., Mezghanni, N., Chen, Y., & Kuo, C. (2024). Learning basketball tactical actions from video modeling. *Journal of Motor Learning and Development*, 12(3), 341–356. <https://doi.org/10.1123/jmld.2023-0045>.
- Samoum, M. A. (2018). *Basketball refereeing mechanics and officiating skills*. Dar Al-Kutub for Printing and Publishing.
- Schmidt, R. A., & Lee, T. D. (2011). *Motor control and learning: A behavioral emphasis* (5th ed.). Human Kinetics.
- Wang, C., Dev, R. O., Soh, K. G., Nasiruddin, N. J., & Wang, Y. (2022). Effects of blended learning in physical education among university students: A systematic review. *Education Sciences*, 12(8), Article 557. <https://doi.org/10.3390/educsci12080557>
- Wulf, G., & Lewthwaite, R. (2016). Optimizing performance through intrinsic motivation and attention for learning: The OPTIMAL theory of motor learning. *Psychonomic Bulletin & Review*, 23(5), 1382–1414. <https://doi.org/10.3758/s13423-015-0999-9>

Appendices

Appendix (1): Refereeing signal evaluation form

Refereeing Signal Evaluation Form

No	Evaluation Criteria	Score (1–5)
1	Accuracy of signal performance	
2	Timing of signal	
3	Body positioning	
4	Clarity of signal	
5	Movement sequence	
6	Correct referee stance	
7	Use of arms and hands	
8	Signal completion	

Total Score: (40)

Appendix (2): Sample illustrations used in the educational program

The educational illustrations included:

1. Referee positioning in front court
2. Referee positioning in back court
3. Traveling violation signal
4. Foul signal mechanics
5. Three-second violation signal
6. Out-of-bounds signal

(Images were displayed using a projector during instructional sessions)

Appendix (3): Example of instructional unit

Instructional Unit Example

Unit Title: Referee Signal Mechanics

Duration: 75 minutes

Unit Structure

Section	Time	Activity
Warm-up	10 min	General warm-up exercises
Explanation	10 min	Explanation using illustrations
Demonstration	10 min	Practical demonstration
Practice	25 min	Students practice signals
Evaluation	10 min	Performance assessment
Cool-down	10 min	Recovery exercises

((أثر الرسوم التوضيحية المرئية في تحسين أداء إشارة تحكيم كرة السلة لدى الطلاب))

محمد عبودي حسين

دنيا عبد السلام فاضل عباس

العراق . المديرية العامة لتربية محافظة النجف الاشرف / مدرسة السدير للبنين حلقة الاولى

العراق . المديرية العامة لتربية محافظة النجف الاشرف /إعدادية النجف للعلوم الرياضية

المستخلص

هدف البحث إلى التعرف على أثر استخدام الصور التوضيحية في تحسين ميكانيكية إشارة التحكيم في كرة السلة لدى الطلاب. وتكمن أهمية الدراسة في توظيف الأدوات التعليمية الحديثة التي تساهم في جودة التعليم وتعزيز فهم الطلاب لجوانب التحكيم. واستخدم الباحثون المنهج التجريبي بتصميم المجموعتين التجريبية والضابطة. تكونت العينة من (22) طالباً، تم تقسيمهم عشوائياً إلى مجموعتين (11 طالباً لكل منهما). اتبعت المجموعة التجريبية منهجاً تعليمياً باستخدام الصور التوضيحية لست وحدات تعليمية، بينما اتبعت المجموعة الضابطة الطريقة التقليدية. وأظهرت النتائج وجود فروق ذات دلالة إحصائية بين الاختبارين القبلي والبعدي لصالح الاختبار البعدي لكلا المجموعتين، كما أظهرت وجود فروق ذات دلالة إحصائية بين المجموعتين في الاختبار البعدي لصالح المجموعة التجريبية. وبلغت نسبة التحسن في المجموعة التجريبية ما يقارب 110%، مقابل 58% في المجموعة الضابطة. وكان الوسط الحسابي للمجموعة التجريبية (1.49 ± 66.53) مقابل (1.64 ± 51) للمجموعة الضابطة، بقيمة $t = 7.13$ عند مستوى دلالة 0.05. بلغت نسبة التحسن في أداء ميكانيكية الإشارة التحكيمية لدى المجموعة التجريبية حوالي 110% مقابل 58% للمجموعة الضابطة، وهذا ما يخدم أحد أهداف التنمية المستدامة التعليم الجيد – تساهم الأدوات التعليمية الحديثة في جودة التعليم.

الكلمات المفتاحية: الرسوم التوضيحية، الإشارات التحكيمية في كرة السلة، المنهج.