The impact of mobile learning using the (Visual Eyes) application on learning some ball skills in rhythmic gymnastics for second-year students

El impacto del aprendizaje móvil mediante la aplicación (Visual Eyes) en el aprendizaje de algunas habilidades con la pelota en gimnasia rítmica para estudiantes de segundo año

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Received: 06-05-26
Accepted: 29-05-26

How to cite in APA

Hasan, I. A., & Majeed, T. N. (2026). The impact of mobile learning using the (Visual Eyes) application on learning some ball skills in rhythmic gymnastics for second-year students. *Retos, 81*, 883-891. https://doi.org/10.47197/retos.v81.119570

Abstract

Objective: This study aimed to identify the impact of mobile learning using the Visual Eyes application on learning certain ball skills in rhythmic gymnastics, and secondly, to identify the differences between the experimental group (using mobile learning with the Visual Eyes application) and the control group (using the instructor's method).
Research methodology: The experimental method was used with a two-group design (control and experimental) for the research sample, which consisted of 52 second-year female students from the College of Physical Education and Sports Sciences, selected purposively. Before implementing the mobile learning-based curriculum, the researchers ensured parity between the control and experimental groups in terms of their performance level of some basic ball skills in rhythmic gymnastics, in order to start from a common starting point. The curriculum consisted of 12 educational units, one unit per week, with units scheduled for holidays being made up to the following week.
Results: The results showed statistically significant differences favoring the post-test in all skills, with the p-value (Sig) reaching the 0.000 level, which is less than the significance level of 0.05 at 31 degrees of freedom. This is attributed to the improvement in the performance of the control group because of continued training and educational follow-up, which contributed to developing their skill performance level compared to the pre-test results.
Conclusions: The researchers concluded that the experimental group outperformed the control group in performing the skills under study after using artificial intelligence applications. The use of artificial intelligence applications positively affects skill learning in rhythmic gymnastics.

Keywords

M-learning; Visualeyes; rhythmic gymnastics.

Resumen

Objetivo: Este estudio tuvo como objetivo identificar el impacto del aprendizaje móvil mediante la aplicación Visual Eyes en el aprendizaje de ciertas habilidades con balón en gimnasia rítmica y, en segundo lugar, identificar las diferencias entre el grupo experimental (que utilizó el aprendizaje móvil con la aplicación Visual Eyes) y el grupo de control (que utilizó el método del instructor).
Metodología de investigación: Se utilizó el método experimental con un diseño de dos grupos (control y experimental) para la muestra de investigación, que consistió en 52 estudiantes de segundo año de la Facultad de Educación Física y Ciencias del Deporte, seleccionadas intencionalmente. Antes de implementar el currículo basado en el aprendizaje móvil, los investigadores aseguraron la paridad entre los grupos de control y experimental en cuanto a su nivel de desempeño en algunas habilidades básicas con balón en gimnasia rítmica, para partir de un punto de partida común. El currículo constaba de 12 unidades educativas, una por semana, y las unidades programadas para días festivos se recuperaban para la semana siguiente. Resultados: Los resultados mostraron diferencias estadísticamente significativas a favor de la prueba posterior en todas las habilidades, con un valor p (Sig) de 0,000, inferior al nivel de significancia de 0,05 con 31 grados de libertad. Esto se atribuye a la mejora en el desempeño del grupo de control gracias al entrenamiento continuo y al seguimiento educativo, lo que contribuyó al desarrollo de su nivel de desempeño en comparación con los resultados de la prueba previa.
Conclusiones: Los investigadores concluyeron que el grupo experimental superó al grupo de control en la ejecución de las habilidades estudiadas tras el uso de aplicaciones de inteligencia artificial. El uso de aplicaciones de inteligencia artificial influye positivamente en el aprendizaje de habilidades en gimnasia rítmica.

Palabras clave

Aprendizaje móvil; Visualeyes; gimnasia rítmica.

Introduction

The field of learning and teaching has witnessed rapid transformations in recent years in light of the tremendous advancements in technology and artificial intelligence. This is due to the emergence of new technologies and applications that have played a significant role in revolutionizing learning and teaching methods.

Mobile learning is one of the modern trends in educational technology. It has garnered widespread attention in contemporary educational literature due to its flexibility in terms of time and place, and the possibility of continuous learning beyond the confines of the traditional classroom. (Traxler ,2007) points out that mobile learning is not limited to the use of mobile devices themselves, but rather involves the transfer of learning with the learner wherever they are. (Kukulska-Hulme, 2013: Shaalan, et al., 2022: Shaker, et al., 2022) indicates that mobile learning represents the new generation of technology-assisted learning models. It relies on employing mobile devices to enable learners to learn anytime, anywhere, while enhancing interaction, motivation, and self-directed learning. It also connects knowledge to the real-world context of learning, making it personalized learning that depends on the learner's movement and interaction with their learning environment. The researchers also emphasize that mobile learning differs fundamentally from traditional e-learning, as it is characterized by being more flexible, individualized, and context-dependent. This contributes to enhancing learner motivation and improving cognitive and skill-based learning outcomes. This theoretical approach is an important foundation for employing learning in applied fields, including various sports in general and rhythmic gymnastics in particular. Because this field requires visual support and immediate feedback that contributes to learning motor skills and improving performance.

(Ally ,2009) defined it as mobile-based learning that provides flexible, learner-centered learning and contributes to improving learning outcomes.

Due to the lack of a precise definition for the Visual Eyes application, the researchers developed an operational definition based on scientific sources and its uses. They define it as an application that relies on evaluating visual perceptual processes in order to improve the interaction between sensory perception and motor response, thus contributing to skill learning.

The application allows learners to record their performance on video and play it back slowly for precise movement analysis and parallel comparison with ideal performance. Simultaneously, it gives the learner the opportunity to compare what has been done with what should be done. The main justification for this study is the scarcity of previous research on using mobile phones in learning rhythmic gymnastics, as well as the limited use of modern teaching methods. Therefore, the researchers aim to conduct a study that attempts to utilize effective teaching methods, such as mobile learning, to motivate students, increase their attention, and stimulate them, while also experimenting with modern applications in the field of skill performance learning. The importance of this research also lies in considering individual differences, given the difficulty all learners face in learning at the same level, and the particular difficulty in learning gymnastics skills, especially ball skills. Mobile learning will provide learners with knowledge and information that can be used anytime and anywhere, and can be viewed multiple times according to each student's comprehension.

The concept of Visual Eyes for Coaches is a pivotal element in the effectiveness of feedback provided to learners. The quality of feedback is closely linked to the teacher's observational accuracy and performance analysis. (Schmidt & Lee, 2019) demonstrated that feedback based on precise observation contributes to accelerating motor learning and improving performance levels. Integrating artificial intelligence technologies, particularly Visual Eyes for Coaches, as tools to support the teacher's visual observation and motor analysis abilities within the learning unit, is not a replacement for their educational role. The teacher's competence in visual perception, performance analysis, and learner guidance remains fundamental to the educational process. These modern technologies contribute to improving the quality of feedback, thereby enhancing the effectiveness of motor learning and achieving integration between the teacher's human role and modern technological tools.

Visual Eyes for Coaching is increasingly important in sports characterized by precision and complex movements, such as gymnastics, where performance demands a high degree of control over muscle coordination, timing, and movement angles. (Ferawati et al., 2026) emphasizes that the success of

teaching and training in these sports depends largely on the coach's ability to notice subtle errors and correct them promptly. (Morgan et al., 2026: De Oliveira et al., 2026) also points out that a competent coach is distinguished by their ability to link an analytical view of performance with sound instructional guidance, which contributes to enhancing learning efficiency and achieving masterful skill performance.

Modern rhythmic gymnastics is an artistic sport that relies on movement performed to music using specialized apparatus. It aims to develop physical, technical, aesthetic, and psychological aspects through organized movements characterized by flexibility, coordination, and rhythmic motion. (Núñez Morales et al., 2025) Rhythmic gymnastics originated under the influence of expressive dance and European schools of movement and rhythm, before being officially recognized by the International Gymnastics Federation in the 1960s (Cleophas, 2024). A sport combines ballet, dance, gymnastics, and apparatus handling.

Research objective

To identify the effect of mobile learning using the (Visual Eyes) application in learning some ball skills in rhythmic gymnastics, and secondly to identify the differences between the experimental group (using mobile learning with the Visual Eyes application) and the control group (using the teacher's method).

Research hypotheses

state that there are no statistically significant differences between the pre-test and post-test scores of the control and experimental groups in learning certain ball skills in rhythmic gymnastics. Similarly, there are no statistically significant differences in the post-test scores between the control and experimental groups in learning certain ball skills in rhythmic gymnastics.

Rhythmic gymnastics is a competitive individual sport and a cornerstone in the preparation of athletes for many other sports, as it contributes to building and properly preparing the entire body (Al-Abd, 1986). It is an important sport, particularly for women, due to its compatibility with their natural and biological characteristics. Its skills are distinguished by their aesthetic nature, which is reflected in the integration of constructive exercises, dance movements, and acrobatic movements with music that expresses the beauty, harmony, and fluidity of movement. Through practicing this sport, individuals can develop physically and acquire a good physique. Rhythmic gymnastics consists of: (Matar & Abdul Wahid, 2010).

1- Free movements without apparatus, such as walking, running, jumping, leaping, undulating, various balancing and swinging movements, and different types of rotations.

2- Movements with apparatus such as (bars, ropes, hoops, balls, and ribbons).

3- Acrobatic movements such as various types of rolls.

The focus will be on the ball, as it is the central element of the study. The ball is a beautiful tool in rhythmic gymnastics. It possesses kinetic qualities, allowing the gymnast to pat, roll, and throw it in any direction. When beginning to learn ball skills, the gymnast must gain confidence and control by understanding the physical laws governing the ball's fall and bounce. Learning to control the ball requires the body to follow the movement, demonstrating speed, agility, flexibility, perfect coordination, rhythmic artistry, and individual expression.

The ball is a tool that evokes excitement through its use and requires great precision, especially when performing the skills. The ball is made of rubber or plastic, has a diameter of 18-20 cm, and weighs 400 grams. It is held and controlled by placing it in the palm of the hand, assuming a cup-like position with the fingers supporting it. The hand should not be rigid, whether under the ball, on top of the ball, under the ball with the elbow rotated backward, under the ball with both hands, on the backs of the hands, on the legs, or on any other part of the body. Among the basic ball skills used in this research (Hassoon & Matar, 2021), experts agreed on the following skill tests:

1. Spinning the ball in a figure-eight pattern in front of the body over the head.

2. Dribbling the ball from a step jump.

3. Throwing and catching the ball from a scissor jump.

4. Spinning the ball around the waist.

5. Rolling the ball on the arms.

Method

Research Methodology

The experimental method was used with a two-group design (control and experimental) for the research sample, which consisted of 52 second-year female students from the College of Physical Education and Sports Sciences, selected purposively. The research equipment included one (1) Australian-made HP computer, two (2) iPhone 16 Pro Max smartphones, two (2) mobile phone holders, four (4) RAM modules, a floor exercise mat, and a rhythmic gymnastics ball.

Before implementing the mobile learning approach, the researcher ensured parity between the control and experimental groups in their performance of basic ball skills in rhythmic gymnastics, aiming to start from a common point. To achieve this, pre-tests of the basic skills under study were administered to both groups, and the data were then statistically analyzed using an independent samples t-test. The results showed no statistically significant differences between the mean scores of the two groups in all skills, as the significance levels were greater than 0.05. This indicates that parity was achieved between the two groups.

Table 1. Shows the equivalence of the control and experimental research groups in the pre-tests of skills

Skills	Experimental Group		Control Group		Calculated t-value	Sig.	Significance
	Mean	Std. Deviation	Mean	Std. Deviation			
M1	2.5500	0.99868	2.6250	0.83280	-0.293	0.771	Not significant
M2	2.1000	0.71818	1.9375	0.84003	0.716	0.477	Not significant
M3	1.7000	0.65695	1.8750	0.75134	-0.856	0.396	Not significant
M4	1.9000	0.71818	1.9688	0.78224	-0.318	0.752	Not significant
M5	2.1000	1.02084	2.0000	0.91581	0.367	0.715	Not significant

Significant < 0.05 at 50 degrees of freedom.

Implementation of Mobile Learning Using the VisualEyes Application

The practical aspect (skill performance) relies on the artificial intelligence application VisualEyes, which was pre-installed on the phones of the main experimental group.

The main experiment began on Wednesday, February 19, 2025, and ended on Wednesday, May 7, 2025. The curriculum consisted of 12 learning units, one unit per week. Units scheduled for holidays were made up to the following week. The practical component consisted of 25 minutes of instruction using the VisualEyes application. The subject teacher sent a pre-prepared model of the correct performance of the required skills to the students' phones, allowing them to review the correct movement pattern and compare their performance during the lesson. During the lesson, the students' performance was recorded using the application, and any skill errors were corrected. Additionally, each pair of students recorded their performance using their personal phones and uploaded the videos to VisualEyes for comparison with the model sent by the teacher. This comparison aimed to identify areas for improvement in skill performance. This practical component, using the application, took 25 minutes for each learning unit. The practical component also included 5 minutes of instruction without using the aforementioned program. After completing the allotted time for implementing the curriculum, the researchers conducted post-tests on May 7, 2025.

The practical component: This included (25) minutes using the program, specifically the VisualEyes application. The subject teacher sent a model of the correct performance of the required skills to the students' phones beforehand, allowing them to review the correct movement model and compare their performance to it during the lesson.

During the lesson, the performance was recorded using the application, and any skill errors were corrected. Additionally, each pair of students recorded their performance using their personal phones and uploaded the videos to VisualEyes for comparison with the model sent by the subject teacher. This comparison between what was done and what should be done contributes to improving skill performance.

This practical component, using the application, took (20) minutes for each learning unit.

The practical component also included (5) minutes without using the aforementioned programs.

The evaluation was conducted by four judges, and the highest and lowest scores were removed, then the two middle scores were combined and divided by (2) to obtain the student's final score out of (10) points, taking into account the scores of the two attempts.

Four judges determine the Mean values for each skill (evaluation). The highest and lowest scores were removed, and the two average scores were added together and divided by (2) to obtain the student's final score out of (10) points, taking into account the scores from the two attempts.

Findings

These are the findings:

Table 2. Shows the arithmetic mean, mean difference, standard deviation of differences, calculated t-value, and significance level for the control group in the pre- and post-tests.

Skills	Pre-test		Post-test		Mean Difference	Std. Error Difference	Calculated t-value	Sig.	Significance
	Mean	Standard Deviation	Mean	Standard Deviation					
M1	2.6250	0.83280	3.9688	1.23090	1.34375	0.23162	-5.802	.000	Significant
M2	1.9375	0.84003	4.0000	0.91581	2.06250	0.20049	-10.287	.000	Significant
M3	1.8750	0.75134	4.5938	1.04293	2.71875	0.23859	-11.395	.000	Significant
M4	1.9688	0.78224	4.2188	1.06965	2.25000	0.21997	-10.229	.000	Significant
M5	2.0000	0.91581	3.0938	1.14608	1.09375	0.17597	-6.215	.000	Significant

Significant < 0.05 at 31 degrees of freedom.

Table 3. Shows the arithmetic mean, mean difference, standard deviation of differences, calculated t-value, and significance level for the experimental group in the pre- and post-tests.

Skills	Pre-test		Post-test		Mean Difference	Std. Error Difference	Calculated t-value	Sig.	Significance
	Mean	Standard Deviation	Mean	Standard Deviation					
M1	2.5500	.99868	6.8000	1.05631	-4.25000	.33931	-12.525	.000	Significant
M2	2.1000	.71818	6.5000	1.10024	-4.40000	.28470	-15.455	.000	Significant
M3	1.7000	.65695	6.0500	1.09904	-4.35000	.30153	-14.426	.000	Significant
M4	1.9000	.71818	6.1500	.98809	-4.25000	.28905	-14.703	.000	Significant
M5	2.1000	1.02084	4.8500	1.03999	-2.75000	.22798	-12.063	.000	Significant

Significant < 0.05 at 19 degrees of freedom.

Table 4. Results of post-tests between the control and experimental groups for some ball skills in rhythmic gymnastics

Skills	Experimental Group		Control Group		Calculated t-value	Sig.	Significance
	Mean	Standard Deviation	Mean	Standard Deviation			
M1	6.8000	1.05631	3.9688	1.23090	8.507	.000	Significant
M2	6.5000	1.10024	4.0000	0.91581	8.860	.000	Significant
M3	6.0500	1.09904	4.5938	1.04293	4.799	.000	Significant
M4	6.1500	0.98809	4.2188	1.06965	6.518	.000	Significant
M5	4.8500	1.03999	3.0938	1.14608	5.566	.000	Significant

Significant < 0.05 at 50 degrees of freedom.
Where:
M1: Spin the ball in a figure-eight pattern in front of the body, overhead.
M1: Dribbling the ball with a step jump.
M 3: Throwing and catching the ball with a scissor jump.
M 4: Spinning the ball around the waist.
M 5: Rolling the ball on the arms.

Discussion

The results showed statistically significant differences in favor of the post-test in all skills, with the p-value (Sig) reaching the 0.000 level, which is less than the significance level of 0.05 at 31 degrees of freedom. This is attributed to the improvement in the performance of the control group because of con-

tinued training and educational follow-up, which contributed to developing their skill performance compared to the pre-test results. The researchers attribute this development to the teaching methodology employed by the teacher, which brought about a change in the learners' behavior. The teacher's use of the method that relies on the teacher's central role in the learning unitexplaining, demonstrating, applying the skill, and correcting errors elicited a positive response from the learners. This aligns with what (Al-Hilah, 2000) indicated: that subjecting any sample to a teaching or training methodology improves its performance level at both the cognitive and skill levels due to the experiences contained within that methodology.

The results of the control group showed limited improvement in some skills, while no statistically significant differences were found in others. Although the control group's scores between the pre-test and post-test were significant, they still lagged behind the experimental group. The researchers attribute this to the limited role of the learner in the current method, where the teacher plays the dominant role in formulating and planning the lesson objectives and completely leading the learning unit. The learner is thus a passive recipient of information, not an active seeker of it. Despite this, the researchers see advantages in the current method, but it needs to keep pace with developments in the educational process and avoid adopting the traditional teaching style, which focuses on direct explanation without utilizing modern technologies. This reduces the effectiveness of learning, especially in skills that require precision and motor coordination. The results showed statistically significant differences in favor of the post-test in all skills, with the p-value (Sig) reaching the 0.000 level, which is less than the significance level of 0.05 at 19 degrees of freedom. The mean scores also indicate a clear improvement in the skill performance of the experimental group after the implementation of the educational program. This is attributed to the effectiveness of the learning method used, which contributed to improved skill performance and better development compared to the pre-test.

The use of visual feedback and video as teaching aids contributes to enhancing motor performance and reducing errors. Visual feedback also contributes to more accurate error correction and improved evaluation (Sigrist et al., 2013). The effectiveness of video in improving gymnastics learning was also confirmed, as indicated. (Potdevin et al., 2018) reviewed the use of video tablets as an effective educational tool for self-assessment and motivation. This supports the use of the VisualEyes application as a video feedback tool within physical education lessons, leading to improved motor skills learning among female students. This reinforces the idea of using visual aids (Kretschmann, 2017), who found that visual feedback enhances motor skills learning (Zhou, 2021), proving more effective than verbal feedback alone. Video-based learning contributes to improved artistic performance and student motivation compared to traditional methods. This underscores the importance of using visual aids, especially the VisualEyes application. Furthermore, learning according to the curriculum developed by the researchers yielded positive results in improving rhythmic gymnastics ball skills. The fact that students recorded each other's skill performances on their personal phones allowed each student to observe, record, and compare what was done and what needed to be done. By watching the slow-motion recording, the teacher can see the stages of the movement path for both the student and the performer simultaneously (the skill model and its execution). Furthermore, the teacher's immediate and corrective feedback is crucial, as the performance was filmed and can be accurately corrected both during and after the skill's completion.

The results of the post-tests between the control and experimental groups for some ball skills in rhythmic gymnastics were presented. The results showed statistically significant differences in favor of the experimental group in all skills (M1, M2, M3, M4, and M5), with the p-value (Sig) reaching 0.000, which is less than the significance level of 0.05 at 50 degrees of freedom. The means also indicate the superiority of the experimental group over the control group in skill performance. This is attributed to the effectiveness of the technology-based educational program and mobile learning, which contributed to improving rhythmic performance and developing skills more efficiently compared to the traditional method used with the control group.

Video-based learning contributes to improved artistic performance. Using visual feedback (such as film) in learning motor skills enhances learners' performance by enabling them to observe and evaluate the finer details of movement. This supports the findings of the current study on gymnastics, demonstrating it as an improved teaching tool for skill teaching (Potdevin et al., 2018). Numerous studies (Potdevin et al., 2018; Kretschmann, 2017; Zhou, 2021) have proven that visual feedback has a clear positive impact

on improving students' motor skill learning by enhancing accuracy and reducing errors during the learning process. This leads to improved motor execution compared to traditional methods.

The results of the current research also showed a clear advantage for the experimental group, indicating that mobile learning and modern technologies allow learners to interact continuously and equally with all aspects of learning content at any time and place. This increases opportunities for self-directed learning and boosts motivation to practice. The greater improvement in some variables may be attributed to the fact that smart applications combine immediate feedback during skill execution with immediate feedback from the instructor, along with the ability to complete complex skills that require precise performance correction something that may be lacking in traditional teaching. Therefore, it can be said that integrating mobile learning with traditional teaching may be the most effective approach, as it combines the advantages of technology in enhancing motivation and independence with the teacher's role in providing direct feedback to correct skill performance. Furthermore, the use of visual and film-based learning tools contributes to enhancing motor performance and reducing errors, and visual feedback contributes to more accurate error correction and improved assessment. (Sigrist et al., 2013)

The effectiveness of film projection in improving gymnastics learning has been confirmed, as indicated by (Potdevin et al., 2018) in his review of research on the use of tablets for film projection as an effective educational tool, self-assessment, and motivation. This supports the use of the VisualEyes application, where the film was shown as a feedback tool within physical education lessons, leading to improved motor skills learning among female students. This reinforces the idea of using visual aids.

Conclusions

The researchers concluded that the experimental group outperformed the control group in performing the skills under study after using artificial intelligence applications. The use of artificial intelligence applications positively affects skill learning in rhythmic gymnastics. The researchers recommend using the Visualeyes application to assess student performance and provide feedback.

Recommendations:

The researchers recommend adopting mobile learning methods in teaching rhythmic gymnastics skills in physical education and sports science colleges. Furthermore, they emphasize the need to train instructors in using mobile learning strategies and modern educational technologies. Finally, they recommend reducing reliance on traditional teaching methods and integrating them with modern approaches for better results.

Acknowledgements

None.

Financing

None.

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