Modern Sport

Volume 24 | Issue 2 Article 13

6-30-2025

The Effectiveness of Mobile Learning via Smartphone in Facilitating the Acquisition of Preliminary Swimming Skills

Khitam Musa Ay
University of Jordan, School of Sport Sciences, Department of Movement and Sport Training Sciences, Khitam.ay@ju.edu.jo

MODERN SPORT 2025;24:237–247

ORIGINAL STUDY

The Effectiveness of Mobile Learning via Smartphone in Facilitating the Acquisition of Preliminary Swimming Skills

Khitam Musa Ay

University of Jordan, School of Sport Sciences, Department of Movement and Sport Training Sciences

Abstract

The objective of this study was to investigate the effectiveness of mobile learning via smartphone technology in facilitating the acquisition of preliminary swimming skills. The researcher adopted an experimental methodology, which was deemed appropriate for the nature of the study. The research population consisted of all female students enrolled in the "Basic Swimming Skills" course at the Faculty of Sports Sciences during the 2023/2024 academic year, totalling 57 students. A purposive sampling technique was employed to select a sample of 32 students enrolled in the same course. These participants were randomly divided into two equivalent groups: an experimental group (n = 15) and a control group (n = 17). Both groups were registered for the course in the second semester of the academic year 2023/2024. The study was conducted at the swimming pool of the Faculty of Sports Sciences at the University of Jordan. The researcher implemented the proposed educational program using smartphones with the experimental group to assess its impact on learning foundational swimming skills. In contrast, the control group received instruction through the traditional teaching methods typically followed in the course plan. The results revealed that both instructional methods had a positive impact on learning; however, the smartphone-based mobile learning approach demonstrated a clear advantage in facilitating the acquisition of basic swimming skills. Based on these findings, the researcher recommended incorporating smartphones into skill-based learning processes in swimming and emphasized the importance of leveraging modern technology and its various applications to support the teaching of motor skills in sports, alongside conventional instruction methods. and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Quality Education)

Keywords: Mobile learning, Smartphone, Swimming

1. Introduction

Digital technology and its various applications have played a pivotal role in the educational process at large and in the field of sports education in particular. Its integration as an instructional tool has proven to be highly beneficial due to the active role it plays in the processes of design, development, presentation, and evaluation. One of the defining features of educational and information technology is the applied interaction it fosters between learners and the learning environment. The growing attention to technology and its use by educational institutions stands as a strong indicator of educational progress and a vital contributor to the development of both individuals and society. Nations increasingly recognize the critical importance of education for all—particularly specialized higher education—as a fundamental pillar for societal advancement, development, and prosperity. They also understand that such progress cannot be achieved without the essential roles of science and technology. In the face of ongoing technological challenges, globalization, and the ever-shifting demands of the labor market, compounded by the decline in job opportunities, countries and communities are striving to reform and enhance their educational systems. These efforts stem from the direct influence education has on the

Received 10 May 2025; revised 27 May 2025; accepted 4 June 2025.
Available online 30 June 2025

E-mail address: Khitam.ay@ju.edu.jo (K. Musa Ay).

https://doi.org/10.54702/2708-3454.2069

various dimensions of individual and societal life. Moreover, education in many countries—especially in developing nations—is shaped by the evolving nature of contemporary life and its associated demands. This reality calls for a transformation in curricula, educational goals, and instructional methodologies. Education has thus shifted from merely conveying scientific facts to fostering their application in practice and behaviour. This transformation is made possible through the implementation of modern teaching strategies grounded in the integration of contemporary technological tools (Mustafa, 2012).

Modern technology has granted learners numerous conveniences and advantages, transforming the educational process into one that is both effective and appealing. As Siam (2013) noted, High-quality education in the age of technology has empowered learners with creativity, innovation, and self-directed learning, shifting them from traditional instructional models to more effective technology-driven learning environments. For university teaching to be truly successful, it must be grounded in the broader academic and scientific framework of the institution, relying on high-quality standards for selecting the core components of the teaching and learning process.

The integration of technology has compelled educators to move beyond repetitive and conventional practices toward a digital landscape characterized by communication, information, and educational technologies. This shift has necessitated exploring how to integrate and employ these tools alongside existing instructional methods, giving rise to models such as distance learning, blended learning, and e-learning. These approaches emphasize the incorporation of technology into educational practices and have led many educators to adopt e-learning extensively—some even advocating for the replacement of traditional classrooms with virtual ones (Abu Khutwa, 2012).

Achieving meaningful learning requires relevance; content must resonate with learners and reflect real-world value. This necessitates strategies that enhance learner readiness and accelerate skill acquisition. In physical and motor education, this means employing contemporary instructional tools to facilitate the development of psychomotor competencies (Al-Khataybah, 2016). Instructional media that engage multiple senses have been shown to improve learners' conceptual understanding and perceptual accuracy of motor tasks, thereby outperforming traditional, lecture-based methods (Khamis, 2019).

Zaghloul (2003), Faraj (2013), and Al-Haik and Al-Hamouri (2005) emphasized that the method and approach used to integrate instructional media into the learning process—particularly in acquiring motor and athletic skills—can be effectively implemented through programming the educational content using technological tools that allow learners to engage in self-directed learning. This approach, known as programmed self-learning, shifts the focus of the educational process from the content itself to the learner. In this model, the learner explores personal interests, preferences, and capacities while progressing at an individual pace.

The instructional method employed in teaching athletic skills plays a fundamental and decisive role in achieving the desired educational outcomes. In the context of technological advancement, the goals of the educational process have evolved to emphasize learner effort and engagement. Self-directed learning, in particular, has redefined the learner's role, granting them greater agency in the learning process. This approach clarifies the roles of both instructors and learners, outlines the appropriate instructional strategies, identifies supportive educational media, and determines the necessary activities to be undertaken. In doing so, it moves away from rote memorization and the passive instructional methods characteristic of traditional teaching practices (Yen-Nan et al., 2022).

The instructional strategy selected for teaching motor skills must correspond with the nature of the skill, learning objectives, learner characteristics, available time, and contextual resources. Educators must also account for individual differences among learners to ensure the effectiveness of instruction (Al-Rabaie & Amin, 2011; Zafar, 2002).

As technology continues to diversify instructional methods and increase learner participation, self-directed learning has emerged as a dominant educational paradigm. Research by Qteit and Al-Khreisat (2009) and Al-Wakeel and Mahmoud (2005) confirms that technology-based self-learning fosters critical thinking, independent information retrieval, and observational skill development. From a pedagogical standpoint, self-directed learning constitutes the most authentic form of educational engagement.

Among emerging educational tools, the smartphone has gained prominence due to its portability, ease of use, and versatility. According to Basyouni (2007), the smartphone represents one of the most powerful learning tools currently available, offering numerous pedagogical advantages. Scholars have described mobile or smart learning as an educational mode in which learners access digital content through portable devices such as smartphones and laptops. These tools enable wireless connectivity to online learning environments and support flexible, time- and place-independent learning (Hosler, 2013).

The benefits of mobile technology extend beyond accessibility—they also enhance learner motivation and promote continuous communication between instructors and students. Smartphones grant learners autonomy over the timing, location, and structure of their learning experience, allowing them to engage based on personal preferences and schedules (Azmi, 2014).

Given these pedagogical developments, this study underscores the importance of diversifying instructional inputs, moving beyond traditional methods, and aligning educational practices with technological advancements and learner needs. It also emphasizes the potential of mobile applications to facilitate and enrich digital learning environments.

Previous empirical investigations have affirmed the effectiveness of technology-enhanced learning in swimming instruction. Zakarnah (2022) found that Keller's instructional strategy—augmented by information technology—significantly improved fundamental swimming skills among military sports students in Palestine. Rokha (2014) reported similar findings, demonstrating that blended learning positively influenced skill acquisition in front crawl swimming among beginners. Salahuddin and Washouha (2020) confirmed the effectiveness of smartphone-assisted instruction in improving front crawl performance relative to traditional methods. Likewise, Sulaiman (2023) observed enhanced outcomes in teaching the front crawl to students with hearing and speech impairments through mobile-based learning. Finally, Ibrahim (2022) concluded that mobile learning significantly improved students' proficiency in both front and back crawl techniques while also increasing their motivation to learn.

1.1. Research significance

- This study highlights the importance of integrating smartphone applications into the educational process within the sports field, thereby supporting technology-driven teaching approaches.
- It seeks to diversify instructional inputs and depart from traditional, routine-based methods by promoting creativity and innovation in the use of technological tools already accessible to students to enhance learning outcomes.
- It addresses the need for educational institutions—particularly faculties of sports sciences—to modernize their teaching methods in alignment with current advancements and learner expectations.
- It aims to leverage the benefits of modern instructional strategies by enhancing sensory involvement, improving learners' cognitive functions such as attention and perception, and achieving time-efficiency in teaching and learning.

1.2. Research problem

Based on the researcher's professional experience in university-level teaching and observation of the learning stages among students, several challenges have become apparent in the learning process—particularly in swimming, a sport practiced in an aquatic environment that can evoke fear and pose safety concerns for beginners. These apprehensions may stem largely from the reliance on traditional instructional methods, which are characterized by directive teaching approaches where the instructor delivers explanations and demonstrations without involving learners in the process. Such methods fail to account for individual differences, disregard learners' intrinsic motivation, and often lead to disengagement and diminished comprehension. In contrast, if instructional strategies were adapted to consider individual learning differences, involve learners in decision-making, and provide proactive feedback through mobile learning facilitated by smartphones, it could foster a more dynamic and engaging educational environment. Technological advancements, particularly the widespread use of smartphones—which students carry with them everywhere—offer versatile applications that can be effectively harnessed in educational contexts. Given the growing trend toward digital learning in higher education, smartphones present a valuable opportunity to address the limitations of conventional teaching methods. Accordingly, the research problem emerges from the need to investigate the effectiveness of mobile learning via smartphones in facilitating the acquisition of preliminary swimming skills, especially as a modern response to the shortcomings observed in traditional instructional approaches.

1.3. Research objectives

1. To assess the effectiveness of mobile learning using smartphones in facilitating the acquisition of basic swimming skills.
2. To evaluate the effectiveness of traditional instructional methods in teaching foundational swimming skills.
3. To compare the outcomes of mobile learning versus traditional methods in improving students' acquisition of introductory swimming skills.

1.4. Research hypotheses

1. There are statistically significant differences at the ($\alpha \leq 0.05$) level between the pre-test and post-test results in favor of the post-test for the group using mobile learning via smartphones.

Table 1. Means, standard deviations, and skewness coefficients for growth and skill variables.

Domain	Variables	Unit of Measurement	Mean	SD	Skewness Coefficient
	Age	Years	19.91	0.76	0.12
Growth Variables	Body mass	Kg	58.57	6.66	0.83
	Height	Cm	157.88	3.94	0.65
Skill Variables	Wall push-off and Glide	Score	1.48	0.63	0.43
in Swimming	Flutter kicks	Score	1.60	0.48	0.39
	Arm strokes	Score	1.05	0.53	0.46

Table 2. Presents the means, standard deviations, and the t-test results indicating the significance of differences in the pre-test measurements between the experimental and control groups for the skill-related variables.

Domain	Variables	Unit of Measurement	Experimental Group		Control Group		T-value	Significance Level
			Mean	SD	Mean	SD		
	Age	Year	19.88	0.88	19.95	0.65	1.2162	0.2334
Growth Variables	Mass	Kg	59.01	6.32	58.13	7.01	0.3709	0.7133
	Height	Cm	158.01	4.11	157.76	3.78	0.1792	0.8590
	Wall Push-Off and gliding	Score	1.45	0.56	1.51	0.71	0.2629	0.7945
Skill Variables	Flutter kicks	Score	1.60	0.44	1.61	0.53	0.0576	0.9544
	Arm strokes	Score	1.04	0.55	1.06	0.51	0.1067	0.9157

2. There are statistically significant differences at the ($\alpha \leq 0.05$) level between the pre-test and post-test results in favor of the post-test for the group using traditional instructional methods.
3. There are statistically significant differences at the ($\alpha \leq 0.05$) level in the post-test between mobile learning and traditional instruction in favor of the experimental group.

1.5. Scope of the research

- **Human Scope:** The study was limited to female students enrolled in the Faculty of Sports Sciences at the University of Jordan, registered in the basic swimming skills course.
- **Spatial Scope**: The study was conducted at the swimming facility of the Faculty of Sports Sciences, University of Jordan.
- **Temporal Scope:** The research was implemented during the second semester of the 2023/2024 academic year.

1.6. Research terminology

- **Mobile Learning:** The use of smartphones as instructional tools within the educational process (Yen-Nan et al., 2022).
- **Traditional Instruction:** A command-based instructional approach where all decisions are made by the teacher, and learners are expected to follow directions throughout the unit.
- **Basic Swimming Skills:** Fundamental aquatic competencies taught prior to introducing advanced swimming techniques.

2. Methodology and procedures

The researcher employed the experimental method using an equivalent groups design (a control group and an experimental group), as it aligns with the nature and objectives of the study. The research population consisted of female students enrolled in the Basic Swimming Skills course at the College of Sport Sciences during the 2023/2024 academic year, totalling 57 students. A purposive sampling technique was applied to select 32 participants from this population, who were then randomly assigned to the study groups as follows:

- The experimental group comprised 15 students, who were taught motor skills using mobile learning through smartphones.
- The control group comprised 17 students, who received instruction through conventional teaching methods during the motor skills learning process.

Additionally, the researcher calculated the skewness coefficient among the study sample members prior to implementing the research procedures for all variables under investigation. Table 1 presents these results.

The researcher then conducted equivalence testing between the experimental and control groups in the pre-test measurement.

Table 2 indicates that the calculated t-value was lower than the critical t-value at a significance level of 0.05. This result suggests the absence of statistically significant differences across all variables between the experimental and control groups, thereby confirming the equivalence of the groups in the pretest measurements.

2.1. Research tools

The researcher employed the following tools during the implementation of the study procedures:

- Skill-based tests to assess the level of proficiency in the targeted swimming skills.
- Instructional programs specifically designed for each research group by the researcher.
- Devices and equipment including: whistle, stadiometer for height measurement, scale for mass measurement, stopwatch, kickboards, ropes, computer, and smartphones.
- A 25-meter long and 12.5-meter-wide swimming pool.

2.2. Research variables

- **Independent Variables:** Mobile learning using smartphones and traditional teaching methods.
- **Dependent Variables:** The level of learning in basic swimming skills.

2.3. Instructional program

The researcher designed an instructional program tailored to the experimental group, which utilized mobile learning via smartphones. The content was disseminated at least one day prior to each scheduled lecture through a dedicated WhatsApp group, allowing students to review the material in advance. The instructional content primarily comprised video demonstrations and diverse multimedia exercises with synchronized audio and visual components.

In contrast, the control group followed a traditional instructional approach in which the researcher delivered the same content through conventional explanation and demonstration methods. Both groups engaged with identical exercises and repetitions to maintain content equivalence. The program consisted of nine instructional units distributed over three weeks, with three sessions per week, each lasting 50 minutes.

All instructional materials were developed through rigorous consultation of specialized literature, previous studies, online academic sources, and multimedia repositories such as YouTube. Furthermore, the content underwent expert validation by specialists in the field of physical education and instructional design. Based on expert recommendations and professional experience in swimming instruction and training, the researcher developed a set of evaluation tools to assess learners' proficiency in the targeted swimming skills. These tools were subjected to standard validity and reliability procedures. The finalized test battery included the following components:

2.3.1. Preliminary skill performance tests for the front crawl stroke, including:

- Wall push-off and gliding test
- Flutter kicks test
- Arm strokes test (Appendix 1)

3. Pilot study

The researcher implemented an instructional unit based on a mobile learning program using smartphones with a pilot sample consisting of four students from the study population. The purpose of this application was to:

- Identify potential challenges and obstacles the researcher might face during the implementation of the swimming instructional program.
- Verify the appropriateness of the tools and educational content used for the study sample.
- Assess the level of engagement and observable satisfaction with the nature of the mobile learning strategy delivered via smartphone during the instructional process.
- Confirm the operational efficiency of the students' smartphones.
- Determine the feasibility of monitoring the duration of unit and video presentations sent to the students during the instructional sessions.

4. Psychometric properties of the research tests

4.1. Validity

Content validity was employed by presenting the tests used in the study to a panel of experts and specialists in the field of swimming education and training. The panel confirmed the content validity of the tests, affirming that they accurately measure the objectives for which they were designed.

4.2. Reliability

The Pearson correlation coefficient was calculated to assess the reliability of the tests using the test–retest method, with a time interval of seven days. This analysis was conducted on the skill-related variables using a pilot sample of four students who were not part of the main research sample. Table 3 presents the reliability coefficients for all tests.

Table 3. Correlation coefficient values between the first and second applications of the skill tests for the pilot study participants.

Test	First Application		Second Application		Correlation Coefficient	Significance Level
	Mean	SD	Mean	SD		
Wall push-off and Glide	1.48	0.54	1.51	0.55	0.786 0.000	0,000
Flutter kicks	1.11	0.57	1.09	0.54	0.562 0.000	0,000
Arm strokes	1.59	0.66	1.57	0.51	0.891 0.000	0,000

The values presented indicate a statistically significant correlation between the first and second applications of the skill tests, as the significance level was less than 0.05. This result provides evidence of the reliability of these tests.

4.3. Pre-tests

The researcher conducted the pretests for the research sample over two sessions held outside the instructional program hours. Following this, the instructional program was implemented for each group.

4.4. Post-tests

The researcher administered the post-tests to the research sample after the completion of the instructional programs for each group.

4.5. Statistical analysis used in the study

The researcher employed appropriate statistical tests to obtain the required results using the Statistical Package for the Social Sciences (SPSS).

5. Results

Table 4 presents the means, standard deviations, and the results of the *t*-test for the pre- and post-measurements of the skill performance variables in swimming for the experimental group. The findings indicate statistically significant differences at the 0.05 significance level between the pre- and post-tests across all variables, in favor of the post-test results. Based on these findings, the research hypothesis is accepted.

Table 5 illustrates the mean scores, standard deviations, and t-test results comparing the pre-test and post-test scores across the skill performance variables for the control group in swimming. The findings demonstrate statistically significant differences at the 0.05 level across all measured variables in favor of the post-test, supporting the acceptance of the research hypothesis regarding the effectiveness of the applied instructional method.

Table 6 presents the mean scores, standard deviations, and t-test results for post-test comparisons between the experimental and control groups in swimming skill performance variables. The findings indicate statistically significant differences at the 0.05 level in favor of the experimental group across all

Table 4. Presents the means, standard deviations, and t-test values indicating the significance of differences between the pre-test and post-test results for the experimental group in swimming. (n = 15).

Variables	Unit of Measurement	Pre-Test		Post-Test		t-value	Significance Level
		Mean	SD	Mean	SD		
Wall push-off and Glide	Score	1.45	0.56	8.90	0.80	29.5474	0.0001
Flutter kicks	Score	1.60	0.44	9.12	0.62	38.3089	0.0001
Arm strokes	Score	1.04	0.55	8.85	0.74	32.8066	0.0001

Table 5. Means, standard deviations, and t-test values for the significance of differences between the pre- and post-measurements of the control group in swimming (n = 17).

Variables	Unit of Measurement	Pre-Test		Post-Test		t-value	Significance Level
		Mean	SD	Mean	SD		
Wall push-off and Glide	Score	1.51	0.71	6.12	0.99	15.6020	0.0001
Flutter kicks	Score	1.61	0.53	6.44	0.79	20.9338	0.0001
Arm strokes	Score	1.06	0.51	6.31	0.45	31.8259	0.0001

Table 6. Presents the means, standard deviations, and t-test results indicating the significance of differences in the post-test scores between participants in the control and experimental groups in swimming.

Variables	Unit of Measurement	Control Group		Experimental Group		t-value	Significance Level
		Mean	SD	Mean	SD		
Wall push-off and Glide	Score	6.12	0.99	8.90	0.80		
Flutter kicks	Score	6.44	0.79	9.12	0.62		
Arm strokes	Score	6.31	0.45	8.85	0.74		

variables. These results support the acceptance of the research hypothesis.

6. Discussion

6.1. Discussion of the first hypothesis

The first hypothesis stated that ***"there are statistically significant differences between the pre- and post-measurements at the level of significance (α ≤ 0.05), indicating the effectiveness of mobile learning via smartphone in facilitating the acquisition of preliminary swimming skills, in favour of the post-measurement."***

The results favoured the post-measurements across all skill variables for both the experimental and control groups, indicating an overall improvement in performance levels. The researcher attributes this improvement to the effectiveness of each group's instructional program, which included educational content and skill-based exercises grounded in sound scientific principles and tailored to the students' abilities. The instructional design followed a logical educational sequence and adhered to established principles of educational program construction, such as progression from simple to complex, from part to whole, and from basic to advanced. Additionally, the instructional units included a sufficient number of repetitions and diverse exercises, which the learners actively performed. These elements significantly contributed to the observed improvements in performance levels, particularly given that the participants were beginners. This status enhanced their motivation to learn the skills, as reflected in their high levels of concentration and attentiveness during the instructional units, aiming to master new skills. Furthermore, the timely provision of necessary feedback whenever needed also played a crucial role in supporting the learning process.

6.2. Discussion of the second hypothesis

The second hypothesis stated that ***"there are statistically significant differences between the pre- and post-measurements at the level of significance (α ≤ 0.05), indicating the effectiveness of the traditional method in learning preliminary swimming skills, in favour of the post-measurement."***

The results favoured the post-measurements across all skill-related variables for the control group, indicating an improvement in performance levels. These findings confirm the positive impact of the traditional instructional program on the study variables. The traditional program was developed based on scientifically sound principles appropriate to the capabilities of the students in the research sample. The researcher adhered to a logical instructional sequence and applied established principles of instructional program development, including progression from simple to complex, from part to whole, and from basic to advanced. Furthermore, the program included a sufficient number of repetitions and a variety of exercises implemented by the learners, all of which were integrated into the instructional units. These elements significantly contributed to the improvement in performance levels, especially considering that the students were beginners. This status increased their motivation to learn, as reflected in their heightened focus and attention during the instructional units in their pursuit of mastering new skills. The necessary feedback was also provided whenever needed to support the learning process.

This is consistent with the findings of Yasar (2020), who emphasized that an instructional program based on sound scientific foundations produces positive results, with its impact clearly observable among learners.

6.3. Discussion of the third hypothesis

The third hypothesis stated that ***"there are statistically significant differences in the post-test measurements at the level of significance (α ≤ 0.05) between the effectiveness of mobile learning and the traditional method in acquiring preliminary swimming skills, in favour of the experimental group."***

The research findings related to the third hypothesis revealed statistically significant differences in the post-test results between the experimental and control groups, favouring the experimental group. These differences were observed across all skill-related variables in swimming, indicating the superior effectiveness of mobile learning using smartphones in enhancing the acquisition of swimming skills among the experimental group participants.

The researcher believes that the use of mobile learning via smartphones by the experimental group provided students with the opportunity to engage multiple senses in the learning process—particularly hearing and sight—due to the instructional program's inclusion of diverse video clips and multiple stimuli such as sound, visuals, and dynamic models. This was achieved through an advanced and highly engaging technological tool that was both accessible and user-friendly. Students were able to view the educational content at a time and place of their choosing, offering flexibility and personalization in the learning experience. This aligns with the findings of Yen-Nan et al. (2022), which indicated that engaging multiple senses in the learning process enhances the speed of learning.

As for the control group, which was taught using the traditional method—through direct explanation and demonstration by the instructor—the researcher notes that it is difficult to determine which sensory modality the learners relied on most effectively during the acquisition of skill-related information. Regardless, the number of senses engaged in the learning process is likely to have been fewer, which may have negatively impacted the learners' perception and understanding of the skills. The researcher further suggests that some details of the motor skills may have been missed by the learners due to a lack of attention at the moment of demonstration. Unlike mobile learning, traditional instruction does not offer the ability to replay and revisit the model as many times as needed based on each learner's individual needs. This limitation likely contributed to the observed differences in learning outcomes between the two groups.

The instructional method and tool employed in the mobile learning process proved to be highly effective, granting students full autonomy to watch the content multiple times. This flexibility significantly enhanced their motivation to learn, alleviated fear and anxiety, and addressed individual differences among them. Viewing the instructional material via smartphone heightened their awareness of the detailed components of each skill. Moreover, pre-viewing the skills provided them with the necessary and anticipatory feedback prior to attending the actual class session, thereby equipping them with a cognitive and motor knowledge base that supported what would later be taught by the instructor during the live session. This is consistent with the findings of Hosler (2013), who noted that using appropriate instructional tools increases learners' motivation.

The researcher further emphasizes that modern learning approaches primarily aim to engage all of the learner's senses by employing educational tools that stimulate more than one sense simultaneously. Learning through direct sensory experiences is considered the most effective form of learning, as it fosters accurate and clear understanding and perception of the skill.

7. Conclusion

In light of the research objectives, hypotheses, and findings, the researcher arrived at the following conclusions:

1. Both the traditional and experimental instructional programs demonstrated a positive impact, with the mobile learning approach showing clear effectiveness.
2. The use of mobile learning via smartphones proved to be distinctly more effective in facilitating the acquisition of preliminary swimming skills.

8. Recommendations

Based on the results of the study and the conclusions drawn, the researcher recommends the following:

- Integrating smartphones into the instructional process for learning swimming skills.
- Utilizing modern technologies and their various applications in teaching motor aspects of sports, and combining them with traditional teaching methods to enhance learning outcomes.

Conflicts of interest

None.

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

Ethical statement

This manuscript was approved by the Scientific Research Committee at the School of Sports Sciences, University of Jordan, on April 1st, 2025.

Author's contributions

All contributions to this study were provided by the researcher, who conceived the idea, authored the manuscript, and finalized all elements. Expert consultations were provided by Mr. Robin Al-Zar'i (statistics) and Mr. Omar Bani Younis (linguistic review). The researcher independently performed all translation tasks.

Funding

This research received no external funding.

Data availability

The data that support the findings of this study are available on request from the corresponding author.

References

Abu Khutwa, M. (2012). Quality standards in hiring faculty members for e-learning. *Arab Journal for Quality Assurance in Higher Education*, *5*(10), 1–28. https://search.shamaa.org/PDF/Articles/YEAjqahe/10AjqaheVol5No10Y2012/1AjqaheVol5No10Y2012.pdf.

Al-Haik, S., & Al-Hamouri, W. (2005). The degree of preference of physical education college students for the teaching methods used in teaching basketball curricula and racquet sports and their attitudes towards them. *Journal of Educational and Psychological Sciences*, *6*(3), 199–223.

Al-Khataybah, A. (2016). The impact of using computers as an educational tool on the level of learning and retention of some land movements in gymnastics for different age groups [Unpublished doctoral dissertation]. University of Jordan.

Al-Rabaie, M., & Amin, S. (2011). Modern trends in teaching physical education. Manara Press.

Al-Wakeel, H., & Mahmoud, H. (2005). Modern trends in planning and developing curricula for the basic education stage. Dar Al-Fikr Al-Arabi.

Azmi, N. (2014). Interactive learning environments (3rd ed.). Arab Thought House.

Basyouni, A. (2007). E-learning and mobile learning. Dar Al-Kutub.

Faraj, A. (2013). Teaching methods in the twenty-first century. Dar Al-Maseera.

Hosler, K. (2013). Pedagogies, perspectives, and practices: Mobile learning through the experiences of faculty developers and instructional designers [Doctoral dissertation, University of Northern Colorado]. ProQuest Dissertations and Theses. https://digscholarship.unco.edu/cgi/viewcontent.cgi?article=1162&context=dissertations.

Ibrahim, F. (2022). The impact of using mobile learning on learning the skills of front stroke and back stroke. *Journal of Sports Sciences*, *35*(3), 29–53. https://journals.ekb.eg/article_282859.html.

Khamis, M. (2019). Educational technology and learning. Dar Al-Sahab.

Mustafa, R. (2012). Employing e-learning to achieve quality standards in the educational process. *Arab Journal for Quality Assurance in Higher Education*, *5*(9), 1–20. https://search.shamaa.org/PDF/Articles/YEAjqahe/9AjqaheVol5No9Y2012/1AjqaheVol5No9Y2012.pdf.

Qteit, G., & Al-Khreisat, S. (2009). Computers, teaching methods, and evaluation. Dar Al-Thaqafa.

Rokha, M. (2014). The impact of blended learning strategy on learning front stroke swimming for beginners. *The Scientific Journal of Physical Education and Sports Sciences*, *71*(1), 465–498.

Salahuddin, T., & Washouha, N. (2020). The effectiveness of a proposed program using smartphones on learning front crawl swimming. *Journal of Sports Sciences*, *33*(11), 1–25. https://sja.journals.ekb.eg/article_265859_17595aef4991abd257963c3eaa119b95.pdf.

Siam, W. (2013). The extent of the contribution of e-learning to ensuring the quality of higher education: A case study of accounting education in Jordanian universities. *Arab International Conference on Ensuring the Quality of Higher Education*, *6*(14), 81–100. https://search.shamaa.org/PDF/Articles/YEAjqahe/14AjqaheVol6No14Y2013/5AjqaheVol6No14Y2013.pdf.

Sulaiman, N. (2023). The impact of using mobile devices on learning the front crawl swimming for the deaf and mute. *Journal of Sports Education Research*, *74*(146), 13–36. https://journals.ekb.eg/article_272495_b3293dc55f92db83d0f9644b801c7f9f.pdf.

Yasar, R. (2020). *The effect of a proposed educational program using coordination exercises on breaststroke and front stroke skills among female physical education students at An-Najah National University* [Master's thesis, An-Najah National University]. https://repository.najah.edu/server/api/core/bitstreams/c12c3f00-4fbf-401b-9aaa-281272cd4c6f/content.

Yen-Nan, L., Lu-Ho, H., & Gwo-Jen, H. (2022). Fostering motor skills in physical education: A mobile technology-supported ICRA flipped learning model. *Computers & Education*, *177*, 104380. https://www.sciencedirect.com/science/article/abs/pii/S0360131521002578.

Zafar, H. (2002). The interdisciplinary teaching method and its impact on learning and development through the spatial organizational options for the tennis learning environment [Unpublished doctoral dissertation]. University of Baghdad.

Zaghloul, I. (2003). Theories of acquisition (1st ed.). Dar Al-Sharq.

Zakarnah, I. (2022). The impact of the Killer strategy in light of information technology on learning the basic swimming skills of diploma students in the Military Sports Department at Al-Istiqlal University – Palestine. *Independence University Research Journal*, *7*(2), 127–154.

Appendices

Appendix No. 1

Skill Performance Assessment Tests for Front Crawl Swimming Skills Among Beginners in the Study Sample

Test One: Wall Push-Off and Prone Gliding Test

Test Execution Procedure:

The learner stands with their back facing the pool wall, knees bent, and torso leaning forward. The arms are extended on the water surface with palms facing downward, upper arms aligned with the ears, and the face submerged in the water. The feet are positioned high against the wall. Upon pushing off the wall, the body is propelled forward as a reaction to the push.

Test Conditions:

The body must remain extended without stiffness; arms should be straight and close together; the face must stay submerged with eyes open and directed downward and forward; legs should be extended and close together, and the body must be in a relaxed state.

Performance Evaluation:

Each component of the gliding skill is observed and scored by the evaluators, with a maximum of 2 points allocated per component. The total score for the overall performance is calculated out of 10.

Assessment Tools Used:

A pre-prepared performance evaluation sheet that includes the name of the skill, its components, and the score assigned to each component.

Skill Name	Skill Component	Score
	Push-off Technique	2
	Arm Positioning	2
Wall Push-Off and Gliding Skill	Leg Positioning	2
	Head Positioning	2
	Body Relaxation	2
Total Score: 10 Points		

Appendix No. 2

Test Second: Leg Kicks Test

Test Execution Procedure:

The swimmer begins with their back facing the pool wall, arms extended forward while holding a kickboard. The torso leans slightly forward. The swimmer pushes off the wall with the legs to achieve a horizontal floating position on the water surface, gliding forward in a prone position. Leg kicking is then initiated over the required distance.

Test Conditions:

The legs must remain fully extended in a horizontal position. Kicking should be continuous, alternating, and rhythmically timed. The hip joint serves as the pivot point for leg movement, with the knees relaxed. The primary propulsive motion involves striking downward with the legs, while the recovery movement is performed by bringing the feet upward from below. The motion should originate from the hip joint with a slight knee flexion, and the soles of the feet should be directed upward.

Performance Evaluation:

Each component of the leg kicking skill is observed and scored as follows: 4 points for the primary (downward) motion, 4 points for the recovery (upward) motion, and 2 points for breathing technique. The overall score is calculated out of 10 points based on the evaluators' assessment of each component and the swimmer's overall performance.

Assessment Tools Used:

A pre-designed performance evaluation sheet that includes the name of the skill, its components, and the designated score for each part of the skill.

Skill Name	Skill Component	Score
Leg Kicks Using Kickboard	Primary Motion	4
	Recovery Motion	4
	Breathing	2
Total Score: 10 Points		

9. Appendix No. 3

Test Three: Arm Strokes Test

Test Execution Procedure:

The swimmer begins with their back facing the pool wall, a pull buoy placed between the thighs to stabilize the legs. Arms are extended forward, with the torso leaning slightly. The swimmer pushes off the wall with the legs to achieve a horizontal floating position on the water surface, gliding forward in a prone position. The arms then perform continuous, alternating circular motions around the shoulder joint, aiming to propel the water backward over the required distance, accompanied by rhythmic breathing.

Test Conditions:

The body must maintain a horizontal floating position in the prone posture, with the pull buoy positioned between the thighs to keep the legs fully extended and stationary. The arm strokes must be continuous, alternating, and correctly timed. The shoulder joint serves as the axis of motion. The primary movement includes the following phases: hand entry, catch, pull and push, and water release. This is followed by the recovery phase, which occurs above the water. For breathing, the swimmer may inhale from either side by rotating the head accordingly, then exhale upon returning the face to the water. The complete arm cycle (primary and recovery motions) should be well-timed so that one arm performs the catch phase while the other exits the water.

Performance Evaluation:

Each component of the arm stroke skill is assessed and scored as follows: 4 points for the primary motion, 4 points for the recovery motion, and 2 points for breathing. The total score is calculated out of 10 based on the evaluators' observation of each skill component and the overall performance level.

Assessment Tools Used:

A pre-prepared performance evaluation sheet that includes the name of the skill, its components, and the score assigned to each part.

Skill Name	Skill Component	Score
Arm Strokes Using a Pull Buoy	Primary Motion	4
	Recovery Motion	4
	Breathing	2
Total Score: 10 Points		