

Research Articles

# The effect of the Ayas model to learning individual fast attack and high-order thinking skills of handball for students

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## Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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## Abstract

**Background and Study Aim.** The significance of this research lies in designing a specialized scale to evaluate advanced cognitive skills related to handball among students. It also examines the impact of the Ayas model on enhancing these higher-order thinking skills and teaching the technique of the individual fast attack in handball. This study aimed to investigate the effect of the Ayas Model on learning individual fast attack techniques and higher-order thinking skills in handball among students.

**Material and Methods.** The experimental method was adopted, involving a sample of 64 third-year students from the College of Physical Education and Sports Sciences at the University of Babylon. The sample was divided into two groups: an experimental group (32 students), taught using the Ayas Model, and a control group (32 students), taught using traditional methods. Pre- and post-tests were conducted to assess the students' performance in individual fast attack techniques and higher-order thinking skills. . Analysis was assisted using the SPSS application.

**Results.** The results revealed significant improvements in both groups, with the experimental group demonstrating substantially higher progress. Statistical analysis confirmed the superiority of the Ayas Model in enhancing both technical and cognitive skills, with calculated t-values indicating significant differences in favor of the experimental group ( $p < 0.05$ ). These findings suggest that the Ayas Model is an effective pedagogical approach for improving students' technical proficiency and cognitive abilities in handball.

**Conclusion.** The study concludes that integrating interactive, student-centered learning methods can enhance sports education outcomes and promote holistic skill development. This research provides a theoretical and practical foundation for educators and coaches to integrate interactive and student-centered learning approaches to holistically improve physical education outcomes.

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## Introduction

Teaching methods play a crucial role in achieving effective learning outcomes, particularly in physical education, where both cognitive and motor skills are developed simultaneously (Campbell-Pierre & Rhea, 2023; Wang et al., 2024). The Ayas model, based on constructivist theory, emphasizes active learning through its four structured stages: extracting ideas, focused learning, challenge, and application (Farhan, 2022). This model places students at the center of the learning process, encouraging them to actively construct knowledge and enhance their critical thinking and practical skills. In the context of handball, the individual fast attack skill requires quick decision-making, strategic execution, and teamwork, making it essential to adopt teaching methods that foster higher-order thinking (Mahmoud, 2020).

In sports education, fostering both technical proficiency and cognitive development is essential for creating versatile athletes (Hussein et al., 2022). Among team sports, handball stands out for its fast-paced nature and reliance on quick decision-making, strategy, and technical precision. To succeed in handball, players must not only master physical skills but also demonstrate higher-order thinking skills, such as problem-solving, evaluation, and creative decision-making, especially in high-pressure scenarios like individual fast attacks (Hussein et al., 2021; Vogel & Schack, 2023). This dual focus on skill execution and cognitive engagement underscores the importance of implementing innovative teaching models in physical education.

The Ayas Model, an interactive and student-centered learning approach, has gained attention for its potential to enhance both skill acquisition and cognitive development (Kahlan, 2023). Grounded in experiential learning theory, the Ayas Model emphasizes active participation, self-reflection, and collaborative problem-solving (Farhan, 2022). Unlike traditional teacher-led methods, it shifts the focus toward empowering students to take ownership of their learning process (Bores-García et al., 2021; Jin et al., 2022). This model encourages learners to engage deeply with tasks, analyze their actions, and refine their skills through continuous feedback and practice.

Despite its growing recognition, the application of the Ayas Model in handball training—specifically in teaching individual fast attack techniques—remains underexplored (Kahlan, 2023). Fast attacks in handball are a critical offensive strategy that requires players to rapidly assess game situations, anticipate opponent movements, and execute precise, high-speed actions (Hatzimanouil et al., 2023). Mastering these techniques demands not only physical conditioning but also cognitive skills such as situational awareness, decision-making, and adaptability (Kuznetsova et al., 2022). By integrating the Ayas Model into handball training, educators have the potential to simultaneously improve students' technical proficiency and their capacity for higher-order thinking.

Previous studies on pedagogical approaches in sports education have highlighted the importance of active learning models in fostering student engagement and performance. However, there is limited research on how such models impact the simultaneous development of motor skills and cognitive processes in complex sports scenarios (Franco et al., 2021). This gap in the literature presents an opportunity to investigate the Ayas Model's effectiveness in teaching handball skills, particularly in the context of individual fast attack techniques.

The Ayas model, developed at Hacettepe University in Turkey, transforms education into an active and student-centered process, emphasizing cognitive integration and cooperative learning. This model encourages students to construct their own knowledge using appropriate tools and resources. Its implementation involves four structured stages: (1) Extracting Ideas: Students brainstorm in small groups to share their prior knowledge about the individual fast attack skill in handball, fostering engagement and identifying positive ideas to build upon; (2) Focus: The teacher provides explanations and facilitates group discussions to deepen understanding of the skill and its types; (3) Challenge: Students perform the skill, identify difficulties, and receive targeted feedback to improve; and (4) Application: Students apply the skill through structured exercises with ongoing feedback from the teacher, ensuring practical mastery and refinement of their learning process (Farhan, 2022).

The researcher found that the methods and approaches used in implementing the lesson do not meet the ambition to reach a distinctive learning of skills, and that the teaching models and their plans provide appropriate education for students, as they are important guides and stimuli for learning motivation and an incentive to learn many activities that develop students' thinking and their various interests in learning resources in their production (Kahlan, 2023). Especially in improving the available capabilities, including the (Ayas) model. Several studies support this perspective. For example, Darling-Hammond et al., (2020) emphasized the importance of aligning teaching strategies with organizational learning frameworks, highlighting that improper application of modern teaching models can hinder knowledge transfer and student engagement.

### *Definition of terms.*

**Model Definition in terminology (Ayas):** It is a model for education that adopts the ideas of the constructivist theory and consists of four steps: (the stage of extracting ideas, the stage of focusing on learning, the stage of challenge, and the stage of application) (Farhan, 2022).

**Higher-order thinking:** defined it as “a set of critical and creative thinking skills that rise to be reflected in this term of thinking, and these skills are activated in higher-order thinking when the individual faces unfamiliar problems and dilemmas” (Cook & Décary, 2020; Murphie, 2009).

**Individual Fast Attack:** The individual fast attack phase begins as soon as the defending team takes possession of the ball. Here, the team that took possession of the ball must think as quickly as possible about a way to help it reach the opposing team's goal in the fastest time and with the least possible effort by sending one of its players to the opposing team's goal before the defenders return to occupy their defensive positions and be able to shoot and score a goal. The team that excels in exploiting fast attacks is the team that usually wins the match (Al-Mamouri & Muteab, 2022).

Traditional approaches often fail to integrate cognitive and physical skill development effectively (Wawrzyniak et al., 2021), which creates the need for innovative models like Ayas (Farhan, 2022; Kahlan, 2023). The primary aim of this study is to evaluate the effect of the Ayas Model on students' ability to learn and perform individual fast attack techniques in handball. Additionally, the study seeks to examine how the model influences the development of higher-order thinking skills, including analysis, synthesis, and evaluation, within the context of the sport. By addressing these objectives, the research aims to contribute to the growing body of knowledge on innovative teaching practices in physical education and offer practical insights for coaches and educators seeking to optimize learning outcomes for their students (Geertsema & le Roux, 2020; Janvier et al., 2016). This study examines the impact of the Ayas model on learning the individual fast attack skill and enhancing higher-order thinking abilities in handball among students, aiming to provide new insights into improving sports education and student performance.

## **Materials and Methods**

### *Partisipant.*

The research population comprised 140 third-year students from the College of Physical Education and Sports Sciences at the University of Babylon. The sample, selected intentionally, consisted of 64 students. The experimental group, represented by Section (A), included 32 students, while the control group, represented by Section (B), also comprised 32 students.

### *Research Methodology.*

The current study employed the experimental method, as it aligns with the nature and objectives of the research. This approach allowed the researcher to systematically examine the effect of the Ayas Model on learning individual fast attack techniques and higher-order thinking skills in handball. Through controlled comparisons between an experimental group and a control group, the methodology ensured accurate assessment of the intervention's impact.

### *Equipment and Materials.*

The researcher utilized a range of appropriate tools and devices to effectively address the research problem and collect the necessary data to achieve the research objectives, as noted by Nemytina, (2022). The information collection methods included references and Arabic scientific sources, tests designed for the research, and questionnaires. In terms of devices, the researcher employed a Lenovo calculator and two stopwatches. The tools used during the study included a measuring tape, 24 colored dresses, a measurement field with dimensions of 25 m x 20 m, two FOX whistles, ten handballs, and 30 indicators. These tools and devices played a crucial role in ensuring the accurate collection of data and successful execution of the research.

Using appropriate research tools helps the researcher solve the research problem and collect data to achieve the objectives of his research, regardless of the tools, devices, data and samples (Nemytina, 2022).

### *Instrument.*

The test used to assess the formation of the individual fast attack was adapted. The objective of the test was to evaluate the effectiveness of the individual fast attack technique. The equipment and tools required for the test included a regular handball court, a handball, a camera to record the performance, a performance evaluation form, numbered jerseys to distinguish between players, and a whistle. In terms of performance, the player begins by standing on one side of the 6-meter area in the center of the corner, based on their preferred arm, and prepares to start. Once the whistle is heard, the player runs along an arc-shaped path along the sideline. After crossing the middle line, they turn to receive the ball from the goalkeeper and then advance toward the opponent's goal using tapping. The player moves straight to the 6-meter area, aiming to cover the shortest distance perpendicular to the goal, and then shoots according to the outlined procedure in Figure 1.

*Registration:* The test score is calculated according to the registration form:

*Evaluation of the first stage:* Standing in the correct place and starting in the correct path until receiving the ball ..... (5) points.

*Evaluation of the second stage:* Receiving the ball correctly ..... (5) points.

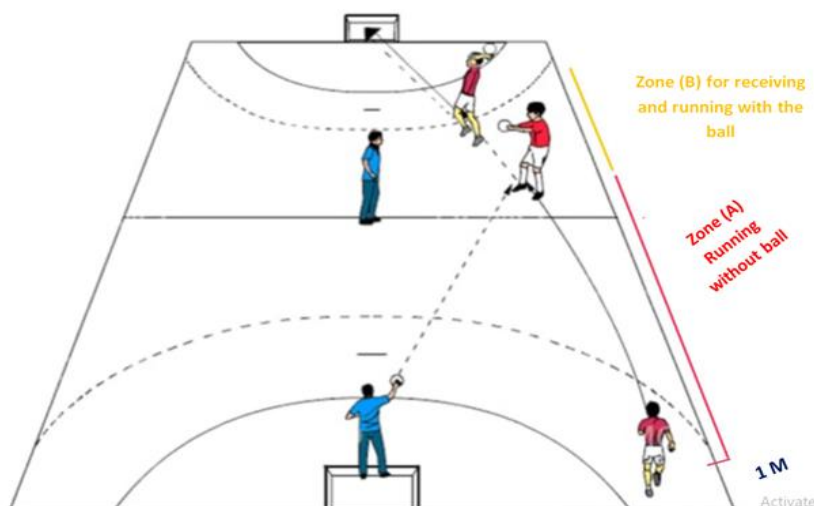
*Evaluation of the third stage:* Performing the correct tapping until reaching the (6m) area in front of the goal and shooting ..... (5) points.

A- Each player is allowed two attempts, with the best performance being recorded.

B- The player's performance is evaluated by two judges and the arithmetic mean is calculated.

C- The maximum score is ..... (15) points.

1 When the tester fails to receive the ball.



**Figure 1.** Individual fast attack with handball

### *High-order thinking skills scale.*

The researcher adopted the high-order thinking skills scale prepared by Alwan & Muhammad, (2024). The high-order thinking test in its final form consists of (32) paragraphs distributed over five main skills of the test, and each correct answer is given one point, but if the answer is wrong, it is given zero, and if it is left out, it is given zero. The maximum score for the test is 32 points, while the minimum score is zero, assigned if the answer is incorrect or omitted.

### *Preparing teaching plans according to the (Ayas) model.*

After reviewing the scientific sources and previous related studies and conducting many personal interviews in addition to his scientific experiences, the researcher prepared teaching plans according to the Ayas model. The researcher prepared his final plan, which includes (12) teaching units for teaching the individual rapid attack.

### *Procedure.*

The research field procedures began with an exploratory experiment conducted on October 23, 2023, involving a sample of 10 third-year students from the College of Physical Education and Sports Sciences at the University of Babylon. The purpose of this first pilot experiment was to identify potential difficulties, ensure the suitability of the tests and tools, and address any ambiguity in the scale items. Additionally, it aimed to assess the time required to complete the scale. Following this, a second exploratory experiment took place on October 24, 2023, with another group of 10 students. This experiment aimed to address any challenges that might arise during the implementation and inform the subject teacher about the model used. The researcher then administered pre-tests for both the experimental and control groups on October 25-26, 2023, to evaluate their high-order thinking skills and individual fast attack skills in handball. The main experiment commenced on October 29, 2023, where the researcher implemented 12 teaching plans over six weeks, applying the Ayas model with the experimental group. The model consisted of four stages: 1) extracting ideas about the individual fast attack skill through brainstorming (5 minutes), 2) focusing on skill explanation and group discussions (5 minutes), 3) challenging the students to perform the skill with feedback (7 minutes), and 4) applying the skill through practical exercises with appropriate feedback (8 minutes). The total duration for the application of the model was 300 minutes. Upon completion of the main experiment, post-tests for both groups were conducted on December 11, 2023, under the same conditions as the pre-tests, to assess the improvement in high-order thinking and individual fast attack skills in handball.

### *Data analysis.*

In this study, data analysis was conducted to evaluate the effectiveness of using the Ayas Model on individual fast attack skills and higher order thinking skills in handball games. Data were analyzed using SPSS version 26, using descriptive statistics such as mean and standard deviation to summarize the data. The level of statistical significance was set at ( $p < 0.05$ ) to ensure the reliability of the results.

## **Results**

The results of the control group indicate statistically significant improvements between the pre-test and post-test. For the individual fast attack variable, the mean score increased from 3.76 ( $\pm 0.74$ ) to 6.87 ( $\pm 1.38$ ), with a calculated t-value of 7.003 and a significance level of 0.001. This suggests that even the traditional teaching method had a positive effect on learning individual fast attack techniques. Similarly, in higher-order thinking skills, the mean score increased from 12.42 ( $\pm 1.17$ ) to 15.84 ( $\pm 1.03$ ), with a calculated t-value of 7.87 and a significance level of 0.000, indicating a significant improvement in cognitive skills as well. Results can be seen in table 1.

*Presentation and analysis of the results of the pre- and post-tests of the control group in the individual rapid attack tests and high-order thinking skills:*



**Table 1.** Results of the Pre- and Post-Tests of the Control Group

Variables	Measurement Unit	Pre-Test		Post-Test		Calculated (T) Value	Sig Level	Sig Type
		Mean	Std. Deviation	Mean	Std. Deviation			
Individual Fast Attack	Degree	3.76	0.74	6.87	1.38	7.003	0.001	Sig
High-Order Thinking	Degree	12.42	1.17	15.84	1.03	7.87	0.000	Sig

Significant at degree of freedom (11) and significance level (0.05).

*Presentation and analysis of the results of the pre- and post-tests of the experimental group in the individual rapid attack tests and high-order thinking skills for the research sample:*

**Table 2.** Results of the Pre- and Post-Tests of the Experimental Group

Variables	Measurement Unit	Pre-Test		Post-Test		Calculated (T) Value	Sig Level	Sig Type
		Mean	Std. Deviation	Mean	Std. Deviation			
Individual Fast Attack	Degree	3.15	0.70	10.34	0.80	31.17	0.000	Sig
High-Order Thinking	Degree	12.74	1.29	23.34	1.38	19.48	0.001	Sig

At a significance level of (0.05) and with a degree of freedom of (11).

Table 2 presents the results of the pre- and post-tests for the experimental group, assessing the individual rapid attack and high-order thinking skills. For the individual rapid attack test, the arithmetic mean of the pre-test was (3.15) with a standard deviation of (0.70). In the post-test, the arithmetic mean increased to (10.34) with a standard deviation of (0.80). The calculated t-value was (31.17) with a significance level of (0.000) indicating a statistically significant improvement in favor of the post-test. Regarding the scale for high-order thinking skills, the arithmetic mean of the pre-test results was (12.74) with a standard deviation of (1.29). In the post-test, the arithmetic mean increased to (23.34), with a standard deviation of (1.38). The calculated t-value was (19.48) indicating a statistically significant difference in favor of the post-test.

*Presentation and analysis of the results of the post-tests of the control and experimental groups in the tests of individual rapid attack and high-order thinking skills:*

**Table 3.** Results of the Post-Tests of the Control and Experimental Groups

Variables	Measurement Unit	Control Group		Experimental Group		Calculated (T) Value	Sig Level	Sig Type
		Mean	Std. Deviation	Mean	Std. Deviation			
Individual Fast Attack	Degree	6.87	1.38	10.34	0.80	7.473	0.000	Sig
High-Order Thinking	Degree	15.84	1.03	23.34	1.38	15.154	0.000	Sig

At a significance level of (0.05) and with a degree of freedom of (11).

When comparing the post-test results between the control and experimental groups, the experimental group demonstrated significantly higher scores in both individual fast attack and higher-order thinking skills. For the individual fast attack, the mean score of the experimental group ( $10.34 \pm 0.80$ ) far exceeded that of the control group ( $6.87 \pm 1.38$ ), with a calculated t-value of 7.473 ( $p < 0.05$ ). Similarly, for higher-order thinking skills, the mean score of the experimental group ( $23.34 \pm 1.38$ ) was significantly higher than that of the control group ( $15.84 \pm 1.03$ ), with a calculated t-value

of 15.154 ( $p < 0.05$ ). These findings strongly suggest that the Ayas Model is more effective than traditional teaching methods in enhancing both technical and cognitive abilities in handball.

## Discussion

The results of this study highlight the significant impact of the Ayas Model on improving individual fast attack techniques and higher-order thinking skills in handball. The experimental group's substantial gains compared to the control group indicate that incorporating student-centered, interactive learning strategies fosters deeper engagement, better skill acquisition, and enhanced cognitive processing. These findings align with previous research emphasizing the role of innovative pedagogical models in sports education, particularly in developing skills that require both physical precision and cognitive agility (Hussein et al., 2021; Hussein & Shaalan, 2021). The Ayas Model's focus on active learning and reflection may have provided students with opportunities to internalize concepts and refine their strategies more effectively than traditional methods (Kahlan, 2023).

Based on the results presented and analyzed for the pre- and post-tests of the control group in individual fast attack and high-order thinking skills in handball, significant differences were observed in favor of the post-tests. The researcher attributes these improvements in the control group, particularly in the individual rapid attack, to the use of the principle of gradation and repetition in performing the individual rapid attack. This approach led to a noticeable enhancement in learning the individual rapid attack, ultimately reaching a higher educational level (AlHaddad et al., 2022). This step helped students understand the detailed parts of the individual rapid attack steps, which helped them discover the educational steps, especially in the initial stages of learning. On the other hand, the difficulty of the individual rapid attack steps to be learned prompted the teacher to use the applied model when presenting the steps (Mohamed et al., 2022). Which led to the students improving some motor responses in the required motor organization, as every offensive situation requires organization and arrangement in a specific direction, which will improve the performance of this activity (Geertsema & le Roux, 2020; Vaz et al., 2021).

Through the aforementioned results that were presented and analyzed for the pre- and post-tests of the experimental group in the individual fast attack and high-order thinking skills in handball, it appears that there are significant differences in favor of the post-tests. The researcher attributes the reasons for these differences to several variables that interfered in the learning process. There was a great benefit from the interaction between high-level thinking skills and skill exercises for individual fast attack in handball, which helped in the learning process and investing time and effort, as the researcher believes that the integration between the thinking and skill aspects is the correct state in the learning process, as the contributions of thinking processes and skill exercises appeared directly using the (Ayas) model in improving performance through the announced results. This is what was stated by Murphie, (2009) that the integration between the thinking processes and the skill exercises results in the player or learner reaching mental, physical and skill readiness before the competition (Hussein & Hrebid, 2023).

The impact of the educational units developed according to the Ayas model by the researcher was clearly evident. The model's influence was significant in facilitating the learning of offensive formations and contributed to noticeable progress in the higher-order thinking skills of the experimental group members (Kahlan, 2023). The gradual progression of skills, from simple to complex and easy to difficult, led to positive outcomes. Additionally, the diverse and multifaceted nature of offensive skills, forms, and positions in handball created an engaging atmosphere, fostering enjoyment and a strong desire to learn. And the students submitted it, which indicates that the educational units using the (Ayas) model for the group were built on correct scientific foundations and were implemented properly (Farhan, 2022).

This came as a result of the proper planning for the students' skill and intellectual numbers, in order to reach the best level in learning skills. This is what was confirmed by Legrain et al., (2021) in that "one of the natural phenomena of the learning process is that there must be development in learning as long as the teacher follows the steps of the sound foundations of learning and teaching. In

order for the beginning of learning to be sound, it is necessary to clarify the explanation, presentation, and practice the correct performance and focus on it until the performance is consolidated and stable (Abod & AlHaddad, 2022b). Correct planning in the development of an educational curriculum inevitably leads to enhanced learning outcomes. This aligns with the view of Mahmoud Abdel Fattah, who emphasized that the primary goal of an educational curriculum is to help students acquire, master, and advance new skills. Learning, as he stated, is the process through which information, skills, or abilities are acquired, whether through experience, practice, or training (Lin et al., 2021).

Based on the results presented and analyzed for the post-tests of the control and experimental groups regarding high-order thinking skills and the individual fast attack in handball, significant differences were observed in favor of the experimental group. The researcher attributes these differences to the use of an innovative and modern model, which emphasizes a competitive learning approach among students (Weigel, 2017, 2018). This method likely fostered a more engaging and effective learning environment, contributing to the superior performance of the experimental group, as the use of the (Ayas) model with its basic stages (the stage of extracting ideas, the stage of focusing on learning, the stage of challenge, and the stage of application) has an effective and major role in the existence of these differences between the two groups in terms of planning and preparing for educational units and their implementation (Kahlan, 2023). Because this model offers a comprehensive and simplified approach, and provides a unique combination of presentation forms that produces an effective learning experience for a given educational objective and for specific learners.

The (Ayas) model works to develop the individual fast attack and high-level thinking skills in handball among the members of the experimental group, as this model works to generate information and ideas and link new information and ideas with previous information through discussions between students and providing feedback by the teacher (Abod & AlHaddad, 2022a; AlHaddad et al., 2022). Confirms that employing the (Ayas) model in teaching works to raise the level of achievement of students and increases acceptance in students' desire for the learning process.

The (Ayas) model also increases students' self-confidence because it works on thinking and providing feedback on information and ideas in an objective manner, and re-discussing and reformulating that information and ideas to add complementary elements for improvement and to ensure that the goals are achieved. The (Ayas) model helps generate new concepts and ideas for the student related to the main topic presented, as this model works to enhance thinking and link new ideas with old ideas. Thus, the hypothesis was achieved, which states that there are statistically significant differences between the control and experimental groups in the post-test in favor of the experimental group.

## Conclusion

Based on the above results, the researcher concluded the effectiveness of the (Ayas) model for learning individual fast attack and high-order thinking skills in handball for students by comparing the scores of the experimental group that studied according to the (Ayas) model in the pre- and post-test. Also, the model is superior in learning over the followed method, and through comparing the post-test scores of the control group that studied according to the followed method and the post-test of the experimental group that studied according to the (Ayas) model. Accordingly, teaching using the (Ayas) model encourages interaction between the teacher and the student, expressing opinions, presenting new ideas, and linking previous ideas with new ideas. Therefore, the researcher recommends adopting the (Ayas) model in the physical education lesson in the faculties of physical education and sports sciences. Also, conducting research and studies on investing the (Ayas) model in learning other skills and activities.

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## Conflict of Interest And Funding

There is no conflict of interest.

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