Physical Activity Journal (PAJU)
Volume 7, Number 1, April 2025
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Impact of the SWOT Strategy and Mind Maps on Teaching Chess in Developing Certain Mental Abilities and Reflective Thinking in Females Aged 14–16 Years

Muhammad Suhail Najm

College of Physical Education and Sports Sciences, University of Mosul, Iraq

Emai: shaham.3251@gmail.com

: https://doi.org/10.20884/1.paju.2025.7.1.14783

Abstract

The study aims to develop two educational programs based on the SWOT matrix and mind mapping to teach chess tactics and examine these programs' impact on enhancing specific mental abilities and reflective thinking. Due to the experimental approach being appropriate for the study's nature, the researcher used it. Academically talented first-year intermediate female students from five different schools in Mosul made up the research population. The total number of students was 560. Al-Mosul High School was randomly selected to conduct the main experiment. The school included 130 students distributed across three classes: Class (A) with 40 students, Class (B) with 45 students, and Class (C) with 45 students. Class (C) was designated the first group (experimental) through a lottery system, taught using the SWOT matrix. Class (B) was defined as the second experimental group taught using the mind mapping strategy. Class (A) served as the control group, which was taught using the traditional method. Meanwhile, Al-Hadbaa Secondary School was used to conduct the pilot experiments. The researcher adopted an equivalent group design. The instructional lessons for the three research groups lasted for (20) instructional units, with two units per week, over a duration of (10) weeks. The statistical analysis was conducted using the various methods. According to the findings, students in the first experimental group—who were instructed using the SWOT matrix—performed better than those in the second experimental group and the control group in every area of attention and associated times. Additionally, the students in the second group (experimental), who were taught using mind mapping, outperformed the students in the first experimental group and the control group in all reflective thinking skills.

Keywords: *SWOT Matrix, Chess Tactics, Matrix, Mental Abilities, Tactical Behavior*

Alamat Koresponden : Physical Education and Sports Sciences, University of Mosul, Iraq
Email : shaham.3251@gmail.com

INTRODUCTION

Educational institutions are searching for methods and procedures that will help them overcome the problems posed by the educational process and gain a competitive advantage. The need to embrace strategic thinking is one of these methods. This indicates that rather than being a choice that may be adopted or ignored, the strategic dimension of education has evolved into an essential imperative. These institutions must thus be persuaded that the strategic mechanism, which activates the essential elements of its success, is what guarantees continuity and quality in educational methods. The institution's capacity for innovation is the most crucial of these (Tergini, 2015; Mustafa, 2014).

Since it necessitates intelligence, concentration, mental imagery, and the capacity to make strategic decisions based on the game's circumstances, chess is regarded as one of the most mentally taxing sports. Considered a mental game, chess has grown to be one of the most popular games in the world. One of the most popular games requires the player to develop ideas and methods to win and safeguard their pieces (Kaddour, 2018).

People of all ages and socioeconomic backgrounds, both male and female, play chess. Because of the behavioral qualities it instills in this game, it has many educational implications that aid in developing its players' personalities. It helps shape their identities in a number of ways, including mental, emotional, and physical. (Al-Khawaldeh, 2007).

The instructor must provide direct direction in order to manage the educational environment using the SWOT technique. Teaching students to recognize their strengths and shortcomings in a competitive learning environment takes time. in addition to the competitor's possible advantages and disadvantages in the educational setting. The process of developing a different approach involves striking a strategic balance between the learner's capabilities, taking advantage of chances, spotting possible dangers from the competition, and analyzing the internal situation's strengths and weaknesses. The ability of the learner to maximize strengths and minimize weaknesses in any educational context is crucial to their success in the strategic situation (Al-Qatamin, 2002).

The strategic components in the internal environment of businesses or educational institutions are represented by both (S) and (W). Strengths are represented by (S). On the other hand, (W) stands for their shortcomings. However, both (O) and (T) stand for the strategic components of the educational situation's external environment. (O) stands for opportunities that are available. On the other hand, (T) stands for dangers and threats that undermine the objectives of the educational setting.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Any learner who uses the SWOT matrix in an educational setting gets a number of strategies, one of which must be adopted as the major strategy. The other strategies are viable alternatives that may be employed depending on the competitive environment. In the event that competitive conditions cause the primary strategy to fail, the learner may turn to these alternatives. The remaining strategies act as the alternative strategy's alternatives in this situation, and the alternative strategy takes precedence (Heba & Al-Sayed, 2016).

Several studies have utilized the SWOT matrix, most of which focused on institutional management and industrial management. These include the studies by Al-Rubaie (2016), in the field of university performance evaluation. However, only one study addressed the field of education, conducted by Heba and Al-Sayed (2016).

Mind mapping is considered one of the important strategies that should be utilized in the educational field due to its unique features and positive impact on facilitating the teaching and learning processes. It enables easy access to information while saving time and effort. Through it, the learner is guided to understand and interpret the structural system of the subject being studied, including the interrelated relationships between its elements. Mind maps increase the speed and efficiency of learning, making it easier to recall information, understand it, connect different topics, and discover new relationships. They also consider individual differences, enabling the brain to work harmoniously and integrate. This allows the learner to utilize the functions of both the right and left hemispheres of the brain harmoniously (Amer, 2015).

Several studies have utilized mind mapping, including the study by Boon et al. (2007). The ultimate result of different thought patterns is thought to be mental activity. Thinking is the highest cognitive function humans engage in, which encompasses memory, perception, feeling, and other functions. Cognitive mental processes are actually a form of structured thought (Al-Khalidi, 2008).

This indicates that the internal mental representations of symbols, objects, meanings, shapes, and situations depend on mental processes to process and handle sensory stimuli. As a result, attention is no longer only on the person's answers or if they are accurate. Every component of any cognitive abilities exam also considers mental talents, thinking patterns, and the processing techniques employed to deal with the sensory stimuli that are offered. This involves monitoring the strategies used in receiving stimuli, paying attention to them, and perceiving them auditorily, visually, and tactually. It

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

also includes tracking the strategies used to encode these stimuli into memory, reflecting on them, and connecting them with each other. Additionally, it involves observing the strategies applied to solve the presented problems, verifying their effectiveness, and determining whether they are practical or not (Georges & Brown, 2010; Boon et al., 2006).

Hence, the significance of this research lies in teaching the techniques of chess using the SWOT matrix and the mind mapping strategy and their impact on certain mental abilities and reflective thinking among females aged 14–16.

Chess is often referred to as the game of the intelligent, the sport of the mind, and the game of kings. This creates an initial desire to play it. As a result, many individuals tend to purchase a chess set or use a dedicated application to practice the game. Here lies the problem: as soon as we begin playing the game, we encounter difficulties in continuing. This is due to the techniques required for the game and the challenges and complexities that may arise during its progression. This makes the challenge of engaging mental abilities in the game a complex task, which might lead to abandoning the effort altogether. However, the sharpness, intelligence, and passion for challenges that females exhibit when engaging in such games encourage us to seek strategies capable of addressing this challenge effectively. Therefore, the researcher proposes to employ two strategies: the SWOT technique and mind maps to teach chess and to examine their impact on developing certain mental abilities and reflective thinking in females aged 14–16.

METHOD

The researcher used the experimental approach because of its suitability for the nature of the study. The research population consists of 560 outstanding first-year intermediate school students from five different schools in the city of Mosul. The sample was selected randomly from the students of Al-Mosul Secondary School for the main experiment, with a total of (130) students distributed across three classes. Class (A) includes (40) students, Class (B) includes (45) students, and Class (C) includes (45) students. Through a lottery, Class (C) was designated the first group (1st experimental), taught using the SWOT matrix. Class (B) was designated as the second group (2nd experimental), which was taught using the mind mapping strategy. Class (A) was designated as the control group, which was taught using the traditional method. Al-Hadbaa Secondary School was used to conduct the pilot experiments. The researcher assumed the design of equivalent groups (EGs). Table (1) below illustrates the

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

experimental design.

Table 1. Design of The Experimental for Egs

Group / Variable	*Equivalence*	*Pre-test*	*Independent variables*	*Post-test*
1st experimental	1. Cognitive Ability 2. Attention Aspects 3. Spatial Ability 4. Multiple Intelligences 5. Reflective Thinking	1. Attention Aspects 2. Spatial Ability 3. Multiple Intelligences 4. Reflective Thinking	SWOT matrix	1. Attention Aspects 2. Spatial Ability 3. Multiple Intelligences 4. Reflective Thinking
2nd experimental			Mind maps	
Control			Traditional method	

Pilot Experiment

Using the SWOT and mind mapping (MM) study plans, a sample of 20 female students was split into two groups, each consisting of 10 individuals. The 1st group was introduced to the SWOT matrix's steps, while the 2nd group was exposed to the steps of MM, from (21/9/2023) to (28/9/2023) over three instructional units. The purpose of the pilot experiment was to verify the feasibility of applying both strategies. The results of the pilot experiment showed that both strategies were feasible.

Pre-test Application

The Modified Tachistoscope Test for Aspects of Attention: The modified Tachistoscope test was applied to measure the three aspects of attention (concentration, distribution, and shifting) and their respective times to the students in the three research groups. The test was conducted from (2/10/2023) to (4/10/2023) in the classrooms of Al-Mosul High School for Outstanding (MHSO) in Mosul City.

Spatial Ability Test: The spatial ability test was administered to the students in the three research groups on (5/10/2023) in the classrooms of MHSO in Mosul City.

Multiple Intelligences Test: The (Teele) inventory was administered to the students in the three research groups on (8/10/2023) in the classrooms of MHSO in Mosul City.

Reflective Thinking Test: The Reflective Thinking Scale was administered to the students of the three research groups on (9/10/2023) in the halls of MHSO in Mosul City.

Application of the Main Experiment

The SWOT Matrix and mind mapping technique were used to teach the instructional content of chess, whereas the conventional approach was used to teach the control group. The experiment was conducted from (10/10/2023) to (26/12/2023) over a

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

period of (10) weeks, with (2) instructional units per week. Each of the three research groups completed a total of (20) units, with each unit lasting (45) minutes.

Application of the Posttests

The Modified Tachistoscope Test for Attention Aspects: The researcher assessed the three components of attention (shifting, distribution, and focus) and their corresponding times using a modified Tachistoscope test. On December 27–28, 2023, the test was administered to the students in the three research groups, in the classrooms of MHSO in Mosul City.

Spatial Ability Test: The spatial ability test was administered to the students of the three research groups on December 31, 2023, in the classrooms of MHSO in Mosul City.

Multiple Intelligences Test: The (Teele) Inventory was administered to the students of the three research groups on January 2, 2024, in the classrooms of MHSO in Mosul City.

Reflective Thinking Test: The reflective thinking scale was administered to the students of the three research groups on January 3, 2023, in the classrooms of MHSO in Mosul City.

Statistical Methods: 1) Percentage to determine the agreement rate among experts; 2) Simple correlation coefficient; 3) AM (Arithmetic mean); 4) Std (Standard deviation); 5) Independent samples t-test; 6) Paired samples t-test; 7) ANOVA (One-way analysis of variance); 8) ANOVA (Two-way analysis of variance); 9) Scheffee test.

The statistical analysis was conducted using SPSS.

RESULT

Results of 1st hypothesis

The results of the two-way analysis of variance (ANOVA) showed that the F values for the aspects of attention at the group level ranged from (12.949) to (14.666). At the test level ranged from (12.283) to (246.836). As well as at the interaction between the group and the test level ranged from (120.601) to (621.957). These were statistically significant, as the significance values (sig) indicated. This leads us to reject the first null hypothesis, which suggests no statistically significant differences between the three groups of students. We accept the alternative hypothesis, which indicates the existence of statistically significant differences between the students of the three groups. To determine which

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

groups showed the differences, the researcher used the Scheffee test to examine the least significant difference in the aspects of attention and their respective times.

Table 2. Scheffee Test for The Least Significant Difference Between 3 Groups

Group / Attention aspects	*1st experimental group (SWOT)*	*2nd experimental group (Mind maps)*	*Control group (The traditional method)*
Attention Concentration	3.978 A	3.221 B	1.733 C
Time of Attention Concentration	16.080 A	16.449 B	17.946 C
Attention Distribution	3.343 A	2.980 B	1.005 C
Time of Attention Distribution	21.969 A	22.977 B	24.984 C
Attention Shifting	2.784 A	2.367 B	0.673 C
Time of Attention Shifting	25.82 A	26.46 B	28.974 C

It is evident from Table 2 that there are differences in the letters for each aspect of attention between the three research groups, favoring the group with the largest arithmetic mean. As for the times of attention aspects, the differences favour the group with the smallest arithmetic mean, as the shorter time is considered better.

Results 2nd hypothesis

The two-way analysis of variance showed that the F values for the components of spatial ability at the group level ranged between (13.996) and (18.444). At the test level, the F values ranged between (13.184 and 13.866). While for the interaction between the group and the test, the values ranged between (541.284 and 2031.263). All these values were statistically significant, as the (sig) values indicated. This leads us to reject the first null hypothesis, which indicates no statistically significant differences among the students of the three groups. Instead, we accept the alternative hypothesis, indicating statistically significant differences among the students of the three groups. To determine which groups the differences favored, the researcher utilized the Scheffee test to assess the least significant difference across the components of the spatial ability test.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Table 3. Scheffee Test for The Least Significant Difference in Spatial Ability Components Among 3 Groups

Group Spatial ability Components	*1st experimental group (SWOT)*	*2nd experimental group (Mind maps)*	*Control group (The traditional method)*
Spatial Perception	9.608 A	8.609 B	5.136 C
Spatial Visualization	4.332 A	3.691 B	1.572 C
Spatial Orientation	5.878 A	5.123 B	2.364 C
Spatial Ability	19.817 A	17.423 B	9.071 C

Table 3 indicates differences in the letters for each spatial ability component and the overall total among the 3 groups. These differences favor the group with the highest mean score.

Results of 3rd hypothesis

The outcomes of the two-way analysis of variance showed that the f values for multiple intelligences at the group level ranged between (44.315 and 255.651). At the test level, the F values ranged between (11.711 and 13.154). While for the interaction between the group and the test, the F values ranged between (46.806 and 91.277). All these values were statistically significant, as indicated by the (sig) values. This leads us to reject the first null hypothesis, which suggests no statistically significant differences among the students of the three groups. Instead, we accept the alternative hypothesis, indicating the presence of statistically significant differences among the students of the three groups. To determine which group the differences favored, the researcher employed the Scheffé test to assess the least significant difference on the multiple intelligences test.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Table 4. Scheffee Test for the Least Significant Difference in Multiple Intelligences Tests

Group Multiple Intelligences	*1st experimental group (SWOT)*	*2nd experimental group (Mind maps)*	*Control group (The traditional method)*
Linguistic Intelligence	4.533 B	4.844 A	4.057 C
Kinesthetic Intelligence	4.326 B	4.889 A	3.861 C
Spatial Intelligence	4.821 B	5.207 A	3.958 C
Musical Intelligence	4.621 B	5.048 A	3.770 C
Logical Intelligence	4.644 B	5.114 A	3.868 C
Intrapersonal Intelligence	4.763 B	5.438 A	4.023 C
Interpersonal Intelligence	4.752 B	5.214 A	4.006 C

Table 4 shows that the letters for each type of multiple intelligence differed between the three research groups, favoring the group with the largest arithmetic mean.

Results of 4th hypothesis

The outcomes of the two-way analysis of variance displayed that the (f) values for reflective thinking skills and the overall total at the group level ranged between (14.740) and (35.901). At the test level, they ranged between (12.251) and (15.185). At the interaction level between the group and the test, the values ranged from (6.140) to (1,091.390). All of these values were statistically significant, as indicated by the (sig) values. This leads us to reject the first null hypothesis, which indicates that there are no statistically significant differences between the students of the three groups. We accept the alternative hypothesis, which indicates that there are statistically significant differences between the students of the three groups. To determine which group the differences favor, the researcher used the Scheffee test to examine the least significant difference in the reflective thinking skills test and the overall total.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Table 5. Least Significant Difference (Scheffee) Test for Reflective Thinking Skills Tests

Group Reflective Thinking	*1st group (SWOT)*	*2nd group (Mind maps)*	*Control group (The traditional method)*
Visual Perception	15.222 B	16.70 A	10.225 C
Detection of Fallacies	15.078 B	16.567 A	11.30 C
Reaching Conclusions	12.233 B	14.744 A	9.40 C
Providing Explanations	21.40 B	23 A	12.763 C
Proposed Solutions	19.30 B	20.789 A	16.150 C
Overall total	83.233 B	91.80 A	59.838 C

It can be seen from Table 5 that there is a difference in the letters for each of the reflective thinking skills and the overall total between the three groups, favoring the higher mean.

DISCUSSION

Discussion of the 1st hypothesis

The 1st group of experimental, which was taught using the SWOT strategy, outperformed the 2nd group of experimental, which was taught using mind maps, and the control group (CG), which was taught using the traditional method, in all areas of attention and their respective times, according to the results of the two-way analysis of variance and the Scheffee test. The researcher points this outcome to the fact that teaching the students chess techniques using the SWOT strategy—by identifying weaknesses, strengths, available opportunities, and potential threats—enhances their ability to focus their attention on the most effective strategies. Simultaneously, it improves their ability to distribute their attention to potential threats from the opponent. Thus, they are able to shift their attention from one strategy to another based on the situation's requirements. This, in turn, was reflected in the student's performance on the Tachistoscope test for attention aspects. This is consistent with what Al-Taie indicated in a study he conducted, stating that "using the SWOT matrix in teaching chess techniques enhances the aspects of attention and their respective times" (Al-Taie, 2021). Students in the 2nd experimental group, who were taught using mind maps, outperformed those in the control group, according to the findings of the

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

two-way analysis of variance. This result can be attributed to spider mind maps allowing for reading chess game situations through sub-branches and then secondary ones, making the situations clearer. Through the students' interaction with the new branches of the mind map, they can arrive at effective strategies. All of this contributes to enhancing their ability to focus their attention and then distribute it to potential threats from the opponent. Thus, they are able to shift their attention from one strategy to another based on the situation's requirements. This was reflected in the students' performance in the 2nd group of experimental on the Tachistoscope test compared to the control group. This aligns with what Safar and Mackinnon pointed out, stating that "the continuous use of mind maps enhances and strengthens attention and its aspects" (Safar, 2013; Mackinnon, 2006).

Discussion of the 2nd hypothesis

The first experimental group, which used the SWOT approach to study, outperformed the second experimental group and the control group in all aspects of spatial ability, according to the Scheffé test and two-way analysis of variance. The researcher points this result to the fact that learning chess techniques through the SWOT strategy enables the students to identify their strengths, weaknesses, available opportunities, and potential threats. This enhances their spatial ability, particularly in terms of spatial perception of all chess piece movements, spatial visualization of potential threats, and spatial orientation toward more effective strategies.

As a result, these improvements were reflected in the student's performance on the spatial ability test and its components (perception, visualization, and orientation). This is consistent with what Al-Taie pointed out in a study, where he stated that "using the SWOT matrix in teaching chess techniques enhances spatial ability" (Al-Taie, 2021). The finding of the two-way analysis of variance showed the superiority of the students in the 2nd group, who studied using MMs, over the students in the CG. This result can be attributed to the fact that spider mind maps allow for interpreting chess positions through sub-branches and secondary branches, progressively clarifying the situations. This enhances spatial perception and spatial visualization. Through spatial orientation, the students are then able to develop effective strategies. All of these factors enhance the spatial abilities of the students in the 2nd group compared to the CG of the students.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Discussion of the 3rd hypothesis

The two-way analysis of variance and the Scheffee test showed the superiority of the 2nd group, taught using the MMs strategy, over the 1st group and the CG in all types of multiple intelligences. The researcher points this outcome to the fact that teaching students chess techniques through mind maps enables them to analyze weaknesses, strengths, available opportunities, and potential threats that may arise. This is achieved through the branches of the mind map, which develop their linguistic intelligence. Additionally, the sub-branches and secondary branches enhance their logical intelligence.

The strategies developed by the students through mind maps support intelligent behavior in their chessboard moves, providing them with effective opportunities to position themselves strategically on the board. Moreover, the nature of mind map lessons enhances intrapersonal intelligence while simultaneously fostering interpersonal intelligence due to the collaborative nature of group work. This was reflected in the students' performance on the multiple intelligences test. This aligns with what Safar indicated: "Mind maps double the levels of intelligence and successfully and effectively harness the latent potentials of this intelligence" (Safar, 2013).

The outcomes of the two-way analysis of variance and the Scheffé test also showed that the 1st group, which was taught using the SWOT strategy, outperformed the CG in all types of multiple intelligences. The researcher points this outcome to the fact that learning chess techniques through the SWOT strategy enables students to identify weaknesses, strengths, available opportunities, and potential threats. This, in turn, enhances their linguistic intelligence. Additionally, analyzing chess positions using the SWOT matrix scientifically enhances the students' logical intelligence. Furthermore, the strategies developed by the students through the SWOT matrix support intelligent behavior in their chess moves, providing them with effective opportunities to position themselves strategically on the chessboard.

The nature of SWOT matrix lessons enhances intrapersonal intelligence while simultaneously fostering interpersonal intelligence due to the collaborative nature of group work. This was reflected in the superior performance of the students in the 1st group on the multiple intelligences test, compared to the performance of the CG.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Discussion of the 4th hypothesis

The two-way ANOVA and the Scheffee test results showed that the second experimental group, which was taught according to the MM strategy, outperformed both the 1st group and the CG in all types of multiple intelligences. The researcher attributes this outcome to the fact that learning chess techniques through mind mapping enables the students to analyze weaknesses, strengths, available opportunities, and potential threats. This is done through the branches of the mind map, which makes the students' thinking more thoughtful and deliberate. They think in a reflective manner to carefully and accurately handle these factors in order to come up with more effective strategies on the chessboard. This is reflected in the student's performance on the reflective thinking test with all of its skills. This aligns with what was stated by Al-Bayati and Al-Obaidi (2019), who indicated that the use of mind maps by students contributes to the development of reflective thinking, especially since the structure of mind maps aligns with the structure of the mind. (Al-Bayati & Al-Obaidi, 2019). Additionally, analyzing the mind map enhances the students' visual perception, enabling them to identify fallacies and interpret chess situations scientifically, thus allowing them to draw effective conclusions.

The results of the two-way analysis of variance and the Scheffee test displayed the superiority of the 1st group, which was taught using the SWOT strategy, over the control group in all types of multiple intelligences. The researcher points this outcome to the fact that learning chess techniques through the SWOT strategy enables the students to diagnose weaknesses, strengths, available opportunities, and potential threats. This enhances their reflective thinking, allowing them to examine situations with greater accuracy. As a result, their visual perception improves, enabling them to detect fallacies and provide logical interpretations easily. Consequently, their choice of playing strategy becomes more thoughtful and cautious, leading to more accurate results. This progress is reflected in the student's performance on the reflective thinking test.

CONCLUSION

Based on the results obtained, the researcher concluded that the group that studied using the SWOT matrix was superior to both the group of students who studied using mind maps and the group that relied on teaching it in the traditional way to develop some mental abilities and reflective thinking. In addition, the group of students who studied using mind maps was superior to those who studied in the traditional way. This indicates

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

that the use of modern methods in the educational process plays a fundamental role in developing a set of different skills and abilities among students in general. It also enhances reflective thinking, as we found in the results of this study, and improves the tactical performance of the game and the use of more accurate strategies in performance.

REFERENCE

Al-Bayati, A. H., & Al-Obaidi, N. A.-M. (2019). The effectiveness of mind maps in developing reflective thinking among first-year middle female students in science. *Journal of Arts, Literature, Humanities, and Social Sciences*, (33).

Al-Khalidi, A. M. (2008). *The psychology of individual differences and intellectual excellence* (2nd ed.). Amman, Jordan: Dar Wael for Publishing.

Al-Khawaldeh, M. M. (2007). *Popular play among children and its educational significance in developing their personalities* (2nd ed.). Amman: Dar Al-Masirah for Publishing and Distribution.

Al-Mashharawi, A. A. (2009). *Reflective thinking and its relationship to academic achievement and thinking styles among students at Al-Azhar University in Gaza* [Unpublished master's thesis]. Al-Azhar University, Gaza.

Al-Qatamin, A. (2002). Strategic planning in public education institutions – An analytical and applied study. *Journal of Economic and Administrative Sciences*, *18*(2), Mu'tah University.

Al-Rubaie, H. M. (2016). *Evaluating university performance using the SWOT matrix: An applied study* [Unpublished master's thesis]

Al-Taie, M. G. (2021). *The effect of two educational programs for strategic thinking techniques in teaching chess on developing some mental abilities and reflective thinking for the age group (13–14) years* [Unpublished master's thesis]. University of Mosul, Iraq.

Amer, T. A.-R. (2015). *Mind maps and learning skills (your path to building smart ideas)*. Cairo, Egypt: Arab Group for Training and Publishing.

Boon, R. T., Burke, M. D., Fore, C., & Spencer, V. G. (2006). The impact of cognitive organizers and technology-based practices on student success in secondary social studies classrooms. *Journal of Special Education Technology*, *21*(1). https://doi.org/10.1177/016264340602100103

Boon, R. T., Fore, C., & Rasheed, S. (2007). Students' attitudes and perceptions toward technology-based applications and guided notes instruction in high school world history classrooms. *Reading Improvement*, *44*(1), 23–31.

Georges, M., & Brown, S. C. (2010). *Cognitive addition developmental*. Missouri: Academic

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793

Press.

Heba, Z. M., & Al-Sayed, M. A. (2016). Environmental analysis using the SWOT model in education – Its concept and application mechanisms. *Journal of Educational Sciences*, *24*(4, Part 1), [pages]. Cairo University.

Kaddour, K. (2018). *The effect of playing and practicing chess on developing strategic thinking and some cognitive abilities in football players under 15 years old* [Unpublished master's thesis]. Abdelhamid Ben Badis University – Mostaganem, Algeria.

Mackinnon, G. R. (2006). Contentious issue in science education: Building critical thinking patterns through two-dimensional concept mapping. *Journal of Educational Multimedia and Hypermedia*, *15*(4), 433–445.

Mustafa, S. (2014). *The effect of a proposed training program to develop attention concentration in students aged 10–12 during physical education lessons* [Unpublished master's thesis]. Tishreen University, Syria.

Safar, A. H. (2013). Mind maps and their applications: A descriptive analytical reference study. *Journal of Humanities*, (39). Algeria.

Tergini, S. (2015). *The role of strategic thinking in activating the creative capacities of the organization: A case study of the Sidal Group* [Unpublished doctoral dissertation]. Mohamed Khider University of Biskra, Algeria.

https://doi.org/10.20884/1.paju.2025.7.1.14783
e-ISSN : 2686-5807 | p-ISSN : 2686-5793