



The Effectiveness of Marzano's Learning Dimensions Model in Developing Complex Skill Performance (Receiving, Dodgeting, Aiming) and Instant Decision Making Under Pressure in Real Basketball Situations among Students of the Faculty of Physical Education and Sport Sciences – University of Babylon

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Abstract: The study sought to examine the effectiveness of Marzano's Dimensions of Learning model in enhancing complex skill performance (receiving, dribbling, and shooting) as well as improving quick decision-making under pressure in basketball among students of the Faculty of Physical Education and Sport Sciences at the University of Babylon. The researcher adopted an experimental approach using a pre-test–post-test design with experimental and control groups. The sample consisted of 60 students selected from a population of 148. The results showed a significant superiority for the experimental group in all variables, with high rates of improvement compared to the control group. The effect size values also showed a significant effect of the Marzano model on the development of skill performance and decision-making, supported by the results of the associated variance analysis that confirmed the strength of the effect of the educational program. These results are attributed to the model's reliance on multidimensional learning, which integrates knowledge and application in real-world play situations, contributing to the development of motor skills and mental processes associated with decision-making under pressure.

Keywords: Marzano's Learning Dimensions Model, Complex Skill Performance, Instant Decision Making.

Introduction

University education in the Faculties of Physical Education and Sport Sciences is undergoing rapid qualitative development toward adopting modern instructional models that focus on enhancing thinking skills, constructing knowledge, and improving students' ability to make decisions in complex motor situations, rather than relying solely on memorization and repetitive traditional skill execution. ([Marzano, Metzler, 2001; 2017](#))

Basketball is a team game that requires a high integration between skill performance and mental processes, especially in real game situations characterized by constant change,

tight time, and multiple motor alternatives, which makes instant decision-making under pressure a decisive factor in the quality of performance ([Raab, 2012](#)).

Hence, the need to employ modern teaching models capable of integrating cognitive, skillful, and emotional aspects into an integrated educational framework, the most prominent of these models is Marzano's Learning Dimensions Model, which is based on five main dimensions, including positive attitudes towards learning, acquiring and integrating knowledge, extending and refining knowledge, using knowledge in meaningful ways, and developing productive habits of mind ([Marzano et al., 1993](#)). This model is characterized by its ability to move the learner from the level of superficial performance to deep performance based on understanding, application, analysis, and decision-making. ([Marzano, 2007](#))

The complex skill performance in basketball, represented in (receiving, dribbling, shooting) cannot be separated from the cognitive processes that accompany it, as it requires the player to read the situation, identify alternatives, and choose the most appropriate response in a short time and under the pressure of the opponent. ([Abernethy et al., 2012](#))

Therefore, the development of this type of performance is not achieved through traditional training, but rather requires educational situations that simulate the competitive reality and activate thinking and decision-making ([Light, 2013](#)).

The importance of this current research comes from the fact that it seeks to employ Marzano's learning dimensions model in an applied educational environment within the basketball lesson with the aim of developing complex skill performance and enhancing the ability to make instantaneous decisions under pressure, which contributes to bridging a clear gap between the skill aspect and the cognitive aspect in physical education curricula, and is considered a qualitative addition to the Arab scientific library in the field of integrating modern cognitive models with motor education.

Research Problem:

Despite advances in teaching methods, the teaching of basketball skills still relies on traditional methods that focus on repetition without linking them to real situations, leading to poor complex performance and decision-making ([Metzler, 2017](#)). Recent studies have indicated that players who learn in traditional learning environments have difficulty making decisions under pressure compared to those who learn according to modern models ([Raab, 2012](#)).

Through field observation, it was found that there is a weakness among students of the Faculty of Physical Education and Sport Sciences at the University of Babylon, particularly in performing complex motor skills and making quick decisions during game situations.

Accordingly, the research problem is determined by the question:

- Does Marzano's Learning Dimensions model contribute to the development of complex skill performance and the development of real-time decision-making under pressure?

Research Objectives:

1. To determine the effectiveness of Marzano's Learning Dimensions Model in improving complex skill performance (receiving, dribbling, and shooting) in basketball.
2. Reveal the impact of the model in developing the ability to make moments of decision under pressure in real play situations.
3. Comparison of the results of the experimental group learning according to the Marzano model with the control group learning in the traditional way.
4. To determine the amount of improvement in composite skill performance and decision-making among the students of the Faculty of Physical Education and Sport Sciences – University of Babylon.
5. Providing a modern applied model that can be adopted in teaching team game skills.

Research Hypotheses:

1. There are significant statistical differences between the pre- and post-tests of the experimental group in terms of improvement in development. Of complex skill performance and instantaneous decision-making under pressure and in favor of the post-test.
2. There are statistically significant differences between the experimental and control groups in the post-test in complex skill performance and instantaneous decision-making under pressure and in favor of the experimental group.
3. Marzano's Learning Dimensions model achieves a positive impact with a high impact on the development of complex skill performance and decision-making development compared to the traditional method.

Research Areas:

- Human Domain: Third-year students of the Faculty of Physical Education and Sport Sciences at the University of Babylon.
- Spatial Field: - Sports and study halls of the Faculty of Physical Education - University of Babylon.
- Domain Time: - From 1/10/2025 to 1/2/2026.

Methodology

The research population consists of (148) students of the third stage at the Faculty of Physical Education and Sport Sciences – University of Babylon for the academic year (2025-2026).

Research Sample:

The sample was selected by the simple stratified random sample method to ensure fair representation of the community, as the sample size reached (60) students who were randomly divided into two groups.

- Experimental group: 30 students (applied to Marzano's strategy)
- Control group: 30 students (traditional method applied)

The base of (25%-40%) of the population was relied on in the educational experimental studies, so (60) out of (148) represents a statistically appropriate percentage and ensures a good test power.

Homogeneity and equivalence:

First: Homogeneity: - The sample was confirmed to be homogeneous in terms of age, height, and body mass, as presented in the table below.

Table 1. presents the homogeneity of the research sample in the selected physical variables.

Variable	mean	Standard deviation	Torsion coefficient	Interpretation
Age (year)	20.50	1.11	0.22	Homogeneity
Length (cm)	173.40	5.70	0.17-	Homogeneity
Mass (kg)	71.20	6.05	0.14	Homogeneity

The skewness coefficient values ranging between (± 1) indicate that the research sample is well homogeneous.

Second: Parity between the two groups: It was confirmed through a t-test of two independent samples to ensure that there were no prior differences between the two groups in (complex skill performance, instantaneous decision making), and the results showed that there were no significant differences as shown.

Table 2. presents the equivalence between the two groups in the pre-test of performance

Variable	Collection	mean	Standard deviation	Calculated value (T)	Significance
Composite skill performance	Experimental	11.98	1.38	0.35	Insignificant
	Officer	11.78	1.50		

- ($p > 0.05$)

Research Tools:

1. Basketball Composite Skill Performance Tests (Receiving – Dodging – Shooting)
2. Instant Decision-Making Test Under Pressure
3. Performance appraisal form.
4. A refereeing questionnaire for basketball experts to verify the authenticity of the tests.
5. Camera photography and performance analysis.
6. Educational program according to the Marzano model.

Validity and Consistency of Tests:

1. Honesty: Honesty has been confirmed in the current research as follows:

- a. **Apparent honesty:** The tests were presented to a panel of experts consisting of 10 specialists in teaching methods, sports training, and basketball. Instruments that achieved an agreement rate of 80% or higher were adopted.
- b. **Content Authenticity:** - Each test is linked to the targeted skills to ensure comprehensiveness of the composite skill performance.

2. **Stability:** The test and retest method (Test-Retest) was used: by applying the test to a survey sample of (10 students) and the test was repeated after (7 days) in order to calculate the Pearson correlation coefficient, and the values came between (0.82 – 0.91), which are high values that indicate good stability.

Exploratory Experiment: A pilot study was conducted on a sample of 10 students outside the main research sample in order to:

- determine the time required for test administration,
- identify potential difficulties, and
- verify the validity of the research instruments.

Educational Program (according to Marzano): An instructional program was designed based on Marzano's Dimensions of Learning model. The program consisted of 8 educational units, with each unit lasting 90 minutes and the duration of the program (4 weeks), and the program consists of the following:

1. Introduction
2. Stimulating motivation
3. Skill Delivery
4. Guided Practice
5. Apply in Play Situations
6. Instant feedback

As for the dimensions of the program, they were as follows:

- After Knowledge
- After mental operations
- After Metacognitive Thinking
- After using knowledge in real situations

Implementation Procedures: - The main experiment was carried out as follows: -

1. **Pre-Test:**
 - Skill tests and real-time decisions were applied to both groups
 - Record results using standardized measurement forms
2. **Implementation of the program:** The training program was implemented, which included eight modules, as follows:
 - Experimental group: - Marzano software was applied to the group.
 - Control group: -Traditional explanation method + presentation and repetition was adopted
3. **Post-Test:** After completing the program, the same tests were administered again under identical conditions to ensure consistency of measurement.

Statistical Methods: The data were analyzed using the SPSS statistical package, and the following methods were employed:

1. Mean.
2. Standard deviation.
3. Skewness coefficient.
4. T-test for independent and paired samples.
5. Pearson's correlation coefficient.

- 6. Percentage improvement.
- 7. Impact size.

Result and Discussion

Presentation of the results of the mean and standard deviations (pre- and post-test):

Table 3. Illustrates the arithmetic means and standard deviations for the experimental group in both the pre- and post-measurements

Variable	Collection	Qibla (FH)	After me (FH)	Standard deviation	Percentage of improvement
Composite skill performance	Experimental	12.82	16.90	1.22	35.9%
	Officer	12.67	14.30	1.45	11.2%
Instant Decision Making	Experimental	11.80	15.80	1.10	40.2%
	Officer	11.65	12.10	1.35	11.1%

Results of the (T) test for the post-comparison between the two groups:

Table 4. presents the results of the t-test for the post-test comparison between the experimental and control groups

Variable	Calculated value (T)	Significance Level	Decision
Skill Performance	5.82	0.05	D statistically
Decision Making	5.98	0.05	D statistically

Effect size for the target research variables:

Table 5. Shows the statistically significant impact of the research variables

Variable	Impact Percentage	Interpretation
Skill Performance	0.83	Big
Decision Making	0.91	very big

ANCOVA Analysis of Research Variables:

Table 6. shows the analysis of (ANCOVA) of the variables of skill performance and real-time decision-making

Variable	Calculated value (F)	p-value	N ²
Skill Performance	18.34	0.000	0.41
Decision Making	21.25	00.00	0.46

Analysis of the Results:

From the above tables, the results showed that there were no statistically significant differences in the pretests, confirming the parity of the two groups. The post-results showed a significant superiority of the experimental group in complex skill performance and instantaneous decision-making, supported by high t-values. The improvement ratios and effect size (0.83-0.91) indicate a significant effect of Marzano's learning dimensions model, which is also supported by the results of the accompanying variance analysis (n² = 0.41-0.46) that confirm the strength of the effect of the educational program. This is due to the

model's reliance on multidimensional learning that integrates knowledge and application in real play situations, as opposed to the traditional method that showed limited improvement.

Discussion

The results of the present study showed a significant superiority of the experimental group that used Marzano's learning dimensions model over the control group in both complex skill performance (receiving-dribbling-aiming) and instantaneous decision-making under pressure. This superiority is attributed to the nature of the model that relies on multidimensional learning, as it integrates knowledge, mental processes, and practical application in real-world contexts, leading to deeper and more stable learning.

The absence of statistically significant differences in the pre-tests indicates the equivalence of the two groups, which enhances the internal validity of the experiment and makes the dimensional differences due to the effect of the independent variable. The post-results showed clear significant differences supported by high t-values, as well as large improvement rates in the experimental group compared to the control, reflecting the effectiveness of the educational program based on the Marzano model.

The effect size values also showed a very large effect in terms of application, not just statistically, which enhances the practical value of the results. The results of the ANCOVA analysis support this trend, as it showed that the Marzano model explains a large proportion of the variation in performance, demonstrating that the improvement is largely due to the educational program used.

This strong effect is explained by the model's ability to transfer learning from theory to practical application in real play situations, which contributes to the development of integrated complex skill performance, where skills are not performed separately, but within a motor sequence associated with the requirements of actual play. This is consistent with Robert J. Marzano (2007) that effective learning is achieved when knowledge is integrated with application in a realistic context.

In terms of instantaneous decision-making, the experimental group reported greater improvement compared to the control, due to training students in situations that simulated competitive pressure, which helped to reduce response time and increase decision accuracy. This is in line with what Richard A. Schmidt and Timothy D. Lee (2019) have pointed out that learning in competition-like environments contributes to the development of cognitive-motor processes associated with decision-making.

Immediate feedback also played an important role in improving performance, as it helped students to correct their mistakes directly and promote self-learning, which is supported by John Hattie and Helen Timperley (2007) in asserting that feedback is one of the most powerful factors influencing learning.

In contrast, the control group showed limited improvement, which can be explained by the traditional method of explanation and repetition, without actually incorporating thought processes or simulating real game situations, resulting in learning remaining at a superficial level that is not significantly reflected in performance under pressure.

Based on the above, it can be said that Marzano's model of learning dimensions is not only effective in improving skill performance, but also extends to the development of mental processes related to decision-making, making it an effective learning model in dynamic and competitive learning environments.

Conclusion

Based on the study results, it could be seen that, the model of DOL developed by Marzano is able to make its contribution effectively in order to increase students in developing complex skills as indicated from the proficiency of students in executing the complex skills. Also, the results showed that the model has a positive effect in enabling the motor decision in the rapid response and pressure situations, which in turn will facilitate the learners in handling all kinds of educational and competition situations.

The experimental group that learned with Marzano's model, outperformed the control group that learnt with the traditional model. The statistic significance results were in favour of the experimental group, as well as the high effect size that showed effectiveness of the model. The findings on the contrary showed that the traditional approach was less effective in the acquisition of not only complex skill but also motor decision making skill, compared with the modernized approach adopted in the study.

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