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ORIGINAL STUDY

The Effect of Driver Model to Teach Some Movements on the Pommel Horse Apparatus in the Art of Gymnastics for Students

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Abstract

This study aimed to examine the effect of the Driver Model on learning selected pommel horse skills in artistic gymnastics among students of the College of Physical Education and Sports Sciences at the University of Basrah. The importance of the study lies in applying a constructivist instructional model that organizes learning steps, enhances motor understanding, and increases student engagement, which contributes to improving skill performance. The research problem was identified in students' difficulties in mastering pommel horse skills, frequent performance errors, and the inability to connect movement phases effectively due to reliance on traditional teaching methods.An experimental design with two equivalent groups (control and experimental) was used. The sample consisted of 20 students, randomly divided into two groups of 10. The instructional program lasted eight weeks and was implemented according to the five stages of the Driver Model: orientation, elicitation and demonstration, restructuring of ideas, application, and review. The results showed that the experimental group significantly outperformed the control group in post-tests. In the front support leg swing skill, the experimental group improved from a pre-test mean of 3.34 to a post-test mean of 7.21, compared to 5.12 for the control group. Similarly, in the entry and exit skill on the pommel horse, the experimental group achieved a mean of 7.33 compared to 5.089 for the control group, with statistically significant differences ($p < 0.05$).It was concluded that the Driver Model has a strong positive effect on improving motor skill performance and learning outcomes in artistic gymnastics. The findings support the effectiveness of constructivist instructional approaches in physical education and align with Sustainable Development Goal 4 (Quality Education).

Keywords: Driver model, Education, Pommel horse apparatus, Art of gymnastics

1. Introduction

The educational process is the cornerstone of developing students' motor and skill-based abilities. It is a complex process influenced by several factors, among which the teaching method is considered one of the most important. Selecting an appropriate instructional model is as important as the educational content itself because it facilitates learning and helps achieve the desired objectives. With the continuous development of learning theories, modern educational models have emerged that place the learner at the center of the educational process. These models emphasize interaction, logical progression, active participation, and the development of thinking skills.

One of the most prominent constructivist models is the Driver Model, which focuses on building knowledge through exploration and interaction between the teacher and the learner. According to Saeed et al. (2019), the Driver Model consists of five stages: orientation, elicitation of ideas, restructuring of ideas, application of ideas to new situations, and review of ideas, with the purpose of correcting misconceptions and promoting meaningful learning (Nouri et al., 2019).

In artistic gymnastics, the need for modern instructional approaches is particularly important because of the complexity of motor skills that require high levels of precision, balance, coordination, and

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neuromuscular control. The pommel horse is considered one of the most difficult apparatuses in artistic gymnastics due to the demands it places on the performer in terms of balance, movement fluidity, and precise body control. Students often encounter difficulties in learning pommel horse skills when traditional teaching methods are used. Therefore, employing contemporary educational models that organize learning experiences and actively engage learners may contribute to improving skill acquisition and performance.

The significance of the present study lies in investigating the effectiveness of the Driver Model in teaching selected movements on the pommel horse apparatus. The model is expected to enhance the learning process by organizing instructional steps, encouraging active participation, and improving students' motor understanding, which may ultimately be reflected in better skill performance. Furthermore, this study contributes to the application of modern educational models in physical education and may provide teachers with more effective strategies for teaching artistic gymnastics skills.

1.1. Research aim

The present study aims to identify the effect of the Driver Model on teaching selected movements on the pommel horse apparatus in artistic gymnastics among students.

1.2. Research hypothesis

The Driver Model has a positive effect on teaching selected movements on the pommel horse apparatus in artistic gymnastics among students.

1.3. Research problem

Pommel horse skills are among the most difficult skills in artistic gymnastics because they require a high degree of neuromuscular coordination, balance, and precise control of continuous body movements. Despite the efforts of instructors, traditional teaching methods may not always achieve the desired level of learning and performance. Through the researcher's experience in teaching gymnastics, it has been observed that many students experience difficulties in mastering basic pommel horse movements, frequently commit performance errors, and struggle to integrate the different phases of the skill into a coordinated sequence.

These difficulties may be attributed to the lack of instructional models that provide a structured and progressive learning process. The Driver Model, as a constructivist approach, emphasizes interaction, active learning, and the gradual development of knowledge and skills. Therefore, there is a need to investigate its effectiveness in teaching selected pommel horse movements and to determine whether it can improve students' skill performance and learning outcomes.

1.4. Previous studies

Mashkoor and Lifta (2020) investigated the effect of the constructivist learning model on learning selected pommel horse skills among physical education students. Using an experimental design, the researchers compared a constructivist-based instructional approach with a traditional teaching method. The findings showed significant improvements in skill performance for the experimental group, indicating that constructivist learning strategies enhance motor skill acquisition in gymnastics (Mashkoor (2020)).

Frikha et al. (2019) examined the effects of verbal, haptic, and combined feedback on motor learning performance. The study found that participants who received combined feedback demonstrated superior skill acquisition and retention compared to those receiving a single type of feedback. The results highlighted the importance of interactive learning environments in mastering complex motor skills (Frikha et al., 2019).

Mödinger et al. (2022) conducted a systematic review examining the role of verbal feedback in learning gymnastics skills. The review analyzed thirteen experimental studies and concluded that verbal instruction combined with feedback significantly improves skill acquisition, technical performance, and retention in gymnastics learning (Mödinger et al., 2022).

Chen et al. (2007) explored the effectiveness of constructivist teaching approaches in physical education. The researchers reported that constructivist instruction enhanced students' understanding of movement concepts and improved learning outcomes without reducing participation in physical activity. The study supports learner-centered approaches in physical education settings (Chen et al., 2007).

Ghorbel et al. (2025) investigated the effectiveness of the flipped classroom approach in learning gymnastics skills among secondary school students. The researchers employed a quasi-experimental design over six weeks and compared a flipped classroom group with a traditional teaching group. The results revealed significant improvements in gymnastics skill performance, knowledge acquisition, motivation, and physical engagement among students taught through the flipped classroom approach. The study concluded that learner-centered instructional models enhance motor learning outcomes in gymnastics (Ghorbel et al., 2025).

Table 1. Homogeneity is demonstrated using the disequilibrium coefficient within each group (control and experimental) using anthropometric measurements.

		Control group			Experimental group		
Variables	Measurements	S	A	Coefficient of Variation	S	A	Coefficient of Variation
Hight	cm	172.45	1.56	0.904	172.65	1.78	1.03
weight	kg	71.65	0.985	1.374	71.66	0.865	1.207
age	year	21.22	0.745	3.51	21.31	0.647	3.036

Table 2. Shows the equivalence using the (t) test between the control and experimental groups in assessing movements.

		Control group		Experimental group				
Evaluating the movements	Measurements	S	A	S	A	T value	sig	Significance level
Leg swing from the front foot	Degree	3.24	0.45	3.34	0.57	0.413	0.512	Non- significant
Legg entry and exit from the pommel horse	Degree	3.56	0.62	3.61	0.53	0.184	0.24	Non-significant

Liu et al. (2025) conducted a systematic review and meta-analysis examining the impact of flipped classroom instruction on motor skill performance among university students. The analysis demonstrated that student-centered instructional models significantly improved cognitive-motor integration and motor skill performance compared with traditional teaching methods. The authors emphasized that active learning environments facilitate the acquisition of complex motor skills (Liu et al., 2025).

Mödinger, Woll, and Wagner (2024) examined the use of digital visual feedback as a teaching strategy for motor learning in physical education. The study proposed a digital-based instructional model that integrates visual feedback into skill learning. The findings indicated that visual feedback enhanced movement understanding, motor control, performance accuracy, and students' engagement in the learning process (Mödinger M, 2024).

2. Methodology and procedures

Research Methodology: The researcher used the experimental method with a two-group equivalent design (control and experimental) using pre- and post-tests, as it was suitable for solving the research problem.

Research Population and Sample:

The research population was determined purposively by third-year students at the College of Physical Education and Sports Sciences, University of Basra, for the academic year 2025-2026, totaling (310) students place: The indoor gymnastics hall at the College of Physical Education and Sports Sciences, University of Basra Time: The period from 8/2/2026 to 14/4/2026 A research sample of (20) students was selected, representing one academic section and constituting (6.45%) of the original population. They were randomly divided into two groups (control and experimental), with each group comprising (10) students. The homogeneity of the sample was established using the coefficient of variation as shown in Table 1, and the equivalence of the two groups was established using the (t) test between the two groups as shown in Table 2.

The results presented in the table indicate that the experimental and control groups were homogeneous in the variables of height, weight, and age, as evidenced by the low coefficients of variation observed in both groups

The results in Table 2 indicate no statistically significant differences between the experimental and control groups in the pre-test scores of the evaluated pommel horse movements, demonstrating the equivalence of the two groups prior to the experiment

Methods of Data Information Collection:

references. Evaluation Used .Equipment and tools used:

Gymnastics Hall, pommel horse apparatus, timer, measuring tape, medical scale, whistle

Field Research Procedures:

1-Skills Identification: The researcher relied on the curriculum used to teach gymnastics to third-year students, which outlined the required skills on the vaulting horse:

1-Lateral swing from the front support position

2-entrance and exit of the leg from the pommel horse

Evaluation of ground movements: The researcher relied on the form he prepared for evaluation, which includes divisions for evaluating the technical performance of skills, and in which he relied on the apparent structure of the skill in the evaluation process, according to the three sections of the skill, which are:

1- Preparatory 2- Main 3- Final Section.

The assessment was out of (10) marks divided into the skill sections (preparatory section, main section, final section).

Table 3. Shows the final skills assessment scores.

T	Skills	Final grade for skills sections degree	degree	degree
1	Lateral swing from the front support	3	4	3
2	Entry and exit of the man on the pommel horse	3	3	4

Table 4. Shows the results of the (t) tests between the arithmetic means of the pre- and post-assessment for the control group.

Assessment used	Measurement	Pre- teste S	Pre- teste A	Post-test S	Post-test A	standard error	T value	Sig	Significance level
Legally swinging from the front foot	Degree	3.24	0.45	5.12	0.632	0.554	3.393	0	significant
Entry and exit of the leg onto the pommel horse	Degree	3.56	0.62	5.089	0.589	0.657	2.327	0	significant

Table 3 shows the evaluation criteria for the selected pommel horse skills, including the distribution of scores across the preparatory, main, and final phases of performance, with a total score of 10 points allocated to each skill

Exploratory Experiment: The researcher conducted an exploratory experiment on 2/8/2026 in the gymnastics hall at the College of Physical Education and Sports Sciences on the same sample group in order to standardize the exercises used, know the components of the load, the extent of the students' ability to perform the exercises, the difficulties the researcher faced during the application of the experiment, and to introduce the assisting staff to the method of application and follow-up at the level

3. Main experiment

Pre-test: The pre-test was conducted on February 15, 2026.

Instructional Model:

A set of specific instructional exercises was developed for the pommel horse and implemented according to Driver's model, which includes five stages (Driver and Oldham (1986):

1- Guidance.
2- Demonstration of ideas.
3- Reformulation of ideas.
4- Application of ideas.
5- Review of changes in ideas.

These exercises were implemented in the main section of the instructional unit during a complete lesson, including its three parts (see Appendix 1), for eight weeks across two instructional units. The program began on February 16, 2026, and ended on April 13, 2026.

Post-test: The post-test was conducted on April 14, 2026.

Statistical Methods: The SPSS system was used for statistical analysis of the data.

3-Presenting, analyzing, and discussing the results:

The results presented in Table 4 reveal significant differences ($p \leq 0.05$) between the pre-test and post-test measurements for the control group in the skills of lateral leg swing from front support and leg entry and exit on the pommel horse. The improvement in post-test scores reflects the positive effect of the educational program on students' skill performance.

The results in Table 5 indicate significant differences ($p \leq 0.05$) between the pre-test and post-test measurements of the experimental group in the skills of lateral leg swing from front support and leg entry and exit on the pommel horse. The higher post-test means demonstrate the effectiveness of the Driver Model in enhancing students' performance of the studied gymnastics skills.

The results presented in Table 6 indicate significant differences ($p \leq 0.05$) between the experimental and control groups in the post-test measurements of the assessed pommel horse skills. The higher performance levels of the experimental group confirm the positive impact of the Driver Model on enhancing students' motor skill acquisition.

By observing Table 4 and Table 5, we can see an improvement and learning of skills on the pommel horse, which are considered fundamental skills. Success in mastering these skills leads to achievement on this apparatus. This teaching and progress demonstrate the importance of attention given to those involved and the students, motivating them to perform correctly in teaching and delivering the lesson effectively. Therefore, Magill (2004) believes that "the natural phenomena of the learning process are that there must be development in learning as long as the teacher follows the correct steps and principles of the learning process, practices correct performance, and focuses on it until the performance is established and stabilized" (Magill, 2004: 237). Qasim Lazam (2005) discusses the role of the thematic curriculum, stating that "learning in the thematic curriculum raises

Table 5. The results of the t-tests show the differences in the arithmetic means of the pre- and post-assessment of the experimental group.

Assessment used	Measurement	Pre- teste		Post-test		standard error	T value	Sig	Significance level
		S	A	S	A				
Legally swinging from the front foot	Degree	3.34	0.57	7.21	0.632	0.894	4.328	0	significant
Entry and exit of the leg onto the pommel horse	Degree	3.61	0.53	7.33	0.741	0.876	4.29	0	significant

Table 6. Shows the results of the t-tests between the arithmetic means in the post-assessment between the control and experimental groups.

Assessment used	Measurement	Control group		experimental group		T value	Sig	Significance level
		S	A	S	A			
Legally swinging from the front foot	Degree	5.12	0.632	7.21	0.632	7.037	0	significant
Entry and exit of the leg onto the pommel horse	Degree	5.089	0.589	7.33	0.741	7.114	0	significant

the level of education and develops skills in terms of knowledge and correct performance" (Qasim, 2005: 56). Both Ammar Mu'ayyad Ashhab and Ghada Mu'ayyad Ashhab (2019) emphasize the importance of "educational units and the gradual progression in learning skills and following. . ." The scientific steps in planning and implementing educational units help raise the level of learning (Ammar, Ghada, 2019: 179). By observing Table 6, we can see the superiority of the experimental group over the control group. Therefore, the Driver model is the best in education because it contains successful educational steps that aid understanding, eliminate errors, promote thinking, and help deliver the lesson correctly. For this reason, Hassan and Nouri (2026) believe that "achieving and acquiring the highest levels of competence in educational situations is due to an effective educational curriculum, as it is a teaching method for organizing the subject matter based on gradual steps, so that the learner can acquire them easily" (Kifaya, Saeed, 2026: 24). Since this model enhances learners' understanding and correct mental processing, it supports the acquisition of the skills under study. This is confirmed by Ghanem (2004), who stated that "teaching thinking skills means teaching students, directly and indirectly, how to apply clearly defined thinking skills such as observation, comparison, classification, discrimination, analysis, and synthesis, regardless of the subject matter content" (p. 48).Since this model enhances understanding and correct mental performance in thinking for the learner, it helps in learning the skills under study. This is confirmed by Mahmoud Muhammad Ghanem (2004): "Teaching thinking skills means teaching students, directly and indirectly, how to implement clearly defined thinking skills such as observation, comparison, and classification." Discrimination, analysis, synthesis, etc., are independent of the subject matter content (Mahmoud, 2004: 48). Regarding the selection of exercises and the program, Mohsen Ali Nassif (2000) states that "a well-organized and properly planned scientific exercise has a significant impact on achieving results" (Mohsen, 2000: 25). The results of the this research goes along with some recent studies that have already confirmed the effect of elevated educational models in developing motor learning and improving skill performance in the art of gymnastics. Ghorbel et al. (2025) mentioned using the flipped classroom strategy in gymnastics education significantly contributed to increasing the level of motor learning, cognitive achievement, and motivation between students compared to the traditional old method, plus increasing interaction and the number of motor repetitions during learning. Furthermore, Garnaas and van den Tillaar (2024) demonstrated that implicit learning and training based on motor variety help improve the acquisition and retention of complex motor skills for longer periods, which is consistent with the steps of the Driver model that rely on gradual understanding and continuous practical application. Similarly, a study by Jabir Mushrif et al. (2024) demonstrated that student-centered learning strategies contributed to developing cognitive abilities and improving students' performance in artistic gymnastics skills. This underscores the importance of adopting modern educational models that place the learner at the center of the learning process. The research findings also align with those of Salih (2026) "study (2026), which confirmed that developing productive thinking and cognitive abilities contributes to improved skill performance on gymnastics equipment, given their role in enhancing motor awareness and control over artistic performance".(Basma,2026:p14)

4. Conclusion

1. The Driver model is a sound model for teaching complex movements that require comprehension and for correcting the learning path, as in movements on the pommel horse in artistic gymnastics for students
2. The Driver five-step method reinforces the constructivist learning steps and helps raise the student's level of perception and understanding.

Author's declaration

Conflicts of interest

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

Ethical clearance

This manuscript approved by the Ministry of Education / General Directorate of Education of Basra Governorate Iraq, on (2026/05/16).

Ethical clearance

All contributions to this study were carried out by the researchers **Thaer Talib Salman Khudair**, who conducted the study procedures, collected and organized the data, participated in the implementation of the experimental program, and contributed to drafting the manuscript, and developed the research idea, designed the study, supervised the research procedures, interpreted the results, and reviewed and finalized the manuscript, with the assistance of a number of experts: **Thaer Talib Salman Khudair** in Statistics and **Mohammad Rahim** in Translation.

Facilitating the task

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Data availibilty

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Appendix 1

Sample learning units

Week: 1 Total Time: 30–32 minutes
Learning Unit: 1-2 Unit Objective: teach skills using horse jumping

Section	Educational exercises	Size	Observations and problems
Practical	1. Assisted Forward and Backward Leg Swing: The student performs a simple leg swing while holding hands on the apparatus, with the instructor assisting in maintaining the rhythm.		-Emphasize the Driver model.
	2. Half-Circle Exercise: The student performs a half-circle with their legs around the horse, pausing to focus on the correct movement path.	8×3	-Emphasize technical performance.
	3. Transition Between Two Supports Exercise: Slowly transitioning between the front and back supports on the horse to develop balance and control.	8×3	-Pay attention to feedback.
	4. Assisted Full Circle Exercise: Performing full leg circles around the horse with the instructor's support to correct errors and enhance fluidity.	8×3	
	5.Combination Exercise: Combining two simple movements (such as a half-circle and a support transition) sequentially to develop motor coordination.	8×3	
		8×3	

تأثير انموذج درايفر في تعليم بعض الحركات على جهاز حصان الحلق بالجمناستك الفني للطلاب

ثائر طالب سلمان

وزارة التربية / المديرية العامة لتربية محافظة البصرة

ملخص البحث

هدفت هذه الدراسة إلى فحص أثر نموذج القيادة على تعلم مهارات مختارة في رياضة الجمباز الفني على حصان الحلق لدى طلاب كلية التربية البدنية وعلوم الرياضة بجامعة البصرة. تكمن أهمية الدراسة في تطبيق نموذج تعليمي بنائي يُنظم خطوات التعلم، ويعزز الفهم الحركي، ويزيد من تفاعل الطلاب، مما يُسهم في تحسين أداء المهارات. تمثلت مشكلة البحث في صعوبات الطلاب في إتقان مهارات حصان الحلق، وكثرة أخطاء الأداء، وعدم قدرتهم على ربط مراحل الحركة بفعالية نتيجة اعتمادهم على أساليب التدريس التقليدية. استُخدم تصميم تجريبي بمجموعتين متكافئتين (ضابطة وتجريبية). تألفت العينة من 20 طالبًا، قُسموا عشوائيًا إلى مجموعتين متساويتين (10 طلاب في كل مجموعة). استمر البرنامج التعليمي ثمانية أسابيع، ونُفذ وفقًا للمراحل الخمس لنموذج القيادة: التوجيه، والاستنباط والعرض، وإعادة هيكلة الأفكار، والتطبيق، والمراجعة. أظهرت النتائج تفوقًا ملحوظًا للمجموعة التجريبية على المجموعة الضابطة في الاختبارات البعدية. في مهارة تأرجح الساق الأمامية الداعمة، تحسّن أداء المجموعة التجريبية من متوسط 3.34 قبل الاختبار إلى متوسط 7.21 بعده، مقارنةً بـ 5.12 للمجموعة الضابطة. وبالمثل، في مهارة الدخول والخروج على حصان الحلق، حققت المجموعة التجريبية متوسط 7.33 مقارنةً بـ 5.089 للمجموعة الضابطة، مع وجود فروق ذات دلالة إحصائية ($p < 0.05$). وخلصت الدراسة إلى أن نموذج القيادة له تأثير إيجابي قوي على تحسين أداء المهارات الحركية ونتائج التعلّم في الجمباز الفني. تدعم هذه النتائج فعالية المناهج التعليمية البنائية في التربية البدنية، وتتوافق مع الهدف الرابع من أهداف التنمية المستدامة (التعليم الجيد).

الكلمات المفتاحية: نموذج القيادة، التعليم، حصان الحلق، الجمباز الفني.