EFFECTIVENESS OF THE CONSTRAINT-LED APPROACH IN TEACHING BASKETBALL DRIBBLING TO 3RD-GRADE STUDENTS

Andrey Shalev, Petar Mihaylov
National Sports Academy "Vassil Levski", Sofia, Bulgaria

ABSTRACT
The issue of motor learning is fundamental to both the theory and practice of physical education. Identifying effective approaches for motor learning will always be a primary objective in this field. This study aimed to determine the effectiveness of the constraint-led approach in teaching basketball dribbling. The investigation was conducted in March of the 2024-2025 school year. The sample included 41 students from the private primary school Dr. Petar Beron and 44 students from the 64th Primary School Tsar Simeon Veliki in Sofia, Bulgaria. All participants were in the 3rd grade. The assessment involved a 20-meter run test and a 20-meter dribbling test. The data were processed using IBM SPSS Statistics 26.0. Descriptive statistics and independent-samples t-tests were used for analysis. The data show that the experimental group achieved better results in the 20-meter dribbling test compared to the control group. The correlation between the 20-meter run and 20-meter dribbling tests was also higher in the experimental group than in the control group. The results show that the constraint-led approach is more effective in teaching basketball dribbling to 3rd-grade students than the traditional method. Research also indicates that this method is more engaging for students than the traditional approach. We found that the constraint-led approach is more effective than the traditional one in teaching basketball dribbling to 3rd-grade students. We recommend the use of the constraint-led approach in physical education for students.

ORCID
Andrey Shalev
https://orcid.org/0009-0001-7957-9945
Petar Mihaylov
https://orcid.org/0009-0007-5589-1989

Cite this article as:
Shalev, A., Mihaylov, P. (2025). Effectiveness of the constraint-led approach in teaching basketball dribbling to 3rd-grade students. *Proceeding book of the 4th International Scientific Congress "Applied Sports Sciences", 2025, Sofia.* pp. 423 - 427.
https://doi.org/10.37393/ICASS2025/66

Keywords: *constraint-led-approach, basketball, students, physical education*

INTRODUCTION

The process of learning motor skills is at the core of a high-quality educational process in the field of physical education. Methodologically, this process varies depending on the specific sport and discipline. However, the framework structure of the learning process remains the same regardless of the sport. It involves progressing through three stages: initial acquisition, in-depth learning, and consolidation and refinement, each with its specific characteristics (Naidenova et al., 2025).

The traditional approach to acquiring motor skills is characterized by isolated practice of specific movement elements, predetermined instructions from the teacher, and a clearly defined technique that learners are expected to replicate. In this model, the student plays a passive role as an executor, and the process is dominated by the pursuit of movement repetition, regardless of the context in which it occurs (Davids, Button, & Bennett, 2008; Renshaw et al., 2010).

Contemporary trends in education, however, emphasize the dynamic nature of movement and the need to adapt to a changing environment. One of the leading approaches that complements the traditional model effectively is the so-called *constraint-led approach (CLA)*. This approach is based on the understanding that motor learning is the result of interaction between *the student's characteristics, the task, and the environment*. Instead of prescribing the "correct" way to perform a movement, learners are encouraged to discover effective solutions through manipulation of the "constraints" in the environment or the task (Newell, 1986; Davids et al., 2008).

In the context of modern physical education, there is an increasing need to adopt *a holistic approach* in which movement is learned as a whole, within a game-like, realistic environment. An increasing number of studies show that isolated drills do not lead to effective transfer in real game situations, as they fail to trigger the necessary adaptation to the variable conditions of the environment (Chow et al., 2016; Renshaw & Chow, 2019). This highlights the need for research comparing the effectiveness of the traditional approach with innovative methods such as CLA in the process of physical education instruction.

Aim and objectives

The study aims to determine the effectiveness of the CLA (Constraint-Led Approach) in teaching basketball dribbling. To achieve this aim, the following objectives were set:

– To review literature, documents, and information

sources related to the researched topic;
– To implement, monitor, and evaluate the effectiveness of the proposed methodology in the process of teaching dribbling during Physical Education and Sport classes;

METHODOLOGY

The study involved 85 third-grade students. Of these, 40 were part of the control group and 45 were part of the experimental group. The procedure was carried out at the Private Primary School Dr. Petar Beron (41 students) and the 64th Primary School Tsar Simeon Veliki (44 students) in Sofia. A total of six classes participated—four from Dr. Petar Beron and two from the 64th Primary School. The study was conducted for 12 physical education lessons in each class at each school.

Written informed consent was obtained from the parents or legal guardians of all participating children prior to their inclusion in the study.

Basketball dribbling instruction for the control group followed the methodologies outlined in basketball teaching manuals (Tsvetkov, 2009). This included defining the motor action, demonstrating and describing the technique, followed by imitation exercises, stationary drills, and movement-based exercises. A key methodological rule is that a technical element may only be included in a game situation once it has been mastered to the level of a motor skill.

In the experimental group, instruction followed the principles of the Constraint-Led Approach (see Table 1). This meant that teaching was conducted through game-based methods, and exercises were designed according to the three main categories: individual, environment, and task (Newell, 1986). A key feature of this approach was that teacher instructions were minimized. Students were encouraged to "discover" effective techniques according to their individual developmental and physiological characteristics.

This meant that after the initial definition and demonstration, students began by participating in the first game. While the individual characteristics, the task, and the environmental conditions acted as constraints for the students, the teacher's role shifted to that of a facilitator in the learning process.

Table 1. *Structure of the teaching process for the control and experimental groups*

The traditional methodology includes many ***demonstrations, verbal descriptions, and frequent pauses to correct errors.***	*Constraint-Led Approach – No direct instructions.* ***The environment's constraints guide the students.*** MISTAKES ARE CORRECTED THROUGH DISCUSSION. FOR EXAMPLE: "How should we dribble?", "Is it effective if the ball goes above the waist?", etc.
Lesson 1 – initial acquisition 1/ Introduction of terminology, demonstration, and description 2/ Flexion and extension of the dominant arm at the elbow joint (stationary); 3/ Same with the non-dominant arm; 4/ High dribble with dominant arm (stationary); 5/ Same with the non-dominant arm; 6/ High dribble with dominant arm while running; 7/ Same with the non-dominant arm	**Lesson 1 – initial acquisition** 1/ Dribbling with turns – using both dominant and non-dominant arms; first walking, then running; students hold a tennis ball in the other hand; 2/ Dribbling through obstacles – cones, poles, benches; students hold a tennis ball in the other hand; 3/ Tag game with dribbling – the free hand is placed behind the back; first with one chaser, then two or three, then 50:50 chasers and runners;
Lesson 2 – in-depth learning 1/ High dribble with dominant arm, changing speed from slow to fast; 2/ Same with the non-dominant arm; 3/ High dribble while running with the dominant arm, changing speed from fast to slow; 4/ Same with the non-dominant arm; 5/ High dribble with dominant hand, one-step stop (jump stop); 6/ Same with the non-dominant arm	**Lesson 2 – in-depth learning** 1/ Running with dribbling from line to line – at full speed, etc.. 2/ Tag game with dribbling – using both dominant and non-dominant arms; same as in the previous session.
Lesson 3 – in-depth learning 1/ High dribble with dominant arm, running, two-step stop; 2/ Same with the non-dominant arm; 3/ High dribble with dominant arm, running, front turn; 4/ Same with the non-dominant arm; 5/ High dribble with dominant arm, running, rear turn; 6/ Same with the non-dominant arm	**Lesson 3 – in-depth learning** 1/ "Fisherman and Fish" with dribbling – in the form of a train (students follow each other); 2/ Mirror game – the teacher performs a motor action, students mimic it like a reflection 3/ Relay game – dribble at maximum speed to a line, turn, and return;

Lesson 4 – skill refinement 1/ Dribbling while running with obstacles – the station method with continuous rotation; 2/ Relay – dribbling	**Lesson 4 – skill refinement** 1/ Game situation – 1 vs. 1 – tennis ball in one hand; ball must cross the line; 2/ Game situations – 2 vs. 2; 3 vs. 3 – same conditions
Lesson 5 – skill refinement 1/ Dribbling while running with obstacles – the station method with continuous rotation; 2/ Relay game – dribbling and shooting at the basket;	**Lesson 5 – skill refinement** 1/ Relay – dribbling and shooting at the basket 2/ Corner ball;
Lesson 6 – skill refinement 1/ Tag game with dribbling	**Lesson 6 – skill refinement** 1/ Corner ball
Lesson 7 – Practice Game	**Lesson 7 – Practice Game**
Lesson 8 – Practice Game	**Lesson 8 – Practice Game**
Lesson 9 – Testing	**Lesson 9 – Testing**
Lesson 10 – Testing	**Lesson 10 – Testing**

At the end of the research period, final testing was conducted in order to determine differences in the acquisition of the motor skill. This was carried out using the motor tests “20m run” and “20m dribbling run” (Borukova, 2018).

All participants completed a standardized warm-up consisting of light jogging and dynamic exercises for approximately 8 minutes.

The 20 m sprint was conducted on a flat, straight schoolyard surface. Children started from a standing position behind a marked starting line. Timing was performed manually using a handheld stopwatch (accuracy ±0.1 s). Each participant completed two trials with approximately 3 minutes of rest between them, and the best time was recorded for analysis.

In the 20 m dribbling run, participants were instructed to dribble a size-5 basketball with their dominant hand along the same 20 m straight course. The start line was the same as in the sprint test. Time was again measured using a handheld stopwatch. Two trials were performed, and the faster of the two was used in the final analysis. Instructions emphasized control and continuous dribbling throughout the course.

To identify the differences, variation, comparative, and correlation analyses were applied using SPSS Statistics 26.0.

RESULTS

The results of the variation analysis are presented in Table 2.

Table 2. *Variation analysis of the control and experimental groups*

Group	Indicators Test	Min	Max	*Mean*	*SD*	V%	As	Ex
Control	20m run (seconds)	3.4	5.1	4.2	0.4	9.5	-0.2	0.7
	20m dribbling run	4	8.6	5.9	1.2	20.3	0.3	0.7
Experimental	20m run (seconds)	3.1	4.9	4.1	0.4	9.7	-0.2	0.7
	20m dribbling run	3.9	7.3	5.4	0.9	16.6	0.4	0.7

The mean values of the test results for both the control and experimental groups, along with the data on coefficients of variation, skewness, and kurtosis, indicate a normal distribution in both samples. This provides the basis for conducting a comparative analysis of the data to identify the differences. The results of the comparative analysis are presented in Table 3.

Table 3. *Comparative analysis of the data from the applied tests*

№	Indicators	Control group		Experimental group		*p*-values
	Test	$Mean_1$	*SD*	$Mean_2$	*SD*	
1	20m run	4.2	0.4	4.1	0.4	$p > .05$
2	20m dribbling run	5.9	1.2	5.4	0.9	$p < .05$

The results of the comparative analysis showed a statistically significant difference in the mean results for the “20m dribbling run” test in favor of the experimental group. No statistically significant difference was found in the “20m run” test.

The data from the correlation analysis revealed a significantly stronger relationship between the two tests in the experimental group ($r = .84$). In the control group, the correlation coefficient was $r = .60$. In both groups, the results were statistically significant.

DISCUSSION

This study aimed to determine the impact of the CLA (Constraint-led Approach) methodology on the teaching process of dribbling during physical education classes. The experiment was conducted with third-grade students from two schools in Sofia over a period of six weeks.

The Constraint-led Approach is gaining increasing popularity in the field of motor skills learning in sports. Roberts et al. (2018) even propose an adapted curriculum for school physical education based on the play-based approach and the principles of CLA.

Renshaw and Chow also adapt the principles of the CLA methodology for teaching within the physical education curriculum (Renshaw & Chow, 2018).

Despite the proposed theoretical frameworks, there is still insufficient empirical data to prove the effectiveness of this methodology in the field of physical education. The literature reveals a limited number of experimental studies focusing on applying this approach in the early stages of motor learning. The present study is among the first to test the effectiveness of the CLA methodology in a school setting with primary school students.

The data from the variation analysis show that the mean results of the "20m run" test, along with the standard deviation, coefficient of variation, skewness, and kurtosis, are almost identical in both groups. The absence of a statistically significant difference between the two groups' results supports the conclusion that the speed abilities of the students were relatively similar.

The comparative analysis for the "20m dribble run" test shows that the mean values between the two groups have a statistically significant difference in favor of the experimental group (by 0.4 seconds). This suggests that the better performance of the experimental group was a result of the applied CLA methodology for teaching dribbling.

The more effective dribbling technique in the experimental group enabled students to maintain a higher speed during the second test, resulting in better outcomes.

We attribute the improved dribbling technique in the experimental group to the CLA methodology. Its basis is in variability in motor actions. Modern methods for teaching technical and tactical skills in sports games within school physical education recommend the application of such variable methodologies. (Naidenova et al., 2025).

Conte et al. (2020) used the same tests in a youth basketball academy with 10-year-old children. They reported average results of 3.99 seconds for the "20m run" and 4.5 seconds for the "20m dribbling run." Comparing these to our results, we found that the linear speed results were nearly identical. However, Conte et al. reported a better average result for the "20m dribbling run," which we believe is due to the tests being applied to youth basketball players in a sports academy, rather than to general school students in physical education classes.

Matulaitis et al. (2020) also used the same tests with youth basketball players. Their average results were 4.2 seconds for the "20m run" and 4.87 seconds for the "20m dribbling run." Again, the difference in the linear speed test was minimal, but the difference was greater in the dribble test. We believe this is for the same reason explained above.

According to the authors, the dribble deficit gives insight into dribbling speed independent of an athlete's sprinting ability (Conte et al., 2020). The dribble deficit is measured as the difference between the results of the tests without and with the ball. According to the authors, this metric helps address the limiting factor of overall performance when assessing dribbling speed (Table 4). It provides a clearer understanding of dribbling ability by minimizing the influence of sprinting speed (Scanlan et al., 2018).

Table 4. *Characteristics of the dribble deficit*

20m run	Speed abilities
20m dribbling run	Speed + technical abilities
Dribble deficit	Technical abilities

The dribble deficit in the control group is 1.7 seconds, while in the experimental group it is 1.3 seconds. This indicates a more effective technique in the experimental group, resulting from the application of the CLA methodology.

CONCLUSION

In conclusion, this study provides evidence that the Constraint-Led Approach (CLA) can effectively enhance the technical efficiency of basketball dribbling in primary school students. By focusing on adaptability and decision-making rather than isolated technical drills, CLA fosters more functional skill development. These findings highlight the potential of CLA to be a meaningful alternative to traditional methods in school-based physical education.

This study is among the first empirical investigations to evaluate the effectiveness of CLA in real-world physical education classes at the primary school level. The findings support the integration of a constraint-led approach into basketball curricula for children, aiming to enhance motivation and foster technical autonomy in students. To increase the validity of the results, larger-scale experiments across different age groups and assessments of long-term skill retention are recommended.

Acknowledgments

The authors express their sincere gratitude to the management and teaching staff of the Private Primary School Dr. Petar Beron and the 64th Primary School Tsar Simeon Veliki for their cooperation during the research. We also thank the students for their active participation and willingness to share their results.

REFERENCES

Borukova, M. (2018). *Kontrol na sportnata podgotvenost na 13–14 godishni basketbolistki [Monitoring the sports preparedness of 13–14-year-old female basketball players]*. Bolid Ins.

Chow, J. Y., Davids, K., Button, C., & Renshaw, I. (2016). *Nonlinear pedagogy in skill acquisition: An introduction*, Routledge, London.

Conte, D., Scanlan, A., Dalbo, V., Zhi Gang, S., Smith, M., Bietkis, T., & Matulaitis, K. (2020). Dribble deficit quantifies dribbling speed independently of sprinting speed and differentiates between age categories in pre-adolescent basketball players. *Biology of Sport, 37*(3), 261–267. https://doi.org/10.5114/biolsport.2020.95734

Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of skill acquisition: A constraints-led approach*. Human Kinetics, Champaign, IL.

Matulaitis, K., Rudzitis, A., Barcaitis, M., Kreivyte, R., & Butautas, R. (2020). Different training programs of mini-basketball players have a different effect on physical and technical preparation. *Baltic Journal of Sport and Health Sciences, 1*(116).

Naydenova, K., Marinov, T., Borisov, L., Traykova, Ts., Kostova, N., Nancheva, D., Simeonova, D., Shalev, A., & Mihaylov, P. (2025). *Teoriya i metodika na fizicheskoto vazpitanie [Theory and methodology of physical education].* NSA Press.

Newell, K. M. (1986). Constraints on the development of coordination. In M. G. Wade & H. T. A. Whiting (Eds.), *Motor development in children: Aspects of coordination and control* (pp. 341–360). Martinus Nijhoff.

Renshaw, I., & Chow, J. Y. (2019). A constraint-led approach to sport and physical education pedagogy. *Physical Education and Sport Pedagogy, 24*(2), 103–116. https://doi.org/10.1080/17408989.2019.1574882

Renshaw, I., & Chow, J. (2018). A constraint-led approach to sport and physical education pedagogy. *Physical Education and Sport Pedagogy, 21*(1), 1–14. https://doi.org/10.1080/17408989.2015.1072506

Renshaw, I., Davids, K., Shuttleworth, R., & Chow, J. Y. (2010). Insights from ecological psychology and dynamical systems theory can underpin a philosophy of coaching. *International Journal of Sport Psychology, 41*(4), 580–602.

Roberts, W., Newcombe, D., & Davids, K. (2008). Application of a constraints-led approach to pedagogy in schools: Embarking on a journey to nurture physical literacy in primary physical education. *Physical Education and Sport Pedagogy, 24*(2), 162–175.

Scanlan, A., Wen, N., Spiteri, T., Milanovic, Z., Conte, D., Guy, J., Delextrat, A., & Dalbo, V. (2018). Dribble deficit: A novel method to measure dribbling speed independent of sprinting speed in basketball players. *Journal of Sport Sciences, 36*(2), 1–7. https://doi.org/10.1080/02640414.2017.1287933

Tsvetkov, V. (2009). *Teoriya i metodika na obuchenieto po basketbol [Theory and methodology of teaching basketball]*. NSA Press.

Corresponding author:
Petar Mihaylov
National Sports Academy "Vassil Levski"
21, Acad. Stefan Mladenov str.
Sofia, Bulgaria
E-mail: petar.mihaylov@nsa.bg

IV International Scientific Congress “Applied Sports Sciences”

PROCEEDING BOOK

Peer-Review Statement
All full-text papers included in this conference proceedings volume have undergone a rigorous peer-review process. Each submission was evaluated by at least two independent reviewers with academic expertise relevant to the topic of the paper. Reviews were conducted in accordance with established scholarly standards, ensuring the quality, validity, and originality of the published contributions. Only papers that met the required scientific and ethical criteria were accepted for publication.

Publication Ethics and Malpractice Statement
The editors of this conference proceedings volume are committed to upholding the highest standards of publication ethics, following the principles outlined by the Committee on Publication Ethics (COPE).

By submitting their manuscripts, all authors confirm that:

- their work is original and has not been previously published or submitted elsewhere;
- the research presented is conducted in accordance with accepted ethical standards;
- all sources used are properly cited;
- there is no plagiarism, data fabrication, or falsification;
- all authors have contributed substantially to the manuscript and approve its final version;
- any conflicts of interest have been disclosed.

The editors maintain responsibility for the integrity of the publication process, ensuring fair and unbiased review, confidentiality of submissions, and immediate action in cases of suspected misconduct. Any breaches of ethical standards will lead to correction, retraction, or other appropriate measures.

21–22 November 2025

Sofia, Bulgaria

IV International Scientific Congress "Applied Sports Sciences"

21–22 November 2025
Sofia, Bulgaria

PROCEEDING BOOK

EDITORS OF THE PROCEEDING BOOK:

Prof. Ognyan Miladinov, DSc
Assoc. Prof. Milena Kuleva, PhD
Assoc. Prof. Stefka Djobova, PhD

Design: Slavka Asenova, Svetla Kostova
Publisher: Scientific Publishing House NSA Press
ISBN (Online): 978-954-718-803-7