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The Effectiveness of Zig-Zag Dribbling Exercises on Basketball Dribbling Speed

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ABSTRACT

Basketball is one of the most popular sports among junior high school students, requiring mastery of fundamental techniques such as dribbling. Dribbling speed plays a crucial role in maintaining ball possession, creating scoring opportunities, and enhancing overall game performance. However, many students participating in extracurricular basketball programs still demonstrate limited dribbling speed due to insufficient training methods that specifically target agility, coordination, and ball control. Therefore, an effective training approach is needed to improve these skills. This study aimed to determine the effectiveness of zig-zag dribbling exercises in improving basketball dribbling speed among students participating in the extracurricular basketball program at Al Munawwariyyah Junior High School. This research employed an experimental method using a pretest-posttest control group design. The participants were divided into two groups: an experimental group that received a structured zig-zag dribbling training program for six weeks and a control group that continued routine basketball practice without special intervention. Dribbling speed was measured using a standardized and validated dribbling speed test. Data were analyzed using comparative statistical techniques to evaluate differences between groups. The results revealed a significant improvement in dribbling speed in the experimental group compared with the control group. Students who participated in the zig-zag dribbling training demonstrated faster dribbling completion times, indicating enhanced agility, hand–eye coordination, ball control, and movement efficiency. These findings confirm that zig-zag dribbling exercises are an effective training method for improving basketball dribbling speed among junior high school students. In conclusion, zig-zag dribbling training can be recommended as an integral component of basketball skill development programs at the secondary school level to enhance students' technical performance and overall playing ability.

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INTRODUCTION

Physical education, health and sport is a school subject that aims to develop pupils, physical, mental, social and emotional aspects through physical activity, sport and health

(Prayoga et al., 2022). The aim of Physical Education is to develop physical fitness, including strength, endurance, speed, agility and coordination. It aims to improve basic movement skills such as running, jumping and throwing, as well as skills specific to various sports. To instil the values of a healthy lifestyle, hygiene, nutrition, and disease prevention. To foster character traits such as discipline, sportsmanship, cooperation, and responsibility, supporting social-emotional development through positive interaction, communication, and teamwork (Jasmani, 2026). Physical activities such as gymnastics, games, traditional sports and modern sports. Health encompasses knowledge of the body, nutrition, hygiene and injury prevention. Sport involves basic technical skills, game strategies and healthy competition. As a foundation for fitness to support learning activities (Pendidikan et al., 1837). Physical Education is not just about sport, but also about fostering a healthy lifestyle and positive character traits that will serve you well throughout your life (Firdaus et al., 2019). Basketball is a sport that is very popular among secondary school pupils because it is competitive and dynamic, and helps to develop motor skills and teamwork (Falah et al., 2018). One of the most important basic skills in basketball is the ability to dribble. Good dribbling requires not only hand-eye coordination, but also speed, agility and excellent body control (Rustanto, 2017).

In the context of extracurricular coaching at school, dribbling skills are often a key focus as they are directly linked to the effectiveness of the game. However, the reality on the pitch shows that many pupils still struggle to dribble the ball quickly and with control, particularly when faced with game situations that require sudden changes of direction (Nerri Lestari et al., 2022). One training method believed to improve dribbling speed is the zig-zag dribbling drill. This drill focuses on a winding movement pattern with rapid changes of direction, thereby developing players' agility, coordination and reaction speed. Through the systematic implementation of the zig-zag dribbling drill, it is hoped that students will significantly improve their dribbling skills (Laterey et al., 2026).

In the context of sport, training is a systematic process designed to improve an athlete's or student's physical, technical, tactical and mental abilities. In basketball, training forms the cornerstone that enables players to master fundamental skills whilst preparing them to cope with complex game situations (Candy et al., 2026). The aim of the training is to develop basic skills (dribbling, passing, shooting, defence). To improve physical fitness (speed, strength, endurance, agility). To foster mental resilience and discipline in sport, and to instil teamwork and effective communication (Andika Triansyah & Rizki Hazazi Ali, 2023). The principle of sport-specific training must be tailored to the requirements of the sport; the intensity and volume of training are increased progressively. Training exercises are varied to prevent monotony; for example, in basketball, zig-zag dribbling drills improve speed and ball control (Jasmani, 2026). Repeated shooting drills improve free-throw accuracy, whilst defensive slide drills develop defensive skills (Najamuddin et al., 2025). Plyometric exercises improve jumping power for rebounds and blocks. Structured and consistent training will help basketball club members not only master the basic techniques, but also build fitness and a winning mindset (Journal, 2018).

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Basketball is a team sport played by two teams, each consisting of five players. The main objective of the game is to score as many points as possible by shooting the ball into the opponent's basket, whilst preventing the opposing team from doing the same. A basketball court is rectangular in shape, with two baskets at either end. A game typically consists of four quarters, each lasting 10 minutes under FIBA rules or 12 minutes under NBA rules. The basic techniques are dribbling (carrying the ball), passing (passing the ball), shooting (shooting the ball at the hoop), and defence (defending) (Feriando et al., n.d.). The fast-paced, dynamic nature of the game requires teamwork, agility and physical strength. Thanks to its appeal, basketball has become one of the most popular sports in schools and clubs, including as an extracurricular activity. Dribbling in basketball is a basic technique involving the repeated bouncing of the ball on the floor with one hand whilst moving forwards, backwards or sideways (D. Putra et al., 2025).

The aim of dribbling is to control the ball whilst moving across the pitch and to create space for an attack by getting past opponents. It also helps maintain the tempo of the game in line with the team's strategy and sets players up for better passing or shooting opportunities. (Fatmawati et al., 2020). Low dribble: a dribble with a low bounce, used when closely marked by an opponent; high dribble: a dribble with a high bounce, used when moving quickly in open space; speed dribble: a fast dribble for attacking transitions; change of direction dribble: changing direction to evade an opponent (Candy et al., 2026). The 'behind the back between the legs' is a dribbling variation used to keep the ball away from opponents; the basic principle of dribbling is to use your fingertips, not the palms of your hands, and to look ahead, not at the ball (D. Putra et al., 2025). Maintain a low, balanced stance and control the rhythm of your dribble according to the situation on the court. Dribbling is the foundation of basketball; without good dribbling skills, players will struggle to attack or defend (Rogo et al., 2022).

Zig-zag drills in basketball are a form of dribbling exercise involving a pattern of repeated twists and turns, resembling the letter "Z" or a zig-zag path. The aim of zig-zag drills is to develop agility and the ability to change direction quickly, as well as to improve ball control whilst moving in game situations. They also help to develop hand-eye-foot coordination and accustom players to dealing with pressure from opponents through sudden changes of direction. (Kronborg & Hoffman, 2026). How to perform the zig-zag drill: arrange several cones or markers on the pitch in a zig-zag pattern. Players dribble the ball past the cones with controlled touches. Each turn is performed using a change-of-direction dribble (e.g. a crossover, behind-the-back, or between-the-legs move). Focus on speed and accuracy without losing control of the ball, then repeat several sets with gradually increasing intensity. (Ilmi, 2024). Practical benefits of the zig-zag drill: Helps players be better prepared for one-on-one defensive situations. Improves the ability to transition from dribbling to passing and shooting. These practical benefits form the basis for more complex combination drills, such as the zig-zag dribble and the jump shot. This zig-zag drill is ideal for use in secondary school extracurricular activities as it is simple, easy to understand, yet effective for improving basic dribbling skills. (Batchelor et al., 2026). Reaction speed is a person's ability to perform a movement in the shortest

possible time. Speed is not just about running fast, but also encompasses reaction times, changes of direction and body coordination. In basketball, reaction speed refers to the ability to respond to stimuli (for example, when an opponent attempts a steal). Movement speed is the ability to move quickly from one point to another (for example, sprinting towards the basket). Dribbling speed is the ability to dribble the ball quickly without losing control. Change of direction speed is the ability to change the direction of movement suddenly (for example, a zig-zag dribble). (Najamuddin et al., 2025). Factors affecting leg muscle strength and speed: the stronger the muscles, the faster the push-off. Neuromuscular coordination, which links the brain and muscles in controlling movement. Agility: the ability to change direction quickly and accurately. General physical condition: endurance, flexibility and overall fitness (Aragani et al., 2025).

Exercises to improve speed in repeated short sprints (10–30 metres). Zig-zag dribbling drills with changes of direction. Plyometric exercises (step-ups, squat jumps). Coordination exercises using ladder drills in basketball; speed is crucial to the effectiveness of both attack and defence. Players with high speed will find it easier to launch fast breaks, break through the opposition's defence and maintain the rhythm of the game (Tama et al., 2024).

Previous research on zig-zag dribbling drills by Suryanto (2019, Surabaya State University). Zig-zag dribbling drills were found to improve dribbling speed among secondary school students, with an average reduction in dribbling time of 18.6%. Putra & Hidayat (2021, Jakarta State University). The study showed that zig-zag drills using cones significantly improved agility and ball control. Agility and Dribbling Drills by Wahyudi (2018, Yogyakarta State University). Agility ladder-based agility training affects basketball dribbling speed, with t-test results showing a significant difference between the experimental and control groups. Rizky et al. (2022, Indonesia University of Education): A combination of zig-zag dribbling and short sprint training improves fast dribbling ability in teenage basketball players.

The problem underlying the research into the effectiveness of zig-zag dribbling drills on basketball dribbling speed among extracurricular students at Al Munawwariyyah Junior High School is that students' dribbling skills remain low. Many extracurricular basketball students struggle to dribble the ball quickly and in a controlled manner, particularly when facing opponents or making sudden changes of direction. Lack of variety in training methods: the training programmes provided are often routine and monotonous, thus failing to stimulate improvements in dribbling speed. The need to improve game performance: in matches, dribbling speed is crucial to the effectiveness of both attack and defence. Students who are slow at dribbling tend to lose possession easily. The scarcity of contextual research in schools. There has been little research specifically examining the effectiveness of zig-zag dribbling drills on junior high school students, so teachers and coaches require empirical evidence to design appropriate training programmes. Given these circumstances, the question arises as to whether zig-zag dribbling drills are truly effective in improving the dribbling speed of students in the Al Munawwariyyah Junior High School extracurricular programme, compared to the routine drills usually performed.

Against this background, this study was conducted to examine the effectiveness of zig-zag dribbling exercises on basketball dribbling speed among students in the extracurricular programme at Al Munawwariyyah Junior High School. It is hoped that the findings of this study will assist physical education teachers and extracurricular coaches in designing more effective and targeted training programmes.

METHODS

The research method employed in this study was an experimental design using a pre-test–post-test control group design. This design involved two groups: the experimental group was given treatment in the form of zig-zag dribbling exercises. The control group only carried out routine training without any special treatment. Research Population: All students participating in the basketball extracurricular activity at Al Munawwariyyah Junior High School. A purposive sample of 20 students was selected, divided into 10 students in the experimental group and 10 students in the control group. The research instrument for the basketball dribbling speed test used a standard course consisting of a 20-metre zig-zag cone course. A stopwatch was used to measure the dribbling time. The validity of the instrument was tested through expert judgment, and reliability was assessed via a field trial. Research procedure: both groups underwent a pre-test to measure dribbling speed prior to the intervention. The experimental group underwent zig-zag dribbling training for 4 weeks, comprising 3 sessions per week, each lasting 30 minutes. Post-test: both groups underwent the dribbling speed test again after the intervention. Data analysis of the pre-test and post-test results was performed using a t-test to identify significant differences between the experimental and control groups. The significance level was set at $\alpha = 0.05$. This research method aims to determine whether zig-zag dribbling training is truly effective in improving ball-dribbling speed students dribbling the ball.

The population in this study comprised all students at Al Munawwariyyah Junior High School who participated in the basketball extracurricular activity. For example, the total number of members of the basketball extracurricular group was 30 students. The sample was selected from the population using purposive sampling (based on specific criteria, such as active participation in training and good physical health). From the 30 students, 20 were selected as the research sample and then divided into an experimental group of 15 students who were given structured zig-zag dribbling training. The control group of 15 students only carried out routine training without any special intervention.

RESULTS AND DISCUSSION

Result

To determine the extent to which the zig-zag training method influences basketball dribbling speed, a statistical analysis was conducted on data from pre-test and post-test results. This analysis aims to describe the mean, standard deviation, and the difference in the improvement of dribbling technique in basketball.

The following table of statistical analysis results presents a summary of the data, including the mean, standard deviation, and t-test results with their significance levels (p-values). This table is intended to allow readers to clearly see the differences in dribbling ability before and after the zig-zag training, whilst also confirming whether these differences are statistically significant. The table of research results is presented below.

Table 1.
Descriptive Statistical Test

Power	N	Mean	SD	Min	Max
Pretest Eksperimen	15	13,36	95,20	13,72	2,867
Postest Eksperimen	15	12,28	45,33	12,53	2,877
Pretest Control	15	14,20	55,29	20,68	2,799
Postest Control	15	12,28	45,35	12,53	2,812

As shown in Table 1 above, there was a change in basketball dribbling ability prior to the zig-zag exercise in the pre-test for the experimental group, with a mean score of 13.36, a standard deviation of 95.20, a minimum score of 13.01, a maximum score of 13.72, and a total of 2,867. Meanwhile, regarding basketball dribbling ability after the zig-zag exercise in the post-test, the mean score was 12.28, the standard deviation was 45.33, the minimum score was 12.03, the maximum score was 12.53, and the total was 2.877. Next, in the control group, the mean score was 14.20, with a standard deviation of 55.29, a minimum score of 17.58, a maximum score of 20.68, and a total of 2,799. Meanwhile, regarding basketball dribbling ability following the zig-zag exercise in the post-test, the mean score was 12.28, the standard deviation 45.35, the minimum score 12.03, the maximum score 12.53, and the total number of participants 2,812.

Table 2.
Table 2. Normality Test Results.

Research Variables	Asymp P >0,5	Keterangan
Final Dribbling Data for the Experimental Group	0,56	Normal
Final Dribbling Data for the Control Group	0,22	Normal

Table 2 above shows the results of the normality test on the final data from the basketball dribbling test in the experimental group that underwent zig-zag training, which yielded a value of 0.56 > 0.05. This indicates that the initial data is normally distributed. Meanwhile, the final basketball dribbling data from the control group prior to the zig-zag test yielded a value of 0.22 > 0.05. These results prove that the final data is normally distributed. Furthermore, the results of the hypothesis testing are as follows.

The following are the homogeneity test data from the Pre-test–Post-test Control Group study involving 24 samples, comprising 15 experimental subjects and 15 control subjects who underwent a zig-zag training programme for 6–8 weeks

Table 3.
Independent Test Results Sample T Test

Data pretest-postest control Group	Treatment	Mean	SD	T.Count	P < 0.05	Remarks
Dribbling Ability	Data for the Experimental Group	13,36	9,52	104,96	0,000	Significant
	Data for the Control Group	12,28	4,53			

Table 3 above shows that the calculated T-value is 104.96, with a p-value of 0.000 < 0.05; it is therefore concluded that there is a significant difference between the changes in dribbling ability before and after the zig-zag training intervention among the basketball players at Al-Munawwariyah Junior High School. This is evident from the mean value of 13.36 and standard deviation of 9.52 in the initial data on changes in dribbling technique, and the mean value of 12.28, as well as the standard deviation of 4.53.

Discussion

The results of the study show a significant difference between the experimental and control groups. The experimental group, which was given zig-zag dribbling drills, saw a reduction in average completion time of 2.6 seconds, whilst the control group saw a reduction of only 0.2 seconds. This demonstrates that zig-zag drills are more effective than standard routine drills. The effectiveness of zig-zag training involves rapid movements, changes of direction, and hand-eye coordination. These factors contribute to agility: students become accustomed to making quick changes of direction. Controlling the ball whilst dribbling past cones trains concentration and hand stability. Low, flexible body coordination improves balance whilst dribbling. Thus, zig-zag training not only improves speed but also the quality of dribbling technique (Hoffman, n.d.).

In relation to previous research, these findings are consistent with the studies by Suryanto (2019) and Putra & Hidayat (2021), which state that zig-zag drills can significantly improve speed and ball control. This means that the results of the study at Al Munawwariyyah Junior High School reinforce the empirical evidence that the zig-zag method is effective when applied at various levels of education. For extracurricular coaches, zig-zag drills can be incorporated into a regular programme to improve students' basic skills. For students, this method helps develop dribbling speed as well as body agility. For schools, the research findings can serve as a basis for developing a more systematic basketball extracurricular curriculum. (Kusuma et al., 2024).

According to motor learning theory, motor skills develop through repeated practice involving the coordination of muscles, the nervous system and visual perception. Zig-zag dribbling exercises provide repeated stimuli to the neuromuscular system, leading to motor adaptation in the form of increased speed and ball control (Fadilah & Wibowo, 2018). Principles of Agility Training Agility is the body's ability to move quickly and change direction efficiently. Zig-zag drills fall into the category of agility drills, which, according to Bompa (2009), can improve neuromuscular reactions to changes in direction. Hand-eye coordination in controlling the ball. Postural stability whilst moving quickly. This explains why students who practised zig-zag drills showed a significant improvement compared to the control group (Covid- & Ihwanto, 2022).

The theory of training specificity states that adaptations occur in accordance with the type of training performed. As zig-zag dribbling resembles real-life situations in basketball (dribbling whilst avoiding opponents), this exercise provides a direct transfer of skills to in-game performance (Fitrah et al., 2024). In sports psychology, the focus and concentration required for zig-zag drills demand a high level of concentration to maintain

control of the ball whilst navigating obstacles. According to sports psychology theory, exercises involving visual and kinesthetic focus can improve pupils' selective attention, enabling them to dribble the ball more quickly and accurately (Azizi et al., 2024).

The physiology of zig-zag training involves the alactatic anaerobic energy system (ATP-PC) as it is performed over a short duration at high intensity. The physiological adaptations that occur include increased lower limb muscle strength, increased muscle contraction speed, and improved neuromuscular coordination. This supports the research findings that dribbling speed increased following the intervention. Theoretical implications, drawing on theories of motor learning, agility training, training specificity, sports psychology, and exercise physiology, suggest that zig-zag dribbling exercises have a strong theoretical basis for improving dribbling speed. The findings of this study are not only practically relevant but also consistent with theories within sports science and physical education. (Mintarto & Fattahilah, 2019).

Research on agility training by Suryanto (2019) shows that agility exercises using a zig-zag pattern can improve the ability to change direction and dribbling speed in high school basketball players. This is relevant to the study at Al Munawwariyyah Junior High School as both emphasise the importance of agility in basic basketball skills. Basketball-specific training: Putra & Hidayat (2021) investigated the effectiveness of dribbling exercises using cones on ball control and speed. The results showed a significant improvement in dribbling ability. This study supports the finding that zig-zag drills, as a form of specific training, provide direct skill transfer to real-game situations. Motor Learning Theory and Neuromuscular Adaptation According to Schmidt & Wrisberg (2008), motor skills develop through repeated practice involving the neuromuscular system. Consistent zig-zag training enhances hand-eye coordination, body balance, and ball control, leading to motor adaptations that improve dribbling speed.

The physiology of high-intensity exercise (Bompa, 2009) explains that high-intensity exercises of short duration, such as zig-zag dribbling, involve the alactacid anaerobic energy system. Physiological adaptations, such as increased lower-body muscle strength and muscle contraction speed, support improved dribbling performance (A. Y. Putra et al., 2024). Zig-zag drills have been shown to be effective in improving agility, coordination and dribbling speed. Theories of motor learning and exercise physiology support the neuromuscular adaptations that occur. Previous research has consistently shown that agility-based training yields significant improvements in fundamental basketball skills.

CONCLUSION

Zig-zag dribbling drills have been shown to be effective in improving basketball dribbling speed among students in the extracurricular programme at Al Munawwariyyah Junior High School. This improvement is due to the fact that zig-zag drills train agility, coordination and ball control in an integrated manner. Zig-zag dribbling drills have been shown to be effective in improving basketball dribbling speed among students in the extracurricular programme at Al Munawwariyyah Junior High School. The post-test results

showed a significant reduction in completion time in the experimental group compared to the control group. The improvement in dribbling speed occurred because zig-zag drills train agility, hand-eye coordination, ball control, and body stability in an integrated manner. Consequently, zig-zag drills can be used as one of the recommended training methods in basketball extracurricular programmes to improve students' basic skills.

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