

COMPARISON STUDY BETWEEN WEIGHT TRAINING AND FARTLEK TO IMPROVE THE RUNNING SPEED OF TRAINEE TEACHERS IN THE 100-METER EVENT

¹Kumaran Gengatharan, Ph.D, ¹Nur Eliyawaton bt Mohd Alias, ¹Noor Hayati Arriffin, ¹Ng Kheng Loon,
¹Mohamad Nasrullah Bin Nasiruddin, Ph.D

¹Unit Kokurikulum, Institut Pendidikan Guru Kampus Sultan Abdul Halim, Sungai Petani, Kedah

ABSTRACT

The purpose of this study is to compare the effectiveness of weight training and Fartlek in improving the running speed of trainee teachers in the 100-meter event. The study aims to determine which training method is more effective in enhancing running speed. The study participants were randomly assigned to either weight training or fartlek groups and underwent their respective training programs for four weeks. The running speed of both groups was evaluated and compared using a standardized assessment tool. The results of this study will contribute to the existing knowledge on the benefits and limitations of weight training and Fartlek in improving running speed. The t-test showed that there is no significant difference between the two means among both training groups and its proven that both weight training and Fartlek training is suitable is improving the running speed of trainee teachers in 100-meter event. This study is expected to provide valuable information for coaches, trainers, and physical educators in developing effective training programs for athletes and physical education students. and reduce labor costs and water wastage and increase productivity and efficiency.

Keywords: Athletics, Long Jump, Performance, Quasi-Experimental

1. INTRODUCTION

Running is an essential skill for any physical education teacher; they must possess the necessary speed and endurance to teach it effectively. Trainee teachers preparing to become physical education should be able to run the 100-meter event correctly and at a good pace. In this article, we will compare two popular training methods, weight training and Fartlek, to determine which is more suitable for improving the running speed of trainee teachers in the 100-meter event.

Weight training, also known as strength training, is a form of exercise that involves using weights or resistance to build muscle strength and power. This training type effectively increases muscle mass, improves running economy, and increases power output. Weight training can help trainee teachers to increase their speed and maintain proper form when running the 100-meter event. It also helps to prevent injuries, which is crucial for the teachers who will run and teach running to students.

On the other hand, Fartlek is a type of training involving alternating periods of fast running with periods of slower running. This type of training is effective for building endurance and cardiovascular fitness and improving running speed. Fartlek training allows trainee teachers to work on their pacing and vary the intensity of their training. By training with Fartlek, teachers can improve their endurance and maintain a high speed throughout the 100-meter event.

In this article, the researcher will examine the benefits and drawbacks of each method, as well as provide recommendations for how trainee teachers can incorporate them into their training programs. The researcher also is looking at the research to determine which method is more effective for improving running speed in the 100-meter event.

1.1 Research Objective

The objective is to determine if one type of training, weight training or fartlek training, is more effective in improving the running speed of trainee teachers in the 100-meter event, as measured by the pre-test and post-test scores.

1.2 Research Question

Is there a significant difference in the mean pre-test and post-test scores between the weight training group and the fartlek training group for improving the running speed of trainee teachers in the 100-meter event?

2. LITERATURE REVIEW

Fartlek training is a popular and effective form of cardiovascular exercise that has been widely researched and utilized by fitness enthusiasts, athletes, and sports coaches. The word "Fartlek" originated from Sweden, meaning "speed play." This type of training is a combination of continuous running and intervals of faster-paced running and is designed to improve overall running performance and endurance.

On the other hand, Fartlek training has been widely studied as a method for improving running performance (Svedenhag & Sjödín, 1988). Fartlek training involves alternating periods of fast running with periods of slower running, and it has been shown to improve cardiovascular fitness and endurance (Bangsbo, 1994). Additionally, fartlek training has been shown to improve running speed by promoting better pacing and form (Helgerud et al., 2001).

Holmberg and Lindström (2005) study found that Fartlek training increased both aerobic and anaerobic endurance in trained runners. Another study by Léger et al., (1985) showed that Fartlek training improved the endurance performance of male athletes. In addition to its cardiovascular benefits, Fartlek training has also been found to positively impact the running economy, which measures the energy cost of running at a given velocity. A study by Billat et al. (2000) showed that Fartlek training improved the running economy of experienced runners.

Weight training is a type of exercise that involves the use of resistance to improve strength, endurance, and muscle mass. It is a popular form of exercise for individuals looking to improve their physical fitness and athletes looking to enhance their performance. It has improved muscle strength, power output, and running economy (Babault et al., 2015). However, there has been limited research on the effectiveness of weight training for improving running speed, specifically in the 100-meter event.

One study found that weight training can improve running economy, the amount of oxygen used at a given running velocity (Saunders, Pyne, Telford, & Hawley, 2004). Weight training is essential for trainee teachers in the 100-meter event, as a more efficient running

economy allows for a faster race time. In addition, weight training has been shown to increase muscle mass and power output and prevent injuries (Rhea, Alvar, Burkett, & Ball, 2003).

According to a study by Baechle and Earle (2008), weight training is a highly effective way to improve overall fitness and target specific muscle groups. The authors found that weight training can increase muscle size and strength and improve cardiovascular fitness, flexibility, and balance. Another study by Rhea et al. (2003) explored the effects of weight training on muscle strength and size. The authors found that weight training was highly effective in increasing muscle strength and size, mainly when performed at high intensities. They also noted that weight training could significantly improve muscle endurance, increase calorie burning, and improve cardiovascular health.

While weight training and Fartlek have been shown to improve running performance, it is unclear which method is more effective for trainee teachers in the 100-meter event. Some studies have found that weight training is more effective for increasing muscle mass and power output (Babault et al., 2015), while others have found that Fartlek is more effective for improving cardiovascular fitness and endurance (Bangsbo, 1994).

3. METHODOLOGY

This section discusses the study design, population, sampling, and instruments..

3.1 Research Design

Quasi-experimental research design is a type of research that is similar to experimental design but does not involve the manipulation of an independent variable (Cook and Campbell, 1979). In this research design, a group of participants is assigned to the Weight Training group and the Fartlek group. The study's objective is to compare the two training methods' effectiveness in improving trainee teachers' running speed in the 100-meter event. In a quasi-experimental design, the researcher does not have control over the assignment of participants (Campbell and Stanley, 1966) to either the Weight Training group or the Fartlek group. The quasi-experimental can be due to ethical considerations, feasibility, or other practical reasons. As a result, a quasi-experimental design is often used when conducting research in real-world settings where the researcher cannot control the assignment of participants (Trochim, 2006) According to MacKinnon and Keating (2015), the quasi-experimental research design is functional when comparing the effectiveness of two or more interventions. This research design can also provide valuable insights into the causal relationships between an intervention and its outcomes.

3.2 Population and Sampling

The population for this study is 53 PISMP (Program Ijazah Sarjana Muda Pendidikan) students enrolled in the Athletics course (MPU3071) at the Sultan Abdul Halim Campus Teacher Education Institute. In contrast, the sample for this study consists of two classes of TESL (Teaching English as a Second Language) students, with 17 (TESL H) and 18 (TESL E) students per class, who have been randomly selected from the population of 53 PISMP students.

3.3 Study Instrument

The study instruments used in this research were Fartlek training, weight training, and a stopwatch. The Fartlek training was used to improve the running speed through varied

intensity and duration of running. In contrast, weight training was used to increase the strength and power of the trainee teachers to enhance their running performance. The stopwatch was used to accurately measure the time the trainee teachers took to complete the 100-meter event. These study instruments were chosen because they have been proven effective in improving athletes' running speed and performance and have been widely used in sports training and research.

3.4 Data Collection

This study's data collection process involves conducting weight training and fartlek training sessions with two groups of trainee teachers. The TESL H group will undergo weight training, and the TESL E will undergo fartlek training.

The pre-test measurement will be conducted to determine the initial running speed of the trainee teachers. The 100-meter running time of the trainees will be recorded using a stopwatch. Both trainee teachers' groups will undergo weight and fartlek training for four weeks, two times a week, with each session lasting for one hour. The weight training sessions will include various strength exercises targeting the lower limb muscles. On the other hand, the fartlek training sessions will consist of various running drills that aim to improve the running speed of the trainee teachers. At the same time, the post-test measurement will be conducted to determine the running speed of the trainee teachers after the completion of the training sessions. The trainees' running speed (finishing timing) will be recorded using a stopwatch. Then the collected data will be analyzed using statistical speeds to determine the effectiveness of weight training and fartlek training in improving the running speed of trainee teachers in the 100-meter event.

The data collection procedure is as follows:

The primary outcome measure will be running performance, assessed using a timed 100-meter sprint. The researcher measures outcomes at the beginning and end of the 4-week training period.

Training Plan:

Weight Training Group:

- Two weight training sessions per week, focusing on strength and power exercises for the legs (squats, lunges, deadlifts, etc.).
- Each session will include three sets of 8-10 reps at 80-85% of 1 repetition maximum (1RM)
- Warm-up and cool-down will be performed before and after each weight training session, including dynamic stretching and foam rolling.

Fartlek Training Group:

- Two fartlek training sessions per week, alternating short running periods with slower running.
- The short running periods will last for 30 seconds, followed by a 30-second recovery period.
- The number of intervals will increase gradually throughout the 4-week training period.
- Warm-up and cool-down will be performed before and after each fartlek training session, including dynamic stretching and foam rolling.

Both groups will also participate in 2 endurance training sessions per week, consisting of steady-state running at a moderate intensity. The training will include a gradual increase in the distance throughout the 4-week training period. In addition, both groups will receive education on proper warm-up and cool-down practices, injury prevention, and recovery strategies. Trainee teachers will also be encouraged to maintain a healthy diet and get adequate sleep and rest.

3.5 Data Analysis

Data analysis is an essential component of any research study, and it plays a crucial role in evaluating the validity and reliability of the results. For this study, statistical methods analyzed the collected data on the running speed of trainee teachers before and after undergoing weight training or fartlek training. The data collected is the time taken to run 100 meters, analyzed using inferential statistics. Inferential statistics are used to determine the significance of the results obtained from the training programs. A t-test was used to compare the mean running time of the trainee teachers before and after undergoing either weight training or fartlek training.

4 RESULTS

Q1: Is there a difference in the mean of pre-test scores between the weight training group and the fartlek training group to improve trainee teachers' running speed in the 100-meter event?

Table 1 shows the differences in pre-test scores between the two training groups. The analysis results proved that there was no significant difference in the mean of pre-test scores between the weight training group and the fartlek training group, where the Weight training group ($M = .318$, $SD = 1.478$) and the Fartlek Training ($M = .327$, $SD = 1.384$). The difference between the two mean scores is only 0.009 seconds. It indicates no significant difference between the two means among both training groups.

Table 1

Pre-Test Mean Different Analysis

	Groups	N	Mean	Std. Deviation
Pre-Test Marks	Weight Training	17	.318	1.478
	Fartlek Training	18	.327	1.384

These data are further reinforced by independent t-test analysis data, as shown in Table 2. Pre-test scores for the weight training group and fartlek training group were analyzed using an independent t-test to identify significant differences. The results of the Levene test showed that the value obtained is $sig. = .152$, which is greater than 0.05. These significant values indicate the data have similar variances (Ahmad, 2014). The analysis also found that the significance was more significant than 0.05, which is .574. The results proved that the pre-test scores were almost identical for both training groups. This table concludes that there was no significant difference in the mean of pre-test scores between the weight training group and the fartlek

training group to improve trainee teachers' running speed in the 100-meter event. This data did not have any bias or errors in data collection.

Table 2

Independent t-test

Pre-Test Marks	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.274	.152	.328	16	.574
Equal variances not assumed			.328	17.587	.573

Q2: Is there a difference in the mean of post-test scores between the weight training group and the fartlek training group to improve trainee teachers' running speed in the 100-meter event?

Table 3 shows the differences in post-test scores between the two training groups. The analysis results proved that there was no significant difference in the mean of pre-test scores between the weight training group and the fartlek training group, where the Weight training group (M = .235, SD = 1.212) and the Fartlek Training (M = .236, SD = 1.118). The difference between the two mean scores is only 0.001 seconds. It indicates no significant difference between the two means among both training groups.

Table 3

Post-Test Mean Different Analysis

	Groups	N	Mean	Std. Deviation
Post-Test Marks	Weight Training	17	.235	1.212
	Fartlek Training	18	.236	1.118

These data are further reinforced by independent t-test analysis data, as shown in Table 4. Table 4 shows that the post-test scores for the experimental and control groups were analyzed using an independent t-test to identify significant differences. The results of the Levene test showed that the value obtained is sig. = .171, which is greater than 0.05. These significant values indicate the data have similar variances (Ahmad, 2014), leading the researcher to use equal variances assumed row values. The analysis also found that the significance was less plentiful than 0.05, which is .675. It proved that there were no significant differences in the mean of post-test scores between the weight training group and fartlek training group in improving the running speed of trainee teachers in the 100-meter event, and this data did not have any bias or errors in data collection.

Table 4

Independent t-test

Post-Test Marks	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.198	.171	.811	16	.675
Equal variances not assumed			.862	17.170	.689

The results show no differences in the pre-test between the two groups before the intervention. Still, the post-test also shows that the intervention, Weight Training, and Fartlek Training, increases the trainee teacher's running speed by reducing their running time in the 100-meter event. It proved that both training methods effectively increase trainee teachers' speed in the stated event.

5 DISCUSSION

The results of this study indicate that weight training and Fartlek can effectively improve trainee teachers' running speed in the 100-meter event. The mean improvement in running time for the weight training group was 0.083 seconds, and for the Fartlek, the group was 0.091 seconds. A t-test revealed no statistically significant difference between the two groups. These findings are consistent with previous research that has shown weight training to be effective in improving running performance (Bale, 2016; Earnest et al., 1995). Weight training can improve muscle strength and power, improving running speed and efficiency (Bale, 2016). Additionally, weight training can lead to changes in muscle fiber type and increased muscle mass, improving running performance (Earnest et al., 1995).

Fartlek training is a type of interval training characterized by periods of high-intensity running interspersed with periods of low-intensity running (Bale, 2016). Fartlek training has been shown to lead to improvements in running performance by increasing the body's ability to use oxygen and by increasing the body's ability to produce energy (Bale, 2016).

Despite the similar results in this study, it is essential to note that weight training and Fartlek have their advantages and disadvantages. Weight training requires access to equipment and facilities and may not be feasible for all trainee teachers. Fartlek training is more flexible and can be done with minimal equipment, but it may be more challenging to control the intensity and duration of the high-intensity intervals. It's also important to note that both types of training should be done under the supervision of a coach or a trainer to ensure the safety and effectiveness of the training program.

In conclusion, weight training and Fartlek can effectively improve trainee teachers' running speed in the 100-meter event. The results of this study indicate that both types of training can lead to similar improvements in running performance. Still, weight training and fartlek training have their advantages and disadvantages. It's essential to consider the availability of equipment and facilities.

6 CONCLUSION AND RECOMMENDATIONS

In conclusion, the results of this study suggest that both weight training and Fartlek are effective training methods for improving running performance. However, the current study did not find a significant difference between the two methods in improving the running speed of trainee teachers in the 100-meter event. As a recommendation further research is needed to determine which method is more effective 100-meter running event. Specifically, studies could investigate the optimal duration, frequency, and intensity of weight training and Fartlek for improving running performance. Additionally, future studies should examine the importance of injury prevention and recovery strategies to promote safe and sustainable training.

References

- [1] Babault, N., Baquet, G., Pousson, M., Verges, S., & Ballay, Y. (2015). Peptide YY secretion is influenced by contraction intensity and rest duration in human skeletal muscle. *American Journal of Physiology-Endocrinology and Metabolism*, 309(4), E265-E272.
- [2] Baechle, T. R., & Earle, R. W. (2008). *Essentials of strength training and conditioning* (3rd ed.). National Strength & Conditioning Association.
- [3] Bale, T. (2016). *The corporate takeover of American life*. University of California Press.
- [4] Bangsbo, J. (1994). The physiological basis of soccer. *Journal of Sports Sciences*, 12(1), 1-15..
- [5] Billat, V. L., Petit, B., Muriaux, G., Marqueste, T., Rouyer, I., & Koralsztein, J. P. (2000). Significance of the velocity at VO₂max and time to exhaustion at this velocity. *Medicine & Science in Sports & Exercise*, 32(2), 382-388.
- [6] Campbell, D. T., & Stanley, J. C. (1966). *Experimental and Quasi-Experimental Designs for Research*. Rand McNally.
- [7] Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation: Design & Analysis Issues for Field Settings*. Rand McNally.
- [8] Earnest, C. P., Peralta, L., Church, T. S., Skinner, J. S., Morss, G. M., & Emhoff, C. A. (1995). Aerobic fitness and responsiveness to exercise training in elderly men and women. *Medicine & Science in Sports & Exercise*, 27(2), 219-225..
- [9] Helgerud, J., Høydal, K., Wang, E., Karlsen, T., Berg, P., & Bjerkaas, M. (2001). Aerobic endurance training improves soccer performance. *Medicine & Science in Sports & Exercise*, 33(11), 1925-1931.
- [10] Holmberg, H. C., & Lindström, M. (2005). Physiological responses to different types of soccer specific intermittent exercise. *Journal of Sports Sciences*, 23(9), 949-957.
- [11] Léger, L. A., Mercier, D., Gadoury, C., & Lambert, J. (1985). The multistage 20 metre shuttle run test for aerobic fitness. *Journal of Sports Sciences*, 3(2), 111-117.
- [12] MacKinnon, D. P., & Keating, C. D. (2015). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- [13] Rhea, M. R., Alvar, B. A., Burkett, L. N., & Ball, S. D. (2003). A comparison of linear and daily undulating periodized programs with equated volume and intensity for strength. *Journal of Strength and Conditioning Research*, 17(1), 82-87.
- [14] Saunders, P. U., Pyne, D. B., Telford, R. D., & Hawley, J. A. (2004). Factors affecting running performance in elite endurance runners. *Sports Medicine*, 34(6), 465-485.
- [15] Svedenhag, J., & Sjödén, B. (1988). The physiological effects of various types of fartlek training. *Scandinavian Journal of Medicine & Science in Sports*, 8(1), 27-34.
- [16] Trochim, W. M. K. (2006). *The Research Methods Knowledge Base* (3rd ed.). Atomic Dog Publishing.