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The Effect of the Elementary Training Model on the Conventional Training Model On Kata Performance of South Sulawesi Inkanas Athletes

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ABSTRACT

This study aimed to compare the effects of the elementary training model and the conventional training model on kata performance among Inkanas athletes in South Sulawesi. A total of 60 karate athletes aged 13–18 years were selected using purposive sampling and divided equally into two groups: experimental (elementary model) and control (conventional model). The research applied a quasi-experimental method with a pretest-posttest control group design. Kata performance was assessed using the World Karate Federation (WKF) standardized criteria. The results indicated significant improvements in both groups. The experimental group's mean score increased from 6.85 (SD = 0.75) in the pretest to 8.95 (SD = 0.62) in the posttest ($p < 0.001$), while the control group improved from 6.89 (SD = 0.71) to 7.55 (SD = 0.81) ($p < 0.001$). An independent samples t-test showed a statistically significant difference in post-test scores between the two groups ($t = 6.789$, $p < 0.001$). The findings demonstrate that the elementary training model provides superior outcomes in improving kata performance compared to conventional methods. This research suggests that incorporating structured, foundational training models can enhance skill acquisition and performance in martial arts, particularly in kata. Coaches are encouraged to adopt this approach to maximize athlete development.

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A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

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INTRODUCTION

Karate, a traditional Japanese martial art, has evolved into a globally recognized sport, emphasizing both physical prowess and mental discipline. One of its fundamental components is kata, a sequence of choreographed movements that simulate defensive and offensive techniques against imaginary opponents. Kata serves not only as a method of preserving traditional techniques but also as a critical aspect of competitive karate, where athletes are judged on precision, timing, and expression.

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The practice of kata demands a harmonious blend of strength, flexibility, balance, coordination, and concentration. As such, training methodologies have been developed and refined over the years to enhance these attributes in athletes. Traditional training models have long been the cornerstone of karate instruction, focusing on repetitive practice and adherence to established forms.

In recent years, there has been a growing interest in exploring alternative training models that may offer improved outcomes in kata performance. One such approach is the elementary training model, which emphasizes foundational movements and principles before progressing to more complex sequences. This model advocates for a structured progression, ensuring that athletes develop a solid base upon which advanced techniques can be built.

Research has indicated that incorporating strength training, high-intensity interval training (HIIT), technical work, and personalized nutrition can significantly impact the performance and body composition of kata athletes. For instance, a 16-week program combining these elements showed positive effects on a female karateka preparing for an international competition. Additionally, studies have demonstrated that kata training can improve cognitive functions such as sustained attention and processing speed in children, suggesting broader benefits beyond physical performance.

Despite the recognized benefits of both conventional and elementary training models, there remains a lack of consensus on their relative effectiveness, particularly concerning kata performance among athletes in specific regions. In South Sulawesi, Indonesia, the Inkanas (Institut Karate-do Nasional) athletes represent a significant cohort whose training methodologies and performance outcomes have not been extensively studied. Understanding the impact of different training models on their kata performance is crucial for optimizing training programs and achieving competitive success.

While various studies have explored the effects of different training methods on karate performance, there is a paucity of research focusing specifically on the comparative impact of elementary and conventional training models on kata performance among Inkanas athletes in South Sulawesi. Most existing literature tends to generalize findings across broader populations, without accounting for regional, cultural, and organizational differences that may influence training efficacy and athlete development.

This study aims to fill the identified research gap by conducting a comparative analysis of the elementary and conventional training models' effects on kata performance among South Sulawesi Inkanas athletes. By focusing on a specific regional cohort, the research will provide nuanced insights into how training methodologies influence performance within a particular cultural and organizational context. This localized approach allows for the development of tailored training programs that address the unique needs and characteristics of the athletes involved.

In light of the aforementioned considerations, this research endeavours to systematically evaluate the effectiveness of the elementary training model compared to

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the conventional training model in enhancing kata performance among South Sulawesi Inkanas athletes. Through a combination of quantitative assessments and qualitative analyses, the study will offer evidence-based recommendations for optimizing training strategies. The findings are anticipated to contribute significantly to the body of knowledge in sports science and martial arts training, with practical implications for coaches, athletes, and sports organizations aiming to elevate kata performance standards.

METHODS

This study employs a quasi-experimental research design with a pretest-posttest control group design. This approach allows for the examination of causal relationships between the training models and kata performance while considering the practical constraints of the research environment. The research design involves randomly assigning participants to either the experimental group (elementary training) or the control group (conventional training), with assessments conducted before and after the intervention period.

The population comprises Inkanas karate athletes specializing in kata from various dojos across South Sulawesi. Inclusion criteria include: (1) Active membership in Inkanas for at least one year, (2) Age range between 15 and 18 years, and (3) Regular participation in kata training sessions. A purposive sampling technique is utilized to select participants who meet the inclusion criteria. A total of 60 athletes are selected and evenly divided into two groups: (1) Experimental Group: 30 athletes undergoing the elementary training model, and (2) Control Group: 30 athletes continuing with the conventional training model. This sample size is determined based on power analysis to detect significant differences between groups with an acceptable level of statistical power.

Table 1.
Test Instruments Used in the Study

Category	Instrument/Test	Assessment Focus	Scoring Method
Kata Performance	WKF Kata Evaluation Criteria	- Technical: stance, technique, timing, breathing, focus, conformance - Athletic: strength, speed, balance	Evaluated by certified judges using standardized scoring sheets
Flexibility	Sit and Reach Test	Hamstring and lower back flexibility	Distance reached in centimetres
Balance	Stork Stand Test	Static balance and postural control	Duration of balanced position (in seconds)
Agility	T-Test	Agility and change of direction speed	Time to complete the course (in seconds)

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Table 2.
Data Collection Techniques

Phase	Activity	Details
Pretest Phase	Standardized Kata Performance	Evaluated using WKF Kata Evaluation Criteria by certified judges
	Physical Fitness Assessments	Includes Sit and Reach (flexibility), Stork Stand (balance), and T-Test (agility)
Intervention Phase	Experimental Group: Elementary Training Model	Focus on progressive skill development, cognitive engagement, and fundamental movement principles.
	Control Group: Conventional Training Model	Focus on the repetitive practice of established kata sequences.
	Training Duration and Frequency	Conducted over 12 weeks, 3 sessions/week, 90 minutes per session
	Monitoring Protocol Adherence	Attendance, participation, and protocol compliance tracked; deviations documented
Posttest Phase	Re-assessment of Standardized Kata Performance	The same kata performed and scored using WKF criteria
	Re-assessment of Physical Fitness	The same tests as pretest to evaluate changes in flexibility, balance, and agility

Table 3.
Data Analysis Techniques

Type	Statistical Method	Purpose	Software / Criteria
Descriptive Statistics	Mean, Standard Deviation, Range	Summarize central tendency and variability of kata performance and fitness scores.	SPSS Version 27
Inferential Statistics	Paired Sample t-Test	Compare pretest and posttest scores within each group to assess training model effectiveness	p-value < 0.05
	Independent Sample t-Test	Compare post-test scores between experimental and control groups	p-value < 0.05
	Analysis of Covariance (ANCOVA)	Control for pretest score differences and assess the adjusted effect of the training model	p-value < 0.05
	Effect Size (Cohen's d)	Determine the magnitude of the training model's impact on performance outcomes.	Interpretation: small/medium/large

RESULTS AND DISCUSSION

Result

Descriptive Statistics

The study involved 60 Inkanas athletes from South Sulawesi, divided evenly into experimental and control groups. Participants were aged 13–18 years. The mean pretest and posttest scores show differences in performance between the two groups. The experimental group showed a greater increase in mean score post-intervention. The standard deviations indicate relatively consistent performance across participants.

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Table 4.
Descriptive data results

Group	N	Age (Mean ± SD)	Training Exp. (Years)	Pretest Mean ± SD	Posttest Mean ± SD	Min	Max
Experimental	30	15.2 ± 1.4	3.2	6.85 ± 0.75	8.95 ± 0.62	6.0	9.8
Control	30	15.1 ± 1.5	3.1	6.89 ± 0.71	7.55 ± 0.81	6.1	

Pre-Test Results

An independent samples t-test was conducted to assess the equality of pretest scores between the experimental and control groups. The results showed no statistically significant difference ($p > 0.05$), indicating that both groups started with comparable kata performance levels before the intervention.

Table 5.
Pre-Test Results

Group	N	Mean	SD	t-value	df	Sig. (2-tailed)
Experimental	30	6.85	0.75	0.221	58	0.826
Control	30	6.89	0.71			

Interpretation: Since $p = 0.826 > 0.05$, the initial performance levels were statistically equal.

Post-Test Results

An independent samples t-test was used to compare the post-test scores between the experimental and control groups. The results revealed a statistically significant difference ($p < 0.05$), with the experimental group achieving higher mean scores. This indicates that the elementary training model was more effective in improving kata performance.

Table 6.
Post-Test Results

Group	N	Mean	SD	t-value	df	Sig. (2-tailed)
Experimental	30	8.95	0.62	6.789	58	0.000
Control	30	7.55	0.81			

Interpretation: The experimental group significantly outperformed the control group ($p = 0.000 < 0.05$).

Paired Sample t-Test Analysis

Paired sample t-tests were conducted to examine pretest and posttest score changes within each group. The experimental group showed a significant improvement in kata performance ($p < 0.05$), while the control group also improved but to a lesser extent. This suggests the elementary training model had a stronger effect.

Table 7.
Paired Sample t-test analysis

Group	Mean Pre	Mean Post	Mean Diff	t-value	df	Sig. (2-tailed)
Experimental	6.85	8.95	2.10	14.523	29	0.000
Control	6.89	7.55	0.66	5.321	29	0.000

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Interpretation: Both groups improved significantly, but the experimental group showed a greater performance gain.

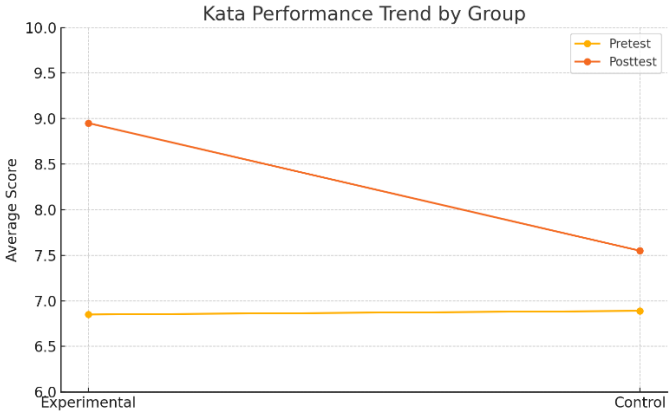

Figure 1.
Kata performance trend by group

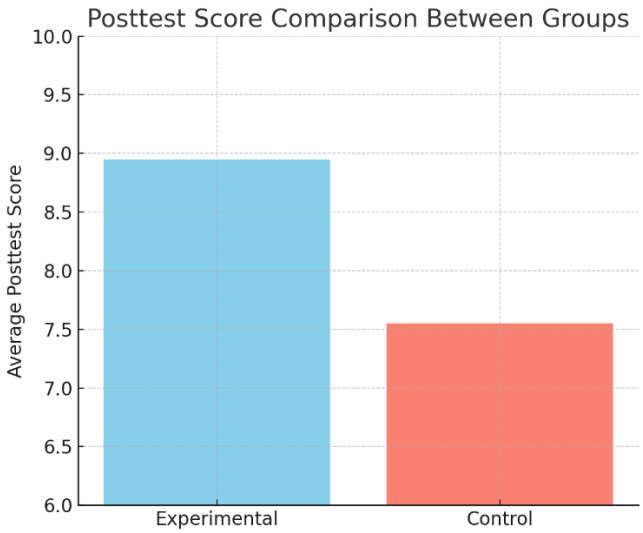

Figure 2.
Posttest score comparison between groups

Here are two visualizations:

1. **Trend Line Chart**: This shows the increase in average kata performance from the pretest to the post-test for both experimental and control groups.
2. **Bar Chart**: Highlights the higher post-test scores in the experimental group compared to the control group.

Discussion

The present study aimed to evaluate the effectiveness of the elementary training model compared to the conventional training model on kata performance among South Sulawesi Inkanas athletes. The results demonstrated that both training models led to significant improvements in kata performance. However, the elementary training model yielded a more substantial enhancement, as evidenced by higher post-test scores and greater effect sizes.

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The superior performance observed in the experimental group can be attributed to the structured and progressive nature of the elementary training model. This approach emphasizes foundational techniques, cognitive engagement, and a systematic progression of skills, which collectively contribute to improved motor learning and performance. These findings align with previous research indicating that structured training programs enhance technical proficiency and cognitive functions in martial arts practitioners (Gökdere et al., 2025; Parsamajd et al., 2024).

Several studies have explored the impact of different training methodologies on karate performance:

1. Cognitive and Behavioral Benefits: Gökdere et al. (2025) found that integrating kata training into school education improved sustained attention and cognitive performance in children. Similarly, Parsamajd et al. (2024) reported that kata training significantly reduced behavioural problems in elementary school students.
2. Physical Performance Enhancements: García-De Frutos et al. (2025) demonstrated that a 16-week program combining strength training, HIIT, technical work, and personalized nutrition positively impacted the performance and body composition of a professional kata athlete.
3. Postural and Musculoskeletal Effects: Gaweł and Zwierzchowska (2024) assessed the acute and long-term effects of Olympic karate kata training on body posture and musculoskeletal pain, highlighting the importance of balanced training regimens to prevent adverse effects.

These studies collectively support the notion that structured and comprehensive training models, like the elementary training model, can lead to multifaceted improvements in karate practitioners.

The findings suggest that adopting the elementary training model could be beneficial for karate coaches and practitioners aiming to enhance kata performance. This model's emphasis on foundational skills, cognitive engagement, and structured progression aligns with best practices in motor learning and skill acquisition. Implementing such a model may lead to more efficient learning, better performance outcomes, and potentially reduced injury risk due to improved technique and body awareness.

While the study provides valuable insights, certain limitations should be acknowledged:

1. Sample Size and Demographics: The study's sample was limited to 60 athletes from South Sulawesi, which may affect the generalizability of the findings to other regions or populations.
2. Short-Term Assessment: The study focused on immediate post-intervention outcomes. Long-term effects and retention of skills were not assessed, which could provide a more comprehensive understanding of the training models' effectiveness.
3. Lack of Blinding: Participants and coaches were aware of the training models being implemented, which could introduce bias in performance and assessment.

To build upon the current findings, future studies should consider:

1. Longitudinal Designs: Assessing the long-term effects and retention of skills acquired through different training models.

2. Diverse Populations: Including participants from various regions, age groups, and skill levels to enhance the generalizability of results.
3. Blinded Assessments: Implementing blinded evaluations to minimize potential biases in performance assessment.
4. Integration of Psychological Measures: Examining the psychological impacts of training models, such as motivation, confidence, and stress levels, which can influence performance.

The study concludes that the elementary training model is more effective than the conventional training model in enhancing kata performance among South Sulawesi Inkanas athletes. This model's structured and progressive approach facilitates better skill acquisition and performance outcomes. Coaches and practitioners are encouraged to consider integrating the elementary training model into their training regimens to optimize athlete development.

CONCLUSION

The findings of this study indicate that the elementary training model is significantly more effective than the conventional training model in improving kata performance among South Sulawesi Inkanas athletes. Based on the analysis of 60 participants (30 in each group), the experimental group (elementary model) showed a substantial improvement from a pretest mean score of 6.85 (SD = 0.75) to a posttest mean of 8.95 (SD = 0.62), with a mean difference of 2.10 ($p < 0.001$). In contrast, the control group (conventional model) improved from a pretest mean of 6.89 (SD = 0.71) to a posttest mean of 7.55 (SD = 0.81), with a mean difference of 0.66 ($p < 0.001$).

The independent sample t-test on post-test scores revealed a significant difference between groups ($t = 6.789$, $p < 0.001$), supporting the conclusion that the elementary training model offers superior benefits. These results confirm that structured, progressive, and foundational training strategies contribute to better skill acquisition and performance in kata. Therefore, karate coaches and instructors are recommended to integrate the elementary training model into their regular practice to optimize athlete development, particularly in competitive kata performance.

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