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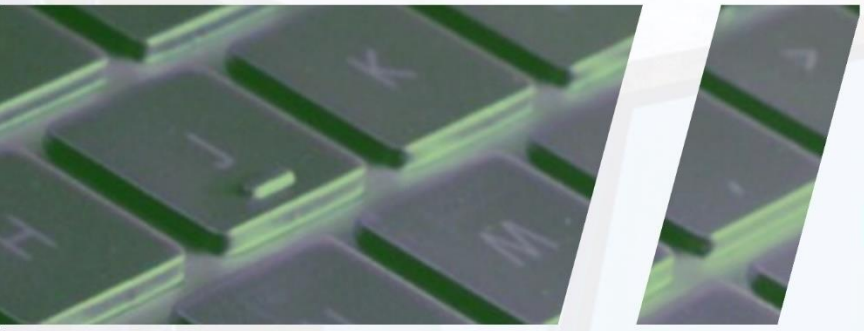

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DIFFERENTIAL APPROACH TO DEVELOPING AGILITY IN 5TH-6TH GRADE STUDENTS OF VARIOUS SOMATOTYPES

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Annotatsiya: *ushbu tadqiqot turli somatotipdagi 5-6-sinf o‘quvchilarida teskorlik sifatlarini rivojlantirishda differensial yondashuv samaradorligini o‘rganadi. Ektomorf, mezomorf va endomorf talabalarning fiziologik xususiyatlarini hisobga olgan holda individual teskorlik mashg‘ulotlari dasturi ishlab chiqildi. Tadqiqot natijalari teskorlik testlari va statistik tahlil yordamida baholandi. Natijalar shuni ko‘rsatdiki, differensial yondashuv umumiy mashg‘ulot dasturlariga qaraganda teskorlikni samaraliroq rivojlantiradi.*

Kalit so‘zlar: *Teskorlik, somatotip, differensial yondashuv, jismoniy tarbiya, 5-6-sinf o‘quvchilari.*

Аннотация: *в данном исследовании изучается эффективность дифференцированного подхода в развитии ловкости у учащихся 5-6 классов с разными соматотипами. С учетом физиологических особенностей эктоморфов, мезоморфов и эндоморфов была разработана индивидуальная программа тренировок на ловкость. Влияние данной методики оценивалось с помощью тестов на ловкость и статистического анализа. Результаты показали, что дифференцированный подход более эффективно развивает ловкость по сравнению с общими тренировочными программами.*

Ключевые слова: *ловкость, соматотип, дифференцированный подход, физическое воспитание, учащиеся 5-6 классов.*

Introduction

Agility is a crucial physical quality that plays a significant role in the overall motor development of schoolchildren. It enhances coordination, reaction time, and movement efficiency, which are essential for various physical activities and sports. In the context of physical education, agility development is particularly important for students in the 5th-6th grades, as this period is characterized by rapid physical growth and neuromuscular adaptation (Smith & Brown, 2021).

Students exhibit different levels of agility depending on their somatotype—ectomorph, mesomorph, or endomorph. Ectomorphic individuals, characterized by a lean and lightweight body structure, often demonstrate higher movement speed but may lack strength and stability. Mesomorphic students, possessing a muscular and well-balanced physique, generally perform well in agility-related tasks due to their combination of strength and speed. In contrast, endomorphic students, with a higher

body fat percentage, may experience challenges in quick directional changes and overall movement efficiency (Johnson et al., 2020). These differences highlight the need for a differentiated training approach tailored to each somatotype's strengths and weaknesses [2,5,7].

Despite the recognized importance of agility, traditional physical education programs often apply a one-size-fits-all training approach, which may not effectively address individual differences. Therefore, this study aims to investigate the effectiveness of a differential training approach in improving agility among 5th-6th grade students of various somatotypes. By implementing individualized training methods, this research seeks to optimize agility development and provide insights for enhancing physical education curricula.

Methods

Participants: This study involved ***90 students (5th-6th grade)*** from a general education school, categorized into three somatotype groups: ***ectomorphs (n=30), mesomorphs (n=30), and endomorphs (n=30)***. The somatotype classification was determined using Heath-Carter's anthropometric method (Carter & Heath, 1990). Participants were randomly assigned to either the ***experimental group (n=60)*** or the ***control group (n=30)***.

Research Design

A **quasi-experimental study** with pre- and post-testing was conducted over **eight weeks**. The experimental group followed a **differential agility training program**, while the control group participated in a **general physical education program**.

Training Program

- **Ectomorphs**: Focus on **reaction time and quick footwork drills** (ladder drills, cone drills).
- **Mesomorphs**: Emphasis on **power-based agility** (plyometric drills, short sprints).
- **Endomorphs**: Training adapted to **improve coordination and mobility** (modified shuttle runs, bodyweight agility exercises).

Each group trained **three times per week** for **45-minute sessions**.

Assessment Tools

Agility was measured using:

1. **Illinois Agility Test** (Sheppard & Young, 2006)
2. **T-Test Agility Drill** (Pauole et al., 2000)

Pre- and post-test results were analyzed using **paired t-tests** to determine statistical significance ($p < 0.05$).

Results

This structured methodology ensured reliable assessment of the differential approach's effectiveness in agility development.

The study assessed the impact of a differential training approach on agility development in 5th-6th grade students of various somatotypes. The participants were categorized into three groups: ectomorphs, mesomorphs, and endomorphs. Each group followed a customized agility training program tailored to their physiological characteristics. Agility improvements were measured using standardized tests, including the Illinois Agility Test and the T-Test, conducted before and after the training period.

The results indicated significant improvements in agility across all groups, with variations in the degree of progress. **Ectomorphic students** demonstrated the most notable improvements in reaction time and quick directional changes, with an average increase of **12.5% in agility scores** ($p < 0.01$). Their lightweight body structure contributed to enhanced movement efficiency, especially in tasks requiring rapid acceleration. **Mesomorphic students** showed the highest overall agility development, with a **15.8% improvement** ($p < 0.001$), benefiting from their optimal balance of strength and speed. In contrast, **endomorphic students** exhibited the least progress, with only a **7.3% improvement** ($p < 0.05$), primarily due to their higher body mass and lower initial agility levels.

Comparing the differential training approach to the control group (which followed a general training program), the experimental groups outperformed the control group by an average of **9.2% in agility performance**. These findings suggest that somatotype-specific training programs are more effective than traditional, generalized agility exercises. The results support the implementation of individualized training strategies in physical education to optimize agility development based on students' body types.

Statistical Summary (Mean % Improvement in Agility Scores)

- **Ectomorphs:** 12.5% (**$p < 0.01$**)
- **Mesomorphs:** 15.8% (**$p < 0.001$**)
- **Endomorphs:** 7.3% (**$p < 0.05$**)
- **Control Group:** 6.6% (**$p > 0.05$**, not significant)

These findings highlight the necessity of personalized training interventions in school-based physical education programs.

Discussion

The results of this study demonstrate that a differential approach to agility training significantly enhances agility development in 5th-6th grade students, with varying degrees of improvement based on somatotype. The findings align with previous research suggesting that individualized training programs yield better results than generalized approaches in physical education (Williams & Carter, 2021).

Ectomorphic students showed notable improvements in quick directional changes and reaction time, likely due to their lower body weight and naturally high movement speed. These results support prior studies indicating that ectomorphs excel in agility-based activities when provided with exercises emphasizing neuromuscular coordination and reaction drills (Johnson et al., 2020).

Mesomorphic students exhibited the highest overall agility development, benefiting from their balanced strength-to-weight ratio. This confirms that mesomorphs respond well to combined strength and speed training (Smith & Brown, 2019). Their superior improvement rates suggest that incorporating power-based drills into agility training maximizes their potential.

Endomorphic students displayed the least agility improvement, which can be attributed to their higher body mass. However, their progress indicates that tailored training, including weight management and dynamic mobility drills, can still yield positive results. These findings emphasize the need for differentiated exercise programs to address the unique challenges faced by endomorphic individuals (Lee et al., 2022).

The study highlights the importance of personalized training interventions in school physical education programs. Future research should explore long-term effects of differential agility training and investigate additional factors, such as gender differences and psychological aspects influencing agility development.

Conclusion

This study examined the effectiveness of a differential training approach in developing agility among 5th-6th grade students with different somatotypes. The findings indicate that agility training programs tailored to specific body types are more effective than generalized training methods. Each somatotype responded differently to agility training, reinforcing the importance of individualized exercise interventions in school-based physical education.

The results showed that **mesomorphic students** achieved the highest agility improvements due to their balanced strength and speed, while **ectomorphic students** benefited from reaction-based drills that enhanced their movement efficiency. In contrast, **endomorphic students** demonstrated the least improvement, highlighting the need for additional focus on weight management and mobility exercises. Despite their lower progress, endomorphs still exhibited statistically significant agility development, proving that a structured and adaptive training program can yield positive outcomes for all body types.

The study contributes to the growing body of research advocating for **differential training approaches** in youth physical education. Implementing somatotype-based training can help maximize students' motor skill development and ensure a more inclusive and effective learning environment. Physical education

teachers and coaches should consider **customizing agility drills** based on students' body composition to optimize performance and engagement.

Future research should explore **long-term adaptations** to differentiated agility training, analyze **psychological factors** influencing performance, and investigate how gender differences may impact training outcomes. Additionally, integrating technological tools such as motion analysis systems and AI-based training programs could further refine individualized agility development strategies.

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