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# GENERALIST VS PHYSICAL EDUCATION SPECIALIST ELEMENTARY SCHOOL TEACHER: DO TEACHER CHARACTERISTICS MATTER?

# UČITELJ RAZREDNEGA POUKA ALI ŠPORTNI PEDAGOG: SO LASTNOSTI UČITELJA POMEMBNE?

## ABSTRACT

Purpose: The aim of this study was to evaluate the comparative effectiveness of motor skill development programs delivered by kinesiologists and generalist teachers in elementary school. Methods: A quasi-experimental design was used in which 79 primary school students aged 9 to 11 years participated. The participants were divided into a control group (n=36) taught by generalist teachers and an experimental group (n=43) taught by kinesiologists. Both groups were assessed on their abilities in five motor skills: forward roll, backward roll, 40-meter sprint, squat and hip hinge. The assessments were conducted at baseline and after a three-month intervention period. Results: In the experimental group, led by kinesiologists, there were statistically significant improvements in all the motor skills assessed. Scores for the 40-metre sprint increased from 3.60 to 4.01, for squats from 3.63 to 4.12, for backward rolls from 3.13 to 3.68, for forward rolls from 3.36 to 3.90, and for hips from 3.09 to 3.85 (all $p<0.01$). In the control group, which was taught by generalist teachers, only the 40-metre sprint improved significantly (from 3.49 to 3.85, $p=0.01$). Discussion: The results suggest that the specialized training and techniques of kinesiologists are more effective in promoting motor skill acquisition in primary school students than traditional methods used by generalist teachers. This emphasizes the potential for integrating kinesiologists into school physical education. Conclusions: Integrating kinesiologists into the physical education curriculum significantly enhances motor skill acquisition and argues for a reevaluation of current educational strategies to include professional kinesiology expertise

*Keywords:* motor skill acquisition, kinesiology, physical education, primary school, pedagogical strategies

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## IZVLEČEK

Namen: Cilj raziskave je bil oceniti primerjalno učinkovitost programov za razvoj gibalnih sposobnosti, ki jih izvajajo kineziologi in učitelji razrednega pouka. Metode: V raziskavo je bilo vključenih 79 osnovnošolskih učencev, starih 9–11 let. Razdeljeni so bili v kontrolno skupino (n=36), ki so jo poučevali učitelji razrednega pouka, in eksperimentalno skupino (n=43), ki so jo poučevali kineziologi. Obema skupinama smo s petimi testi ocenili gibalno učinkovitost: preval naprej, preval nazaj, 40-metrski šprint, počep in upogib bokov. Ocenjevanja so potekala teden dni pred in teden dni po zaključku trimesečnega intervencijskega obdobja. Rezultati: V eksperimentalni skupini, ki so jo vodili kineziologi, so se statistično značilno izboljšale vse ocenjene gibalne sposobnosti Rezultati za 40-metrski šprint so se izboljšali s 3,60 na 4,01, za počepe s 3,63 na 4,12, za preval nazaj s 3,13 na 3,68, za preval naprej s 3,36 na 3,90, in za upogib bokov s 3,09 na 3,85 (vsi $p<0.01$). V kontrolni skupini, ki so jo poučevali učitelji razrednega pouka, se je statistično značilno izboljšal le 40-metrski šprint (s 3,49 na 3,85, $p=0.01$). Diskusija: Rezultati so pokazali, da so specializirano usposabljanje in različne učne metode kineziologov učinkovitejše pri izboljševanju gibalnih sposobnosti pri osnovnošolskih učencih v primerjavi s tradicionalnimi učnimi metodami, ki jih uporabljajo učitelji razrednega pouka. Rezultati poudarjajo potencial za integracijo kineziologov v šolski predmet šport. Zaključek: Integracija kineziologov v učne ure športa lahko znatno izboljša gibalne sposobnosti učencev, zato bi bilo priporočljivo, da se strokovno znanje kineziologije sistematično vključi v učni načrt predmeta šport.

*Ključne besede:* gibalne sposobnosti, kineziologija, predmet šport, osnovna šola, učne metode

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## INTRODUCTION

School is an important environment in which children spend much of their time and is significantly shaped by the influence of educators on both academic and personal development (Maxwell et al, 2017). Physical Education (PE) is an essential part of the educational spectrum that promotes the holistic development of students by supporting health and healthy habits and contributing to overall human well-being (Oh & Graber, 2019). PE contributes significantly to the physical, cognitive, emotional and social development of students. Participation in various PE activities helps students develop important psychosocial skills such as self-confidence, perseverance and problem solving, while reducing the risk of obesity (Latino et al., 2023). Recognizing the role of PE is crucial as it is integrated into broader educational goals and supports students' comprehensive development (Baena-Morales & Ferriz-Valero, 2023).

In PE classes, motor skills are monitored, assessed, and evaluated, as they, along with student engagement and educational outcomes, contribute the most to overall success in PE. Motor skills are defined as purposeful and meaningful movement structures and include all motor activities that are part of daily life. They can be categorized into three groups: biotic, non-kinesiological, and kinesiological knowledge (Neljak, 2013). In the process of learning and acquiring new motor skills, it is important to consider that not all motor skills are appropriate for every age group. Selected motor skills should be aligned with the developmental stages of a particular age (Findak, 2003). Motor skills acquired in early childhood serve as the foundation for lifelong physical activity (PA) and health (Šalaj et al., 2018). Research shows that children with better-developed motor skills in preschool age tend to be more physically active and have better cardiorespiratory endurance in adolescence. Therefore, it is crucial to encourage the development of motor skills from an early age through structured exercise programs and free play. Timely and high-quality development of motor skills creates prerequisites for a child's healthy development and the adoption of an active lifestyle (Barnett et al., 2009).

Previous research has examined differences in kinanthropological characteristics between students in different educational programs. Petrović (2024) investigated differences in kinanthropological characteristics between students in a full-day school program participating in extracurricular badminton and those in a regular program, with a sample of 201 students. The results indicated that the control group had higher body height and weight, while BMI differences were significant initially but not in the final measurement. Students in the full-day program showed significant improvements in explosive and repetitive strength, hanging

endurance, and flexibility. Skender (2024) examined differences in students' PA levels during PE classes led by a kinesiologist versus a generalist teacher. The study, conducted on 33 students, used Fitbit Charge 3 wristbands and found no significant difference in step count during PE classes. However, a significantly higher total daily step count was recorded on days when a kinesiologist conducted the lesson. Petračić (2023) analyzed factors influencing PE lesson quality among 1,598 generalist teachers. The study identified perceived teacher competence as the strongest predictor (explaining 33% of variance), followed by supportive factors and teachers' attitudes. Findings highlight the importance of professional development, improved material conditions, and systemic support. Milić et al. (2022) explored generalist teachers' attitudes toward school subjects, focusing on PE, in a sample of 111 teachers. PE received the lowest competency ratings compared to core subjects, suggesting a need for further research and improved teacher training. Alić et al. (2021) assessed PE teaching competencies among 50 generalist teachers and 50 teacher training students. Teachers rated their competencies higher, particularly in motivation and lesson implementation, while students scored lower in planning. The study suggests enhancing practical kinesiology training in teacher education. Miholić (2017) examined kinesiology competencies among 1,804 generalist teachers and 398 teacher training students. Significant gaps were found between assessed and desired competencies, emphasizing the need to redefine kinesiology training and lifelong learning programs. Šumanović et al. (2016) investigated teachers' challenges in PE instruction based on a sample of 201 teachers. Poor material conditions and low subject status were major concerns, while teachers highlighted the need for better training in working with children with disabilities and injury prevention. Rastovski et al. (2013) analyzed fourth-grade students' perceptions of PE in a study involving 331 students. PE was rated positively (4.1–4.8/5), with boys and high-achieving students giving the highest ratings. Rogulj et al. (2011) studied teachers' attitudes toward PE grading with a sample of 67 teachers. Teachers rated their understanding of grading components as low (2.7/5), emphasizing behavioral aspects the most (16%) and theoretical knowledge the least (12%), suggesting the need for more objective. This series of studies illustrates a broad view of PE in Croatia, focusing on the attitudes and competencies of both teachers and students, highlighting areas for improvement in teacher training, the practical application of PE in schools, and the social perceptions of PE as a subject. The research collectively emphasizes the need for better training, resources, and support to improve the quality of PE teaching and learning outcomes.

The Ministry of the Republic of Croatia, through its Action Plan (2024), outlines specific guidelines for combating obesity, primarily through PA, one of which is the inclusion of master's degree graduates in kinesiology into primary education. In line with this, the experimental program "Primary School as a Full-Day School" gives PE a new significance in primary education. In this program, a specialized PE teacher, a kinesiologist, is introduced. Unlike the standard program, the full-day school program increases the PE hours in the 4th grade from two to three hours per week as part of the A1 program. Additionally, in the A2 program, the PE teacher participates in one more class per week in the primary education curriculum. Furthermore, in programs B1 and B2, extracurricular and after-school activities are conducted, where 20-30% of the classes must be dedicated to physical, health, and sports education. A 10-minute recreational break is also introduced. The goal of this program is to ensure that every student has at least one school hour of PAdaily within the school (Ministry of Science and Education, 2023). Considering the mentioned changes, the primary research question of this study is whether there are differences in the level of motor skill acquisition by students when PE classes are conducted by different educational leaders. The aim of this study is to determine the differences in the level of motor skill acquisition among 3rd and 4th grade primary school students when PE classes are led by a kinesiologist (in the full-day school program) versus a generalist graduate (in the standard program). It is hypothesized that students in the full-day school program, where PE is led by a kinesiologist, will achieve a higher level of motor skill acquisition compared to those in the standard program.

## METHODS

### Participants

A total of 79 students from the 3rd and 4th grades of primary education, aged between 9 and 11 years, participated in the study. The participants were divided into two groups. The first, control group (G-1), consists of 36 students, with 18 boys and 18 girls, who attend PE classes led by a generalist graduate as part of the standard educational program. The second, experimental group (G-2), consists of 43 students, including 24 boys and 19 girls, who attend PE classes led by a kinesiologist within the full-day school program. The participants were selected from two different types of school programs, allowing for a comparative study of the levels of motor skill acquisition between students in the full-day school program and those in the standard program (Table 1).

Table 1. Demographic Indicators of the Sample.

| Leader | Gender | Age | N |
|---|---|---|---|
| Master of Primary Education (G-1) | Girls | 9-11 | 18 |
| | Boys | | 18 |
| Master of Kinesiology (G-2) | Girls | 9-11 | 19 |
| | Boys | | 24 |

*Notes.* G-1: Control group (standard program); G-2: Experimental group (full-day school program)

## Variables and Protocol

In this study, variables related to the acquisition of motor skills were measured, with the level of mastery assessed on a scale from 1 to 5 by a team of three kinesiologists. These variables included: forward roll, backward roll, 40-meter sprint from a standing start, squat, and hip hinge. These variables were measured at two point, with a 3-month interval between measurements.

The research was conducted in primary schools during PE classes in the morning hours. A total of 79 students from third and fourth grades were included in the study, divided into two groups based on the type of educational program: the control group (G-1), consisting of students attending PE as part of the standard educational program, and the experimental group (G-2), consisting of students attending PE as part of the full-day school program. The testing was carried out over a period of three months, from March 11 to June 18, 2024, with each student participating in both the initial and final measurements. Before the start of the study, the principals of both schools approved the research, and the class teachers and PE teacher informed the parents and obtained their consent for data collection during PE classes. In order to protect student privacy, results were recorded using unique codes. Prior to each motor skill test, all tasks were demonstrated to the students to ensure proper execution and reduce the possibility of errors. The demonstration covered each task individually, with clear instructions on the correct technique and performance. The motor skill measurements were carried out by a professional team consisting of three kinesiologists with extensive experience in working with primary and secondary school students. All three kinesiologists graduated from the Faculty of Kinesiology at the University of Zagreb. At the time of the research, they were employed as PE teachers in secondary schools and had experience working with children of different ages through sports schools and clubs. The tests were performed in school gymnasiums, which met the necessary conditions for conducting the tests. During testing, students underwent appropriate preparation and warm-up aligned with the tasks they were about to perform. For

each student, data on gender and age were recorded, which were collected directly during testing. The measurements were conducted under the supervision of trained examiners who ensured the accuracy and consistency of the results. Both groups of students attended three PE classes per week. Some students from the standard program participated in extracurricular sports activities, while some students from the full-day school program were involved in B1 and B2 sports activities as part of the full-day school program.

**Forward Roll**

From a standing position, the student performs a light two-foot takeoff, with the gaze directed toward the spot where the hands will be placed on the mat. Simultaneously, the student places their hands on the ground, executes a head-forward bend, and rounds their back. The motion continues with a rolling action, during which the student grabs their knees to accelerate the rotation. The movement ends with the student rising to a standing position without using their hands to push off the floor (Neljak et al., 2008). The forward roll requires full-body coordination and develops spatial orientation. Correct execution of this movement not only improves coordination, balance, and proprioception but also helps in the development of the vestibular system, enhancing awareness of the body's position in space (Su, Lin, & Chang, 2014).

**Backward Roll**

From a standing position with the back facing the mat, the student squats with bent knees, hands placed above the shoulders with palms facing upward. The movement begins with a backward roll over the rounded back, maintaining a contracted body position. During the rotation, the student places their hands on the floor at shoulder width, shifts the weight onto the hands, and strongly pushes off from the ground. The movement concludes with the student returning to the squat position and then standing up (Neljak et al, 2008). The backward roll requires a higher level of coordination and upper body strength compared to the forward roll. In addition to developing muscle strength in the arms and shoulders, this movement also contributes to better spatial orientation and vestibular system development (Su, Lin, & Chang, 2014).

**40-Meter Sprint from High Start**

Upon the command “On your marks,” students assume a starting position behind the starting line. At the command “Set,” they take a high start position, with their feet placed diagonally such that the toes of the back foot are aligned with the heel of the front foot. The weight is placed on the front of the feet, with the heels slightly raised off the ground. The knees are bent,

and the torso is slightly inclined forward. The opposite arm to the front leg is placed forward, while the other is positioned behind. The arms are slightly bent, and the hands are relaxed in alignment with the forearms. The head is aligned with the spine, and the gaze is directed forward. On the sound signal, the students quickly sprint toward the finish line. During the sprint, the torso remains slightly leaned forward, with the head and body aligned, and the shoulders relaxed. The swinging leg strikes the ground with a digging step on the front of the foot, and the leg fully extends at the moment of takeoff. The thigh of the swinging leg lifts upward, reaching its peak at the takeoff of the push-off leg. The arms are bent at 90° and rhythmically coordinated with the leg movement (Neljak et al., 2008). Running, as a natural form of movement, has a significant impact on the development of the cardiovascular system, agility, and coordination. The high start enables a faster reach of maximum speed and enhances response to auditory stimuli, helping children develop explosive power and speed (Babić, Blažević, & Radetić-Paić, 2011).

**Squat**

In the starting position, the feet are placed shoulder-width apart, and the weight is evenly distributed across the entire foot. The movement begins with bending at the knee and hip joints, lowering the hips downward and backward. The chest remains upright, and the torso is slightly inclined forward. The head aligns with the spine, and the gaze is directed forward. Returning to the starting position is done by raising the body along the same path, activating the lower extremity muscles and maintaining body stability (Eisenmann & Hutchison, 2018). The squat is crucial for the motor development of children. It positively impacts muscle strength at an early age and helps prepare children for PAthroughout their lives (Collins et al., 2019).

**Hip Hinge**

In the starting position, the feet are placed hip-width apart, and the knees are slightly bent. The arms are relaxed in front of the body or placed on the hips. The chest remains upright, and the gaze is directed forward. The movement begins with a bend at the hip joint, with the hips moving backward. The back remains elongated, and the head aligns with the spine. The weight is evenly distributed across the whole foot. Returning to the starting position is done along the same path, activating the gluteal muscles and maintaining control of the movement (Eisenmann & Hutchison, 2018).The hip hinge, known as a hip flexion in Croatian, is a fundamental motor skill that develops awareness of proper hip bending. It is crucial for aligning posture and biomechanics of movement. Proper execution of this movement improves core stability, hip

mobility, and proprioception, which forms the foundation for successfully executing more complex motor tasks. Teaching hip hinge from an early age helps children develop proper body mechanics, which is essential for activities such as lifting objects, jumping, and changing movement directions (Burton et al., 2021).

**Description of the Evaluation Procedure for Motor Skills**

The evaluation of students' motor skills was conducted by a group of three graduate kinesiology experts. Each expert assessed each student with a grade from 1 to 5. The final grade for the student's performance was calculated as the arithmetic mean of all ratings, rounded to two decimal places. The evaluation of motor skills was based on the following criteria:

1. First Level: The student cannot perform the movement or can only occasionally perform it at the level of recognition. Motor skills are still in the initial stage of acquisition. This level is evaluated with a grade of "insufficient" (1).
2. Second Level: The student performs the movement such that the basic spatial indicators of the movement are recognized. However, the movement is executed in a manner that is so uncoordinated and clumsy that it deviates significantly from the standard execution. Motor skill is at the level of early refinement. This level is evaluated with a grade of "satisfactory" (2).
3. Third Level: The student correctly performs the spatial indicators of the movement, but the temporal indicators (timing) of the movement deviate significantly from the standard execution. Motor skill is at the level of advanced refinement. This level is evaluated with a grade of "good" (3).
4. Fourth Level: The student performs all essential parts of the movement correctly, but there are still certain spatial and temporal deviations from the standard execution. Motor skill is at the level of initial stabilization (consolidation). This level is evaluated with a grade of "very good" (4).
5. Fifth Level: The student performs the movement correctly without deviations from the standard execution, or if deviations exist, they are negligible. Motor skill is at the level of final consolidation (automation). This level is evaluated with a grade of "excellent" (5).

This grading system is based on the methodological guidelines outlined in the book “Kinesiology Methodology in Primary and Secondary Education” by Neljak (2013).

### Statistical Analysis

After data collection, the data were stored in tabular format using Microsoft Excel. Subsequently, they were transferred and processed in the statistical software package Statistica, version 14.2.0.18. Descriptive statistics, such as the arithmetic mean and standard deviation, were calculated for all variables. To determine the differences between the control group (G-1) and the experimental group (G-2) in both the initial and final measurements, an independent samples t-test (Student's t-test) was applied. For assessing the differences between the initial and final measurements within each group, a paired samples t-test was used. Statistical significance was set at the level of $p<0.05$. In order to determine whether there was a statistically significant progress between the groups, a two-way analysis of variance (ANOVA 2x2) was conducted. The normality of the data distribution was tested using the Shapiro-Wilk test, where the p-value needed to be greater than 0.05 for the distribution to be considered normal. Despite potential deviations from normal distribution based on the Shapiro-Wilk test, parametric tests were still performed because the sample size in both groups was greater than 30.

## RESULTS

Table 2 presents descriptive indicators and differences between the control group (G-1) and the experimental group (G-2) in the initial measurement of motor skills variables. Based on the results obtained, it can be concluded that the sample is homogeneous, as there are no statistically significant differences between the groups in all measured motor skills variables (forward roll, backward roll, 40-meter sprint, squat, and hip hinge; $p>0.05$). These results confirm the initial homogeneity of the groups in the domain of motor skills and allow for a valid comparison of the effects of the intervention in the subsequent course of the study.

Table 2. Descriptive indicators and differences between the control group (G-1) and the experimental group (G-2) in the initial measurement of motor skills.

| Variables | G-1(N=36) (AM ± SD) | G-2 (N=43) (AM ± SD) | t | p |
|---|---|---|---|---|
| FOR ROLL | 3,42 ± 1,04 | 3,37 ± 1,15 | 0,24 | 0,811 |
| BACK ROLL | 2,85 ± 1,04 | 3,13 ± 1,16 | -1,13 | 0,263 |
| 40m SPR | 3,49 ± 0,85 | 3,60 ± 0,90 | -0,54 | 0,593 |
| SQUAT | 3,89 ± 0,84 | 3,89 ± 0,83 | 1,39 | 0,170 |
| HIPHINGE | 3,29 ± 1,15 | 3,09 ± 0,91 | 0,84 | 0,405 |

*Notes.* G-1: Control group (standard program); G-2: Experimental group (full-day school program)

Table 3 presents the results of the paired sample t-test between the initial and final measurement of motor skills in the control group (G-1). Analysis of the obtained results indicates that a statistically significant difference ($p<0.05$) between the initial and final measurement was achieved only in the 40-meter sprint variable ($p=0.01$), where an improvement from 3.49 to 3.85 was recorded. No statistically significant changes were observed in the other motor skills tests (forward roll, backward roll, squat, hip hinge).

Table 3. Paired sample t-test results between the initial and final measurement of motor skills in the control group (G-1).

| Variables | N (G-1) | AM-1 | AM-2 | DIFF | SD | p |
|---|---|---|---|---|---|---|
| FOR ROLL | 36 | 3,42 | 3,63 | 0,21 | 0,90 | 0,16 |
| BACK ROLL | 36 | 2,85 | 2,93 | 0,08 | 0,90 | 0,62 |
| 40m SPR | 36 | 3,49 | 3,85 | 0,36 | 0,74 | 0,01* |
| SQUAT | 36 | 3,88 | 4,07 | 0,19 | 0,67 | 0,12 |
| HIPHINGE | 36 | 3,29 | 3,57 | 0,28 | 1,14 | 0,14 |

*Notes.* G-1: Control group (standard program); p*: significant p<0.05

Table 4 presents the results of the paired sample t-test between the initial and final measurement of motor skills in the experimental group (G-2). Analysis of the results indicates that statistically significant differences ($p<0.05$) were achieved in all motor skills variables. Improvements were recorded in forward roll (0.54, $p=0.00$), backward roll (0.55, $p=0.00$), 40-meter sprint (0.41, $p=0.01$), squat (0.49, $p=0.01$), and hip hinge (0.76, $p=0.00$).

Table 4. Paired sample t-test results between the initial and final measurement of motor skills in the experimental group (G-2).

| Variables | N (G-2) | AM-1 | AM-2 | DIFF | SD | p |
|---|---|---|---|---|---|---|
| FOR ROLL | 43 | 3,36 | 3,90 | O,54 | 0,47 | 0,00* |
| BACK ROLL | 43 | 3,13 | 3,68 | 0,55 | 0,53 | 0,00* |
| 40m SPR | 43 | 3,60 | 4,01 | 0,41 | 0,97 | 0,01* |
| SQUAT | 43 | 3,63 | 4,12 | 0,49 | 0,57 | 0,00* |
| HIPHINGE | 43 | 3,09 | 3,85 | 0,76 | 0,57 | 0,00* |

*Notes.* G-2: Experimental group (full-day school program); p*: significant p<0.05

Table 5 present the results of the independent samples t-test in the final measurement between the control group (G-1) and the experimental group (G-2) in the variables of motor skills. Analysis of the obtained results indicates that a statistically significant difference was achieved in the backward roll variable ($p=0.01$) in favor of the experimental group (G-2). No statistically significant differences were found in the other variables (forward roll, 40-meter sprint, squat, hip hinge), although the G-2 group achieved higher absolute values.

Table 5. Descriptive indicators and differences between the control group (G-1) and the experimental group (G-2) in the final measurement of motor skills.

| Variables | G-1(N=36) (AM ± SD) | G-2 (N=43) (AM ± SD) | t | p |
|---|---|---|---|---|
| FOR ROLL | 3,62 ± 1,37 | 3,89 ± 0,98 | -1,02 | 0,31 |
| BACK ROLL | 2,92 ± 1,34 | 3,68 ± 1,00 | -2,86 | 0,01* |
| 40m SPR | 3,85 ± 0,90 | 4,00 ± 0,73 | -0,81 | 0,42 |
| SQUAT | 4,07 ± 0,89 | 4,12 ± 0,72 | -0,28 | 0,78 |
| HIPHINGE | 3,57 ± 1,22 | 3,85 ± 0,85 | -1,17 | 0,25 |

*Notes.* G-1: Control group (standard program); G-2: Experimental group (full-day school program)

Table 6 presents a comparison of the differences between the initial and final measurements of motor skills in the control group and the experimental group. An analysis of the obtained results indicates that the experimental group achieved statistically more significant progress in most of the measured variables. In terms of motor skills, the experimental group demonstrated statistically significantly better results in all tests compared to the control group, as evidenced by p-values ($p<0.05$). Additionally, the experimental group exhibited a greater absolute change in results expressed in scores.

Table 6. Descriptive Indicators and Results of Two-Factor Analysis of Variance for Motor Skills in the Control (G-1) and Experimental (G-2) Groups in Initial and Final Measurements.

| variables | G-1 | | G-2 | | interaction time*group | | | post-hoc bonferroni test | |
|---|---|---|---|---|---|---|---|---|---|
| | I | II | I | II | | | | | |
| | AM ± SD | AM ± SD | AM ± SD | AM ± SD | F | p | partial η2 | comparison | p |
| FOR ROLL | 3,42 ± 1,04 | 3,62 ± 1,37 | 3,37 ± 1,15 | 3,89 ± 0,98 | 4,33 | 0,04* | 0,05 | G2>G1 | 0,000015* |
| BACK ROLL | 2,85 ± 1,04 | 2,92 ± 1,34 | 3,13 ± 1,16 | 3,68 ± 1,00 | 8,47 | 0,01* | 0,09 | G2>G1 | 0,000022* |
| 40m SPR | 3,49 ± 0,85 | 3,85 ± 0,90 | 3,60 ± 0,90 | 4,00 ± 0,73 | 0,05 | 0,83 | 0,00 | G2>G1 | 0,019586* |
| SQUAT | 3,89 ± 0,84 | 4,07 ± 0,89 | 3,89 ± 0,83 | 4,12 ± 0,72 | 4,74 | 0,03* | 0,06 | G2>G1 | 0,000011* |
| HIPHINGE | 3,29 ± 1,15 | 3,57 ± 1,22 | 3,09 ± 0,91 | 3,85 ± 0,85 | 5,54 | 0,02* | 0,07 | G2>G1 | 0,000002* |

*Notes.* G-1: Control group (standard program); G-2: Experimental group (full-day school program); p*: significant $p<0.05$

## DISCUSSION

This study examined the effects of teacher expertise on the acquisition of motor skills in elementary school students and compared the results between those taught by kinesiologists and generalist teachers. The experimental group taught by kinesiologists showed significant improvements in all motor skills, assessed and outperformed the control group taught by generalist teachers. This improvement is consistent with the findings of Grainger et al. (2020), who emphasized the necessity of systematic and structured teaching for mastering basic motor skills, a strategy that kinesiologists apply more effectively due to their specialized training in pedagogy and motor development. The quantitative gains observed in specific motor skills such as forward rolls, backward rolls, squats, 40-meter sprints, and hip hinges (all $p<0.01$) underscore the efficacy of kinesiologists' specialized training and their ability to tailor instruction to students' developmental needs. The lack of progress in the control group could be attributed to inadequate demonstration of motor tasks by generalist teachers, possibly due to insufficient physical training or lack of confidence in teaching complex movements (Petračić, 2023). The minimal improvement in the 40-meter sprint in the control group stands in sharp contrast to the more comprehensive improvements in several skill areas in the experimental group, which further illustrates the effects of the special PE. This deficiency points to a broader issue within general teacher education programs, where the importance of PE may not be sufficiently emphasized, leading to a gap in the effective teaching of motor skills. Expanding teacher training programs to include intensive modules on PE taught by experienced kinesiologists could provide generalist teachers with the necessary skills and confidence to improve student outcomes in PE. In contrast, the specialized training of kinesiologists and their holistic pedagogical approach allowed for more effective teaching of skills and their integration into PE lessons, resulting in better development of students' motor skills. This underscores the importance of incorporating advanced kinesiology expertise into the primary school curriculum to improve both the quality of PE and the overall development of students. Significant improvements in motor skills such as backward rolling and hip hinges not only reflect the immediate impact of kinesiology expertise, but also indicate a broader application of these specialized skills to promote students' overall physical health and kinanthropometric development. These improvements demonstrate how effectively integrating kinesiology into the curriculum can enhance PE outcomes across multiple dimensions. The findings of this study, which highlight significantly better motor skill acquisition under the guidance of a kinesiologist, further emphasize the importance of expert leadership in PE. This is particularly

significant in the context of research that underscores the critical importance of early motor skill development. Sutapa et al. (2021) emphasize that targeted play activities can significantly enhance children's motor skills as early as ages 4.5 to 6. This period is crucial because, according to Veldman et al. (2023), early childhood (up to age 6) is considered a critical phase for developing fundamental motor skills due to rapid brain growth and the formation of new neural connections. Furthermore, Hurtado-Almonacid et al. (2024) found that children's motor age is often lower than their chronological age, highlighting the need for early interventions in school settings to improve motor skills. The extensive improvements seen in the group taught by a kinesiologist argue for an earlier introduction of specialized PE, possibly beginning in kindergarten, to take advantage of the developmental benefits during this critical period of motor skill acquisition. These findings suggest that involving kinesiologists in the educational process should begin even earlier, in preschool institutions and kindergartens, to ensure the optimal development of fundamental motor knowledge and skills, which serve as prerequisites for later motor learning and PA. This study provided insight into the state and progression of motor skill acquisition and kinanthropometric characteristics in students attending full-day school programs compared to those in standard, regular programs. The results indicate potential benefits of integrating kinesiologists into primary education curricula. The improved development of motor skills, as evidenced by the significant improvements in various assessments, highlights the value of embedding kinesiology expertise into the elementary school educational framework to promote a holistic approach to PE. It is important to consider that the main limitation of this study is the short intervention period of three months. The positive impact of kinesiologists in primary education should be examined more thoroughly through a longitudinal study, tracking primary school students from grades 1 to 4 in a full-day school program compared to those in a standard program. Nevertheless, the findings of this study can serve as a foundation for further discussions on integrating kinesiologists into primary education, with detailed monitoring and evaluation of their effects on the development of motor skills and the overall kinanthropometric status of students. Additionally, future research could incorporate other aspects of student development to gain a comprehensive understanding of the full-day school program’s impact on children’s overall growth and progress. Longitudinal studies would also provide a clearer picture of how these improvements in motor skills translate into long-term benefits for physical health and academic performance, which in turn would inform policy and curriculum development in primary education.

## CONCLUSION

This study underscores the significant benefits of integrating kinesiologists into the primary school curriculum. Expert-led PE not only enhances students' motor and functional skills, but also contributes significantly to their overall development and health. The results support the systematic involvement of kinesiologists to improve students' PA and motor skills. In addition, the data point to the need for longitudinal studies to investigate the long-term effects of such educational strategies. The specific contribution of this research to direct educational work is that it shows that specialized PE led by kinesiologists significantly promotes not only the development of motor skills, but also the physical and cognitive growth of students. These findings suggest that the presence of kinesiologists in the school environment can change the usual practices of PE by providing customized, effective and holistic educational experiences. Furthermore, the study highlights how the early integration of kinesiologists can provide a foundation of motor skills that supports broader academic and health outcomes, thus arguing for a structural change in the way PE is conceptualized and implemented in the educational system. These findings provide a valuable foundation for further research into the comprehensive benefits of kinesiology-based programs in primary schools.

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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