Article Classification:
Original research

IMPACT OF SPECIALIZED AND UNSPECIALIZED PHYSICAL EDUCATION TEACHERS ON THE SPEED AND ENDURANCE OF 7-9-YEAR-OLD STUDENTS

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OPEN ACCESS

Submitted: 06 July 2023
Accepted: 08 December 2023

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Cite this article as:
Naydenova, K. (2023). Impact of specialized and unspecialized physical education teachers on the speed and endurance of 7-9-year-old students. *Journal of Applied Sports Sciences*, Vol. 2, pp. 52 - 61.
DOI: *10.37393/JASS.2023.02.5*

ABSTRACT

Reduced motor activity and impaired physical fitness are among the great problems of modern society. Many authors point out that one solution to this problem is creating a lasting interest in motor activity before the age of 10-11 when the child has a natural need for movement. At the same time, in Bulgaria and many other countries, physical education in preschool and primary school age is taken over by teachers who are not specialists in physical education and sports. This study aimed to track changes in acquiring motor abilities such as speed and endurance for pupils in the 1st, 2nd, and 3rd grades, aged 7 to 9 years, with whom specialists with different specializations have worked. The research was carried out with 11 pupils at a primary school. Running 30 m and Shuttle Running 4 x 50 m tests were used. The testing and mathematical-statistical methods (variation analysis and comparative analysis with t-criterion of Student) were used in the study. The analysis showed a significant difference in students' results between physical education and non-specialist teacher training. Undoubtedly, training by a non-specialist teacher leads to a decrease in the values of the considered indicators in the pupils' physical fitness.

Keywords: *physical education, pupils, teachers, motor qualities*

INTRODUCTION

Physical Education and Sport is a compulsory subject in many countries in Europe (Naul, Scheuer, 2020) and the world, and in a few, like the UK, it is a core examination subject at the end of education (Forey & Cheung, 2019). It is also compulsory in all four stages of Bulgarian secondary education. Its importance is determined by the unity of its two leading components, cognitive and motor skills. Based on the characteristics of modern lifestyles and the fact that the primary student spends about 8-9 hours daily at school, it can be argued that PE and sports lessons largely provide the daily minimum of movement for students, something WHO has been warning about since the beginning of the 21st century (WHO Europe, 2007; WHO, 2010). In this regard, the motor component of the educational work is the one that has great importance in terms of students' development and the formation of conditions and competence for a healthy lifestyle, which creates many responsibilities for the physical education teacher. This allows authors such as Pangrazi, Beighle (2020), Hapke, Topfer, and Lohmann (2021) to consider that the physical education teacher is responsible not only for the formation of motor skills of students but also for the state of public health. Of particular importance in terms of health and the formation of healthy lifestyle skills is the teaching of physical education in Primary schools, as the period is crucial in terms of physical and motor development based on movement and the child's natural needs to move, as evidenced by authors such as (Robinson et al., 2015; Barnett et al., 2016; Pham et al., 2021).

In contrast to the need for physical activity in the years of schooling, according to D. Ignatov (2021), there is a discernible reduction in a child's motor activity. This decline can be predominantly attributed to shifts in lifestyle, marked by extended periods of desk-bound engagement due to schooling demands. Thus, physical education and sports classes two or three times a week, sports activity classes, and active recreation and sports classes are the few opportunities for physical activity for primary school-age pupils within educational institutions. At the same time, these physical education and sports classes, as well as active recreation and sports classes, are often replaced with in-class learning activities led by non-specialist teachers. A significant normative weakness concerning the education and development of students in the primary stage stems from the regulations in the Law on Pre-school and School Education and Regulation No. 15 of 22 July 2019 regarding the status and professional development of teachers, principals, and other pedagogical specialists, which allow a teacher who is not a specialist in physical education to conduct classes in this subject. Practice shows that the training process is either not good enough or not implemented in such cases. According to authors such as Dinham and Williams (2019), one of the reasons for this is inadequate prior preparation for the specific lesson by non-specialist teachers. Lynch and Soukup (2017) address the question further by suggesting that multi-subject teachers do not have sufficient professional preparation to enable them to deliver PE lessons. Cruickshank, Hyndman, Patterson, and Kebble (2021) suggest another reason. According to them, the importance of subjects such as mathematics, language training, etc., makes non-specialist teachers pay more attention to them than to physical education, enabling them to replace the content of classes.

The analysis of literature and documentary sources, as well as our findings on the organization of training with primary school students, motivated us to study the influence of specialist and non-specialist teachers on changes in motor skills in primary school students. In this regard, we set the aim of the present study to monitor the changes in motor qualities such as speed and endurance in 1st, 2nd, and 3rd-grade pupils aged 7 to 9 years, with whom specialists with different profiles worked.

The achievement of the objective implies the completion of the following main research tasks:

1. To conduct sport pedagogical testing of the same 1st, 2nd, and 3rd grade students, once at the beginning and once at the end of each school year.
2. To process, analyze, and interpret the results obtained from the testing.
3. To qualitatively assess the changes in the motor qualities of the students in the three school years studied and to identify the impact of the positive and negative effects of the work of specialized and unspecialized PE teachers on this development.

METHODOLOGY

The study was conducted in three consecutive academic years: 2020/2021, 2021/2022, and 2022/2023.

Participants

This study presents the results of 11 students who were seven years old at the beginning of the experimental work and nine years old at the end.

The testing was conducted using two of the tests created by Miladinov et al. (2019) for assessing the physical fitness of students from grades I to XII in schools in Bulgaria, presented in Table 1. The state of the motor skills was measured according to the assessment guidelines, once at the beginning and once at the end of the school year.

Table 1. *Indicators examined*

Indexes	Measure unit	Measurement direction
Running 30 m	0.01 s	-
Shuttle running 4x50 m	0.01 s	-

Limitations of the study

The experiment started in 2020. In 2020 and 2021, much of the school year was spent online, thus broadly limiting the scope of the study. The experiment began with seventeen children, some of whom, given the specifics of their education, transferred to other schools and dropped out of the study. The children participating in various sports outside school hours were subtracted from the sample to make the study as objective as possible. For this reason, only eleven children from one school class were examined.

Research methods

In order to fulfill the set tasks and aims of the research, the following methods were used: a study of the specialized literature and legal documents concerning physical education and sports regulations, sports pedagogical testing, and pedagogical observation.

Procedure

The experiment carried out is a confirmatory one. During the first two school years, the work with students was conducted by a specialist physical education teacher, whose job was also made difficult by large periods of online learning. In the third year of the study, the Physical Education and Sport class was conducted by a non-specialist teacher and in a fully attended format.

The children participating in the experiment were from one class, and their only organized motor activity was within the above organizational forms. Statistical processing of the results found no statistically significant gender differences in students' achievements, which allowed us not to separate the group into girls and boys.

Data analysis

The collected data were statistically processed using the SPSS v.23 software product. Based on the research objectives, the following statistical methods were applied:

- Variation analysis for defining average values, distribution of normality, and various indicators.
- Comparative analysis with Student's *t*-criterion for dependent samples.
- Proving the reliability of the differences between the mean values of the indicators compared to different years. In this regard, the impact of non-sport specialist teachers was also examined.

RESULTS

According to the statistical processing algorithm, the analysis and interpretation of the study results concerning the test data of students in the 1st, 2nd, and 3rd grades will be presented below. Tables 2, 3, and 4 present the variation analysis results:

Table 2. *Variation analysis of the indicators of speed and endurance of pupils from 1st grade*

Indexes	N		R	Xmin	Xmax	$\bar{X}$	S	V%	As	Ex
Running 30 m	11	1	3.75	6.75	10.50	7.74	1.11	14.34	1.67	3.04
		2	1.76	6.69	8.45	7.37	0.66	8.95	-0.28	-0.47
Shuttle running	11	1	16.15	55.63	71.78	61.71	5.29	8.57	0.48	-0.64
		2	14.16	50.19	64.35	56.61	5.31	9.37	0.30	-1.48

The results presented in Table 2 illustrate the data from the applied variation analysis of the studied students in their first year. At the beginning of the school year, the mean value of the performance on the Run 30 m test, which provides information about the state of the motor quality "speed", was 7.74 sec. This value at the end of the school year decreased to 7.37 sec. In both cases, the score corresponded to a "good 4" on the subject grading scale for the Bulgarian conditions. A positive result was achieved by the changes during the school year in the values of students' range (R), minimum (X min), and maximum achievement (X max), which decreased. The slowest student in the testing at the beginning of the year improved his achievement by 2.05 s, which resulted in a decrease in the values of the spread factor. At the same time, the homogeneity of the group of students under study was also improved. Information about this is provided by the coefficient of variation (V%) values, starting at 14.34% at the beginning of the school year and reaching 8.95% when measured at the end of the school year. A negative sign in front of the value of the asymmetry coefficient (As) in end-of-year testing indicated a clustering of student achievement around the best achievement.

The results of the Shuttle run 4x50 test, and the indicator values from the variation analysis showed a high level of homogeneity of the group in both measurements. The values of the asymmetry (As) and skewness (Ex) indicators showed the normality of the distribution of values. At the same time, a significantly improved performance was observed in the second test. In contrast to the first test, in which the student's score was a "good 4", the score rose to a "very good 5" on the second test. Such an improvement in results within a school year can indicate a very good testimonial for a teacher's performance, especially regarding changes in indicators relevant to students' endurance.

Table 3. *Variation analysis of the indicators of speed and endurance of pupils from 2nd grade*

Indexes	N		R	Xmin	Xmax	$\bar{X}$	S	V%	As	Ex
Running 30 m	11	1	1.35	6.34	7.69	7.05	0.46	6.52	-0.48	-1.09
		2	1.65	6.29	7.94	6.93	0.60	8.65	0.95	-0.69
Shuttle running	11	1	19.56	53.85	73.41	61.04	6.06	9.92	0.79	0.16
		2	14.84	49.89	64.73	57.94	5.51	9.50	-0.21	-1.44

The results of the second-grade students in the 30 m Running test are presented in Table 3. In comparing the two tests, changes are observed in the values of all variance analysis indicators. The same is observed for the Shuttle Run 4x50m test. The average performance on both tests improved over the school year and was within the "good 4" range. The numerical values of the asymmetry (As) and skewness (Ex) measurements made the distribution normal and subsequently applied the parametric Stewart t-criteria for hypothesis testing to be defined. The coefficient of variation (V%) values for both tests at the beginning and end of the school year remained below 10%. This indicated a high-class homogeneity, which, in turn, shows a good approach of means and methods to influence all students in a positive direction. However, this was not the case for the coefficient of variation values for 3rd-grade students. In both tests, there was an increase in the coefficient

values at the end of the year, which classified the group not as strong but as relatively homogeneous. The decrease in the homogeneity of the group was a sign of heterogeneous influences on the students, which, observing the values of the other indicators of the analysis of variance, pointed to the decrease in the students' results.

Table 4. *Variation analysis of the indicators of speed and endurance of pupils from 3rd grade*

Indexes	N		R	Xmin	Xmax	$\bar{X}$	S	V%	As	Ex
Running 30 m	11	1	1.61	6.03	7.64	6.75	0.57	8.44	0.34	-1.66
		2	3.14	5.87	9.01	7.38	0.94	12.73	-0.11	-0.51
Shuttle running	11	1	19.11	48.17	67.28	56.27	7.00	12.44	0.33	-1.46
		2	23.66	48.79	72.45	57.44	7.82	13.61	0.58	-0.71

The results presented in Table 4 showed changes in terms of the range of the indicator (R), minimum (X min), and maximum (X max) value of student achievement. For the above indicators, a decrease in the values can be observed in both tests, except for the increase in the minimum value in the 30 m Run test. In parallel with the decrease in the homogeneity of the group, there was also a decrease in the mean values of both tests. This, in turn, was worrying, given the fact that for 9-year-old students, several authors attested to an improvement in performance on both tests. Considering that students' physical activity was almost entirely realized at school, this could be considered a negative testimonial for the non-specialist teacher working with them in PE and sports lessons. This suggestion was confirmed by interpreting the comparative analysis data, which enables this statement to be confirmed or rejected.

Table 5. *Comparative analysis of the mean values of the index of 30 m running*

Grade	N	X_1	S_1	X_2	S_2	d	d%	Cohen's *d*	temp	P(t)
I grade	11	7.74	1.11	7.37	0.66	0.36	4.65	0.59	2.00	95
II grade	11	7.05	0.46	6.93	0.60	0.11	1.56	0.22	0.80	57
III grade	11	6.75	0.57	7.38	0.94	-0.62	9.1	0.72	-2.40	97

The data from the comparative analysis that was applied to test the research hypothesis is presented in Tables 5 and 6 and Figures 1 and 2. The data were separated and presented for the two tests included in the study. The changes in performance from the abovementioned variation analysis and the hypotheses made regarding the Run 30m test were fully confirmed. During the study period, the motor quality "speed" was positively changed only in the 1st and 2nd grades. Relative achievement growth was 4.65% for first-grade students. This growth was supported by the required level of probability guarantee and a Cohen's *d* value of 0.59. The increase could be defined as "moderate", and considering the conservative nature of the "speed" motor quality and the teacher's work, a specialist in Physical Education and Sports could be considered appropriate.

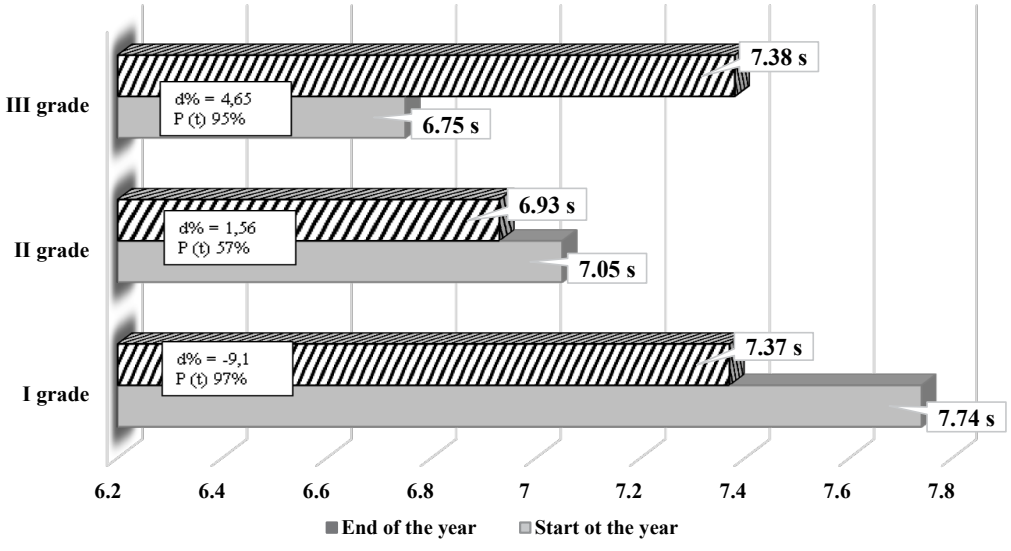

Figure 1 . *Comparative analysis of average scores of motor quality speed of students from 1st, 2nd, and 3rd grade*

Between the two tests of the second-grade students, the relative gain in achievement was d - 1.56%, or from 7.05 s at initial testing to 6.93 s at final testing. The difference could be defined as random, given the guaranteed probability of 57%. This explains Cohen's *d* value of 0.22, representing the small growth rate. Nevertheless, during the first two years, the students' performance on the test under consideration undergoes continuous positive changes - going from 7.74 s at the first test in the first grade to reaching a score of 6.93 s at the end of the second grade.

However, the mean achievement values of the students observed were not changed in the same way in 3rd grade. In the initial testing, the average achievement of the students was 6.75 s, which follows the ascending line of the previous studies. At the end of the school year, the examined indicator reached a value of 7.38 s, which reached values like those reported at the end of the first grade. Here, a decrease of 0.62 s or 9.1% was observed with a high probability of guarantee P(t) = 97% and a Cohen's *d* value of 0.72. The difference could be defined as significant from a practical point of view. With similar values of the considered indicators, the decreased parameters of the motor quality "speed" can be explained by the methods and means applied by the non-specialist physical education teacher.

Table 6. *Comparative analysis of the mean values of the index of 4x50 m*

Class	N	X_1	S_1	X_2	S_2	d	d%	Cohen's *d*	Temp	P(t)
I class	11	61.71	5.29	56.61	5.31	5.10	8.26	0.99	3.27	100
II class	11	61.04	6.06	57.94	5.51	3.09	5.06	0.54	1.80	90
III class	11	56.27	7.00	57.44	7.82	-1.16	2.06	0.28	-0.94	64

Similar changes were observed in the results of the 4x50m Shuttle Run. First-grade students showed the most significant increase in performance of 5.10 s, with the average going from 61.71 s at the beginning of the school year to 56.61 s at the end. The difference

of 8.26% is supported by a sufficiently high guarantee probability of P(t)=100%. This allows the changes to be fully explained by the methods and means applied in the lesson work to develop the motor quality "endurance". On the other hand, in the study of endurance, the value of Cohen's *d* was 0.99, which, from a practical point of view, meant that the difference revealed was significant.

The performance improvement of 5.06% or 3.09 s and Cohen's *d* values of 0.54 between the tests at the beginning and end of 2nd grade was not supported by a sufficiently high level of guarantee probability P(t)=90%. The long intervals and absence from physical classes for online learning could explain such results. This was particularly the case at the beginning of the school year. In turn, they did not allow any targeted and planned interventions regarding motor skill development that required running certain distances and exercises that could not be performed in the home environment. The same trend of changes in the Run 30 m test results should be noted here.

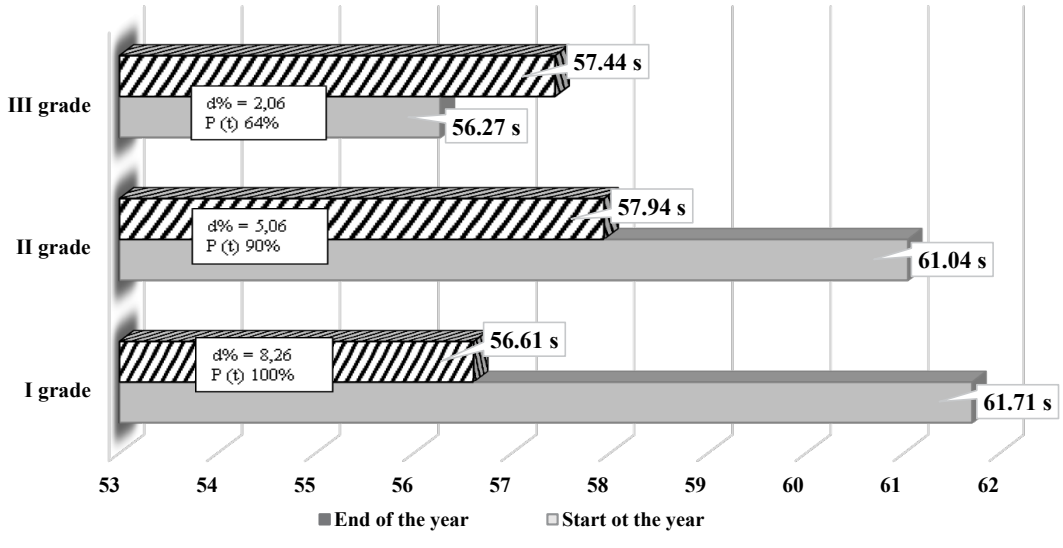

Figure 2. *Comparative analysis of average scores of motor quality endurance of students from 1st, 2nd, and 3rd grade*

As with the 30 m Run test, the 4x50m Shuttle Run improved performance at the beginning of 3rd grade. The results were followed by a decrease by the end of the school year, from 56.27 s to 57.44 s. Again, it was observed that these values are similar to those at the end of the previous school year. Over the school year, there was a decrease of 2.06%, which could be defined as small according to Cohen's *d* value of 0.28. However, it cannot be pointed out that this decrease in achievement is normal for pupils of 9 years of age, in whom several factors were present that supported the development of motor skills.

DISCUSSION

Part of the study was a pedagogical observation, according to which the main differences in the approaches of the two teachers were significant. Comparing their actions, it should be noted that there were numerous weaknesses in the non-specialist teacher. One of which was a failure to regulate the level of physical intensity in the lesson, which was expressed in a concern that the students would sweat, and at any such occurrence, they stopped the activity and left the students to 'rest' on the benches. For non-specialist teachers, there were insufficient competencies relevant not only

to methodological approaches to developing motor qualities but also to the overall planning and implementation of the teaching process in Physical Education and Sports. Such issues have also been discussed by authors such as Sotirov and Bazelkov (2010), Dokova and Kinov (2016), and Lynch and Soukup (2017).

Such gaps in the training of non-specialists underlie the survey results presented and analyzed above. Evidence in this sense could also be the conclusion of authors such as D. Ignatov (2021), according to which the physical performance of students in 3rd grade is characterized by different dynamics, with changes associated with a smooth improvement in performance. In this regard, the studies conducted by Tepeva (2019) and D. Zheleva-Terzieva (2021) could point to the dependence between the personal qualities and the professional preparation of the teachers, which, in combination with the characteristics of the age development of the child, stand at the basis of a good education. Simeonov (2019) drew a similar conclusion too.

According to the compared achievement of the students tested across the three school years, it is essential to note that both of the tests included in the study showed a steady improvement in their achievement up to the beginning of third grade, after which the scores decreased at the end of the last school year. This fact contradicted the statements of authors such as Simeonov (2019), Lovkov (2019), Ignatov (2021) and the results of other previous studies done by Nancheva, Naydenova (2019), Naydenova, Nancheva (2019), which revealed a continuous improvement of results over the researched age period.

CONCLUSION

In conclusion, it should be noted that the changes identified in the report concerning the motor qualities of strength and endurance align with the expected trajectory of physical development in the 7-9 age group. However, of significant importance in this development and manifestation of growth is the class work in the Physical Education and Sports class, particularly that of the teacher. The selection of methods and means to develop motor qualities, the effectiveness of the development process, and the ability to plan and regulate the physical load in the lesson are essential elements of a successful teacher. Undoubtedly, the influence of the teacher's professional and personal qualities and the competencies acquired during their professional training is significant.

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