IMPACT OF DISTANCE LEARNING IN AN ONLINE ENVIRONMENT ON PHYSICAL PERFORMANCE IN HIGH SCHOOL BOYS

Daniela Simeonova, Andrey Shalev
National Sports Academy “Vassil Levski”, Sofia Bulgaria

ABSTRACT
One of the tasks of physical education in the different grades of the Bulgarian school is the purposeful development of motor skills and achieving an optimal level of physical activity for every age group. The COVID-19 pandemic forced a change in the way students are taught and the conduct of their physical education classes. In this regard, the aim of our research is to reveal the impact of one year of training in an online environment on the physical fitness of high school students.

To achieve this goal, we conducted our research twice (at the beginning and end of the 2021/2022 school year) and tested 39 students (boys) from the “Peter Beron” high school for foreign language teaching - the city of Montana. We conducted the research through the national system for evaluating the physical fitness of students, which includes the tests of running 30 meters, long jump from a place with both feet, throwing a solid ball, running 200 meters shuttle run, and T-test. We applied a variation and comparative analysis to the data from the two tests. Results showed a positive change in the following tests: throwing a solid ball, long jump from a place with both feet, and the 200m shuttle run. In the other two tests, there was no improvement in results.

Keywords: physical education and sports, students, physical ability, online environment.

INTRODUCTION
Various authors point out the reduced levels of physical activity, overweight and improper nutrition among adolescents, which affect their physical fitness, and hence their quality of life. Due to online learning, in the last three years, students’ physical activity has also been significantly reduced in physical education classes. This made us explore the changes in high school students' physical fitness.

In the middle and the end of the 20th century in our country (Shterev, 1975), (Petkova and Kvar- tirnikova, 1985), (Slanchev, 1992), (Rachev, 1968) studied the problems of physical fitness. In recent years, studies on physical fitness have been conducted by (Marinov, 2020), (Marinov, Georgieva, Alipieva, 2019), (Borisov et al., 2019), (Nancheva, 2019), (Nancheva and Naydenova, 2019), (Miladinov and Konchev, 2019).

Despite the number of the authors who have examined the problems of physical fitness, Marinov, Georgieva, and Alipieva (2019) claimed ‘that no actions have been taken to update the system for assessing the students’ physical fitness in the last 25 years. Moreover, Borisov et al., (2019) defined the studies on physical fitness conducted between the 1960s and 1980s as wide-ranging and a result of purposeful state policy, and those conducted since the beginning of the 21st century - as random and a result of personal research interests. Considering the importance of physical fitness, we believe that systematic studies on the problem are necessary. According to Marinov (2020) ‘... the strategy for improving the health of an individual or the population as a whole should be focused on the level of physical fitness.’

As we noted above, recent years have left their mark on the students’ physical activity. In her report, Kuleva (2020) talked about the impact of the COVID-19 pandemic on the effectiveness of work in distance learning. Other authors like Naydenova (2021) pointed out the difficulties and opportunities for conducting physical education lessons in an electronic environment. Nevertheless, online learning is believed to limit the students's movement significantly. They were forced to study in front of the computer, which changed some of their habits related to physical activity, which reflected on their physical fitness. This raised questions about how negatively the online learning affected students’ health and physical fitness and how the harm caused by it can be amended, which brought us to the aim of our research.

Aim and objectives of the study
The study aimed at revealing the impact of e-learning on high school boys’ physical fitness. To achieve
our goal, we set the following tasks to solve:

1. To study the literary sources on the problem under consideration.
2. To apply a sport-pedagogical test on students’ physical fitness by using the test battery of Mi- ladinov et al., (2018)
3. To study the change in students’ physical fitness over one school year.

Based on the literary sources reviewed and the above-mentioned goal and tasks, we defined the physical fitness of students between 14 and 16 years of age as the subject of our study and changes that occurred in students’ physical fitness for one school year of online learning as the objects of the research.

METHODS

The testing was done at the beginning and the end of the school year 2021/2022 in the High School with Foreign Language Education ‘Peter Bogdan’ in Montana. The selected students were tested twice following five tests: 30 meters running, standing long jump, throwing a solid ball, 200 meters shuttle run, and T-test. The test results were processed with the statistical software product SPSS.22. and variation and comparative analyses were made.

The study included 39 students between 14 and 16 years. Twenty-one of them were 14 years old and 18 -16 years old.

All parents of the studied participants signed an informed agreement that the information received from the tests will be used in the present survey.

RESULTS

The data analysis and interpretation began with the indicators from the variation analysis. The values of the variation coefficient in 14-year-old boys were between 12 and 20%. This showed a relative similarity in achievements, which gave us the reason to assume that physical education work with the respective class was not conducted effectively. The values of the asymmetry (As) and excess (Ex) coefficients, which carry information about the normality of the distribution, showed the presence of normality in all tests except for the T-test done at the end of the school year, and the two measurements of 30 meters running. Significantly lower values of the variation coefficient were noticed in all tests done by the 16-year-old boys, which indicated a significant standardization of the mean achievements in the respective class. This gave us the reason to assume that the work carried out during the school year in physical education lessons positively impacted separate motor skills as components of physical fitness in adolescents. The asymmetry (As) and excess (Ex) coefficients showed normal distribution, which allowed us to use parametric statistics indicators in the follow-up analysis. The follow-up analysis began with the results from the 30m running test.

<table>
<thead>
<tr>
<th>Test</th>
<th>n</th>
<th>Initial Data</th>
<th>Final data</th>
<th>Increase</th>
<th>t</th>
<th>P(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>S</td>
<td>V%</td>
<td>X</td>
<td>S</td>
</tr>
<tr>
<td>30 m running</td>
<td>21</td>
<td>5.07</td>
<td>0.78</td>
<td>15.38</td>
<td>4.99</td>
<td>0.91</td>
</tr>
<tr>
<td>Long jump</td>
<td>21</td>
<td>187.61</td>
<td>30.76</td>
<td>16.39</td>
<td>196.85</td>
<td>32.94</td>
</tr>
<tr>
<td>Throwing a solid ball</td>
<td>21</td>
<td>594.76</td>
<td>123.19</td>
<td>20.71</td>
<td>632.38</td>
<td>138.45</td>
</tr>
<tr>
<td>200 m shuttle run</td>
<td>21</td>
<td>42.05</td>
<td>5.20</td>
<td>12.36</td>
<td>41.00</td>
<td>4.61</td>
</tr>
<tr>
<td>T – test</td>
<td>21</td>
<td>13.90</td>
<td>1.41</td>
<td>10.14</td>
<td>14.78</td>
<td>2.28</td>
</tr>
</tbody>
</table>

The results in Figure 1 show changes in the studied boys at both ages. The improvement of the results in 14-year-olds, within the school year was by 0.08 seconds, which, based on the guaranteed probability P(t) – 99.9%. This difference in the results and the statistical reliability gave us a reason to confirm the above-mentioned assumption about the positive impact of the applied means and methods in physical education lessons during online learning within the school year we studied.
Tables 1 and 2, and Figure 2 present the Standing long jump test results. The figures showed improvement in the results in both age groups. In the group of 14-year-old students, we noted an increase of 9.24 cm within the school year. This difference can be defined as credible and attributed to the influence of the physical education training in that year. The guarantee probability P(t) was high – 96.8%. The difference between the achievements at the beginning and the end of the school year for the older students was 0.89 cm. Still, contrary to the younger students, as seen in Table 2, the guarantee probability was low - 27.5%, which gave us a reason to attribute it to random factors.

Table 2. Data from the comparative analysis of 16-year-old boys

<table>
<thead>
<tr>
<th>Test</th>
<th>n</th>
<th>Initial Data</th>
<th>Final data</th>
<th>Increase</th>
<th>t</th>
<th>P(t)</th>
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<td>Test</td>
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<tr>
<td></td>
<td></td>
<td>X</td>
<td>S</td>
<td>V%</td>
<td>X</td>
<td>S</td>
</tr>
<tr>
<td>30 m running</td>
<td>18</td>
<td>4.57</td>
<td>0.30</td>
<td>6.56</td>
<td>4.36</td>
<td>0.21</td>
</tr>
<tr>
<td>Long jump</td>
<td>18</td>
<td>216.33</td>
<td>20.55</td>
<td>9.50</td>
<td>217.22</td>
<td>19.53</td>
</tr>
<tr>
<td>Throwing a solid ball</td>
<td>18</td>
<td>801.66</td>
<td>110.04</td>
<td>13.72</td>
<td>821.11</td>
<td>109.75</td>
</tr>
<tr>
<td>200 m shuttle run</td>
<td>18</td>
<td>35.78</td>
<td>3.67</td>
<td>10.26</td>
<td>33.97</td>
<td>3.29</td>
</tr>
<tr>
<td>T – test</td>
<td>18</td>
<td>13.43</td>
<td>0.96</td>
<td>7.15</td>
<td>12.97</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Figure 1. Mean values of the results achieved in the 30-meter running test

Figure 2. Mean values of the results achieved in the Standing long jump test
The results from the Solid ball throwing test, presented in Figure 3, made us consider that the physical education lessons in the electronic environment had a positive impact on the upper limbs explosive power. The results of the studied 14–16-year-old students showed an improvement in their achievements. In the case of 14-year-old boys, the improvement was with 37.62 cm within the research. The obtained difference could not be defined as reliable, based on the value of P(t), presented in table 1 - 84.8%. For the 16-year-old students, the difference in achievement was 19.45 cm, comparing the results from the beginning and the end of the school year. Still, this difference could not be supported by the required level of guarantee probability P(t) - 91.3%. Although both considered age groups showed improvements in their achievements, considering the statistical indicators, we could not attribute these differences to the applied means and methods in the physical education lesson.

The 200m shuttle running test provides information on the changes that occur in speed endurance. The results from the study for both groups included in our study showed a minimal improvement in the results at the end of the school year compared to those at the beginning. The younger participants showed improvement by 1.05 seconds, which could not be confirmed with the required level of guarantee probability P(t) - 72.4%. This was not the case with the older students tested, in which the mean difference between the first and second measurements was 1.81 seconds. The difference here was confirmed with the required level of guarantee probability P(t) – 99.9%. The shown difference and the statistical reliability gave us a reason to attribute the improvement of these achievements to the physical education lessons implemented in an electronic environment.
Tables 1 and 2 and Figure 5 present the results from the T-test conducted in both groups. The 14-year-old students showed lower results by 0.88 seconds, which, despite the lack of statistical reliability \( P(t) = 93\% \), was alarming regarding the selection of methods and means aimed at developing one of the motor skills - agility - in the specific class. The results of the 16-year-old students showed improvement in achievements obtained from the tests at the beginning and the end of the school year. The difference between the two measurements was 0.43 seconds, confirmed with the required level of guarantee probability \( P(t) = 98\% \). The difference in results and the statistical reliability level allowed us to positively assess the work in physical education lessons and the means, and methods used by the teacher.

![Figure 5. Mean values of the results achieved in the T-test](image)

**DISCUSSION**

The analysis and interpretation of the results obtained from the study showed a lot of changes regarding the physical fitness manifestation in both age groups of the studied students. Comparing these two groups’ results, we can claim that positive changes occurred only in the lower limbs’ explosive power in the 14-year-old students. The results confirmed the opinions of authors like Zheleva-Terzieva (2019), who claimed that new technologies negatively affected adolescents’ motor activity, which inevitably affected their physical fitness. On the other hand, these results confirmed the obtained in a study by Naydenova and Alachev (2019), reporting a continuous increase in explosive power measured by the same test in schoolgirls.

The results from the tests with the 16-year-old students showed a statistically reliable increase in the achievements in three of the total five applied. It is impressive that the results from all tests requiring running over a certain distance - 30-meter run, 200-meter shuttle run, and T-test – improved. At the same time, the achievements in the tests giving information about lower and upper limbs’ explosive power got worse.

Our research results showed possibilities for a positive effect of physical education lessons in an electronic environment, but, in our opinion, these possibilities need to be broadened in future, which should be based on the experience gained so far from this kind of learning. At the same time, our research results confirmed those got by Zheleva-Terzieva (2021), who, although partially, examined the problem, paying attention to the impact of the COVID pandemic on motor skill strength, and pointed out some influences and changes in the skill parameters.

**REFERENCES**

IMPACT OF DISTANCE LEARNING IN AN ONLINE ...

Corresponding author:
Daniela Simeonova, PhD
Department of Theory of Physical Education
National Sports Academy „Vassil Levski”
21, Acad. Stefan Mladenov str.
Sofia, Bulgaria
E-mail: daniela.simeonova@nsa.bg
National Sports Academy “Vassil Levski”
Sofia, Bulgaria

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