

Case technologies of universal learning actions in physical education of junior schoolchildren

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Abstract:

Improving the effectiveness of primary school educational process of physical education using case methods is an urgent and timely task of pedagogy. *Research aim:* to develop and test a pedagogical case-technology for the universal educational actions development in the process of younger schoolchildren's physical education. *Materials and methods.* The research project was conducted at a secondary school in Chelyabinsk (Russia) from September 2021 to May 2022. 48 children aged 10-11 (4th grade schoolchildren) took part in the project. 24 people made up the control group (CG), which was engaged in accordance with the traditional program of physical education and 24 people – experimental group (EG). Case tasks aimed at the universal educational activities development and improvements were introduced into the physical education lessons in this group. In the homework of EG group children, they were asked to perform case tasks of varying complexity in a developed workbook on physical education throughout the school year. Psycho diagnostics methods were used to assess and distribute schoolchildren according to the levels of personal, regulatory, cognitive and communicative educational actions formation: Luskanova (1999), point; Gorchinskaya (1999), point; children's version of the Kettell and Koan test (Kapustina, 2006), point. We conducted a questionnaire survey of schoolchildren's parents in order to identify the attitude to the case tasks implementation by children and to attract them to participate in family physical culture and sports events. *Results.* At the end of the research project, it was found that the experimental system of using the case method in the process of primary school children's physical education had a significant impact on the increase in the personal, regulatory, communicative and cognitive educational actions level development. There was a much greater development of interest among schoolchildren of the experimental group in the implementation of the proposed school and extracurricular educational tasks in physical culture using case technology and involving the children's parents in joint physical culture and sports activities. *Conclusions.* The developed experimental system for the case method application for the development of primary schoolchildren's universal educational actions in the process of physical education, which provides for the case tasks use in both scheduled and home forms of physical education with the use of a workbook turned out to be more effective than the traditional curriculum.

Key Words: case-technology, physical education, universal learning activities, primary school

Introduction

The search for innovative pedagogical forms, means and methods used in the educational process of schoolchildren's physical education to solve the tasks of the discipline seems timely and relevant (Hrehorowicz, 2021; Almonacid-Fierro, 2021). Despite the active use of modern pedagogical technologies in physical culture in educational institutions, the health status of a significant part of students remains unsatisfactory (Krasnozhan, 2017). According to An De Meester et al. (2018), Huang et al. (2019) in more than 50% of primary schoolchildren, physical activity was less than the amount of daily physical activity recommended by WHO (Global recommendations on physical activity for health, 2010). Hypodynamia among young people is a key cause of severe non-communicable diseases from the cardiovascular, respiratory, endocrine and nervous systems

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(Jieyu Chen et al., 2017; Yang, & Dong, 2017; Guryanov et al., 2022; Kolokoltsev et al., 2021), the development of obesity and diabetes (Ding et al., 2020). Low physical activity of students reduces the adaptive mechanisms of the body, which negatively affects the indicators of physical development, physical fitness and cognitive abilities (Chekhovska et al., 2020; Bakiko et al., 2020; Kolpakova, 2018; Ignatenko et al., 2021).

Currently, it is not possible to compensate for inactivity in educational institutions by increasing the number of hours of physical education in the schedule due to objective reasons. In these conditions, improving the effectiveness of physical education in educational institutions should be carried out by optimizing the educational process using innovative pedagogical technologies (Drachuk et al., 2018; Görner, & Reineke, 2020).

The analysis of scientific sources testifies to numerous directions of the educational process of physical education optimization in educational institutions (Loginov, & Snigirev, 2022). Information technologies are widely used in pedagogical science in the theoretical and practical training of persons studying physical education (Hrehorowicz, 2021). Researchers have shown the high efficiency of using online learning in pedagogical practice, especially during the COVID-19 pandemic (Almonacid-Fierro, 2021; Kokhan et al., 2021).

A promising direction in educational institutions has become the use of nonlinear pedagogy in the educational process, including in physical culture (Lee et al., 2017), which provides for a research direction of study and significant student's autonomy in an academic subject development. In the last decade, the project method (Emeline, 2019) and a video case use, which is a display of short and understandable educational video material, have become widespread for solving educational problems. Researchers have proved the high efficiency of the educational process when using «inverted classroom» pedagogical technology (Mischenko et al., 2020).

According to the opinion of Drachuk et al. (2018), Görner, & Reineke (2020), the available achievements of science and practice in the field of children's and adolescents' physical education, the PE classes' methodology still needs further modernization. One of the modern technologies encouraging students to learn is case technology. According to Vorovshchikov et al. (2014), case technology is based on teaching a student to find alternative solutions to real complex life and work problems under a teacher's guidance. The implementation of case tasks stimulates the child's individual learning opportunities development, forms motivation to acquire new knowledge. Case technology carries elements of creative project activity, allows choosing a path for self-education, promotes the formation of independence and significantly develops the child's communicative and creative abilities.

The subject «Physical culture» makes it possible to improve not only physical health, but also contributes to the comprehensive harmonious development of children, adolescents and youth, and involves the development of communicative, regulatory, cognitive and personal universal educational activities. In a broad sense, «universal learning activities» imply the ability to learn. The scientific literature analysis has shown that there is no information, which would present the mechanisms for the universal educational actions formation using case technology in the process of organizing PE lessons and independent development of educational material (Basyuk et al., 2021). In our opinion, the study of the case technology use in the universal educational activities development will significantly increase the effectiveness of the educational process among younger schoolchildren on the subject of «Physical Culture».

Research aim is to develop and test a pedagogical case-technology for the universal educational actions development in the process of younger schoolchildren's physical education.

Material & methods

The research project was carried out on the basis of secondary school No. 13 in Chelyabinsk (Russia) from September 2021 to May 2022. The project involved 48 children aged 10-11 (4th grade schoolchildren). Of these, 24 children made up the control group (CG) and 24 – the experimental group (EG). During the research, children of both groups attended PE classes 3 times a week for 45 minutes. Lessons in CG were conducted according to the traditional training program (Lyakh, 2021). CG children received theoretical knowledge of physical culture only during the lesson; homework was verbal in nature and was not mandatory for their performance.

In EG, case tasks aimed at the universal educational actions formation in children were introduced into the PE lessons content. Also, a «Workbook on physical culture» was developed and introduced into the educational process for EG students. It contained a system of mandatory homework using case studies that help in the study of certain motor actions and contribute to the universal learning activities formation.

Homework assignments (36 thematic assignments per year) were selected taking into account the schoolchildren's age characteristics and sections of the physical education program in elementary school (at the rate of 72 hours of physical education per year). Tasks were given to the subjects once a week. For example, homework included tasks: enter your anthropometric indicators and physical fitness data into the workbook, make up your daily routine, draw your conditioning procedures and sports uniforms related to each section of the program, write 5 points on safety in physical culture. The children had to come up with outdoor games or relay races, prepare a report on an outstanding athlete of their city, make up sets of physical exercises for circular

training and general developmental exercises according to the section of the curriculum, master the elements of self-control during physical exertion. The homework was checked by the teacher during the lessons and the workbooks themselves with the assessment. The teacher, for many tasks, made a note and gave practical recommendations in the form of: choosing assistants from the class, performing tasks together with adults, preparing oneself for the role of a teacher or referee, and more. Thematic home case studies were compiled taking into account the sections of physical education programs and were a continuation of the educational material. The tasks were not supposed to cause heavy workload of children and cause them fatigue. They should stimulate interest in creative activity, have a cognitive character, develop the cohesion of the class team and identify leadership abilities. In homework, attention was paid to the organization of joint activities of children and their parents in family sports.

To assess the children's development and the personal universal educational actions distribution by levels, the Luskanova (1999) methodology was used, point; to analyze cognitive educational actions, the Gorchinskaya (1999) methodology was used, point. The schoolchildren's regulatory and communicative educational actions were evaluated using the children's version of the Kettell and Koan test (Kapustina, 2006), point.

Parents' consent to their children's participation in the research project was obtained. The conducted research does not contradict the principles of the Helsinki Declaration of 2008 in the field of medical and biological observations.

The obtained material was processed statistically using a licensed package of statistical programs (STATISTICA 10.0, MS Excel 2010). The assessment of the significant difference in the qualitative values of the indicators was carried out using the chi-squared (χ^2) calculation. A statistically significant difference ($p < 0.05$) was considered critical at $\chi^2 > \chi^2_{\text{critical}}$, which = 3.84145.

Results

According to the criteria of the conducted psycho diagnostics of schoolchildren at the research beginning (September 2021), the distribution of children according to the levels of universal educational actions formation was carried out (Table 1).

Table 1. The number of children according to the levels of universal educational activities formation at the beginning of the research project

Group of universal educational activities	Level of universal educational activities, abs., %					
	Low		Average		High	
	CG	EG	CG	EG	CG	EG
Personal	7 (29.2)	8 (33.3)	14 (58.3)	14 (58.3)	3 (12.5)	2 (8.3)
Regulatory	5 (20.8)	6 (25.0)	15 (62.5)	15 (62.5)	4 (18.7)	3 (12.5)
Cognitive	9 (37.5)	11 (45.8)	10 (41.7)	9 (37.5)	5 (20.8)	4 (18.7)
Communicative	9 (37.5)	10 (41.7)	11 (45.8)	9 (37.5)	4 (18.7)	5 (20.8)

It was found that the majority of children at the beginning of the research project were assigned to the «average» level in all groups of the universal educational activities formation (Table 2). This means that more than half of the children (58.3% of children in CG and EG) are able to organize their health-saving activities and perform the role of a student. A significant number of children (62.5% in both observation groups) plan their educational activities under a teacher's guidance and use it to monitor their activities. There is interest in scheduled and extracurricular activities, but children resort to the help of peers or adults – 41.7% of CG schoolchildren and 37.5% of EG ones. In addition, 45.8% of CG children and 37.5% of EG children students are able to work in the classroom in the classroom and in extracurricular activities. They can attract classmates to their game, but have little difficulty during its implementation.

However, there are small deviations in the distribution among other groups, for example, only 20.8% of CG children and 18.7% of EG children have a «high» level of interest in scheduled and independent studies and find a creative approach to solving certain tasks.

It was found that about 35% of children are assigned to a group with a «low» level of educational activities development. In the group of personal actions there were 29.2% children in (CG) and 33.3% - in (EG). In the group of regulatory actions there were– 20.8% children in (CG) and 25.0% - in (EG). In the group of cognitive actions there were 37.5 children in (CG) and 45.8% in (EG); communicative – 37.5% children in (CG) and 41.7% - in (EG). These data indicate that such children do not show activity and initiative in the educational process, some do not have sufficient interest in scheduled and extracurricular PE classes. Children assigned to the «low» level avoid paired, group, team creative work in the classroom during classes and during self-education.

At the end of the research project, we repeated the psycho diagnostics of schoolchildren on the development and distribution of children according to the universal educational actions criteria (Table 2). It is

established that the proposed pedagogical case-technology for the universal educational actions development among schoolchildren studying in the process of physical education in the fourth grades turned out to be significantly more effective than the traditional curriculum.

Table 2. The number of children according to the universal educational activities formation levels at the end of the research project

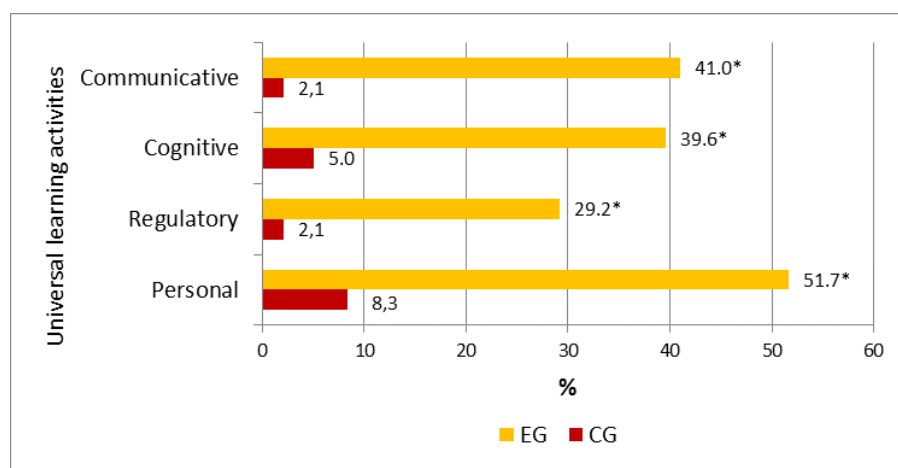
Group of universal educational activities	Level of universal educational activities, abs., %					
	Low		Average		High	
	CG	EG	CG	EG	CG	EG
Personal	5 (20.8)	0 (0)	14 (58.3)	12 (60.0)	5 (20.8)	12 (60.0)*
Regulatory	5 (20.8)	0 (0)	14 (58.3)	14 (58.3)	5 (20.8 %)	10 (41.7)*
Cognitive	5 (20.8)	0 (0)	13 (54.2)	10 (41.7) *	6 (25.0)	14 (58.3)*
Communicative	5 (20.8)	0 (0)	13 (54.2)	9 (37.5) *	6 (20.8)	15 (62.5)*

Note. * - significance of the difference between the values of the CG and EG indicators ($p < 0.05$)

The results analysis showed that in CG there was a slight improvement in the levels of distribution of children in all groups of educational activities. In EG, children who at the beginning of the project showed a large percentage at the «low» level in all groups of educational activities, after the experiment were distributed between the «high» and «medium» levels. EG children assigned to the «low» level of universal educational actions formation were not found (Table 2).

The number of EG schoolchildren assigned to the «high» level of education increased by an average of 40%. In the group of personal universal learning activities, a significant increase was 51.7%, regulatory – 29.2%, cognitive – 39.6% and communicative – 41.0%, compared with the increase in the number of children in CG, $p < 0.05$, Figure 1.

In the control group, the increase in the number of children with the level of «high» education averaged 4.0%. In the group of personal universal learning activities, the increase was 8.3%, regulatory – 2.1%, cognitive – 5.0% and communicative – 2.1%, Figure 1.

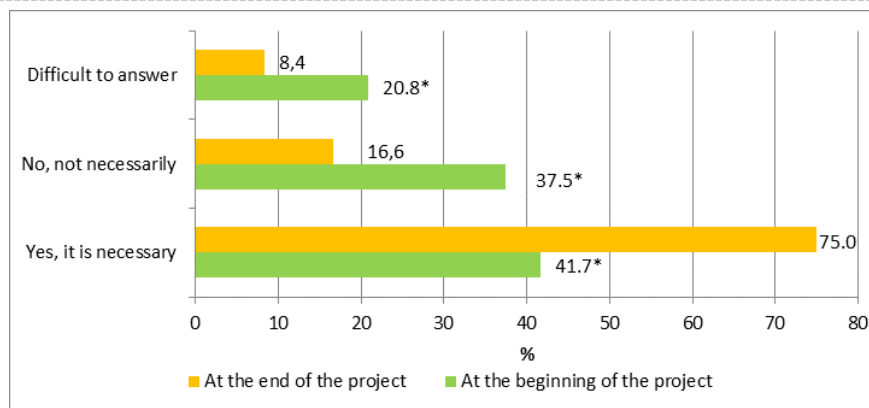


Note. * - significance of difference ($p < 0.05$)

Fig. 1. The number of children with a «high» level of educational activities formation distribution at the end of the research project

The obtained results of the number of EG children distribution mainly at the «high» level of universal educational actions formation indicate that the children began to show greater activity and initiative in the educational process. They have increased their interest in scheduled and extracurricular PE classes (they began to find a creative approach to solving certain tasks), learned to work in a team in class and during self-education (they can attract classmates to their game with interest and enthusiasm).

The survey of the children's of the experimental group parents conducted at the beginning of the research project showed that, in general, parents reacted negatively to the introduction of workbooks on physical culture into the educational process, arguing that children were heavily loaded with other subjects, Figure 2.



Note. * - significance of difference ($p < 0.05$)

Fig. 2. The results of parents' answers to the question: «Do you consider it necessary to keep a workbook on physical culture using case tasks in teaching schoolchildren?»

A survey conducted among parents at the end of the research project showed that the majority of parents (75.0%) changed their opinion about the rationality of using a workbook on physical culture with included case studies aimed at forming children's learning activities, $p < 0.05$. According to parents, children began to communicate more with their peers, coming up with any outdoor and sports games or physical exercise complexes. In addition, it became interesting for the parents themselves to help in the search for any information on physical culture and sports. More than 80% of parents began to participate in all family sports events organized by the school. Previously, parents were inert to such forms of physical culture and sports activities.

Dicussion

The search for innovative means and methods of optimizing the educational process in educational institutions is an urgent direction of modern pedagogical science (Hrehorowicz, 2021; Almonacid-Fierro, 2021). Such studies are most important among primary schoolchildren, who have an insufficient level of educational activities formation, which makes it difficult to master the educational material (Vorovshchikov et al., 2014). It is considered that the subject «Physical culture» also needs further modernization of the educational process (Drachuk et al., 2018; Görner, & Reineke, 2020). Therefore, the topic of scientific research chosen by us is important and relevant in pedagogical activity. It is known from scientific literature sources that a promising innovative technology that activates schoolchildren to learn is case technology (Vorovshchikov et al., 2014). However, the use of such a technique for physical education is not sufficiently reflected in the literature.

The research project carried out by us allowed establishing the positive impact of case studies on physical culture on the important educational activities development in schoolchildren aged 10-11. Independent execution of case tasks by schoolchildren both in the prescribed forms of physical education, and when doing homework with the use of a workbook on physical culture, are a logical continuation of the educational process. This technology allows increasing the children's learning time, since three PE lessons per week is clearly not enough for the educational skills development in schoolchildren. The constant inclusion of a system of homework using case technology in the process of physical education contributes to a more effective formation of personal, cognitive, regulatory and communicative learning activities in younger schoolchildren. The research data obtained by us are consistent with the results of the pedagogical experiment of other authors (Vorovshchikov et al., 2014; Basyuk et al., 2021), who noted the possibility of effective self-education of students and the independence, communicative and creative abilities development in children in other school subjects.

According to our data, it was found that at the end of the observation in the experimental group, the number of children with a «high» level of educational activities formation significantly increased compared to the control group of children where the traditional physical education curriculum was used (Lyakh, 2021). Children in the experimental group began to show more activity and initiative in the educational process. They have increased their interest in scheduled and extracurricular PE classes. Such children began to find a creative approach to solving certain tasks, mastered the skills of teamwork in the classroom and during self-education and self-organization.

The use of case tasks in the educational process allowed increasing interest in the educational process of physical education among parents of children in the experimental group. At the end of the research project, more than 75% of parents noted a positive attitude to the PE lessons organization at school and at home using case tasks. Parents began to actively participate in their physical culture and sports activities organized at school. The results of the project obtained by us and the materials of other researchers indicate the need for a constant search

for new means and methods of pedagogical technologies on the part of scientists and teachers of educational institutions.

Conclusions

It was found that at the beginning of the research project, a significant number of primary schoolchildren were attributed to the «low» level of universal educational actions development. Such children do not understand the basics of their health-saving activities; they conflict with the teacher and classmates. They have difficulties in solving problems of a creative nature; they do not show interest in physical education, there are difficulties in planning and monitoring their activities. The ability to work in pairs, groups or in a team in the classroom and in extracurricular activities is reduced.

We have proposed an experimental case technology for the universal learning activities development for children aged 10-11 in the process of physical education. The technology, designed for one academic year, provided for the use of case studies with mandatory workbook maintenance in the prescribed forms of physical education and self-education in physical culture with the involvement of parents.

The approbation of the proposed case technology showed that at the end of the research project, the number of children with a «high» level of all universal educational activities formation increased. The increase in the number of such children in the experimental group averaged 40.0%, compared with the control group, where the increase in such children was 4.0%. Children in the experimental group began to show activity and initiative in mastering the subject, increased interest in regular and extracurricular PE classes when working in a team. The use of case technology, as a means of developing universal learning activities in children, allowed arousing interest and attracts more than 85% of parents to family physical culture and sports activities.

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

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