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Diagnosing the Level of Forming the Practical Component of Future Physical Education and Sports Specialists' Readiness for Educational Activities to achieve Sustainable Development

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Abstract

Background. Ukraine's support for sustainable development strategies and European integration processes requires the training of specialists engaged in sustainable development educational activities.

Objectives. The study aimed to show the impact of the experimental methodological system on the forming the practical component of physical education for future physical education and sports specialists' readiness for educational activities contributing to sustainable development.

Materials and methods. The study involved 390 students from the faculties of physical education of the T. H. Shevchenko National University "Chernihiv Colehium", the National University of Life and Environmental Sciences of Ukraine, Sumy State University, and Sumy State Pedagogical University named after A. S. Makarenko, future specialists in physical culture and sports. The students were informed about the features of the study and voluntarily participated in the pedagogical experiment. The participants of the study are represented by both sexes of different courses, from which the control and experimental groups were formed. The research methods used include the study and analysis of scientific and scientific-methodical literature, pedagogical experiments, surveys, testing, analyses, synthesis and generalisation of information, as well as methods of mathematical statistics.

Results. At the beginning of the study, 93.33 % of students in the control group and 94.44 % of students in the experimental group had a low level of the practical component of readiness for educational activities contributing to sustainable development. The final stage of the study revealed a significant improvement in the studied indicator within the experimental group: 43.33 % of students demonstrated a low level of the practical component of the studied readiness, 16.67 % had a satisfactory level, 31.11 % showed an average level, and 8.89 % had a high level. The corresponding changes were observed in all defined indicators: activities for sustainable development in physical education classes or sectional sports lessons; activities for sustainable development during extracurricular work of a physical education teacher or outside the sectional work of a sports coach with a population of different age groups; and activities for sustainable development in managerial positions. In the control group, at the end of the experiment, no significant changes were found in the the practical component levels of future physical education and sports specialists' readiness to participate in educational activities for sustainable development.

Conclusions. The findings of the pedagogical experiment confirmed the positive impact of the developed methodological system on the forming the practical component of future physical culture and sports specialists' readiness to participate in educational activities for sustainable development.

Keywords: sustainable development, education, physical education, sports, teacher of physical education, sport coach.

Introduction

In the second half of the twentieth century, because of countries' rapid economic development, humanity inherited some global problems. The need to address these issues has led to the emergence of a global strategy for sustainable development (Shapar, 2006). Achieving social justice, economic development, restoration and preservation of nature requires cooperation among all countries in various fields, as well as appropriate reorientation of education to sustainable development (UNECE Strategy, 2005).

Despite Ukraine's aspirations for European integration (Association, 2014) and ongoing reforms in Ukrainian education, the transition to sustainable education in Ukraine is not systematically implemented and is not widely studied (Koreneva, 2018). However, in developed countries such as Canada, Australia, the United States of America, the United Kingdom, Germany, Sweden, and other developed countries of the European Union, the issue of education for sustainable development is being studied very intensively (Gorski et al., 2023; Grosseck et al., 2019), and in a number of countries is being implemented at the state level (UNESCO Shaping, 2014). After all, education is recognised as a factor that can contribute to sustainable development goals (United Nations, 1992).

Education for sustainable development is not just about transferring specific knowledge or changing behaviour, but about changing values, about the ability to acquire and apply knowledge in a holistic way, to be able to find cause and effect relationships and to predict the consequences of activities, about acquiring relevant competencies, critical and systemic thinking and lifelong learning that affect all segments of the population (Leal Filho, 2021).

Sport is also an important factor in sustainable development (Sport as an enabler, 2018) and is actively involved in addressing various sustainability issues abroad (IOC Sustainability, 2024; The Sustainability Report, 2024). Scientists consider the commonality of the goals of sustainable development, sport and physical culture (Chernushenko, 2003; Chen et al., 2018), analyse the legacy of the Olympic Games for sustainability (Chappelet, 2008; Cashman, 2006), explore the possibility of educational activities for the sustainable development of sports coaches (Perez-Ordas et al, 2018) and educational aspects of sustainable development in the field of physical education and sport because 'healthy sport requires a healthy environment', on the other hand, 'unhealthy environments hinder people's motivation to participate in sport and can negatively affect athletes' performance' (Oben, 2009; Lundvall & Fröberg, 2022).

To implement education for sustainable development in the practice of physical education teachers, scientists propose the following steps:

- critical analysis and revision of curricula and guidelines for physical education and sport programmes in each country to determine which parts of Agenda 2030 and which sustainable development goals are relevant to education for sustainable development in physical education and sport;
- rethinking the prospects of physical education in the field of physical education in the direction of transformational learning, when there is a shift in focus "from self to others" and "perception of oneself as part of the whole" – society and the environment;
- reorientation of views on health and well-being from a holistic perspective to increase teachers' and students' skills and knowledge about the interaction and interconnection between health, well-being and the environment, which can be achieved by incorporating cross-curricular topics and competences into key physical education concepts (Lundvall & Fröberg, 2022).

Research suggests that physical education students and physical education teachers: have too general an understanding of sustainability and link it to either an environmental perspective or social skills; do not have a clear understanding of the strategies that are appropriate for implementing sustainable development goals in physical education classes. Among the reasons that prevent them from implementing sustainable development education in the classroom are a lack of knowledge and appropriate guidance on how to implement SDGs, as well as a lack of time and resources for physical education. Physical education itself is positively assessed for fostering the values necessary for sustainable development (Baena-Morales et al., 2022; Merma-Molina et al., 2023). The involvement of physical education in addressing practical sustainability issues in local schools and communities has received positive feedback and a desire to continue to work in this area (Lynch & Boylan, 2016).

In Ukraine, the activities of the physical education and sports sector from the perspective of "for sustainable development" is hardly covered by the public. There are a small number of theoretical works that deal with individual components of sustainable development (Imas et al., 2017; Kachan & Prystynskyi, 2022) and practical activities of environmental or social nature without any focus on sustainable development (Imas et al., 2020; Bubka & Bulatova, 2017).

In 2011, the United Nations Economic and Social Council defined teacher competencies in sustainable education. According to this document, each competence for sustainable development has the following four components: "learning to know (the teacher understands...), learning to do (the teacher is able to...), learning to live together (the teacher works with others...), learning to be (the teacher is a person who...)" (UNECE Learning, 2011). In Ukraine, the content of these competencies has been proposed for future specialists in physical culture and sports (Tsyhura, 2020), but currently, education for sustainable development in higher education institutions is not systematic. Therefore, we focused on the development and implementation of a methodological system to train future physical education and sports professionals for sustainable educational activities. We previously found that specialists in this field are not sufficiently aware of the issues of sustainable development, do not understand the essence and depth of sustainable development goals, are able to establish the connection of physical culture and sports only with the sustainable development goals of the social direction (Tsyhura & Harkusha, 2023), and need to acquire knowledge on this issue for their professional activities (Tsyhura, 2021). One component of the readiness of future physical education and sport specialists for sustainable development educational activities is active practical work.

The aim of this study is to show the impact of the experimental methodological system on the formation of the practical component of future physical education and sports specialists' readiness for educational activities that promote sustainable development.

Materials and Methods

Participants

The study involved 390 future specialists in physical culture and sports who were students of the faculties of physical education of T. H. Shevchenko National University

"Chernihiv Colehium", the National University of Life and Environmental Sciences of Ukraine, Sumy State University, and Sumy State Pedagogical University named after A.S. Makarenko. Students were informed about the features of the study and voluntarily participated in the pedagogical experiment. To conduct the pedagogical experiment, control and experimental groups were formed. The participants of the study are represented by both sexes in different courses. At the ascertaining stage of the experiment, both groups (control and experimental) had 90 students each: the control group consisted of 52 boys (57.8 %) and 38 girls (42.2 %); the experimental group consisted of 55 boys (61.1 %) and 35 girls (38.9 %). At the formative stage of the experiment, the control group consisted of 83 students, including 44 boys (53 %) and 39 girls (47 %); the experimental group consisted of 90 students, including 49 boys (54.4 %) and 41 girls (45.6 %).

Research Design

The pedagogical experiment was conducted in stages from 2019 to 2024 in accordance with recommendations (Sysoieva, Krystopchuk, 2013). At the ascertaining stage, future specialists in physical culture and sports were tested to determine their initial readiness level for sustainable development. At the formative stage, a methodological training system was introduced for the participants of the experimental group. At the end of the experiment, the level of readiness of the participants for educational activities related to sustainable development was determined. The methods used in the study are: study and analysis of scientific and methodological literature, pedagogical experiments, surveys, testing, analyses, synthesis and generalisation of information and methods of mathematical statistics.

For the final check of the formation of the practical component of future physical education and sports specialists' readiness for educational activities for sustainable development, thematic tests with open-ended questions were used, which allowed for a creative approach to the tasks; they were created using the Google Forms service. The questions in the tests corresponded to the material proposed for study during the acquaintance of students with the materials of the author's course "Sustainable Development in Physical Education and Sport" (Tsyhura & Harkusha, 2024) and indicators of readiness of the practical component. In particular, the tests contained questions related to methodological work in the following categories: extracurricular and community activities, leadership positions, physical education classes, and sports sections.

Accordingly, the indicators of the practical readiness criterion were defined as follows:

- activities for sustainable development at physical education lessons or sectional lessons in sport;
- activities for sustainable development during extracurricular work of a physical education teacher or during sectional work of a sports coach with a population of different age categories;
- activities for sustainable development in a managerial position.

The tests in Google Forms were distributed through Google classroom, also contained all the educational and methodological information on the course "Sustainable Development in Physical Education and Sports". The formation of the practical component of the readiness of future specialists in physical culture and sports for educational activities for sustainable development was assessed by converting the scores obtained by students into the ECTS scale for assessing the quality of educational achievements of students of higher education institutions: 0-59 points – low level, 60-74 points – satisfactory level, 75-89 points – average level, 90-100 points – high level. The same scale was used to assess each indicator (content component) of the practical component.

Statistical Analysis

Systematisation of the materials and mathematical processing were performed using a Microsoft® Excel 2010. The non-parametric Pearson's χ^2 test was used to compare the results of the study at a significance level of $p < 0.05$ (Herych & Syniavska, 2021).

Results

According to the results of the baseline testing at the formative stage of the experiment (Fig. 1, Fig. 2, Fig. 3), a significant number of students in both groups had a low level of formation in the practical component according to all the defined indicators. Thus, depending on the studied component, in the control group at the beginning of the pedagogical experiment, 88.9 % to 95.6 % of students had a low level of formation in the practical component of readiness for educational activities for sustainable development. A satisfactory level of this indicator was observed in 3.3 % of students using the indicator "activities for sustainable development in a managerial position" (Fig. 3), 2.2 % of students using the indicator "activities for sustainable development in a physical education lesson or sectional sport lesson"(Fig. 1), and 10 % of students using the indicator "activities for sustainable development during extracurricular work of a physical education teacher or outside the sectional work of a sports coach with the population of different age categories" (Fig. 2). From 1.1 % to 2.2 %, students had an

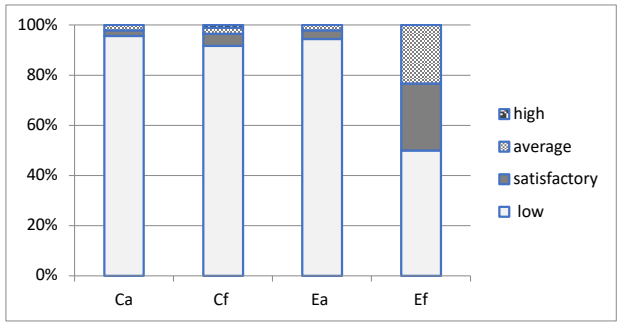

Fig. 1. Diagram of the levels of formation of the practical component of future physical education and sports specialists' readiness for educational activities for sustainable development according to the indicator "activities for sustainable development in physical education class or sectional sport lesson" (% of students): Ca – control group, ascertaining stage of the experiment; Cf – control group, formative stage of the experiment; Ea – experimental group, ascertaining stage of the experiment; Ef – experimental group, formative stage of the experiment. Similar designations are used in the rest of the diagrams

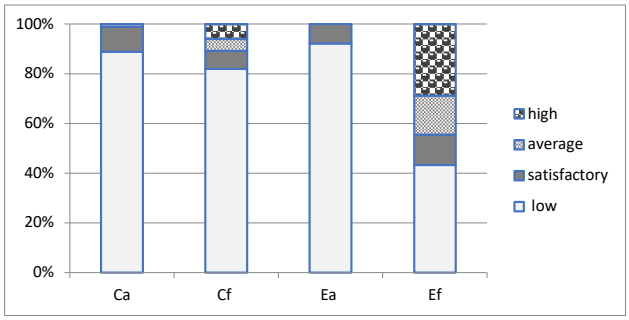

Fig. 2 Diagram of the levels of formation of the practical component of future physical education and sports specialists' readiness for educational activities for sustainable development according to the indicator "activities for sustainable development during extracurricular work of a physical education teacher or outside the sectional work of a sports coach with the population of different age groups" (% of students)

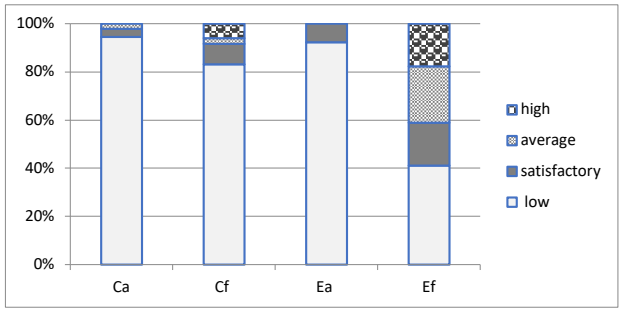

Fig. 3. Diagram of the levels of formation of the practical component of future physical culture and sports specialists' readiness for educational activities for sustainable development using the indicator "activities for sustainable development in a managerial position" (% of students)

average level of the practical component of readiness for educational activities for sustainable development, depending on the component under study (Fig. 1, 2, 3).

In the experimental group, at the beginning of the study, the situation was similar: from 92.2 % to 94.5 % of students had a low level of the practical component of readiness for educational activities for sustainable development, depending on the component under study (Fig. 1, 2, 3). From 3.3 % to 7.8 %, students had a satisfactory level of this indicator; the average level was found in 2.2 % of students only for the indicator "activities for sustainable development in physical education classes or sectional sports lessons". There were no students with a high level of formation for the studied component by any of the identified indicators in either the experimental or control groups.

At the formative stage of the pedagogical experiment, the situation in the control group underwent minor changes. In the experimental group, significant changes were observed depending on the indicator. Thus, the number of students with a low level of formation in the practical component of readiness for educational activities for sustainable development according to various indicators decreased to 41.1-50.0 %. The number of students with a high level of formation in the studied component according to the indicator "activities for sustainable development in a managerial position" is 17.8 % (Fig. 3), whereas the indicator "activities for sustainable development during the extracurricular work of a physical education teacher or out of sectional work of a sports coach with the population of different age categories" – 28.9 % (Fig. 2). The number of students with an average level of formation for the studied component according to the same indicators was 23.3 % and 15.6 %, respectively; with a satisfactory level of formation of 17.8 % and 12.2 %, respectively. For the indicator "activities for sustainable development in a physical education lesson or sectional sport lesson", the indicators are somewhat lower. There were no students with a high level of formation in the studied component. The percentage of students with a satisfactory and average level was almost the same at 26.7 % and 23.3 %, respectively (Fig. 1).

The generalised data show that at the beginning of the study, the majority of students in the control and experimental groups had a low level of the practical component of readiness for educational activities for sustainable development: 93.33 % and 94.44 % of students, respectively; 6.67 % and 5.56 % of students in the control and experimental groups had a satisfactory level of this component, respectively (Fig. 4).

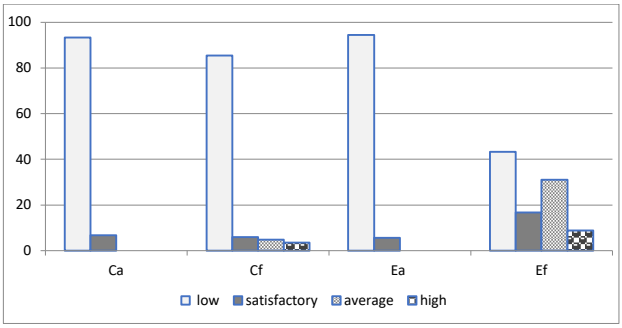

Fig. 4. Diagram of the levels of formation of the practical component of future physical education and sport specialists' readiness for educational activities for sustainable development (% of students)

The analysis of the data of the final test at the end of the formative stage of the experiment revealed a significant improvement in the indicator of the practical component of future specialists' physical culture and sports readiness for educational activities for sustainable development in the experimental group (Fig. 4). In particular, in the control group, 85.54 % of students had a low level, 6.02 % had a satisfactory level, 4.82 % had a medium level, and 3.61 % had a high level of the practical component of readiness. The number of students in the experimental group with a low level of the practical component of readiness was found to be half as much – 43.33 %, with a satisfactory level of readiness –16.67 %, with an average level – 31.11 %; and 8.89 % of respondents had a high level of the practical component of readiness for educational activities for sustainable development (Fig. 4).

The above comparisons are due to the calculation of Pearson's criterion, which was used to determine the differences between the series of indicators in our two samples (Table 1). Thus, the indicators of Pearson's criterion indicate the similarity of the control and experimental

Table 1. Distribution of students by levels of formation of the practical component of educational readiness for sustainable development (generalised data by identified components)

Groups of students	Levels of formation of the practical component of readiness				χ^2 empirical	χ^2 critical $p < 0.05$
	low	satisfactory	average	average		
Ascertaining stage of the experiment						
Control	84	6	0	0	0.096	3.84
Experimental	85	5	0	0		
Formative stage of the experiment						
Control	71	5	4	3	34.42	5.99
Experimental	39	15	28	8		

groups in terms of the level of formation of the practical component of readiness for educational activities for sustainable development at the beginning of the pedagogical experiment: χ^2 empirical < χ^2 critical (0.096 < 3.84, $p < 0.05$); and a significant difference between these groups after the formative stage of the experiment: χ^2 empirical > χ^2 critical (34.42 > 5.99, $p < 0.05$).

Discussion

According to previous studies (Tsyhura & Harkusha, 2023), it was assumed that future physical education and sports specialists have a low level of formation in the practical component of readiness for educational activities for sustainable development. The assumptions were confirmed during the ascertaining stage of the pedagogical experiment. It was found that, on average, 93.89 % of students participating in the experiment had a low level of formation in the practical component of readiness for educational activities for sustainable development. Analysing the students' answers to the questions related to sustainable development activities in physical education classes or sectional sports lessons, during extracurricular activities and community work, and while working in leadership positions in their speciality, it can be confidently stated that the vast majority of students in the control and experimental groups had no idea about the types of sustainable development activities of a physical education teacher or coach. Such results of the study are in line with the research of our foreign colleagues who indicated that it is very difficult for physical education and sports teachers to determine the types of activities for sustainable development during their professional activities (Baena-Morales et al., 2022; Merma-Molina et al., 2023).

The peculiarities of the formation of the practical component of future physical culture and sports specialists' readiness for educational activities for sustainable development were identified by analysing the levels of formation of the studied component according to pre-established indicators. Some of our results agree with those of our foreign colleagues (Baena-Morales et al., 2022; Merma-Molina et al., 2023). Thus, no students in the experimental group with a high level of formation in the practical component according to the indicator "activities for sustainable development in physical education lessons or sectional sports lessons" were found. According to the other two indicators ("activities for sustainable development during extracurricular work of a physical education teacher or outside the sectional work of a sports coach with the population of different age groups" and "activities for sustainable development in a managerial position"), an average of 23.34 % of students had a high level of formation in the practical component. This indicates that it is easier for future physical education and sports professionals to find and implement sustainable development activities during extracurricular activities, such as hiking, health days, and recreational activities, than to implement such activities in physical education classes. The ability to introduce different active sustainability activities in physical education classes while maintaining the structure of the lesson or sports training was the most difficult task of all the tasks. Imagining themselves in a leadership position or participating in extracurricular activities makes it much easier for students to find the right types and forms of work to promote sustainable development.

The positive dynamics of changes in the same indicators of the practical component of readiness in the control group of students can be explained by the fact that information about conscious citizens with developed sustainability skills from sports arenas sometimes gets into Ukrainian media and social networks. This is admired by spectators and has great educational value. An example of this is the cleaning of stands by Japanese fans after a football match in Qatar (FIFA, 2022). Accordingly, foreign colleagues point out that sustainable development education is a complex process and that extracurricular activities may have greater potential to address a variety of topics, address different age groups, and provide more opportunities for multidimensional learning experiences (Leal Filho et al., 2021). Teachers find it difficult to incorporate the provisions of sustainable development into physical education lessons due to a lack of guidance and teaching materials (Baena-Morales et al., 2022; Merma-Molina et al., 2023). However, when sustainability activities are well selected in physical education and sport classes, very positive feedback from communities and the desire of participants to continue such activities are reported (Lynch & Boylan, 2016).

Conclusions

The results of the pedagogical experiment confirm the positive impact of the experimental methodological system on the formation of the practical component of future physical education and sport specialists' readiness to participate in educational activities for sustainable development. At the beginning of the study, 93.33 % of students in the control group and 94.44 % of students in the experimental group

had a low level of the practical component of readiness for sustainable development-related educational activities. The final test showed a significant improvement in the studied indicator in the experimental group: 43.33 % of students had a low level of formation of the practical component of the studied readiness, 16.67 % had a satisfactory level, 31.11 % had an average level, and 8.89 % had a high level. The corresponding changes were observed in all defined indicators: activities for sustainable development in physical education classes or sectional sports lessons; activities for sustainable development during extracurricular work of a physical education teacher or outside the sectional work of a sports coach with a population of different age groups; and activities for sustainable development in managerial positions. In the control group, at the end of the experiment, no significant changes were found in the levels of the practical component of future physical education and sports specialists' readiness to participate in educational activities for sustainable development.

Conflict of interest

The authors declare that there is no conflict of interest.

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Діагностика рівня сформованості практичного компонента готовності майбутніх фахівців фізичної культури і спорту до освітньої діяльності для сталого розвитку

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 1 табл., 4 рис., 34 джерела.

Історія питання. Підтримка Україною стратегії сталого розвитку та євроінтеграційні процеси вимагають підготовки фахівців до освітньої діяльності для сталого розвитку.

Мета дослідження. Метою дослідження є: показати вплив впровадженої експериментальної методичної системи на формування практичного компонента готовності майбутніх фахівців фізичної культури і спорту до освітньої діяльності для сталого розвитку.

Матеріали та методи. У дослідженні брали участь 390 студентів факультетів фізичного виховання Національного університету «Чернігівський колегіум» імені Т. Г. Шевченка, Національного університету біоресурсів і природокористування України, Сумського державного університету та Сумського державного педагогічного університету імені А. С. Макаренка – майбутні фахівці фізичної культури і спорту. Студенти були інформовані про всі особливості дослідження і брали участь у педагогічному експерименті добровільно. Учасники дослідження представлені обома статями різних курсів, з яких було сформовано контрольну та експериментальну групи. Методи дослідження: вивчення та аналіз наукової та науково-методичної літератури, педагогічний експеримент, опитування, тестування, аналіз, синтез та узагальнення інформації, методи математичної статистики.

Результати. На початку дослідження 93,33 % студентів контрольної групи та 92,22 % студентів експериментальної групи мали низький рівень практичного компонента готовності до освітньої діяльності для сталого розвитку. Завершальний етап дослідження показав істотне покращення досліджуваного показника в експериментальній групі: студентів з низьким рівнем сформованості практичного компонента досліджуваної готовності було 41,12 %, із задовільним – 14,44 %, із середнім – 30,00 %, з високим – 14,44 %. Відповідні зміни простежували за усіма визначеними показниками: діяльність для сталого розвитку на уроці фізичної культури або секційному занятті з виду спорту; діяльність для сталого розвитку під час позакласної роботи учителя фізичної культури чи поза секційної роботи тренера з виду спорту з населенням різних вікових категорій; діяльність для сталого розвитку на керівній посаді. У контрольній групі на завершення експерименту істотних змін щодо рівнів практичного компонента готовності майбутніх фахівців фізичної культури і спорту до освітньої діяльності для сталого розвитку не виявлено.

Висновки. Результати педагогічного експерименту підтверджують позитивний вплив розробленої методичної системи на формування практичного компонента готовності майбутніх фахівців фізичної культури і спорту до освітньої діяльності для сталого розвитку.

Ключові слова: сталий розвиток, освіта, фізична культура, спорт, вчитель фізичної культури, тренер.

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