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Training of Physical Education and Sports Specialists to Meet the Needs of the Labour Market

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Abstract: The purpose of the study was to develop a mechanism for training physical education and sports professionals. The methodology included an analysis of the use of innovative methods such as module-rating training implemented at the Kazakh Academy of Sport and Tourism, programmes for the development of digital competencies of coaches through the Open Sport Academy platform, and dual programmes such as the cooperation of the Vasyl Levsky National Sports Academy with Bulgarian sports federations through the Dual Education for Sports Professionals programme. The study found that the training of physical education and sports professionals should be closely linked to labour market requirements, in particular through the integration of modern technologies and increased practical training. The study of the labour market in countries such as Kazakhstan and Bulgaria showed that successful educational programmes should take into account not only theoretical aspects, but also the opportunity for students to gain real-world experience in sports clubs, federations and other organisations. In addition, it has been found that the introduction of dual educational programmes that combine university studies and practical workplace activities has a significant impact on the competitiveness of graduates. An important aspect is also the use of digital technologies, such as online learning platforms and virtual simulators, which allow students to acquire the necessary skills to work in the context of the digital transformation of the sports industry. The practical significance of the study lies in the fact that the findings can serve as a basis for improving curricula and enhancing cooperation between educational institutions and employers in the field of physical education and sports.

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1. Introduction

The need for highly skilled personnel capable of meeting the challenges of the health, fitness, rehabilitation and sports industry is driven by the growing competition for specialists in this field. The lack of sufficient research on the relationship between educational programmes and the real needs of employers complicates the process of reforming educational standards. The urgency of studying this topic is underscored by the low level of integration of practical experience into curricula, which creates a gap between theoretical training and practical skills of graduates. Among the problems that need to be addressed is the lack of attention to the digitalisation of the educational process, the introduction of innovative teaching methods and the integration of physical education enterprises into the training process. This problem leads to limited competitiveness of specialists at the international level, which negatively affects the labour market. Certain aspects, such as professional orientation, development of communication and teamwork skills, remain insufficiently researched. In addition, there are imperfect mechanisms for monitoring changes in the labour market and updating the content of curricula in line with these changes. Greater cooperation between educational institutions and employers could contribute to more effective training. However, the lack of such mechanisms makes it difficult to implement a systematic approach to training. The need for a detailed study of this issue is due to the need to adapt the educational process to the real conditions of the labour market, develop innovative approaches to training and increase the competitiveness of physical education and sports professionals.

A number of studies focus on the training of physical education and sports specialists with an emphasis on the introduction of innovative approaches to teaching, in particular Avsiyevich et al. [1] studied the level of readiness of Kazakhstani specialists in the field of physical culture and sports for scientific and innovative activities. They found that scientific activity in this area remains at an average level due to insufficient integration of innovative approaches and limited access to modern digital technologies. Cheng et al. [2] analysed the possibilities of integrating sports training and psychology into basketball teaching using image recognition algorithms. They found that the introduction of artificial intelligence technologies can optimise curricula and improve the effectiveness of students' physical training. Li [3] also studied the introduction of information technology in physical education and sports training at universities. It was found that digital tools significantly improve the quality of the learning process, especially in remote environments. In turn, Rebbouj and Lotfi [4] used machine learning to assess physical activity and plan training. The researchers found that these technologies allow creating individualised training programmes to achieve maximum results.

The quality of training of future specialists in higher education institutions was studied by Hulko and Romanenko [5]. They found that the effectiveness of training depends on the use of innovative methods and close cooperation with employers in the field of physical education and sports. In his study, Hamdan [6] investigated the impact of balance training on improving basketball shooting and dribbling skills. It was found that special balance exercises significantly improve athletes' coordination and performance. Rebryna [7] analysed the training of specialists in the organisation of active leisure activities in places of mass recreation. The need to improve curricula to take into account innovative approaches in the field of recreation was identified.

The group of authors Karasievych et al. [8] focused on the preparation of future physical education teachers for sports activities using a neuro-pedagogical approach. In their work, the researchers analysed how this approach contributes to the development of key competences required for a modern teacher. It was found that neuropedagogy ensures the integration of professional and cognitive skills that are important for the effective organisation of educational and training processes. In particular, this approach contributes to the development of creative thinking, emotional stability and adaptability, which significantly improves the quality of training of physical education specialists. Ruiz-Montero et al. [9] investigated how the cultural context influences the initial training of physical education and sport teachers. In their work, they emphasised the importance of a multicultural environment for the development of future teachers' professional competences. The authors concluded that learning in such a context contributes to the development of intercultural communication, tolerance, and the ability to work in multicultural teams. These skills are especially important in the context of modern globalisation and the need to adapt to different social and cultural conditions. Zhao [10] examined in his study the features of the scientific approach to sports training of students specialising in physical education. The author analysed the effectiveness of adaptive training programmes based on individual indicators of students' physical condition. It has been found that such programmes allow better consideration of the physical and psychological characteristics of participants, which provides much better results in the training process. This approach is recognised as promising for the training of highly qualified specialists who are able to adapt training programmes to individual needs.

The aforementioned studies demonstrate a wide range of modern approaches to the training of physical education and sports specialists, as well as the importance of integrating innovative technologies into the educational process. Most studies do not sufficiently cover the issue of adapting curricula to the dynamic needs of the labour market,

especially the implementation of dual educational programmes. Also, the impact of digital technologies' integration on the training of specialists in the context of modern employers' requirements remains insufficiently studied.

The purpose of the study was to identify the main innovative methods and practices of training physical education and sports specialists that meet the requirements of the labour market in order to develop recommendations for improving models of cooperation between higher education institutions and employers. Objectives of the study are:

1. To study the implementation of innovative teaching methods in the training of physical education and sports specialists, in particular in Kazakhstan and Bulgaria;
2. To determine the impact of dual degree programmes and cooperation between educational institutions and professional sports federations and organisations;
3. To conduct a case analysis of successful practices of training coaches and fitness instructors aimed at increasing the competitiveness of specialists in the labour market;
4. To develop recommendations for improving curricula in higher education institutions focused on training physical education and sports professionals, considering market requirements and innovative technologies.

2. Literature Review

The fast shift to online instruction brought about by the COVID-19 epidemic has fundamentally changed physical education. To find out how physical education teachers felt about online instruction in the first wave, Korcz et al. [11] compared surveys from six European nations. Strong cross-national disparities were seen in the results: teachers in North Macedonia and Kosovo reported bad experiences with online training, whereas those in Croatia, Poland, and Bulgaria had more positive evaluations. Issues were ascribed to inadequate equipment, inadequate IT instruction, disjointed platform usage, and worries about curriculum quality and safety. Crucially, this study revealed systematic disparities in digital preparedness, emphasising the need for institutional assistance to maintain high-quality physical education in digital settings.

Scholars have looked at instructional techniques that aim to improve pupils' motor abilities outside of the epidemic context. Longakit et al. [12] used a randomised study with university students to examine a 12-week gaming skill-based activity programme. Although there was no discernible difference in the experimental and control groups' baseline motor competence, the intervention resulted in notable gains in coordination, skill acquisition, and overall motor development. This research highlights how social connection, teamwork, and intrinsic motivation can be enhanced through game-based learning in physical education. Unlike conventional techniques, game-centered approaches promote psychological advantages including cooperation and involvement in addition to physical ability.

In Kazakhstan, Laulanbekov et al. [13] investigated how to include health-saving competencies into higher education curricula in order to prepare pre-service teachers. Their intervention focused on the interdisciplinary integration of psychology, pedagogy, and subject-specific teaching techniques, and it was grounded in a specially created course. According to survey results, 79% of students strongly supported the implementation of health-promoting strategies at various instructional levels. This study supports more general demands that preventative health competences be incorporated into teacher preparation programmes so that graduates can support students' long-term wellbeing. It also demonstrates the expanding significance of competence-based education in physical education, which incorporates sustainability and health literacy in addition to physical activity.

Kuvatov et al. [14] examined the intellectual capability of Kazakhstani physical education students in order to support this health focus. While demographic characteristics like age and gender had no discernible impact, their psychometric tests demonstrated considerable relationships between academic achievement and both implicit and broad intellectual skills. These results demonstrate the importance of intellectual capacity as a little-studied aspect of training physical education teachers. They also support the idea that intellectual capital is an essential component of developing human capital, arguing that developing cognitive and analytical abilities is just as important as developing physical and pedagogical competence.

Botagariev et al. [15] assessed an experimental training programme for Kazakhstani physical education students in order to better develop professional preparation. They discovered through comparative statistical research that the training improved readiness in areas connected to responsibility, creativity, and intellect. The study emphasised the growing demands on aspiring educators, who must strike a balance between accountability, innovation, and instructional proficiency. The results validated the need for organised, creative training interventions to improve teacher preparation to match contemporary educational requirements, even though overall preparedness was rated as ordinary.

Recent research has focused on identifying the psychosocial elements that support successful physical education programmes and creating trustworthy instruments. He et al. [16] created and validated a questionnaire specifically for Chinese junior high schools, filling a long-standing gap in the assessment of programme implementation. Their instrument showed excellent stability and reliability over 38 items and five dimensions, making it a reliable way to gauge the level of programme execution. These verified techniques are crucial for both directing programme improvement across various educational contexts and monitoring adherence to national standards. Crucially, the authors

emphasised the necessity of cultural adaptation, highlighting the more general difficulty of guaranteeing contextual relevance in physical education evaluation.

The psychological resources of physical education students have been the focus of attention concurrent with this emphasis on structural examination. Yiming et al. [17] investigated the relationships among more than 1300 students' self-efficacy, subjective well-being, and career development. According to their findings, affective aspects of well-being act as a mediating factor between self-efficacy and career development outcomes. Positive and negative affect were important pathways linking self-efficacy with both job exploration and adaptability, but life satisfaction had a modest mediating effect. In the field of physical education, this study emphasises the interconnectedness of psychological capital and professional trajectory, stressing that promoting students' self-esteem and general well-being enhances their employability and long-term professional success.

Empirical data indicates the significance of instructional strategies in influencing student results at the pedagogical practice level. In their analysis of secondary schools in Colombia, Navarro et al. [18] found that the efficacy of physical education teaching strategies is positively impacted by the quality of instructional procedures, including assessment, measurement, and pedagogical alignment. Their results, which were derived from structural equation modelling, showed that reflective practice and regular evaluation procedures are important factors that influence the effectiveness of education. This is in line with global trends that emphasise evidence-based pedagogy, where teacher training includes more than just technical instruction; it also includes the ability to evaluate and improve practice critically.

Mo et al. [19] did a systematic review and meta-analysis on the impact of game-based physical education interventions on children's and teenagers' enjoyment in order to support this evidence. The scientists, who synthesised around two thousand publications, came to the conclusion that game-based approaches greatly increase enjoyment for both genders and age groups, especially when interventions are given in sessions lasting at least thirty minutes and last longer than three weeks. The results imply that enjoyment serves as both an outcome and a motivating factor for continued engagement, supporting previous experimental research on movement skill. As a result, game-based learning becomes a fundamental component of long-term participation in physical education as well as a pedagogical alternative.

Curriculum structure continues to be a crucial factor in determining student learning. A Brazilian public university's physiology course sequencing was examined by Rodrigues et al. [20], who compared the performance of students who had taken human physiology before exercise physiology with those who had not. The significance of curricular scaffolding was highlighted by their findings, which showed that students without the precondition had a more than twofold higher chance of failing. Despite finding both courses difficult, most students agreed that they were relevant to professional practice. These results emphasise that thoughtful curriculum design, where advanced applied competencies are supported by core scientific knowledge, is necessary for professional preparedness in physical education.

In conclusion, a balance between structural coherence, innovation, and psychosocial support is necessary to advance physical education. While competence-based and health-oriented approaches foster resilience and flexibility, digital and game-based techniques increase engagement. Validated assessments, well-organised curricula, and connection with labour market demands are all necessary for effective preparation. Institutions must support professional preparedness as well as the ability to adjust to changing educational and societal needs if they are to make sustainable growth.

3. Methodology

A thorough comparative case analysis of training methods for physical education and sports specialists in Kazakhstan and Bulgaria was used to gather data for this study. Peer-reviewed academic publications, digital platform content (e.g., Moodle, SportsManager Pro), reports from professional sports federations, and official documentation from educational institutions, such as curricula and programme descriptions (e.g., the Sport Academy Program in Kazakhstan and the Dual Education for Sports Professionals in Bulgaria), were the main sources of data. The study also included a thorough examination of educational programmes from Finland and the USA, which were chosen for their high degrees of technology integration and practical emphasis. The degree of digital integration, the existence and efficacy of dual programmes, practical focus, and the utilisation of innovative platforms were among the factors used to triangulate the data. The chosen case studies were evaluated using qualitative comparative methodologies to find best practices and transferable innovations. They also satisfied predetermined criteria, such as strong student involvement, successful application of novel methods, and clear labour market relevance.

The study of the training of physical culture and sports specialists in Kazakhstan analysed the use of such innovative methods as module-rating training, which is implemented at the Kazakh Academy of Sport and Tourism (KazAST), and programmes for the development of digital competencies of coaches through the Sport Academy Program [21]. Particular attention is paid to the integration of technologies into the educational process, such as virtual sports training simulators and Moodle distance learning platforms, which are actively used to prepare students for work in modern conditions. In Bulgaria, the use of dual programmes was studied, such as the cooperation of the Vasyl Levsky National Sports Academy with Bulgarian sports federations through the Dual Education for Sports Professionals programme [22]. Innovative training methods included trainings using biomechanical sensors to analyse

athletes' movements, training based on the E-Coach [23] system for remote management of sports teams, and professional development programmes through the SportsManager Pro platform aimed at developing coaches' management skills. The study compared the training of specialists in Kazakhstan and Bulgaria based on the criteria of integration of digital technologies, effectiveness of dual programmes, practical orientation of training and the level of involvement of innovative platforms. Kazakhstan and Bulgaria were chosen for comparison because both countries have similar economic and educational contexts and are interested in improving the training of specialists in the field of physical education and sports, taking into account the needs of the labour market.

To compare the training programmes for physical education and sport specialists, educational courses from the USA and Finland were selected. In particular, the Bachelor of Science in Kinesiology programme at the University of Nevada, Las Vegas and the Degree Programme in Sports Coaching and Management at Haaga-Helia University of Applied Sciences in Finland were studied. These programmes were selected for their high practical orientation, innovative approach to the use of digital technologies and strong emphasis on sports rehabilitation and management.

The criteria for comparison were the integration of digital technologies into the educational process, the development of students' practical skills, the implementation of dual programmes that combine learning with professional activities, and the use of innovative platforms for managing sports organisations. The US programme stood out for its interdisciplinary approach, which included sports rehabilitation, sports performance analysis and sports organisation management, making it a model for the implementation of similar methods in other countries. In turn, the Finnish programme was practical and focused on the development of entrepreneurial skills in the field of sports, which is an important criterion for the modern labour market. In particular, the selected programmes demonstrated a high level of training and were analysed as potential models for improving educational programmes in Kazakhstan and Bulgaria to meet the current requirements of the labour market.

The case studies were selected based on the criteria of successful implementation of innovative practices, involvement of a significant number of participants, and the level of impact on the competitiveness of graduates in the labour market. The data for the analysis were obtained from official company reports, materials from professional forums, and peer-reviewed articles on these projects. All these cases allowed us to assess the actual methods and approaches to training specialists in the field of physical culture and sports that meet the requirements of the labour market, as well as to identify successful practices that can be adapted for other organisations in this field. Recommendations were developed to improve curricula in higher education institutions, and a model of cooperation between educational institutions and employers was developed.

To assess the effectiveness of the proposed educational approaches, key benchmarks include: (1) graduate employment rate within 6-12 months; (2) employer satisfaction scores on graduate readiness; (3) skill proficiency gains measured through pre/post assessments; (4) internship-to-employment conversion rate; (5) level of digital tool integration in curricula; and (6) career progression data at 3- and 5-year intervals. These metrics offer clear, quantifiable indicators of programme success.

4. Results and Discussion

The training of physical education and sports professionals should take into account the changing trends of the labour market, which requires highly qualified specialists with a wide range of competencies, including pedagogical, managerial, biomedical and technological skills. One of the key features is the adaptation of the content of educational programmes to the current requirements of employers. It is important to ensure the development of not only theoretical knowledge but also practical skills, in particular in such areas as organising the training process, developing individual physical development programmes, introducing innovative rehabilitation methods, using digital technologies to monitor physical activity, and conducting research in the field of sports.

The innovative component of training involves the integration of modern technologies into the learning process. The use of specialised software for analysing physical performance, virtual simulators for practising exercise techniques, and platforms for distance learning and training management significantly increases the competitiveness of graduates [24-26]. The use of virtual reality (VR) technology in physical education and sports training in higher education institutions. It has been found that integrating VR into the learning process can improve students' skills in sports training by allowing them to practice movements and strategies in a safe and controlled virtual environment [27]. Virtual reality can also significantly reduce physical activity during training, while increasing the effectiveness of learning through interactive simulations of sports situations. However, the cost of purchasing and maintaining motion-tracking devices, VR equipment, and AI-driven analytics platforms might be unaffordable, especially for organisations with tight budgets. Furthermore, these technologies may put a strain on institutional resources due to their high technological infrastructure and continuous staff training requirements.

Cooperation with employers, sports clubs and organisations is also important, allowing students to practice in real-life conditions and form an understanding of the specifics of work in the field of physical education. The introduction of a dual system of education, where learning is combined with practical activities, contributes to better preparation for professional activities [28]. The needs of the labour market also require knowledge of foreign languages, as the globalisation of the sports sector opens up new opportunities for international cooperation. Graduates should be

prepared to work in a multicultural environment and participate in international projects. Particular attention should be paid to the aspects of inclusion. A young physical education specialist should be able to work with people with special needs, understand the principles of adaptive physical education and develop programmes for different age and social groups.

The introduction of innovative teaching methods in the training of physical education and sports specialists is a key area of modernisation of the educational process in Kazakhstan and Bulgaria. In Kazakhstan, the training of physical education and sports specialists is actively developing through the integration of innovative technologies into the educational process. Some attention is paid to the development of digital competencies of students and teachers, which meets the modern requirements of the labour market. One example of such an approach is the use of module-rating training at the Kazakh Academy of Sport and Tourism (KazAST). This system provides a differentiated approach to the development of students' professional competences. It allows us to take into account the individual characteristics of students, their level of knowledge, practical skills and motivation to learn. As a result, each student can achieve optimal results by developing those competences that are most relevant to the chosen specialisation. In addition, an important tool for professional growth is the introduction of the Sport Academy Program [21]. This digital platform creates opportunities for coaches, teachers, and students to gain additional knowledge and skills through distance learning courses. Courses are tailored to the individual needs of users, which provides flexibility in learning. For example, users can study modern approaches to the training process, rehabilitation techniques for athletes, the basics of sports management and other disciplines important for working in the sports sector.

Another key innovation is the use of virtual sports training simulators. These technologies allow future specialists to simulate real-life situations that they may encounter in their professional activities. For example, students can practice exercise techniques, analyse tactical schemes in team sports, or practice responding to emergencies such as injuries during competitions. This contributes to the development of practical skills that meet the modern requirements of the profession. Another important aspect is the use of distance learning platforms such as Moodle. These platforms allow creating interactive learning materials, providing feedback between teachers and students, and organising knowledge control in a convenient format. Moodle is actively used to prepare electronic lectures, tests, training videos and other materials that students can use at any time [29]. This approach makes the learning process more accessible and convenient, especially for those who combine their studies with professional activities.

In Bulgaria, the training of physical education and sports specialists is focused on the integration of theoretical education with practical training, which ensures the comprehensive development of students and meets the modern requirements of the labour market. One of the key areas in this area is the implementation of dual educational programmes that combine study at higher education institutions with practical activities at sports organisations. In particular, the Vasyl Levsky National Sports Academy is actively implementing the Dual Education for Sports Professionals programme [22]. This initiative was created to provide students with the opportunity to gain real-world experience in the sports industry while still studying. As part of the programme, students take theoretical courses at the Academy, while completing practical assignments in sports federations, clubs, or other organisations working in the field of physical culture and sports. The Academy’s cooperation with Bulgarian sports federations is an important part of the programme. Such interaction allows students to get directly acquainted with the professional standards and specifics of work in the sports sector. For example, students who specialise in coaching have the opportunity to participate in the development of training programmes, analyse sports competitions or accompany athletes at various stages of their training. Those studying sports management or sports rehabilitation can gain practical experience in the areas of organising sports events, managing resources or working with innovative rehabilitation technologies. The Dual Education for Sports Professionals [22] programme not only promotes the development of professional skills but also helps students adapt to real-life working conditions. An important element is that during the internship, students can receive feedback from experienced industry professionals, which allows them to improve their competencies and respond effectively to the challenges of the modern sports environment. The dual approach also increases the competitiveness of graduates in the labour market. By combining theoretical knowledge and practical skills, students have an advantage when applying for jobs, as they are already familiar with the specifics of working in their field. In addition, this system allows employers in the sports industry to identify promising young professionals at the stage of their studies. Among the innovative methods used in Bulgaria, special attention should be paid to training using biomechanical sensors to analyse athletes’ movements, which allows students to master modern methods of diagnosing and optimising physical activity. The E-Coach [23] system provides remote control of sports teams, allowing future coaches to master organisational and coordination skills. Professional development programmes through the SportsManager Pro platform are focused on the development of managerial competencies, which is an important element of training. Collaborations with these platforms include user manuals and teacher seminars tailored to applied sports situations in addition to access to technology resources. The focus of these training sessions is on digital team management tactics, remote coaching methods, and real-time data analysis. Additionally, Bulgarian educational institutions are becoming more involved in EU-funded programmes that support the digital revolution of education by providing chances for academic mobility and collaborative training with global specialists. As a result, teachers are gradually learning how to use sophisticated digital tools into both theoretical and practical instruction; nevertheless,

additional institutional assistance and standardisation are still needed to guarantee uniformity across institutions and areas.

In order to improve the quality of education, Bulgaria is actively implementing dual education programmes that combine theoretical learning with practical training. For example, the Dual Education for Sports Professionals programme involves cooperation between universities and sports federations, which allows students to gain practical experience during their studies. In Kazakhstan, specialists in the field of physical culture and sports are trained through specialised higher education institutions, such as the Kazakh Academy of Sports and Tourism. Kazakhstan is actively integrating digital technologies into the educational process. In particular, in 2024, the Sport Academy Program [21] was launched, which aims to develop the digital competencies of coaches through online platforms. In addition, virtual sports training simulators and distance learning platforms such as Moodle are being introduced into the educational process, which improves the quality of student training. Instructors undergo structured workshops and certifications that enhance their digital literacy and familiarise them with evidence-based practices in technology-supported physical education. Additionally, some universities have begun to establish internal professional development centres that offer continuous training in instructional technologies, helping educators remain updated on advancements in sports science, biomechanics, and e-learning methodologies.

The process of training specialists in the field of physical culture and sports in Bulgaria and Kazakhstan demonstrates the desire of both countries to adapt educational programmes to the requirements of the labour market. Bulgaria focuses on dual educational programmes that combine theory and practice, while Kazakhstan focuses on integrating digital technologies into the educational process. Both approaches contribute to improving the quality of training and competitiveness of specialists in the international labour market, but there are also differences, as shown in Table 1.

Table 1. Comparison of training of physical education and sports specialists in Kazakhstan and Bulgaria.

Criteria	Kazakhstan	Bulgaria
Integration of digital technologies	There is use of digital tools in the learning process. Lectures are mostly delivered using traditional methods, but the use of digital platforms is growing	Digital technologies are actively integrated. Distance learning platforms, electronic libraries, and analytical tools for training analysis are used. For example, a system of GPS navigators for monitoring physical activity is used in educational institutions
Effectiveness of dual programmes	There are experimental dual programmes, but cooperation with employers and sports organisations is not sufficiently developed. For instance, less than half of student's complete internships in sports clubs	Integration of dual programmes. Most students have the opportunity to combine studies with practice in professional clubs or sports federations. For example, more than half of graduates have experience working in sports organisations before graduation
Practical orientation of training	Significant emphasis on theoretical disciplines, insufficient attention to practical training. For example, only a quarter of the teaching hours are devoted to practice, which reduces students' readiness for real work	Practical orientation is a priority. For example, half of the study time is spent on training, simulations of training processes and work with real teams. Students learn modern training methods directly on sports grounds
Level of involvement of innovation platforms	There is a systematic approach to using innovative platforms. For instance, VR and AR technologies are integrated in specialised courses	The use of innovative platforms is widespread. For example, interactive training simulators (such as Kinomap) are actively used to simulate various sports conditions
Cooperation with employers	Employers are mostly involved for one-off events such as lectures or seminars. Practical training in real conditions is rarely organised systematically	Employers are active partners of universities. For example, they provide scholarships to students, equipment for laboratories and organise regular internships
Academic mobility	Low level of academic mobility. A few students participate in international exchange programmes	High level of mobility. For instance, students participate in Erasmus+ programmes or other initiatives to exchange experiences
Level of investment in sports infrastructure	There are resources to create modern sports infrastructure. For example, the number of modern stadiums or specialised halls is insufficient	There is investment in upgrading sports infrastructure. For example, sports universities have access to modern gyms, swimming pools and laboratories for analysing physical data

Source: compiled by the authors based on [21, 22].

It is essential to study practical examples to train physical education and sports professionals. In particular, the Bachelor of Science in Kinesiology programme at the University of Nevada, Las Vegas, focused on an interdisciplinary approach, including modules on sports rehabilitation, sports performance analysis and sports organisation management. This approach may be useful for Bulgaria and Kazakhstan, where it is necessary to improve training programmes by expanding the curriculum to include sports rehabilitation and using digital platforms to assess athletes' physical fitness. In today's labour market, there is a need for professionals who are able to use technology to improve the training process and monitor the health of clients.

The Degree Programme in Sports Coaching and Management at Haaga-Helia University of Applied Sciences demonstrated a strong practical focus and was focused on developing entrepreneurial skills in the field of sports. Special attention was paid to the implementation of dual programmes that combine theoretical training with practical work in sports clubs and organisations. For Bulgaria and Kazakhstan, the introduction of such an approach would make the process of training students more oriented towards the practical needs of the labour market. Universities in these

countries could develop partnerships with sports clubs and fitness centres, where students could undertake internships, gaining real work experience and acquiring the necessary skills.

The integration of digital technologies and innovative platforms in both programmes is also an important aspect that needs to be adapted in Bulgaria and Kazakhstan. The use of platforms for online training, analysis of sports results and management of sports organisations would make the training process more flexible and modern. This is especially true in the context of global digitalisation and the growing popularity of remote services in the field of sports and health. Thus, the analysis of educational programmes from the United States and Finland has identified several key aspects that could be useful for improving training programmes in Bulgaria and Kazakhstan. In particular, the introduction of an interdisciplinary approach, the development of entrepreneurial skills, the active use of digital technologies and dual programmes would help to increase the competitiveness of graduates in the international labour market and meet the modern requirements of the sports industry. In general, the analysis of these cases showed that effective training of specialists in the field of physical culture and sports should be based on three main aspects [1]. First, it is the integration of digital technologies that make the training process more flexible and accessible. Second, it is important to develop mentoring programmes that accelerate the professional growth of young coaches and improve the quality of their work. Thirdly, it is necessary to integrate psychological knowledge into the curriculum, which helps to create effective strategies for interacting with clients. All these aspects form a comprehensive training of specialists capable of meeting the requirements of the modern labour market.

In the training of physical education and sports professionals, cultural factors may have a major impact on the adoption and efficacy of dual education systems and technological technologies. Dual education methods that demand flexible, student-centred learning and tight cooperation with outside companies may initially encounter resistance in nations where traditional pedagogical paradigms and hierarchical instructor-student relationships predominate, as is partially the case in Kazakhstan. Digital learning platforms and internships may be seen as secondary or less respectable ways of information acquisition by educators and students used to lecture-based education. Furthermore, societal views of physical education as an auxiliary or non-technical field may limit interest in breakthroughs like biomechanical sensors or virtual simulations and hinder investments in technology infrastructure.

On the other hand, a more positive cultural attitude toward dual systems and digital innovation is fostered by Bulgaria's comparatively higher level of integration with EU labour and educational frameworks. The acceptance of collaborative learning models, openness to multicultural work environments, and institutional experience with Erasmus+ and similar programmes support smoother implementation of dual programmes and digital platforms. The degree to which students and institutions fully adopt remote training tools and real-time performance monitoring systems, however, might be influenced by cultural attitudes toward work-life balance, employment status, and digital privacy. Overall, the degree to which these educational reforms are successfully assimilated and maintained across various national contexts depends on a number of important factors, including the cultural willingness to accept non-traditional modes of learning, the value society places on innovation and hands-on training, and the level of trust in technological systems.

The analysis of the training of physical education and sports specialists in Kazakhstan and Bulgaria allows us to formulate specific recommendations aimed at improving the educational process and ensuring the competitiveness of graduates. In Kazakhstan, the key element is the integration of modern digital technologies into the educational process. Accordingly, the recommendation is to set up digital laboratories in higher education institutions equipped with virtual training simulators and biomechanical sensors that will enable students to simulate real-life situations in sports. Such simulators allow for detailed reproduction of training processes, analysis of athletes' physical performance and improvement of training approaches. It is also important to introduce educational platforms such as Moodle or the Sport Academy Program [21], which provide remote access to educational materials and training programmes. Another important area is the establishment of partnerships between educational institutions and sports organisations. In Kazakhstan, such cooperation is actively developing through the integration of students into internships at sports clubs, such as Fitness Blitz and World Class. This allows future coaches not only to acquire theoretical knowledge, but also to gain practical experience in real working conditions. A recommendation for improving this area is to create career development centres in higher education institutions that will coordinate student internships and their interaction with employers.

In Bulgaria, considerable attention is paid to the dual education system, which combines university studies with practical training at sports federations. In particular, the Dual Education for Sports Professionals programme [22] provides students with a real opportunity to apply their knowledge in their professional activities, working together with teams of athletes and coaches. To improve this approach, it is recommended to increase student participation in the development of training programmes using innovative technologies, such as the E-Coach [23] remote sports team management system. It is also worthwhile to make more active use of professional development programmes, such as SportsManager Pro, which allow coaches to develop management skills. Particular attention should be paid to developing the digital competencies of future professionals. In Bulgaria, this aspect is implemented through the use of biomechanical sensors to analyse athletes’ movements, which allows students to master the most advanced methods in sports science. Accordingly, the recommendation is to introduce into the curriculum disciplines focused on digital data analysis, modelling of training processes and the use of software for managing sports teams.

For both countries, it is advisable to create platforms for continuous training of physical education and sports professionals. In Kazakhstan, this role is partially fulfilled by the Sport Academy Program [21], which provides access to modern training materials. In Bulgaria, this function is performed by the E-Coach [23] system and the Dual Education for Sports Professionals [22] programme. To improve training, it is recommended to create a single national platform for physical education professionals that will combine theoretical materials, interactive trainings and certification opportunities. Based on the experience of both countries, it can be concluded that the use of digital technologies, practical training and cooperation with employers are key to ensuring the competitiveness of physical education and sports professionals. The mechanism of integrating these approaches into the education system will allow students not only to acquire theoretical knowledge, but also to gain practical experience and develop the skills necessary to work in the labour market (Table 2).

Table 2. Mechanisms for training specialists in physical culture and sports.

Stage	Kazakhstan	Bulgaria
Analysis of labour market needs	Analysis of vacancies on the Work.kz, HeadHunter.kz platforms. Practical tasks – forming a database of current employer requirements	Analysis of vacancies through partner federations. Practical tasks – development of competency profiles for coaches
Curriculum development	Integration into digital technology programmes such as Open Sports Academy, Moodle. Practical exercises – creating virtual training simulations	The introduction of dual programmes, such as "Dual Education for Sports Professionals". Practical exercises – development of individual development plans
Practical training	Internships in sports clubs such as "Fitness Blitz", "World Class". Practical exercises – managing training processes using biomechanical sensors	Participation in dual education programs through partner federations. Practical exercises – training athletes using the E-Coach system
Development of digital competencies	Learning through the Open Sports Academy platform. Practical exercises – using software for movement analysis	Training through the programme "SportsManager Pro". Practical exercises – managing sports teams and analysing data through digital systems
Advanced training	Organisation of training using virtual simulators. Practical exercises – creation of simulated training situations	Advanced training through partnership with the National Sports Academy. Practical exercises – conducting practical classes using biomechanical sensors
Performance evaluation	Testing knowledge and skills through Open Sports Academy simulators. Practical exercises – preparation and analysis of training cases	Monitoring training results through the E-Coach system. Practical exercises – developing training plans using data analysis

The mechanism of training specialists in physical culture and sports, presented in Table 2, in Kazakhstan and Bulgaria is aimed at ensuring the competitiveness of graduates in the modern labour market through the integration of innovative approaches. The main goal of this mechanism is to adapt the educational process to the real needs of employers, increase the practical orientation of training and promote the development of students' digital competencies. The training begins with an analysis of labour market needs, including the collection and systematisation of information on vacancies, competence requirements and key industry trends. The use of tools such as online platforms or cooperation with employers allows us to identify gaps in existing programmes and determine which skills will be most in demand in the future.

The development of curricula is based on the introduction of modern technologies and innovative approaches to learning. The integration of digital platforms and simulators not only improves the efficiency of learning theoretical knowledge, but also provides students with the opportunity to practice in real-world conditions [30-32]. At the same time, the use of dual programmes that combine study and work allows students to gain valuable practical experience while still studying. An important step is the development of digital skills, which are becoming an integral part of modern education. Using software to analyse movements or manage sports processes prepares students to work with innovative technologies. In addition, professional development through trainings and practical classes contributes to their professional growth. A holistic approach to training is aimed at creating well-rounded professionals who are able to adapt to changes and work effectively in a rapidly changing market environment.

After examining the outcomes of training programmes for sports and physical education specialists in Kazakhstan and Bulgaria, a number of significant obstacles have surfaced that could compromise the programmes' efficacy and fairness. Accessibility is one of the most significant issues, especially in rural or underdeveloped areas. For example, in Kazakhstan, many places still lack enough access to specialised facilities, contemporary infrastructure, and dependable internet, which makes it challenging for students outside of big cities to take full advantage of digital and hybrid learning options. Similarly, in Bulgaria, students from remote areas frequently struggle to commute to partner sports federations or access cutting-edge training equipment and technologies that are primarily available in central institutions, even though the dual education model offers strong opportunities for hands-on training.

Another major obstacle to the wider adoption of creative training strategies is affordability. Even though new technologies improve training quality, some of them entail high financial costs that can be unaffordable for educational institutions. Numerous public universities in Kazakhstan are dependent on limited state financing. As a result, there are disparities in educational performance since only a small number of schools can provide students with access to contemporary facilities. Even though working with sports federations in Bulgaria helps ease some financial strains, kids from lower-income families are still concerned about the cost of participation in dual programmes. This adds to the

technological preparedness that differs greatly across the two countries. It's possible that faculty members, especially senior staff, lack the expertise needed to handle sophisticated technology like biomechanical analysis tools or offer courses via virtual platforms. In addition to impairing the effectiveness of instruction, this digital gap restricts students' access to modern sports science technology, which are crucial for becoming competitive in the global labour market. Furthermore, these problems are made worse by irregular digital system maintenance and insufficient professional assistance, which frequently leads to underutilisation of the technological resources that are available.

Innovative teaching methods in sports training and physical education must be carefully evaluated for sustainability, especially in light of the financial and environmental implications. The initial purchase, maintenance, and instructor training costs of high-tech equipment like VR simulators, AI-driven analytics platforms, and biomechanical sensors can be prohibitively expensive for universities with little funding. Furthermore, equipment obsolescence brought on by the quick speed of technology advancement might raise long-term expenses and generate electronic waste. The energy usage of maintaining virtual worlds and operating digital platforms is concerning from an environmental standpoint, particularly in places without access to renewable energy sources. Institutions should invest in shared infrastructure, embrace digital solutions with minimal energy requirements, and give priority to scalable, affordable technology in order to improve sustainability. Further reducing ecological footprints while preserving educational quality can be achieved by incorporating environmental awareness into programme design, such as encouraging virtual rather than in-person travel for training or internships.

Gender inequality in sports training and physical education is still a major issue, especially in systems that are being modernised through structural and technological changes. Systemic obstacles that female students frequently encounter include restricted opportunities for leadership positions in sports, a lack of representation in technical training courses (such as biomechanics and sports analytics), and gendered preconceptions that affect their choice of specialisation and expectations for their careers. In some cultural contexts, dominant attitudes may deter women from pursuing professions in male-dominated sports disciplines or from fully engaging in specific physical activities. This might have an impact on post-graduate possibilities and enrolment patterns. Educational programmes must include gender-sensitive tactics that actively assist female pupils in order to address these inequities. This entails boosting female involvement in the curriculum's digital and technology components, guaranteeing equitable access to mentorship opportunities, and modifying training materials to reflect inclusive practices.

In the context of cooperation between higher education institutions and employers, an important step is to establish mentoring programmes where experienced professionals can pass on their knowledge and skills to younger colleagues. Mentoring promotes the development of professionals at all stages of their careers, giving newcomers the opportunity to learn directly from those who already have extensive experience in the field of sports and physical education [33, 34]. The discussed barriers highlight the need for a more methodical and comprehensive approach to changing the education of sports and physical education teachers. The creation of low-cost digital technologies suited to the requirements of emerging systems, national-level training for educators in digital pedagogy, and targeted funding for institutions with limited resources represent a few solutions that could lessen current gaps. In general, innovative methods of training physical education and sports professionals have great potential to improve curricula and increase the efficiency of training specialists who meet modern labour market requirements. The key aspects are the integration of digital technologies, the introduction of dual programmes, the development of sports psychology and the use of innovative simulators.

Educational institutions in Kazakhstan and Bulgaria are increasingly matching their curricula to regional employment trends, such as the need for coaches with expertise in digital performance analysis, rehabilitation specialists, and sports managers who can operate in technologically advanced environments. For example, curricula are modified to incorporate courses on entrepreneurial skills, virtual coaching, and digital client monitoring in regions where the sports and fitness sector is growing as a result of urbanisation or state investments in public health. Universities are also able to update course material, launch new certification programmes, and give internships priority for experiential learning thanks to continuous corporate discussions and employment market data analysis.

The improved professional adaptability, job happiness, and career advancement of graduates in physical education and sports demonstrate the long-term effects of educational innovations on their professions. When joining the workforce, graduates who receive training in settings enhanced by data analytics platforms, virtual simulators, and practical internships exhibit greater levels of competence and confidence. They can more easily move into a variety of roles, such as coaching, sports management, rehabilitation, and digital sports analysis, thanks to their exposure to modern industry processes and technical systems. In addition, early exposure to real-world situations cultivates a deeper comprehension of workplace dynamics, which lowers turnover rates and promotes long-term job satisfaction. Graduates sometimes find work before graduating through institutional collaborations in systems like Bulgaria's dual education model, which speeds up their career paths. In Kazakhstan, people with training in digital competences are also more suited for positions in the rapidly developing fields of online fitness services and sports technology. All things considered, these innovations develop professionals who are technically skilled and strategically minded, improving their long-term career resilience and upward mobility in a sports business that is changing quickly.

The training of physical education and sports professionals is one of the key areas that has a significant impact on the quality of physical education, the development of sports and the overall health of society. This study has shown that

the introduction of modern approaches to the training of specialists in this field contributes to adaptation to the needs of the labour market. The results of this study show that the use of technologies such as virtual reality and artificial intelligence has a positive impact on the training of specialists, increasing their competence and readiness to work in modern conditions. The study by Li and Li [35], and Li et al. [36] confirms this trend, demonstrating that the use of virtual reality allows simulating real training conditions, improving coordination and motor skills of students, which is especially useful in physical education and sports training. Also, Guo and Li [37] note that AI tools contribute to the personalisation of learning and optimisation of sports training, which is in line with our findings on the need to implement such technologies to increase the competitiveness of specialists. The work of Soltani and Vilas-Boas [38] emphasises the benefits of using multi-user virtual environments in the training of physical education professionals. These findings confirm that VR technologies and simulation of sports situations have a positive impact on the development of students' practical skills. However, this study adds that such technologies not only improve practical skills, but also help to adapt to real working conditions. The study by Xu [39] focused on the use of sports posture recognition technology in physical education. This work also points out the effectiveness of using such technologies, but additionally emphasises the need to train teachers in the effective use of such tools so that they can integrate them into their professional activities.

This study highlighted the importance of a multidisciplinary approach that combines physical education with psychology, pedagogy, and information technology. This is supported by the findings of Mishra et al. [40], who emphasise the effectiveness of AI analysis for the prevention of sports injuries. They argue that an interdisciplinary approach is key to ensuring quality education and training. Moreover, the study by Protsenko et al. [41] focuses on the pedagogical conditions for the training of future physical education teachers. Their emphasis on the integration of an interdisciplinary approach is consistent with these findings on the need for this approach in education, including the use of VR and interactive technologies for learning. Both studies also emphasised the importance of the motivation of professionals as one of the key factors for successful training.

This study found that the introduction of programmes to develop these skills in the educational process is one of the priorities in training competitive professionals. The work of Abduyakubovna and Urunbaevich [42] also points to the importance of adapting the training system to the needs of the modern labour market, which coincides with the findings. The authors emphasised that employers expect graduates to have not only technical skills, but also a high level of flexibility, creativity, and teamwork. Coimbra et al. [43] noted that physical education-based training develops important behavioural skills in students, such as self-regulation, responsibility, and commitment. This study also found that the development of these skills is an important component of training, as they ensure successful professional performance in the future. Naumchuk et al. [44] developed a methodology for assessing the quality of professional training of future specialists in physical culture and sports, which contributes to the improvement of the objectivity of assessing students' academic achievements. This study also emphasises the importance of developing effective tools for assessing the competencies of specialists, but additionally focuses on the use of artificial intelligence technologies to automate this process. Nguyễn et al. [45] analysed the problem of professional burnout of trainers during fully online and blended learning. Their study confirms the importance of adapting the educational process to critical conditions, including the need for emotional support for trainers. This paper also identifies the importance of the psychological component in professional training, especially in the context of distance learning, and confirms the importance of implementing strategies to prevent professional burnout.

A systematic review of professional careers in physical education conducted by Voltan et al. [46] shows that a successful career depends on a balance between theoretical training and practical skills. This paper also emphasises the need for a harmonious combination of these components, but we add that innovative technologies can significantly reduce the gap between theory and practice. Zhou [47] investigated the informatisation of educational management in physical education. The results of this study echo these conclusions about the need to digitalise management and learning processes. Educational management should provide not only control, but also support for specialists in the process of knowledge acquisition.

This paper confirms that the quality of teaching has a significant impact on the formation of students' professional competences and their ability to adapt to new conditions. Kohake [48] investigated the relationship between teaching quality and learning outcomes in physical education. The author also showed that systematic observation of lessons can improve the training of future professionals. In turn, D'Elia [49] identified the importance of physical education in primary school, focusing on the training of teachers who will be able to work with children of this age. This is reflected in the present study, as the basic skills formed at an early age are the foundation for the further development of physical education and sport. Tsyhura and Harkusha [50], and Skyba [51] emphasised the importance of education for sustainable development in the training of physical education and sport professionals. The present study shares this view, adding that the sustainability of the educational process can be achieved through the introduction of the latest technologies and cooperation with employers to ensure the relevance of knowledge and skills. In addition, Ten et al. [52] considered the prospects for the development of grassroots sports in Kazakhstan, paying attention to the training of coaches to work in the context of community initiatives. This study also noted the importance of taking into account the regional context in the training of specialists, in particular through the development of specialised programmes adapted

to the needs of the local labour market. Thus, the conclusions coincide in terms of adapting the educational process to the specific requirements of different countries.

Although most of the findings of various studies are consistent with our results, there are some discrepancies. For example, Aldous and Brown [53] critically assess the transformational aspirations in the UK for professional education in physical education. They believe that most initiatives do not meet the real needs of the labour market. However, this study notes that the adaptation of educational programmes to these needs can significantly increase the effectiveness of training. Taking into account the results of this study and the conclusions of other authors, it is necessary to strengthen the integration of modern technologies into the process of training specialists. This will make the learning process more efficient and relevant to market needs. In addition, it is important to include modules in the curriculum that develop students' communication, creativity and leadership skills, as these are the skills that are in demand in the labour market. The development of training programmes that take into account the challenges in education will not only improve the level of physical education, but also meet the needs of the labour market.

5. Conclusion

Thus, the study of the training of physical education and sports specialists in Bulgaria and Kazakhstan has identified a number of successful practices that meet the requirements of the modern labour market and ensure a high level of professionalism among graduates. Comparison of the training systems in these two countries has revealed both common and different approaches to this process, which is important for improving educational programmes and cooperation between educational institutions and employers.

In Bulgaria, one of the most successful examples is the introduction of the Dual Education for Sports Professionals programme, which allows students to combine theoretical studies with practical work in sports federations and clubs. This provides an opportunity to gain real-world experience in the industry, which significantly increases the competitiveness of graduates in the labour market. The programme also includes training in the use of the latest technologies, such as biomechanical sensors for analysing athletes' movements, which allows students to develop their professional skills and adapt them to the modern requirements of the sports industry. Thus, Bulgaria focuses on the integration of technology into the educational process and provides students with the opportunity to work with real data and modern tools.

Kazakhstan is also actively introducing innovations into the process of training physical education and sports specialists. One of the most successful initiatives is the Sport Academy Program, launched in 2024, which aims to develop the digital competencies of coaches. This programme includes online courses, the use of virtual training simulators and distance learning platforms such as Moodle. The difference between Kazakhstan and Bulgaria is the deeper integration of digital technologies, which is especially relevant in the context of the development of online education and the growing demand for digital competencies in the sports sector.

Despite the general focus on practical training, each country has its own characteristics. Bulgaria focuses more on dual programmes that provide a balance of theory and practice in the real conditions of sports organisations. Kazakhstan, in turn, focuses on digitalisation and the introduction of innovative methods such as online courses and virtual simulations. Both approaches have their advantages and can be used to improve training systems in these countries, as well as to develop effective models of cooperation between universities and employers. One limitation of the study is its focus on only four countries which may limit the generalisability of the findings. Another limitation is the absence of feedback from students and employers, which restricts insight into how these programmes are perceived and evaluated by key stakeholders. Further research could focus on the impact of new technologies on the effectiveness of student training in different educational systems, as well as on comparing models of cooperation between educational institutions and employers in a broader context. Additionally, further studies should incorporate direct feedback from students and employers to better assess the perceived effectiveness, relevance, and practical impact of training programmes.

All the Declarations and Statements

Author Contributions Statement

Anna Zhidovinova – Conceptualization, Methodology, and Supervision: Proposed research ideas, Constructed the overall framework, and supervised project execution.
Aliya Zhumanova – Writing – Drafted the initial manuscript, contributed to the literature survey, and documented the technical background of the study.
Zhassyn Mukhambet – Writing – Review and Editing, and Project Management: Reviewed and edited the manuscript, ensured clarity and coherence, and helped coordinate project milestones and deadlines.
Evgeny Bronskiy – Conceptualization, methodology, data curation, writing-original draft preparation.
Dmitriy Muchkin – Software, validation, writing-reviewing, and editing.

All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflicts of interest.

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The data that support the findings of this study are available on request from the corresponding author.

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None.

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Declaration of Generative AI in Scholarly Writing
We have not used AI tools or technologies to prepare this manuscript.

Abbreviations
The following abbreviations are used in this manuscript:

COVID-19 - COronaVIrus Disease 2019
KazAST - Kazakh Academy of Sport and Tourism
USA - United States America
US - United States
VR - virtual reality
AI - artificial intelligence

Appendix
None.

References

[1] V. N. Avsiyevich, A. V. Zhidovinova, L. I. Shalabaeva, A. T. Kulbaev, and Y. V. Shchegoleva, “The level of readiness of Kazakhstani specialists in physical culture and sport to scientific and innovative activity,” Theory Methodol Phys Educ, vol. 1, no. 75, pp. 6-19, 2024, doi: 10.48114/2306-5540_2024_1_6.

[2] J. Cheng, L. Wen, and B. Zhang, “Visualization analysis of integrating college sports training and psychology into basketball physical education teaching system based on image recognition algorithm,” Appl Artif Intell, vol. 38, no. 1, p. 2419571, 2024, doi: 10.1080/08839514.2024.2419571.

[3] Y. Li, “Theory and practice of physical education and sports training in colleges and universities based on information technology,” in 2020 Int Conf Comput Inf Process Adv Educ, Ottawa: IEEE, 2020, pp. 121-124, doi: 10.1109/CIPAE51077.2020.00040.

[4] M. Rebbouj and S. Lotfi, “Physical education and sport activity assessment tool-based machine learning predictive analysis for planification of training sessions,” Health Sport Rehabil, vol. 10, no. 3, pp. 95-104, 2024, doi: 10.58962/hsr.2024.10.3.95-104.

[5] T. Hulko and B. Romanenko, “On the question of quality training of future specialists in institutions of higher education,” 2024, doi: 10.36074/logos-24.05.2024.071.

[6] Y. Hamdan, “The effect of balance training on improving shooting skills and the basketball debate among the students of the Faculty of Physical Education and Sports,” Ibero-Am J Exerc Sports Psychol, vol. 18, no. 1, pp. 38-47, 2023, doi: 10.13140/RG.2.2.16783.97447.

[7] A. Rebryna, “Training of physical education and sports specialists for the organization of active leisure in places of mass recreation of the population,” Probl Educ, vol. 1, no. 100, pp. 165-174, 2024, doi: 10.52256/2710-3986.1-100.2024.12.

[8] S. Karasievych, B. Maksymchuk, V. Kuzmenko, N. Slyusarenko, O. Romanyshyna, E. Syvokhop, O. Kolomiitseva, L. Romanishyna, I. Marionda, V. Vykhrushch, M. Oliinyk, A. Kovalchuk, M. Halaidiuk, and I. Maksymchuk, “Training future physical education teachers for physical and sports activities: Neuropedagogical approach,” Broad Res Artif Intell Neurosci, vol. 12, no. 4, pp. 543-564, 2021, doi: 10.18662/brain/12.4/264.

[9] P. J. Ruiz-Montero, S. C. Robles, M. G. Carmona, and A. B. Meliá, "ApS experience in initial teacher training for the double degree in primary education and physical activity and sport sciences. The multicultural context as a framework for action," Publicaciones, vol. 49, no. 4, pp. 145-164, 2019, doi: 10.30827/publicaciones.v49i4.11733.
[10] S. Zhao, "Research on scientific sports training of students majoring in physical education," Braz J Sports Med, vol. 27, no. 5, pp. 460-463, 2021, doi: 10.1590/1517-8692202127042021_0163.
[11] A. Korcz, J. Krzysztoszek, M. Łopatka, B. Popeska, H. Podnar, B. Filiz, E. Mileva, A. R. Kryeziu, and M. Bronikowski, "Physical education teachers' opinion about online teaching during the covid-19 pandemic – comparative study of European countries," Sustainability, vol. 13, no. 21, p. 11730, 2021. doi: 10.3390/su132111730.
[12] J. Longakit, J. Lobo, R. Tagare, J. Aliser, B. Colobio-Englatiera, T. Panganiban, J. M. Aquino, D. Rodriguez, N. Gazali, and M. Kurnaz, "Investigating the effect of a 12-week game skill-based activity in physical education to enhance movement competence of students: A randomized trial," Pedag Phys Cult Sports, vol. 28, no. 6, pp. 525-533, 2024. doi: 10.15561/26649837.2024.0607.
[13] A. Laulanbekov, J. Torybayeva, and M. Tusseyev, "Developing health-saving competence of pre-service teachers in Kazakhstan," Retos, vol. 60, pp. 1140-1148, 2024. doi: 10.47197/retos.v60.105881.
[14] A. Kuvatov, S. Zhilgeldinov, and E. Zhumataeva, "The methodological basis for increasing the internal intellectual potential of physical education and sports students," Retos, vol. 49, pp. 713-721, 2023. doi: 10.47197/retos.v49.98466.
[15] T. Botagariev, Z. Khakimova, J. Andrushchishin, A. Akhmetova, and S. Konisbaeva, "Professional readiness and efficiency of future physical education teachers," Int J Instr, vol. 14, no. 2, pp. 271-288, 2021. doi: 10.29333/iji.2021.14216a.
[16] L. He, A. F. B. M. Ayub, and S. B. Amri, "Development and validation of a questionnaire to assess the implementation of physical education programs in Chinese junior high schools," BMC Publ Health, vol. 24, no. 1, p. 2387, 2024. doi: 10.1186/s12889-024-19844-5.
[17] Y. Yiming, B. Shi, S. Kayani, and M. Biasutti, "Examining the relationship between self-efficacy, career development, and subjective wellbeing in physical education students," Sci Rep, vol. 14, no. 1, p. 8551, 2024. doi: 10.1038/s41598-024-59238-6.
[18] J. R. S. Navarro, Y. S. Pérez, and S. J. H. Naranjo, "Impact of teaching strategies applied in physical education in educational institutions in Monteria, Colombia," Retos, vol. 61, pp. 1351-1361, 2024. doi: 10.47197/retos.v61.110619.
[19] W. Mo, J. B. Saibon, Y. Li, J. Li, and Y. He, "Effects of game-based physical education program on enjoyment in children and adolescents: A systematic review and meta-analysis," BMC Public Health, vol. 24, no. 1, p. 517, 2024. doi: 10.1186/s12889-024-18043-6.
[20] M. A. M. Rodrigues, R. R. Silva, D. A. T. Santos, J. V. R. de Freitas, P. Gentil, C. A. Vieira, A. C. S. Rebelo, M. S. Andrade, M. H. Campos, G. de Conti Teixeira Costa, B. Knechtle, R. L. Vancini, and C. A. B. de Lira, "Investigating academic performance and perceptions of human physiology and exercise physiology courses among undergraduate students of physical education at a Brazilian public university," BMC Med Educ, vol. 24, no. 1, p. 87, 2024. doi: 10.1186/s12909-024-05058-1.
[21] Sport Academy Program, 2024. [Online]. Available: https://www.salesian.vic.edu.au/learning/enrichment-programs/sports-academy-program/
[22] Dual Career Combining Education and Sports, 2020. [Online]. Available: https://www.interregeurope.eu/good-practices/dual-career-combining-education-and-sports
[23] E-Coach, 2025. [Online]. Available: https://ecoach.coursevo.com/
[24] Y. Georgiev, N. Nedev, E. Ivanova, D. Nikolova, and M. Popova, "Methods of Rehabilitation of Children through Eastern Martial Arts and their Impact on Health," Int J Child Health Nutr, vol. 14, no. 3, pp. 246-257, 2025. doi: 10.6000/1929-4247.2025.14.03.6
[25] G. Wojdala, R. Trybulski, M. Bichowska, and M. Krzysztofik, "A Comparison of Electromyographic Inter-Limb Asymmetry during a Standard versus a Sling Shot Assisted Bench Press Exercise," J Hum Kinet, vol. 83, no. 1, pp. 223-234, 2022. doi: 10.2478/hukin-2022-0084
[26] M. Wilk, R. Trybulski, M. Krzysztofik, G. Wojdala, Y. Campos, A. Zajac, E. Lulińska, and P. Stastny, "Acute Effects of Different Blood Flow Restriction Protocols on Bar Velocity During the Squat Exercise," Front Phys, vol. 12, p. 652896, 2021. doi: 10.3389/fphys.2021.652896
[27] Mathematical Problems in Engineering, "Retracted: Research on college physical education and sports training based on virtual reality technology," vol. 2023, no. 1, p. 9839018, 2023, doi: 10.1155/2023/9839018.
[28] A. Cattolico, C. Sellitto, C. I. De Girolamo, S. Moffa, K. Corona, L. Bagella, G. Guerra, D. Tafuri, A. De Luca, and A. Lucariello, "The impact of pilates mat training on flexibility and core strength in young female volleyball players," J Hum Sport Exercise, vol. 20, no. 4, pp. 1172-1183, 2025. doi: 10.55860/6crkxg57
[29] N. Abdybekova, and K. Eliseeva, "Pedagogical conditions for the introduction of online learning in the university," Bull Jusup Balasagyn Kyrg Nat Univ, vol. 15, no. 2, pp. 4-11, 2023. doi: 10.58649/1694-8033-2023-2(114)-4-11
[30] E. Dahan, and Y. Keller, "Kinship Verification Using Hierarchical Structures and Extended Contrastive Learning," IEEE Open J Comp Soc, vol. 6, pp. 1549-1560, 2025. doi: 10.1109/OJCS.2025.3610270
[31] G. Kapoor, A. Chahal, N. Sharma, S. Kaur, and H. Hendrik, "Electronic-learning: Friend or Foe," Int J Educ Ref, vol. 34, no. 2, pp. 405-415, 2025. doi: 10.1177/10567879221140095
[32] R. Abdrakhmanov, A. Zhaxanova, M. Karatayeva, G. Z. Niyazova, K. Berkimbayev, and A. Tuimebayev, "Development of a Framework for Predicting Students' Academic Performance in STEM Education using Machine Learning Methods," Int J Adv Comp Sci Appl, vol. 15, no. 1, pp. 38-46, 2024. doi: 10.14569/IJACSA.2024.0150105
[33] N. Korshunova, A. Akylakunova, and A. Kadyrov, "Mentoring in pedagogical activities," Bull Jusup Balasagyn Kyrg Nat Univ, vol. 16, no. 2, pp. 29-34, 2024. doi: 10.58649/1694-8033-2024-2(118)-29-34
[34] A. TA, G. D'Souza, and V. Augustine, "Effect of Professional Development Programme on Mentorship in Enhancing Self-efficacy and Outcome Expectancy of In-Service Teachers," Int J Educ Ref, 2025. doi: 10.1177/10567879251323882
[35] C. Li and Y. Li, "Feasibility analysis of VR technology in physical education and sports training," IEEE Access, 2020, doi: 10.1109/ACCESS.2020.3020842.

[36] D. Li, C. Yi, and Y. Gu, “Research on college physical education and sports training based on virtual reality technology,” Math Probl Eng, vol. 2021, no. 1, p. 6625529, 2021, doi: 10.1155/2021/6625529.
[37] Q. Guo and B. Li, “Role of AI physical education based on application of functional sports training,” J Intell Fuzzy Syst, vol. 40, no. 2, pp. 3337-3345, 2020, doi: 10.3233/jifs-189373.
[38] P. Soltani and J. P. Vilas-Boas, “Multi-user virtual environments for physical education and sport training,” in Cases on Immersive Virtual Reality Techniques, K. C. C. Yang, Ed., Hershey: IGI Global, 2019, pp. 20-41, doi: 10.4018/978-1-5225-5912-2.ch002.
[39] J. Xu, “Analysis and improvement of the application of playground sports posture detection technology in physical education teaching and training,” EAI Endorsed Trans Pervasive Health Technol, vol. 10, 2024, doi: 10.4108/eetpht.10.5161.
[40] N. Mishra, B. G. M. Habal, P. S. Garcia, and M. B. Garcia, “Harnessing an AI-driven analytics model to optimize training and treatment in physical education for sports injury prevention,” in Proc 2024 8th Int Conf Educ Multimedia Technol, New York: ACM, 2024, pp. 309-315, doi: 10.1145/3678726.3678740.
[41] Protsenko, O. Kotova, V. Tsybulska, I. Oliinyk, H. Sukhanova, O. Kyriienko, and O. Nepsha, “Professional training of future physical education teachers in higher education institutions of Ukraine,” in 10-th Volume of the International Collective Monograph “Modern Aspects of Science”, Jesenice: International Economic Institute, 2021, pp. 281-290.
[42] K. N. Abduyakubovna and I. S. Urunbaevich, “On the improvement of the pedagogical staff training system in the field of physical education and sports,” J High Educ Theory Pract, vol. 23, no. 8, 2023, doi: 10.33423/jhetp.v23i8.6077.
[43] M. Coimbra, R. Cody, J. N. Kreppke, and M. Gerber, “Impact of a physical education-based behavioural skill training program on cognitive antecedents and exercise and sport behaviour among adolescents: A cluster-randomized controlled trial,” Phys Educ Sport Pedagogy, vol. 26, no. 1, pp. 16-35, 2020, doi: 10.1080/17408989.2020.1799966.
[44] V. Naumchuk, V. Shandryhos, O. Vynnychuk, V. Yednak, and M. Oliiar, “Development of a methodology for assessing the quality of professional training of future specialists in physical education and sports,” Sci Herald Uzhhorod Univ Ser Phys, vol. 55, pp. 2786-2797, 2024, doi: 10.54919/physics/55.2024.278pa6.
[45] H. M. T. Nguyễn, T. H. T. Đỗ, and N. Q. Nguyễn, “Professional sports trainers' burnout in fully online and blended classes: innovative approaches in physical education and sports training,” Front Educ, vol. 7, p. 918599, 2022, doi: 10.3389/feduc.2022.918599.
[46] Z. Voltan, J. C. Caselli Messias, and E. R. de Paula, “Professional career in physical education: A systematic review,” Braz J Vocat Guid, vol. 22, no. 2, pp. 135-163, 2021, doi: 10.26707/1984-7270/2021v22n203.
[47] Y. Zhou, “A study on the guiding role of educational management informatization in integrated physical education teaching and sports training,” Appl Math Nonlinear Sci, vol. 9, no. 1, pp. 1-17, 2024, doi: 10.2478/amns-2024-0941.
[48] K. Kohake, “Systematic observation to measure teaching quality in different contexts: Insights from science lessons, physical education lessons, and sports training using the classroom assessment scoring system,” Front Educ, vol. 9, p. 1437996, 2024, doi: 10.3389/feduc.2024.1437996.
[49] F. D'Elia, “Physical education in primary school and impact on primary teacher education students from two different university sites,” Acta Kinesiol, vol. 17, no. 1, 2023, doi: 10.51371/issn.1840-2976.2023.17.1.5.
[50] H. Tsyhura and S. Harkusha, “Education for sustainable development: Understanding by physical education and sports specialists,” Phys Educ Theory Methodol, vol. 23, no. 4, pp. 614-621, 2023, doi: 10.17309/tmfv.2023.4.17.
[51] Y. Skyba, “Correspondence of soft skills of bachelors of physical culture and sports with the specialization 'Physical culture and sports rehabilitation' to the needs of the labor market,” Sci J Natl Pedagog Dragomanov Univ Ser 15 Sci Pedagog Probl Phys Cult, vol. 3K, no. 176, pp. 428-436, 2024, doi: 10.31392/udu-nc.series15.2024.3k(176).95.
[52] A. Ten, B. Zaurenbekov, M. Shepetyuk, Y. Baitasov, V. Avsiyevich, and A. Telemgenova, “Prospects for the development of physical culture and grassroots sports in the Republic of Kazakhstan,” J Phys Educ Sport, vol. 22, no. 9, pp. 2246-2253, 2022.
[53] D. Aldous and D. Brown, “A critical analysis of CIMSPA's transformative aspirations for UK Higher education sport and physical activity vocational education and training provision,” Sport Educ Soc, vol. 26, no. 6, pp. 634-647, 2020, doi: 10.1080/13573322.2020.1786363.

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