



# Technologies for gamification of physical culture, recreation and sports activities in a virtual sports club

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## Abstract

**Objective of the study** was to generalization of experience and transfer of knowledge of the theory of virtuality in the field of physical culture, recreation and sports activities, as well as the development of gamification technology for home training of children.

**Methods and structure of the study.** The research was conducted by synthesizing theoretical insights and practical expertise from virtual entities. The methods employed included: a review of scholarly and methodological literature, a content analysis and conceptualization, the application of gamification, the development of mobile app technology, and the utilization of neural networks.

**Results and conclusions.** Based on the examination of scientific literature, a comprehensive definition of a virtual school sports club is formulated, highlighting its key characteristics and content. A model of a virtual martial arts sports club named "Sokol" in Izhevsk, with an informal structure, has been developed. The paper describes the creation of a gamification application that enables the use of devices for physical education and sports activities, thereby enhancing the child's motivation and interest in training. These innovations are designed to enhance physical education and sports activities, improve children's physical fitness, and foster the development of children's associations.

**Keywords:** gamification, virtual sports club, virtual technologies in training, sportization, virtual organization, mass sports.

**Introduction.** According to the order of the Government of the Russian Federation of January 23, 2021 No. 122-r, as part of the complex of events "Decade of Childhood"<sup>1</sup> by 2027, it is planned to implement key socially significant initiatives, including: increasing the coverage of children aged 5 to 18 years with additional education; improving physical education and sports work and increasing the level of physical fitness of children; developing children's associations; organizing and conducting scientific research on modern childhood, from the perspective of which this study is conducted. Currently, in the period of digitalization of all spheres of society, the concept of "virtual" is becoming increasingly relevant and in demand, such definitions as "virtual reality", "virtual money", "virtual

business centers", "virtual technologies", etc. appear, thus, an innovative and promising structural direction is being formed in the field of economics and business – "virtual organizations" [3, 4, 5, 6]. This direction is closely related to information and communication technologies and is based on network business interaction. In the field of physical education and sports (PES), the direction of "virtual organizations", "virtual public associations and clubs" is practically absent, not considered, not studied and, therefore, its development is a very urgent task.

**Objective of the study** was to identify and substantiate the essence and content of the concept of "virtual sports club" and the virtual technology of "gamification" in physical culture, recreation and sports activities.

**Methods and structure of the study.** The scientific work was carried out on the basis of generaliza-

<sup>1</sup> Order of the Government of the Russian Federation No. 122-p of January 23, 2021: "Plan of the main events held within the framework of the Decade of Childhood".



tion of theoretical knowledge and practical experience of functioning of virtual organizations, the following methods were used: content analysis and definition of concepts, gamification, technology of creation of mobile application, neural network. Many experts claim that the future is in transferring business to online mode, in virtual organizations [5, 6]. In modern scientific literature there are various definitions of the concept of “virtual business organization” [3, 4, 6]. Thus, O.E. Kalenov [3] gives the following definition: A virtual organization is a formal or informal organization that unites spatially separated economic entities (legal entities and individuals) that interact in the process of joint activities for the purpose of manufacturing products, providing services and obtaining maximum profit, using mainly information and communication technologies.

**Results of the study and discussion.** In the field of physical education and sports, there are public associations of legal organizations – these are **federations, associations**, etc. – **organizations with a formal structure** and strong centralized management, with rigid vertical connections and weak horizontal interactions, the financing of which is based on membership fees, and the activities are very often aimed at organizing paid services for students in the training, educational and competitive processes.

The practice of the “noughties” and “tenths” showed that not all clubs, sections and even regional federations are satisfied with such structural and managerial functioning. Legal and physical entities want more freedom, more independence, the ability to plan their health and sports activities based on local regional characteristics. Thus, it is clear that the reasons and prerequisites for the emergence of virtual organizations in the field of physical education and sports are emerging.

**Virtual web organizations** in the field of physical education and sports. In essence, these are web services that provide health and training online services for real registered users from anywhere in the world on a paid basis. Let's outline some of them:

**“Onetrack”** (Available at: <https://www.onetrack.club/>) is a virtual club for people who run. Members are provided with interactive training plans and have access to daily live sessions led by an expert trainer in audio or video formats.

**“Fitocracy”** (Available at: <https://www.fitocracy.com/>) is a service that allows you to choose your own virtual trainer for fitness classes, assesses the level of physical fitness of a club member, creates a nutrition

plan, organizes operational control over the training process and user achievements (points are awarded for training and interactive progress graphs are provided).

**Virtual school sports club.** Based on the content analysis of works on the definition of a virtual organization, carried out by the authors L.A. Leinonen, 2009 [4]; M.A. Kurmanbaeva, I.V. Chizhankova, 2017; O.E. Kalenov, 2018 [3]; I.E. Khromov, 2018 [6]; G.I. Gumerova, E.Sh. Shaimieva, 2018; M.S. Sudakov, A.O. Kondrat, M.I. Danilenko, 2019 [6] and others, we formulated the following generalized definition, in the context of the field of physical education and sports: “Virtual school sports club” (VSSC) [2] is a virtual informal or semi-formal organization, without the formalization of a traditional organizational and legal structure, permanently or temporarily uniting various entities (legal entities - sections, clubs - and / or individuals), the functioning of which is based on network interaction and is aimed at implementing physical education, health and sports activities (PEHS).

Let's consider the main features and content of VSSC:

1. Low level of formalization. An informal sports organization is, to some extent, a spontaneously created association of clubs, sections, without concluding organizational and legal agreements, to achieve certain common goals (not profit) in physical education, health and sports activities. Such fundamental goals are the reason for the creation and existence of both formal and informal organizations [1]. The VSHSK is, in essence, a club without borders.

2. Decentralized management, priority of horizontal interaction links, and also, perhaps, the presence of a virtual core – an organization around which cooperation takes place.

3. Temporality of cooperation, i.e. project-based nature of interaction for the implementation of common goals for all entities.

4. Network interaction of all VSSC entities.

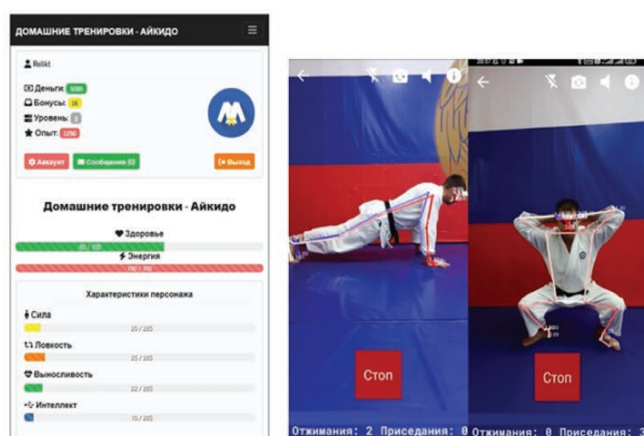
5. Communication via information technologies, as well as the use of virtual technologies, such as gamification, in physical education, health and sports activities.

**“Gamification” is a virtual technology for physical education, health and sports activities.**

We offer gamification technology – a computer application for home training of children, aimed at increasing their motivation and interest in participating in the training process. The main goal of the application is to create an exciting and motivating environ-



ment for home training. The developed application is intended for people involved in martial arts. The user creates and develops a virtual character that accumulates experience and increases levels as they perform physical exercises (Figure a). For performing exercises and achieving various goals, users receive virtual currency that can be used to “improve the virtual character” and purchase various in-game items. The reward system allows users to indirectly evaluate the results of their efforts. This approach encourages the user to train regularly and ensures visible progress in physical fitness.



A

B

*Visualization of some aspects of the gamification application: a) interface of the character progress system; b) control of exercise performance using a neural network*

The application also allows you to implement:

1. Competitive mode - where the user can compare their achievements with the results of other participants.

2. Virtual battles - where the user can fight both with each other and against computer-controlled opponents. To successfully repel attacks, users must regularly perform physical exercises that strengthen their characters and increase their chances of winning. This mechanism additionally encourages users to train regularly and helps improve their physical fitness.

The application includes a function for monitoring the correctness of exercise performance using a smartphone camera and artificial intelligence technologies, developed by Yu. V. Churakov and A. V. Mikheev [7]. The check is carried out both by a virtual trainer and a built-in neural network, which ensures the accuracy and objectivity of the assessment (Figure 2. b).

**Conclusions.** In the field of physical culture and sports, an innovative and promising structural direction is being formed and developed – “virtual sports club”, “virtual public associations”, and virtual technologies in the field of physical education and sports, such as gamification, are being developed. These innovations are aimed at improving physical education and sports work, increasing the level of physical fitness of children, and developing children’s associations. Virtual sports organizations are designed to ensure the flexibility of their functioning, mass participation and sportification of physical education of those involved. The development and implementation of gamification technology allows using devices for the purposes of physical education and sports, creating motivation and increasing the child’s interest in training.

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