A METHODOLOGICAL MODEL FOR DEVELOPING PROFESSIONAL COMPETENCE OF PRE-SERVICE PHYSICAL EDUCATION TEACHERS BY MEANS OF GYMNASTICS

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Abstract

The paper presents a methodological model for developing the professional competence of pre-service physical education teachers by means of gymnastics. The model was built by modelling, theoretical analysis of the literature and generalisation of teaching practice, and rests on the integration of systemic, competency-based and activity approaches. It consists of five interrelated blocks: a target block (social order, aim and tasks), a methodological block (approaches and principles), a content block (four modules - theoretical, practical, communicative and reflective), a procedural block (forms, methods and means of gymnastics teaching) and an evaluative-result block (criteria, indicators, levels and diagnostic tools). The model specifies the pedagogical conditions of its implementation and three stages of its introduction - diagnostic, formative and control. Its approbation in a 16-week experiment with second-year physical culture students ($n = 40$) showed a significantly larger gain in overall competence in the experimental group than in the control group (+9.1 vs +3.4 points on a 100-point scale; $t = 4.91$; $p < 0.001$). The model can be used in the design of gymnastics courses in bachelor programmes for physical education teachers.

Keywords: methodological model; professional competence; gymnastics; pre-service physical education teachers; competency-based approach; pedagogical conditions; reflective practice.

1. Introduction

Modern teacher education is expected to produce graduates who can act professionally from their first day in school, not only graduates who know their subject. For a physical education teacher this means a combination of motor mastery, methodological knowledge, the ability to organise and communicate with a class, attention to safety and the habit of analysing one's own lessons.

Uzbek state policy formulates the same expectation. The Concept for the Development of the Higher Education System until 2030 (Presidential Decree No. PF-5847 of 8 October 2019) sets the transition to a credit-module system and practice-oriented training [13]. Presidential Resolution No. PQ-4877 of 3 November 2020 is directed at improving the training of personnel for physical culture and sport and at raising the scientific potential of the field [14]. The "Uzbekistan - 2030" Strategy (Presidential Decree No. PF-158 of 11 September 2023) sets the goal of an education system that meets international standards [15].

Gymnastics is one of the core disciplines of the physical culture bachelor programme, and it is unusually rich in professional content. Every gymnastic exercise is taught through a progression of lead-up exercises; it requires exact demonstration and verbal explanation; it cannot be taught without spotting and safety; and its errors are visible and analysable. In practice, however, university gymnastics is often limited to improving the student's own technique and fitness. There is no systematic description of how gymnastics can be organised so that it develops the student as a future teacher.

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The absence of such a description is the research problem. A model is the appropriate form for solving it, because it shows the structure of the process, the links between its parts and the conditions under which it works, and it can be transferred to other institutions.

Aim. To develop and substantiate a methodological model for developing the professional competence of pre-service physical education teachers by means of gymnastics, and to report the results of its approbation.

2. Theoretical and methodological foundations

The model integrates three approaches, each of which answers a separate design question.

The systemic approach answers the question of structure. Following L. von Bertalanffy's general systems theory, a pedagogical process is treated as a whole made of interrelated elements whose links matter as much as the elements themselves [2]. For the model this means that aim, content, methods and assessment must be designed together and checked for consistency.

The competency-based approach answers the question of the result. A. V. Khutorskoy defines competence as the integration of knowledge, skills and experience of activity in a person-centred paradigm [5]. L. P. Matveev describes the professional readiness of the physical education teacher as a unity of motor, methodological and organisational components [7]. L. S. Shulman's pedagogical content knowledge - the ability to turn subject content into teachable form - explains why a skilled gymnast is not yet a competent gymnastics teacher [10].

The activity approach answers the question of the process. A. N. Leontiev showed that knowledge is appropriated in activity rather than by listening or memorising [6]. D. Schön's reflective practitioner adds that professional growth requires systematic reflection on one's own action [9]. In gymnastics this translates into tasks where the student does what a teacher does: demonstrates, explains, spots, corrects and evaluates.

Empirical research supports the choice of gymnastics as the core means. A 16-week gymnastics curriculum improved children's stability and object-control skills more than standard physical education in a study of 333 pupils [8]. A survey of 107 Portuguese sports-science students found only medium perceived competence for teaching gymnastics and the weakest self-rating for adapting curricular content; the authors recommend experiential, reflective training modules [1]. Uzbek authors have described the developmental possibilities of gymnastics and approaches to forming professional competence in physical education [3; 4]. What the literature lacks is a single structured model that connects these elements into a teachable system - the gap this paper addresses.

3. Methods

The model was developed with theoretical methods - analysis and synthesis of pedagogical, psychological and sports-science literature, analysis of the state educational requirements for the 60112200 - Physical Culture programme, and pedagogical modelling. Empirical methods included observation of gymnastics classes, questionnaires and diagnostic testing of students, and generalisation of the author's teaching experience at Bukhara State University and Asia International University.

The model was approbated in a formative pedagogical experiment in the 2024/2025 academic year with 40 second-year students (experimental group n = 20, control group n = 20) over 16 weeks [11]. Data were processed with descriptive statistics, Student's t-test, one-way ANOVA with eta squared and Pearson correlation; the significance level was $p < 0.05$.

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4. The model at a glance

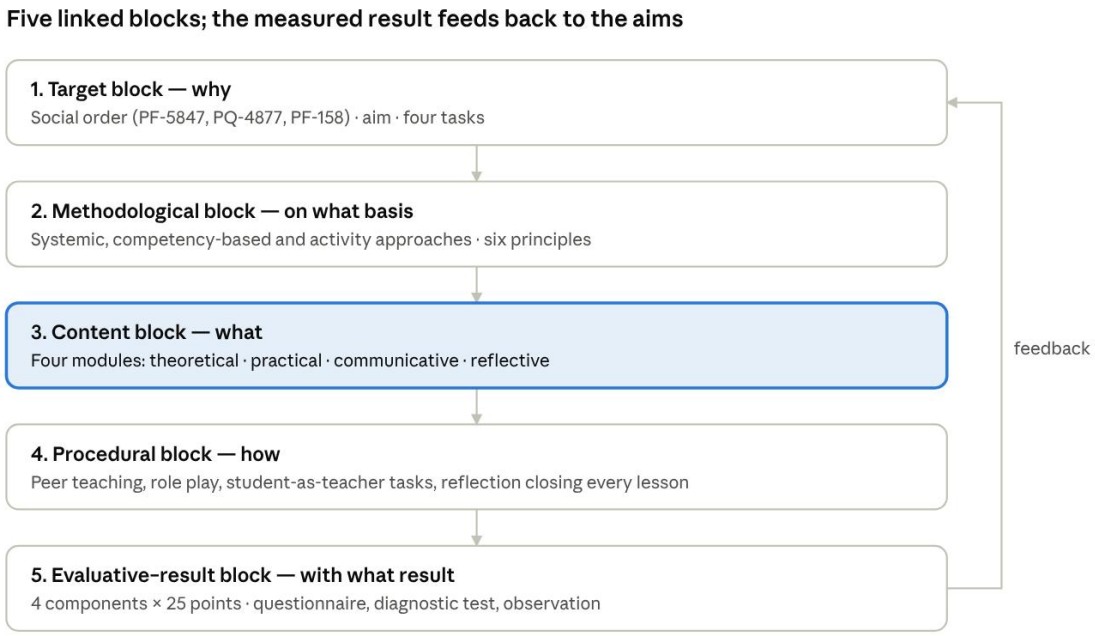


Figure 1. Methodological model · 5 blocks, 1 feedback loop

The blocks run from the social order to the measured result; the content block, with its four modules, is the core, and the result of each cycle corrects the aims of the next.

5. The model and its blocks

The model consists of five blocks; each block answers one question of design, and the evaluative-result block feeds back into the target block.

1. Target block - why. Its starting point is the social order: the state requirement for competent, practice-ready physical education teachers expressed in the documents cited above [13-15] and in the qualification requirements of the programme. The aim is to develop the professional competence of pre-service teachers by means of gymnastics. The tasks are: to deepen theoretical and methodological knowledge of gymnastics; to form the skills of demonstrating, explaining and spotting exercises; to develop the ability to manage a group and communicate during a lesson; and to form the habit of reflective analysis of one's own teaching.

2. Methodological block - on what basis. It contains the three approaches (systemic, competency-based, activity) and the principles that follow from them: integration of theory and practice; professional orientation of every exercise; gradual increase of independence (from imitation to teaching peers); safety; individualisation and differentiation; and obligatory reflection.

3. Content block - what. The content of the gymnastics course is arranged in four modules, each targeting one component of competence.

Module	Content	Competence component
Theoretical	Gymnastics terminology, exercise technique, teaching progressions, lesson planning	Theoretical knowledge
Practical	Performing and demonstrating exercises, organising independent practice, spotting and	Practical skill

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Module	Content	Competence component
	safety	
Communicative	Commands and verbal explanation, managing the group, motivating, giving feedback	Communicativeness
Reflective	Evaluating one's own and peers' teaching, error analysis, self-assessment	Reflectivity

4. Procedural block - how. Forms: practical classes, independent training, peer teaching. Methods: modular teaching, role play, the "student as teacher" task, peer analysis in pairs, training sessions and problem situations. Means: general developmental exercises, apparatus exercises, elements of artistic gymnastics, gymnastic equipment (rings, mats, beams, sticks) and methodological aids. Each lesson has an introductory part (10-15 min), a main part (50-55 min) and a closing part (10-15 min), and the closing part always contains structured reflection.

5. Evaluative-result block - with what result. Competence is measured on a 100-point scale, 25 points for each component. Diagnostic tools are triangulated: a 20-item Likert-type questionnaire, a four-module diagnostic test and a five-indicator observation sheet used at the beginning, middle and end of the course. The expected result is a higher level of professional competence; the measured result feeds back into the target block to correct aims and tasks for the next cycle.

6. Pedagogical conditions and stages of implementation

The model works only when certain pedagogical conditions are met:

1. **Material conditions** - a gymnasium equipped with apparatus and safety mats (rings, beams, mats, gymnastic sticks) so that every student can practise and teach.
2. **Organisational conditions** - regular practice: two classes a week of 80 minutes, plus independent training sessions; the share of tasks in which the student acts as a teacher grows from the beginning to the end of the course.
3. **Didactic conditions** - feedback after every lesson and compulsory reflective analysis in its closing part.
4. **Personal conditions** - differentiation of tasks according to students' initial preparation and physical condition.

The model is introduced in three stages.

Stage	Duration	Content
Diagnostic	1 week	Baseline assessment of the four components; grouping of students
Formative	14 weeks	Classes in the four modules; growing independence from imitation to peer teaching
Control	1 week	Repeated assessment; analysis and correction of the model

7. Approbation of the model

In the approbation experiment the experimental group gained 2.7 times more than the control group, and the difference was significant ($t = 4.91$; $p < 0.001$) [11].

Group	Pre-test (points)	Post-test (points)	Gain
Experimental, taught by the model (n = 20)	46.1	55.2	+9.1
Control, standard curriculum (n = 20)	45.7	49.1	+3.4

The experimental group outperformed the control group in every component at the post-test. The largest gain was in practical skill (+3.7 points), which reflects the weight of hands-on demonstration and spotting in the practical module. The effect of the model was largest for the reflective component (η^2 =

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0.29), which confirms the role of the compulsory reflective part of every lesson. The moderate correlation between practical skill and reflectivity (r = 0.605) shows that reflection grows together with practice but does not follow from it automatically, which justifies keeping the reflective module as a separate element of the model.

The greater spread of results in the experimental group indicates that students benefited unevenly, which supports the personal (differentiation) condition of the model. The approbation was limited to one university and 40 students; testing the model in several universities and with delayed post-tests is the next step.

8. Conclusion

The proposed model turns gymnastics from a means of students' physical preparation into a structured means of their professional formation as teachers. Its scientific novelty lies in linking each component of professional competence to a specific gymnastics module, a set of methods and a measurable indicator, within one system built on the systemic, competency-based and activity approaches. Its practical value is that it can be transferred to the gymnastics course of any physical education teacher programme: the modules, lesson structure, diagnostic tools and conditions are described explicitly. The approbation confirmed the effectiveness of the model (+9.1 vs +3.4 points; $p < 0.001$).

The model is recommended for designing working curricula of the gymnastics course and for the professional development of university lecturers who teach gymnastics.

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