JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 5, ISSUE 02
MOPNTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

PEDAGOGICAL AND PSYCHOLOGICAL FOUNDATIONS AND MODERN APPROACHES TO DEVELOPING PROFESSIONAL COMPETENCIES OF FUTURE TEACHERS OF TECHNOLOGICAL EDUCATION

Tumanov Uktamjon Fazliddin ugli
Senior Lecturer, Doctor of Philosophy
(PhD) in Pedagogical Sciences
at the University of Business and Science
https://orcid.org/my-orcid?orcid=0009-0001-8348-8050
email: tumanov.uktamjon1992@gmail.com

Abstract

This article analyzes the pedagogical and psychological foundations of the development of professional competencies of future teachers of technological education in the context of modern approaches from a theoretical and methodological perspective. Based on the integration of the competency approach, activity theory, constructivist educational paradigm and reflexive-axiological approach, the motivational-axiological, cognitive, operational-activity and reflexive components of professional competence are systematized. Psychological determinants affecting professional formation - professional motivation, pedagogical reflection, creativity and metacognitive skills - are scientifically substantiated. The effectiveness of digital pedagogy, STEAM-education and project-based learning mechanisms is also demonstrated.

Keywords

Professional competence, pedagogical-psychological foundations, competency-based approach, activity theory, constructivist educational paradigm, reflexive-axiological approach, motivational-axiological component, cognitive component, operational-activity component, reflexive component, psychological determinants, professional motivation, pedagogical reflection, metacognitive skills, digital pedagogy, STEAM education, project-based learning.

Introduction

In the context of globalization and digital transformation, the modernization of the education system makes it an objective necessity to introduce competency-based, integrative and innovative approaches to the process of training pedagogical personnel. In particular, the issue of developing professional competencies of future teachers in the field of technological education is of urgent importance from the point of view of ensuring pedagogical activity in accordance with the requirements of production, engineering thinking and the digital economy. This process is inextricably linked with pedagogical and psychological determinants - professional motivation, reflection, creativity, metacognitive strategies and emotional and intellectual stability - and their systematic development determines the formation of a teacher as a professional subject.

In the context of globalization and digital transformation, the modernization of the education system makes it an objective necessity to introduce competency-based, integrative and innovative approaches to the process of training pedagogical personnel. In particular, the issue of developing professional competencies of future teachers in the field of technological education is of urgent importance from the point of view of ensuring pedagogical activity in accordance with the requirements of production, engineering thinking and the digital economy. This process is inextricably linked with pedagogical and psychological determinants - professional motivation, reflection, creativity, metacognitive strategies and emotional and intellectual stability - and their systematic development determines the formation of a teacher as a professional subject.

In the Republic of Uzbekistan, bringing the education system to a qualitatively new level has been identified as one of the priority areas of state policy. The "Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030"[1], approved by the Decree of the President of the Republic of Uzbekistan No. PF-5712 dated April 29, 2019, lists the training of pedagogical personnel and improving their professional skills, as well as the widespread introduction of modern pedagogical and information and communication technologies into the educational process as key tasks. Also, the Decree No. PF-60 dated January 28, 2022 "On the Development Strategy of New Uzbekistan for 2022–2026"[2] identified improving the quality of education, strengthening the professional potential of teachers, and improving the system of continuous professional development as priorities. Decree of the President of the Republic of Uzbekistan No. PF-158 dated October 16, 2024 "On measures to further improve the system of training qualified personnel in vocational education and introduce international educational programs"[3] and Decree of the President of the Republic of Uzbekistan No. PF-73 dated April 28, 2025 "On measures to further improve the system of training pedagogical personnel"[4], Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 349 dated June 15, 2021 "On measures to introduce dual education in technological educational institutions and develop professional competencies"[5], These regulatory legal acts require the adoption of a competency-based approach as a methodological basis in the training of pedagogical personnel.

From this point of view, it is of scientific and practical importance to scientifically analyze the pedagogical and psychological foundations of the development of professional competencies of future teachers of technological education, identify their structural components and development mechanisms, and improve them based on the integration of modern educational technologies (digital pedagogy, STEAM education, project-based learning). This research serves to enrich the theory of pedagogical education, as well as to modernize the methodological system of teacher training in the direction of technological education.

LITERATURE ANALYSIS AND REVIEWS

The development of professional competencies of future teachers of technological education is one of the most pressing issues of the education system today. The competency approach not only forms the knowledge and skills of the teacher, but also ensures his ability to make pedagogical decisions, use innovative technologies, and take into account the individual needs of students. There are a number of theoretical approaches to the concept of pedagogical competence in different countries and scientific schools.

As one of the republican scientists N.A. Muslimov points out, "A teacher's competencies are a multi-component system in which pedagogical, methodological and psychological elements work together"[6], S.N. Abdullayev states, "Professional competence is a complex integrated set of knowledge, skills, advocacy, communication and information digital competencies necessary for a teacher to effectively work in pedagogical conditions"[7], A.Kh. Usmanov states, "There is an inextricable link between technological methods and pedagogical psychological approaches in the formation of a teacher's professional competencies. Together, they stimulate creative thinking and reflective activity in the learning process," clearly showing the integration of pedagogical and psychological mechanisms. Sh.F.Usmonov states that "Pedagogical competence is determined by the ability to purposefully plan the educational process, choose innovative methods, and support the personal growth of students"[8], recognizing that reflective activity serves as an important psychological component in optimizing a teacher's pedagogical decisions and reorganizing the educational process.

I.A. Zimnyaya, one of the scientists of the CIS, "Competence is an integrative property of personality, which expresses the ability to act effectively and professionally due to the combination of knowledge, skill, motivation and reflection" [9], V. A. Slastenin, E. V. Shmakov "Pedagogicheskaya kompetentnost vklyuchaet knobnost stroit obrazovatelnyy protsess cherez sub'ekt sub'ektnye otnoshenia, uchityvat individualnye osobennosti uchashchihsya i primenyat sovremennye pedagogicheskie tekhnologii" [10] sheds light on the pedagogical competence of the teacher from a structural point of view.

Foreign scholars Ormrod, J. E., scientifically substantiate the teacher's ability to apply his/her competencies in real pedagogical situations by stating that "Learning involves not only the acquisition of knowledge and skills but also the ability to apply what has been learned in varied contexts"[11], while Schunk, D. H., explained it as "Constructivist approaches position the teacher as a facilitator of meaning making, requiring competencies in guiding inquiry and facilitating collaboration"[12].

RESULTS AND DISCUSSIONS

The conceptual model developed during the research was based on the methodological integration of the competency approach, activity theory, constructivist educational paradigm, and reflexive-axiological approach. This integration is not accidental, but arises from the fact that the professional activity of a technological education teacher is a multifunctional and multi-level system.

The results of practical implementation showed that the model: strengthened the internal systemic connection between all components of professional competence, ensured the integration of theory and practice, activated psychological determinants, and formed reflexive mechanisms of pedagogical activity. As a result, the ability of future teachers to design professional activities, model technological processes, and make pedagogical decisions rose to a qualitatively new level.

Professional competence is manifested as an interconnected and dynamically developing integrative system of motivational-axiological, cognitive, operational-activity and reflexive components. These components are formed not separately, but in a functional unit and complement each other. Figure 1 below presents the dynamics of the structural components of Professional Competence.

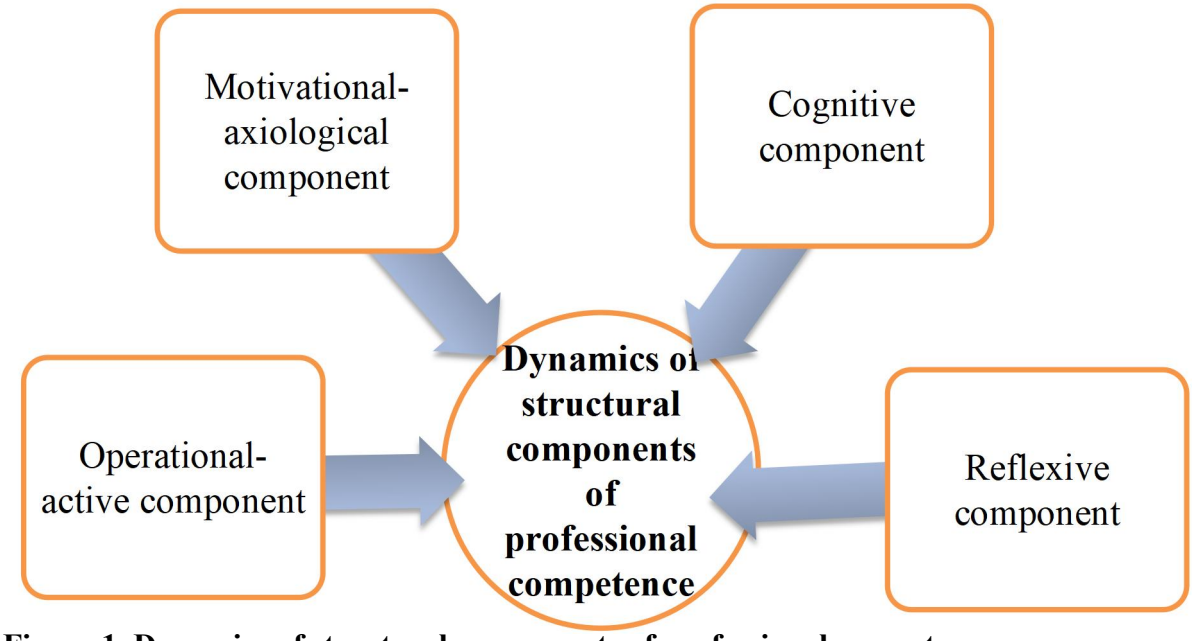

Figure 1. Dynamics of structural components of professional competence.

Motivational-axiological component - training organized on the basis of a reflexive-axiological approach served to consciously form a system of professional values. During the study, the following qualitative changes were observed: the conceptual idea of the role of technological education in the development of society expanded, a conscious attitude to professional responsibility and pedagogical ethics was formed, an internal need for innovative activity appeared. These results confirm that axiological foundations play a decisive role in the process of professional formation. As Zeer and Zimnyaya noted, the stability of professional competence is determined by the degree of formation of the motivational core. The results of the study practically substantiated this theoretical position.

Cognitive component - activation of constructivist cognitive mechanisms. Problem situations, case technologies and interdisciplinary integrative tasks organized on the basis of the constructivist paradigm led to the transition of students from passive assimilation of knowledge to the process of active construction. The following qualitative changes were identified: the ability to systematically and logically analyze technological processes increased, the ability to transfer theoretical knowledge to real production situations was formed, the competence to identify cause-and-effect relationships and forecast developed. This process took place in accordance with Bruner's principle of "knowledge is a subjective construction". As a result, students moved from reproductive cognition to productive and research activity.

Operational-activity component - practical confirmation of the theory of activity. Project and design activities organized on the basis of the theory of activity (Leontev, Rubinstein) involved students in the process of solving real technological problems. Observations showed that: the ability to independently plan the stages of technological project development was formed, modeling and prototyping skills were developed, and the potential for developing innovative solutions increased. These results confirm that personal development occurs in the process of activity. Students became not just learners, but active designers.

The reflexive component is an internal mechanism of professional growth. Through reflexive analysis, portfolio management, peer review, and pedagogical discussions, students mastered critical evaluation of their own activities. As a result, the skill of constructive analysis of professional mistakes was formed, an individual development strategy was developed, and a conscious justification of pedagogical decisions was ensured.

Systematic integration of psychological determinants of professional motivation, creativity, metacognitive skills. Motivation was transformed from an external stimulus to an internal need. Students formed a socially responsible attitude to pedagogical activity. STEAM and project-based activities developed divergent thinking. Students began to offer alternative approaches to technological problems. Metacognitive monitoring allowed for conscious management of educational activities. Students mastered the mechanism of planning, monitoring and evaluating their knowledge. This was an important indicator of the formation of professional autonomy.

Modern pedagogical approaches — STEAM education, digital pedagogy, and project-based learning — produce certain results when used separately, but their integration creates a synergistic effect. Figure 2 below shows the synergistic effect of Modern Approaches.

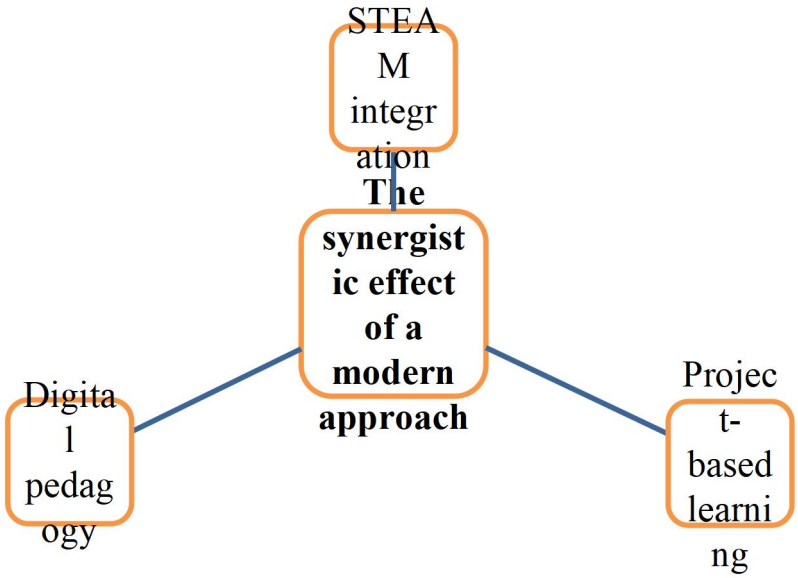

Figure 2. Synergistic effect of modern approaches.

STEAM integration - interdisciplinary integration systematically shaped technological thinking. Students demonstrated the potential to comprehensively solve real-world problems based on an engineering approach.

Digital pedagogy - digital platforms and design programs have made it possible to technologize the teaching process. Based on the TPACK model, the integration of content, pedagogy, and technology has been effective.

Project-based learning - project activities formed professional independence, responsibility, and research competencies.

These three approaches, when integrated together, created a synergistic effect, comprehensively developing all components of professional competence.

STEAM develops interdisciplinary thinking, the project method transforms knowledge into practical activities, and digital pedagogy ensures the harmony of content, method, and technology. As a result of the integration of these three, cognitive and operational components develop harmoniously, creativity and problem-solving are activated, reflective analysis and metacognitive control are strengthened, and professional motivation rises to the level of internal need.

The results obtained provide the basis for the following theoretical generalizations: professional competence is a multi-component, mutually integrated and dynamic system. Psychological determinants are manifested as an internal mechanism for the formation of competence. The activity-based education model ensures the professional maturity of a technological teacher. Reflection is the central mechanism of professional growth. The integration of modern pedagogical technologies provides qualitatively new results.

The structural model of the professional competence of a teacher of technological education was theoretically substantiated. Pedagogical and psychological determinants were analyzed in their interrelation.

The development of professional competencies of future teachers of technological education is a systematic process based on the integration of pedagogical and psychological factors, which, combined with modern educational approaches, provides a new qualitative stage of professional formation.

Conclusion. In conclusion, it can be said that the professional competencies of future teachers of technological education are formed through the integration of motivational-axiological, cognitive, operational-activity and reflexive components. Pedagogical and psychological determinants - professional motivation, pedagogical reflection, creativity and metacognitive skills - constitute the internal mechanism of development. The integration of STEAM-education, project-based learning and digital pedagogy has a synergistic effect and comprehensively develops all components of the competency. The reflexive mechanism is manifested as a central factor of professional growth and professional identification.

As a result, the integrative pedagogical-psychological model effectively forms the professional training and innovative potential of a technological education teacher.

List of used literature

1.O‘zbekiston Respublikasi Prezidentining 2019-yil 29-apreldagi “O‘zbekiston Respublikasi xalq ta’limi tizimini 2030-yilgacha rivojlantirish konsepsiyasi” PF-5712-son farmoni https://lex.uz

2.O‘zbekiston Respublikasi Prezidentining 2022-yil 28-yanvardagi “2022–2026-yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasi to‘g‘risida”gi PF-60-son farmoni https://lex.uz

3.O‘zbekiston Respublikasi Prezidentining 2024-yil 16-oktabrdagi “Kasbiy ta’limda malakali kadrlar tayyorlash tizimini yanada takomillashtirish va xalqaro ta’lim dasturlarini joriy qilish chora-tadbirlari to‘g‘risida” PF-158-sonli Farmoni https://lex.uz

4.O‘zbekiston Respublikasi Prezidentining 2025-yil 28-apreldagi “Pedagog kadrlar tayyorlash tizimini yanada takomillashtirish chora-tadbirlari to‘g‘risida” PF-73-sonli Farmoni https://lex.uz

5.O‘zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 15-iyundagi “Texnologik ta’lim muassasalarida dual ta’limni joriy etish va kasbiy kompetensiyalarni rivojlantirish chora-tadbirlari” 349-son qarori https://lex.uz

6.Muslimov, N.A., & Olimov, Q.T. Texnologik ta’lim o‘qituvchilarining kasbiy tayyorgarligi. Darslik. Toshkent: O‘zbekiston pedagogika universiteti nashriyoti, 2023. 198 s., s. 45–47.

7. Abdullyev.S.N Ta’lim psixologiyasi va pedagogik kompetensiyalar. Darslik — Toshkent: Fan va Texnologiya, 416 s.

8. Usmonov.Sh.F Pedagogik ta’lim nazariyasi. Darslik — Toshkent: O‘zbekiston pedagogika universiteti nashriyoti, 2023. 75 s.

9. И. А. Зимняя Психология компетентности. — Москва: Академия, 2003. s.58

10. В. А. Сластенин, Е. В. Шмаков Педагогика: Учебник для вузов. — Москва: *Academia*, 2017.

11.Jones S., Clarke L. Vocational training methodologies: A comparative study. Oxford University Press, 2017, 134-bet.

12.Schunk, D. H. Learning Theories: An Educational Perspective (6th ed.) — 2012. Boston: Pearson Education, 554 pp.

13. o’g’li, T. U. F. . (2023). The Regularity and Consistency of Monitoring and Accounting For the Components of Pedagogical Skills in the Process of the Teacher’s Work. Procedia of Philosophical and Pedagogical Sciences, 2(5), 34–37. Retrieved from https://procediaonline.org/index.php/philosophy/article/view/648