European Journal of Innovation in Nonformal Education (EJINE)
Volume 5 | Issue 6 | Jun - 2025 ISSN: 2795-8612

The Content of Implementing the Process of Enhancing Informatics Teachers' Qualifications Based on an Informal Education Approach

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A B S T R A C T
This article analyzes informal education as a novel approach in the professional development system. The potential of informal education is highlighted as an approach that serves to enhance this process. Informal education ensures continuous learning for teachers, facilitates self-development, addresses personal and professional needs, and maintains the integrity of lifelong education.

A R T I C L E I N F O
Article history:
Received 22 Apr 2025
Received in revised form
23 May 2025
Accepted 24 Jun 2025

Keywords: professional development, formal education, non-formal education, informal education, professional activity, personal activity, effectiveness.

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In today's globalized and digitalized society, the field of education is rapidly evolving, which requires teachers to continuously update their knowledge and skills in line with the ever-changing demands of the times, that is, to engage in ongoing professional development. Particularly for teachers of subjects like computer science and information technology, which are constantly being updated and closely intertwined with technological processes, this need is becoming not just a necessity, but a matter of social and professional responsibility. Today, improving the education system is of paramount importance for the socio-economic development of society. It is possible to train qualified personnel by utilizing new models, enhancing professional training programs, and advancing the qualifications of teachers. The modern information environment compels teachers to actively and continuously engage in educational activities. In this context, it is crucial to utilize digital technologies, internet resources, online educational platforms, and advanced methodologies. In the contemporary world, the prospects for educational development for teachers are defined by innovative approaches, with the core principle being the continuity of education [2].

Current trends in the education system are aimed at transitioning from theoretical knowledge acquisition to practical application, creating flexible programs, and diversifying forms of education. Consequently, the modern educational process is evolving through innovative technologies and real-life-related approaches, taking into account the needs of each individual. In today's digital society, computer science teachers use informal education to enhance their ability to effectively organize the educational process, assimilate daily information when applying new pedagogical methods, stay updated on innovations in their field, and improve their implementation of innovative practices.

Analysis of existing experiences reveals that informal education aligns comprehensively with the structure of teachers' lives, and certain elements of teaching are present in almost all forms of social activity. In this regard, researcher A.V. Okereshko emphasized that "the motivation for teachers' personal

development and self-improvement often lies in informal education" [5].

Informal education is most effective and popular in an environment rich in information and events. Such education occurs when assimilating socio-cultural experiences, reflecting them through one's own perspectives, and outside the framework of pedagogically organized processes.

"The conditions or incentives for informal education stem from the influence of the social environment - family, friends, work, and mass media. Through this type of education, people learn directly from their surroundings and assimilate the experiences of those around them" [6]. Studying and measuring informal education is considered challenging. However, informal education encompasses factors such as shaping teachers' life attitudes, filling gaps in their professional competence, developing the ability to effectively solve problems, and moreover, "informal education becoming a lifestyle for adults who strive to maximize the realization of their potential" [3].

A.A. Ibragimov, one of our republic's researchers, emphasizes that "it is crucial to develop curricula based on the learner's self-recognized professional challenges and needs, as well as to effectively utilize all types of education (formal, non-formal, informal)." Furthermore, it can be observed that the researcher, based on these conceptual principles, has structured the components of formal, non-formal, and informal learning according to his own perspective [4]. In some existing practices, it is noted that professional development can be implemented through formal, non-formal, and informal types of education. Formal learning involves official educational processes conducted with the participation of teachers, facilitators, and others, resulting in certificates or other documents being issued upon completion of courses. Non-formal learning includes the introduction of advanced methods and other innovations in collaboration with various educational institutions. Informal learning refers to the acquisition of knowledge through various events, seminars, or communication tools used in daily life, where each participant engages individually. It is emphasized that these different types of learning can be utilized for professional development.

In recent years, significant and positive efforts have been undertaken in our Republic to legally strengthen these types of education. Notably, the newly revised Law "On Education" in our Republic, for the first time, specifies types of adult education and training. It establishes that adult education should be implemented based on the principle of "lifelong learning" through formal, non-formal, and informal types of education, which are defined as follows. "Formal education is institutionalized (incorporating specific rules and norms), targeted, and planned education carried out with the participation of state educational institutions and state-recognized accredited non-governmental educational organizations.

Non-formal education is institutionalized (embodying specific rules and norms), purposeful, and planned by a person or organization providing educational services. It serves as a supplement or alternative to formal education in lifelong learning. Informal education is aimed at specific goals but is not institutionalized (does not embody specific rules and norms). It is less organized and structured than formal or non-formal education and may include learning activities in the family, workplace, place of residence, and everyday life [1].

Informal education is not considered a compulsory form of education as its purpose does not necessarily aim to achieve a specific goal or acquire a particular competency. Teachers can gain information related to their professional activities at any desired time from surrounding educators or other social environments, and understand how to apply it in practice. In such cases, teachers' professional development occurs naturally, creating an environment conducive to self-improvement. Organizers might think that teachers sufficiently develop their knowledge and skills through periodic professional development processes. However, based on advanced international experiences and research results, it is emphasized that in today's globalized and digitalized society, daily information is interesting and useful for teachers. This is because informal education is a method of satisfying daily needs during professional activities [3]. Informal education ensures the integrity of continuous education throughout the professional activities of computer science teachers by enhancing and refining their personal and professional needs, goals, and priority tasks. In the process of continuous professional development, teachers can seek harmony between their professional activities and lifestyle, strategically planning their work accordingly. In other words, shaping a strategy for work throughout their life and professional

activities should be carried out while considering the typological differences in the individual trajectory of a teacher's life and career. This process can only occur when computer science teachers actively engage, fostering their self-awareness, which in turn supports achieving excellence in both their professional activities and personal lives. Informal education serves as a vital source of spiritual enrichment for the teacher's inner world, considered an even more significant aspect than professional competence. Beyond formal and other educational institutions, informal education enables the expansion of professional competence into universal human competence, fulfilling the teacher's essential needs for experiences and personal development, ultimately leading to comprehensive professional growth [5].

Developing materials for enhancing the qualifications of computer science teachers based on informal education is a highly complex issue that, in its initial stages, should be addressed by leveraging international experiences and through the collaborative efforts of international and national creative teams. It is worth noting that "the education system cannot develop in isolation from the global scientific-educational environment." The activities of computer science teachers encompass not only teaching the subject but also fostering students' digital literacy, information security culture, algorithmic and logical thinking skills, and the development of a culture of working with modern technologies. To effectively fulfill such tasks, there is a growing need for personalized educational resources that go beyond formal education courses, are flexible, convenient, and tailored to the individual characteristics of learners, enabling the organization of the educational process in a personalized manner. Thus, the informal education approach in enhancing the qualifications of computer science teachers serves as a convenient and effective alternative to traditional courses, ensuring their development in line with modern requirements. For quality and effective professional development based on informal education, the key knowledge and skills that teachers need to acquire can be categorized into the following seven main directions:

1. Self-Learning Skills. A core component of informal education is the teacher's ability to independently acquire knowledge. This involves not merely searching for information but also selecting, evaluating, and purposefully mastering it. These skills include:

- Selecting, analyzing, and evaluating information sources—utilizing various websites, articles, video tutorials, and scientific journals while assessing the reliability of each source.
- Effective use of online platforms—engaging in independent learning through platforms like Coursera, EdX, Stepik, and Khan Academy, monitoring progress, and obtaining certifications.
- Creating a targeted learning plan—teachers should be able to define their learning objectives, answering questions such as "What do I want to learn?", "In how much time?", and "With what resources?"

2. Utilization of Information and Communication Technologies (ICT). Every modern teacher must be proficient in ICT, not only for teaching but also for personal development:

- Effective use of webinars, podcasts, and video tutorials—key resources for professional development, enabling knowledge acquisition and exposure to new ideas through auditory and visual means.
- Online communities—such as Telegram, Facebook, Stack Overflow, and subject-specific forums, allowing teachers to stay updated with real-time developments in their field.
- Virtual collaboration tools—such as Google Docs, Jamboard, and Miro, facilitating teamwork on projects and educational materials.

3. Personal Development Planning. Teachers must identify their strengths and weaknesses, independently work on self-improvement, and establish a development strategy. This includes:

- Professional diagnostics—assessing professional strengths and weaknesses, evaluating knowledge and skills through tools like SWOT analysis or checklists.
- Creating a development trajectory—outlining a step-by-step plan to achieve specific goals.
- Maintaining and regularly updating a professional portfolio—documenting activities, achievements, and progress to serve as a basis for reflection and reporting.

4. Reflection and Self-Assessment. In the process of independent learning, it is critical for teachers to analyze their activities systematically, aiding in structured development:

- Activity analysis skills—addressing questions such as “What have I learned?”, “What challenges did I face?”, and “What would I do differently?”
- Keeping a reflective journal—recording thoughts, feelings, and plans weekly or after each course, capturing reflections on progress.
- Self-assessment tools—using tools like Google Forms, checklists, or 360° feedback to objectively evaluate oneself.

5. Mentorship and Peer Learning. A key aspect of informal education is active participation in professional communities, reflected in:

- Engagement in subject-specific communities and local mentorship groups—exchanging experiences, asking questions, and sharing resources through platforms like Telegram and Facebook.
- Mentorship—collaborating with experienced professionals, receiving personalized advice, and engaging in teaching processes.
- Peer review culture—teachers evaluating each other’s work, providing feedback on strengths and areas for improvement to foster mutual development.

6. Mastery of Innovative Educational Technologies. Computer science and ICT teachers must remain open to innovations, adopting new platforms and methodologies, including:

- Utilizing digital education platforms—effectively applying tools like Google Classroom, Moodle, and Edmodo in teaching.
- Implementing innovative methodologies—such as STEAM, gamification, flipped classroom, and blended learning in practice.

7. Applying Acquired Knowledge in Practice. The most critical skill is the ability to apply learned knowledge to professional practice, impacting students and becoming a practical reality:

- Adapting learned knowledge to the classroom—implementing new technologies in real lessons and gathering feedback.
- Developing methodological guides and lesson plans—using methods that enhance student engagement and critical thinking.
- Monitoring and evaluation—assessing modified lesson models, analyzing results, and making necessary adjustments.

The seven directions outlined above serve as a robust foundation for ensuring the independent professional development of teachers based on informal education. Each direction is aimed at forming specific professional competencies, characterized by their interconnected, systematic, and mutually complementary nature.



Figure 1. Schematic Representation of the Seven Key Directions Essential for Teachers' Skill Enhancement Based on Informal Education

Teachers who effectively master these directions can become active participants in continuous development, evolving into competitive, technologically literate, and creative educators. They can also play a leading role in improving educational quality and implementing innovations in practice. Therefore, these directions should serve as essential components of methodological guidelines and personal development programs for computer science and information technology teachers in every general education school. Based on these conceptual principles, it is of significant importance to study the characteristics of teachers' professional activities, analyze the requirements for skill enhancement, explore existing opportunities for professional development without detachment from primary duties, examine daily work routines, and other aspects, while considering their outcomes to design a daily skill enhancement process. This approach aims to establish a continuous skill development framework throughout a teacher’s entire professional career.

In conclusion, informal education holds great significance in the formation and development of computer science teachers. It is a form of education that supports and reinforces each other, is mutually conditional, and even complements one another, ultimately leading to convenient and beneficial outcomes for the individual.

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