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## **Theoretical aspects of the technological competence formation in the teacher of labor training and technology**

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### **To cite this article:**

Kravchenko Lesia, Vyacheslav Lyulchenko. Theoretical aspects of the technological competence formation in the teacher of labor training and technology. International Science Journal of Education & Linguistics. Vol. 2, No. 2, 2023, pp. 22-28. doi: 10.46299/j.isjel.20230202.03.

**Received:** 02 09, 2023; **Accepted:** 02 14, 2023; **Published:** 04 01, 2023

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**Annotation:** The article highlights the results of a theoretical study of the educational process of training students of the specialty 014.10 Secondary education (labor training and technologies), namely, the formation of technological competence, as an important element of professional competence. The components, established pedagogical conditions, selected pedagogical methods and criteria for formation and establishment of the technological competence formation level among the students of higher education have been determined.

**Keywords:** the teacher of labor training and technology, pedagogical process, acquirer, technical competence, the institution of higher education.

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## **1. Introduction**

Special attention is paid to raising of the educational process level in institutions of higher education, in particular by defining and substantiating the pedagogical conditions for the professional competencies formation in the student. This is related to the review and updating of the educational process for the implementation of the national development of education in Ukraine, which involves the implementation of the new educational project "New Ukrainian School". This approach consists in the formation of the educational process in institutions of higher education in order to prepare a future teacher who will be fully prepared for activities in institutions of secondary education. The future teacher must acquire knowledge and develop competences in order to be fully prepared for activity, namely the creation of such conditions under which the student will be able to show himself as a creative individual.

The realisation of the "New Ukrainian School" project consists in creating a favorable educational environment for the student in the secondary education institution, not only for mastering a certain amount of knowledges, but also in creating such conditions where the student will be able to think critically about the problem and express his own point of view. This pedagogical approach allows the student of secondary education to acquire knowledges, master skills, think critically, determine the values of the acquired qualities, which will be a guarantee of successful educational

and/or professional activities. It is necessary to pay attention especially to the key competences in the field of natural sciences, engineering and technology, which allows to encourage the student to be interested, curious, search for new ideas, carry out researches and observation in a group or independently [5, 7].

The main role in the student's formation of this key competence is assigned to future teachers of labor training and technology during the teaching of the educational subject "Technologies", the purpose of which is to reveal and develop the creative potential of the student's personality, the ability to apply knowledge in practice, to solve practical tasks in everyday life through practical assimilation of the basics of design, technologies and decorative art [4, 12].

## **2. Object and subject of research**

Changes and reorientation of the educational process to new standards provided by the "New Ukrainian School" reform, and especially in the implementation of the problem of training teachers of labor training and technology, which will be able to ensure the formation of key competencies in natural sciences, engineering and technology in students. The particular interest is the problem of forming technological competence in future teachers of labor and technology. Solving this problem is the subject of our research. And the object of research is technological competence and its components.

## **3. The purpose and objectives of the research**

The purpose of the research is to establish the elements that fill the technological competence based on the theoretical analysis of the researched problem; create pedagogical conditions for the formation of technological competence; determine pedagogical methods for effective formation of technological competence.

## **4. Analysis of literature**

The study of the theoretical and methodological foundations of the training of teachers of labor education and technology and their adaptation to professional activity were highlighted in the works by O. Kortsia, M. Kortsia, V. Sydorenko, A. Tereshchuk, S. Yashchuk. The solution to the problem of the formation of professional competence among teachers of labor training and technology in the process of obtaining education is outlined in the works by D. Kilderov, S. Tkachuk, O. Fedorova, V. Kharlamenko. The implementation of interdisciplinary connections in the process of training a teacher of labor education and technology for the formulation of technical competence is revealed in the works by M. Kurach, S. Riabets, V. Yahupov. Therefore, the analysis of the scientific literature demonstrates that the problem of acquiring technological competence in the teacher of labor training and technology is relevant, because it involves readiness for the formation of competence in the field of natural sciences, engineering and technology in students in general secondary education institutions.

## **5. Research methods**

A complex of theoretical, modelling, and empirical methods was used to verify and implement the research objectives.

## **6. Research results**

The specificity of the training of modern teachers of any subject area involves various specific features related to both the educational process in institutions of higher education and aspects of

future professional activity in institutions of general secondary education. But the process of particular interest is the process of training future teachers of labor training and technology, which combines pedagogical and technological training. Scientist S. Podolyanchuk points out the process of training future teachers of labor education and technology as a complex educational process that combines a general pedagogical and methodical component with technical and technological content in institutions of higher education. Implementation of the conditions for reforming the content of education, modernisation of the educational process for future teachers of labor training and technology, will be a guarantee of preparation for the market of educational services of competitive professionals [7, 13].

Taking into account the research of scientists V. Svystunov and V. Yagupov made it possible to clearly define the structure of the professional competence of the future specialist, which includes general human, scientific, professional, functional, personal and technological competences [6, 16]. Our research is based on the identification of pedagogical conditions for the formation of technological competence among teachers of labor training and technology in the process of obtaining an education in a higher educational institution. After all, teachers of labor education and technology have to know the current trends in the development of the technosphere, the introduction of new technologies, understand the interaction of material, energy and information systems and their impact on the ecological state of the planet.

In order to establish the concept of "technological competence" of a teacher of labor education and technology, we performed an analysis of scientific literature, which allowed us to single out the certain aspects. Thus, the scientist O. Fedorova points out that for a teacher of labor training and technology, the subject competence is technological competence, as a set of professional and personal characteristics of teachers of vocational training, and the functions of technological competence are manifested in the interaction of subjects of professional activity, in various forms of organisation educational process [9, 14].

The formation of technological competence in the future teacher of labor training and technology indicates a certain level of readiness to perform professional duties in secondary education institutions. In practice, this can be manifested as the practical implementation of professional training of a specialist, which will become a guarantee of personal and professional development of students, mastery of managerial, pedagogical, project, social knowledge, skills, norms and values, as well as ways of implementing managerial-pedagogical, project-technological activity and formation of social interaction [1, 14].

Researcher O. Korets substantiates that the formation of basic technical professional competence in future teachers of labor education and technology will allow to professionally operate with knowledge about the achievements of science and technology and the implementation of practical design and technical activities in accordance with the field of education "Technology" [2, 3].

Therefore, after conducting an analysis of scientific research, regarding the successful formation of technological competence in the future teacher of labor training and technology during the educational process in a higher education institution, it is necessary to implement effective pedagogical forms and methods, create an educational and methodological base, realise the potential of the scientific and pedagogical staff of a higher education institution, to motivate educational activities, to form a system of knowledges, abilities and skills in the process of preparation and creation of a favourable psychological and pedagogical atmosphere.

The team of authors under the leadership of scientist A. Tereshchuk has developed a model curriculum "Technology 5-6 grades" for general secondary education institutions, which includes educational modules "Fundamentals of design and construction", "Fundamentals of technologies and construction materials" and "My everyday life," which, if fully mastered, will enable students to develop key competencies in natural sciences, engineering, and technology.

The research of N. Kramarenko and S. Ryabets demonstrates that interdisciplinary connections ensure orderliness, systematicity and broad generalization of knowledge, focus on a specific profession, in particular, training of specialists in the specialty 014 Secondary education (Labor

training and technology). Establishing intersubject and interthematic integration of connections between professional disciplines in the process of obtaining an education in a higher educational institution allows the student to develop inquisitiveness, search and observation, the ability to research, formulate new ideas, draw conclusions and stimulate detailed knowledges about the surrounding world, and the result of such a pedagogical approach is the formation of competence in the field of natural sciences, engineering and technology [10].

The concept of technological competence of the teacher of labor training and technology includes mastered knowledges, formed skills and acquired skills. And the essence of the concept of technological competences of the future teacher of labor education and technology, taking into account the requirements of the New Ukrainian School, is the acquisition of knowledges about existing construction materials, their properties and the possibility of use, extraction technologies and processes. The acquisition of knowledges precedes the formation of skills regarding the selection of structural materials taking into account their properties and criteria, designing products taking into account the characteristics of materials, performing economic calculations during the selection of materials for the project, selecting the method of processing structural materials with a sequence of technological operations, using secondary materials and applying creative abilities under the time of the educational process in secondary educational institutions.

The formation of the technological competence of a teacher of labor training and technology, as a component of professional competence, involves combining the components of the educational system into a purposeful process for mastering knowledge about modern achievements of science and technology, the development of technologies for processing structural materials, determining new characteristics of materials, searching for alternative sources of material, etc. The formation of this competence involves a wide range of combination of technical and technological knowledges through the use of various pedagogical learning technologies.

The scientist O. Fedorova takes the position that the formation of technological competence is possible due to the observance of such types of professional and pedagogical activities as educational and professional, scientific and research, educational and design, organizational and technological [14]. A special role in mastering technical disciplines belongs to the technological component. Traditionally, in the process of training future teachers of labor training, the emphasis is the study of the most common processes of processing materials (metalworking, woodworking, etc.). But this is not exactly technology. Specific technologies provide the assimilation of a much larger volume of educational material on a deeper scientific basis [15].

So, taking into account the requirements of the New Ukrainian School, we were able to form the special concept of "technical competence of teachers of labor education and technology", which involves the formed knowledges of modern construction materials and their properties (technological, mechanical, physical, hygienic), the possibility of application, the principles of using mining technologies and processing (manual, mechanical). Having mastered such knowledges, the future specialist will be ready to carry out the selection of structural materials taking into account their properties and criteria, to design products taking into account the characteristics of materials, to carry out economic calculations during the selection of materials for the project, the selection of the methods of processing structural materials with a sequence of technological operations, to use secondary materials and to apply creative abilities during the educational process in secondary education institutions.

The technological component also includes the formation of practical skills and skills in the manufacture of individual parts, structural elements and their assembly, in particular, by including in the training program of future labor training teachers of various practical disciplines ("Workshop in training workshops", "Workshop on technical modelling and construction", "Workshop on artistic processing of materials", etc.). Technological and design components are closely related.

The functional component of the study of technical disciplines has a largely integral character and is rarely dominant in one or another educational discipline. It consists of understanding the design features, studying the advantages and disadvantages, fields of application, manufacturing features of

both individual machine parts or structural elements, as well as complex functional units (drives, assemblies, mechanisms, machines, etc.) from a design and technological point of view. In practice, its role is usually reduced to solving optimisation issues regarding the choice of material and design of a part, product, tool or auxiliary equipment, feasibility and justification of the use of drives, gears, mechanisms, connections, etc. [7].

Introduction into the educational process of intersubject and interthematic connections in the teaching of disciplines with the observance of the principles of fundamentality and the improvement of motivational bases for learning creates the possibility of achieving the set goal, goals and objectives. This pedagogical approach will allow to increase the level of residual knowledges, which are necessary for the formation of the technological competence of the acquirer. Improving the educational process of training future teachers of labor training and technology, in particular for the formation of technological competence with the introduction of interdisciplinary subjects, involves the use of an integrative approach in the study of professional disciplines and disciplines of free choice [11].

An analysis of the disciplines provided by the educational program of secondary education (Labor training and technologies. Informatics) allows us to conclude that there is a problem in the meaningful, systematic, consistent and effective formation of technological competence. The comparative analysis highlights a certain lack of continuity and interrelationship of elements for the effective formation of technological competence, which prompts the introduction of intersubject and interthematic connections and the introduction of the discipline of free choice "Technological competence of the teacher of labor education and technology" with the appropriate content.

The realisation of intersubject and interthematic connections will take place during the mastering of professional disciplines and disciplines of free choice, such as sketch geometry, drawing, general electrical engineering, the basics of the theory of technological education, the basics of production, production and processing of structural materials, technical mechanics, working and energy machines, occupational health and safety, folk crafts and handicrafts, technical creativity, decorative and applied art and artistic processing of materials. These disciplines include the mastering of the technological competence elements. Especially in the process of teaching the specified disciplines, it is necessary to implement various non-traditional, interactive and active learning methods to optimise the educational process in order to increase the efficiency of assimilation of theoretical knowledge, the formation of professional skills and abilities. This approach will make it possible to implement the first pedagogical condition.

The second pedagogical condition is implemented by teaching the free-choice discipline "Technological competence of the teacher of labor training and technology", which combines theoretical and practical approaches for obtaining and consolidating technological knowledges, forming skills and acquiring technological skills. The purpose of this discipline is to provide knowledge about the technique, properties of structural materials, technology of processing structural materials, production basics, etc., for the fulfilling of technological competence in the process of professional training. In the process of teaching this discipline, it is necessary to apply the method of problem-based learning, the method of psychological self-regulation, and active learning methods for the successful design of the educational system. The particular interest is the gaining experience through self-development, self-realisation, self-determination and self-education for achieving professional goals.

The third pedagogical condition consists of the practical mastering by the future specialist of technologies for the formation of technological competence using the mastered theoretical baggage of knowledge and acquired skills in the process of passing pedagogical (propaedeutic), pedagogical (production), pedagogical (in extra-curricular educational institutions), technological (educational) and pedagogical (production with specialisation) practices. And in order to establish the level of formation of technological competence, it is necessary to apply the criteria, namely motivational-holistic, cognitive-oriented and reflective-active, which are characterized through a system of indicators.

So, the researched and the characterized educational process of obtaining a bachelor's degree in the specialty of secondary education (Labor training and technology. Informatics) namely, the formation of technological competence at a high level is possible under certain pedagogical conditions and the implementation of the interdisciplinary and interthematic approaches.

## 7. Prospects for further research development

Our research does not exhaust all points and aspects of existing problems. The educational process of training future teachers of labor training and technology for the formation of technological competence in students requires scientific developments and the introduction of free choice disciplines into the educational process.

## 8. Conclusions

Having carried out researches, we found that the educational process of training future teachers of labor training and technology should be directed to the formation of technological competence, as an important element of professional competence. We established the components that fill the concept of "technological competence of a teacher of labor education and technology". It was determined that the formation of technical competence in the future teacher of labor training and technology, as a component of professional competence, is possible due to the implementation of pedagogical conditions using an interdisciplinary approach, the introduction of the discipline of free choice and the apparatus for establishing the level of formation.

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### References:

- 1) Kilderov, D. E., Steshenko, V. V., Steshenko, B. V. (2016) Requirements for determining the special (professional) competencies of a teacher of labor education (before the preparation of the standard of higher education in the specialty "014 Secondary education"). *The International Science Conference «Actual problems and prospects of technological and professional education»*, Ternopil, Ukrain. 86-88. [in Ukrainian]
- 2) Korets, O.M. (2014) The role of physical and mathematical disciplines in the formation of technical competence of future teachers of technology. *Collection of scientific works of Kamyanets-Podilsky National University named after Ivana Ogienko*, 20, 277–279. [in Ukrainian]
- 3) Korets, M.S., (2006). Teoriia i praktyka tekhnichnoi pidhotovky vchyteliv trudovoho navchannia. *Theory and practice of technical training of teachers of labor education. Natsionalnyi pedahohichnyi universytet im. M.P. Drahomanova*, 503. [in Ukrainian]
- 4) Marushchak, O.V. (2015) Formation of professional competence of the future teacher of technologies. *Scientific Notes*, 7, 88-92. [in Ukrainian]
- 5) Nova ukrainska shkola. URL: <tps://motn.gov.ua/ua/tag/nova-ukrainska-shkolah> [in Ukrainian].
- 6) Petrenko, O.B. (2016) Professional competence of a modern teacher. *Collection of scientific works of RDGU*, 3, 327. [in Ukrainian]
- 7) Podolyanchuk S. (2019). A systematic approach to the study of technical disciplines in the training of labor education and technology teachers. *Problems of modern teacher training: coll. Science. Uman State Pedagogical University named after Pavel Tychyna*, 1 (19), 102-110. [in Ukrainian]
- 8) Pro osvitu: Zakon Ukrainy vid 05.09.2017 r. № 2145-VIII. Holos Ukrainy – Voice of Ukraine. (2017). URL: <https://zakon.rada.gov.ua/laws/show/2145-19> [in Ukrainian].
- 9) Pryhodii, M. A. (2011). Suchasni aspekty pidhotovky vchyteliv tekhnolohii. *Modern aspects of technology teacher training: [monohrafiia]. Chernihiv: ChNPU imeni T. H. Shevchenka* [in Ukrainian].

10) Ryabets, S.I. (2021) On one of the approaches to the definition of interdisciplinary links as a means of forming students' competence in the field of natural sciences, engineering and technology. *Pedagogical education: theory and practice*, 30, 251-261. [in Ukrainian]

11) Stadnichenko, S.M. (2015). Mizhpredmetni zviazky yak dydaktychna osnova rozvytku pryrodnycho-naukovoї osvity maibutnikh uchyteliv fizyky. *Collection of scientific works of Kamianets-Podilskyi National University named after Ivan Ohienko*, 21, 89-92. [in Ukrainian]

12) Tereshchuk, A. I., Gashchak, V. M., Abramova, O. V., Pavych, N. M. (2021). Tehnologii. 5–6 klasy. *Metodyka organizacii osvitnogo seredovyscha*. Chernivci: Bukrek [in Ukrainian].

13) Torubara, O.M. (2017). Features of professional training of future teachers in today's conditions. *Problems of modern teacher training: coll. Science. Uman State Pedagogical University named after Pavel Tychna*, 15, 418-425. [in Ukrainian]

14) Fedorova, O.V. (2021) Technological competence as a subject competence of a teacher of labor education and technology. *The VIII International Science Conference "Problems and tasks of modernity and approaches to their solution", Tokyo, Japan*. 169-173. [in Ukrainian]

15) Yagupov, V.V. (2012) Leading methodological characteristics of the main types of competence of future specialists, which are formed in the system of vocational education. Access mode: <https://core.ac.uk/reader/32309500> [in Ukrainian]

16) Yagupov, V. V. (2007) Competence approach to training in higher education. *Scientific Notes of NaUKMA*, 71, 3-8. [in Ukrainian]