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FORMATION OF LIFELONG LEARNING COMPETENCES IN THE PROCESS OF PROFESSIONAL TRAINING OF FUTURE TRANSPORT SPECIALISTS

The purpose of this study was to design and experimentally test the effectiveness of a model for forming lifelong learning competences in future transport specialists in higher education institutions. The study presents the authors' vision of the structure of lifelong learning competences for transport specialists, identifies the pedagogical conditions for forming lifelong learning competences, and designs a model for forming such competences. It is proven that the effectiveness of forming lifelong learning competences in future transport specialists significantly increases when active learning methods and innovative information and computer technologies are applied in the process of professional training. The most significant pedagogical conditions for effective formation of lifelong learning competences are identified as: pedagogically-driven motivation of future transport specialists to form and develop lifelong learning competences, implementation of methods that contribute to the formation and development of such competences in professional training, and formation of professional qualities in future transport specialists based on conscious perception of universal and professional values. The authors argue that there is a necessary effective link between employers and higher education institutions for collecting and analysing structural and functional changes and shifts in professional activities. The creation and maintenance of such a link will allow higher education institutions to more effectively respond to changes in labour market demands and ensure a high level of professional training for their graduates.

Keywords: competency-based approach; professional training of higher education graduates; lifelong learning competences; competences' structure; competences' formation model; active learning methods; innovative information and computer technologies.

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ФОРМУВАННЯ КОМПЕТЕНЦІЙ ОСВІТИ УПРОДОВЖ ЖИТТЯ У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ ФАХІВЦІВ У ГАЛУЗІ ТРАНСПОРТУ

Метою даного дослідження було спроектувати та експериментально перевірити результативність моделі формування компетенцій освіти упродовж життя у майбутніх фахівців у галузі транспорту у закладах вищої освіти. У дослідженні подано авторське бачення структури компетенцій освіти упродовж життя для фахівців у галузі транспорту, виокремлено педагогічні умови формування компетенцій освіти упродовж життя, спроектовано модель формування компетенцій освіти упродовж життя для фахівців у галузі транспорту. Доведено, що ефективність формування компетенцій освіти упродовж життя у майбутніх фахівців у галузі транспорту значно зростає за умови застосування у процесі професійної підготовки основних різновидів активних методів навчання та новітніх інформаційно-комп'ютерних технологій. Установлено, що найбільш ефективними

педагогічними умовами ефективного формування компетенцій освіти упродовж життя є педагогічно-кероване мотивування майбутніх фахівців у галузі транспорту до формування і розвитку компетенцій освіти упродовж життя; упровадження у процес професійної підготовки методів, які сприяють формуванню і розвитку компетенцій освіти упродовж життя; формування у майбутніх фахівців у галузі транспорту професійних якостей на основі свідомого сприйняття системи загальнолюдських та професійних цінностей. Авторами стверджується, що наразі необхідний дієвий зв'язок між працедавцями та закладами вищої освіти для збору та оперативного аналізу структурно-функціональних змін у професійній діяльності. Створення та підтримка такого зв'язку дозволить закладам вищої освіти ефективніше реагувати на зміни у вимогах ринку праці та забезпечити високий рівень професійної підготовки своїх випускників.

Ключові слова: компетентнісний підхід; професійна підготовка випускника закладу вищої освіти; компетенції освіти упродовж життя; структура компетенцій; модель формування компетенцій; активні методи навчання; новітні інформаційно-комп'ютерні технології; зв'язок між працедавцями та закладами вищої освіти.

Introduction. In the contemporary world, the concept of lifelong / long-life learning has gained significant prominence, as it is seen as a fundamental tool for individuals to succeed in their personal and professional lives. The concept of lifelong / long-life competences refers to a set of skills, attitudes, and knowledge that an individual can develop over time and use throughout their life to adapt to new challenges and situations. These competences are essential for success in any field, but they are particularly important for mastering a non-linguistic specialty. The importance of lifelong / long-life learning competences has gained attention in recent years due to the rapid pace of technological advancements, demographic changes, and globalisation. The ability to learn and adapt continuously is essential for individuals to remain relevant and productive in the workforce and society.

In the context of education (higher and professional), lifelong / long-life learning is regarded as a critical aspect of building competences among students that are essential for their personal and professional growth. Lifelong / long-life competences refer to skills, knowledge, and attitudes that enable individuals to continually learn and adapt to new situations throughout their lives. These competences play a crucial role in mastering a non-linguistic specialty, as they allow individuals to remain competitive in a rapidly changing world. Lifelong learning, also known as lifelong learning, refers to the idea that learning should be a continuous and ongoing process that extends beyond formal education. It involves developing competences and acquiring new knowledge and skills throughout one's life, regardless of age or stage of career.

Literature review. Our literature sources analysis has shown that the concept of lifelong learning competences has been in the focus of scientific discussions for some time and continues to attract the scientific attention up to now. The studies are arguing their significance in today's context, and the various frameworks and models proposed to develop and assess these competences. The idea of lifelong learning as a tool for human capital development emerged in the second half of the last century (see, for example, Becker, G. S. 1962; Jessup, F. W. 1970). Despite the fact that this educational approach immediately faced reasoned criticism (Preston, R. 1999), the idea was actively discussed in various forums, refined and developed (Hager, P. 1998). Gradually, there is a growing understanding in the world of career development as "the evolution of experience in sequential work activity of an employee over a period of time" (Brown, A. et al. 2010).

The concept of lifelong competences has gained increasing attention in recent years as a result of the rapid pace of technological change and globalization. Lifelong competences refer to the skills that are required to succeed in a particular field of work. According to the European Union, lifelong competences can be divided into three categories: key competences, transversal competences, and digital competences (European Commission, 2008). Key competences include communication in a foreign language, digital competence, and social and civic competence. Transversal competences refer to skills that can be applied across different fields, such as critical thinking and creativity. Digital competences refer to the ability to use technology effectively. In the context of mastering a specialty, transversal competences are particularly important, as they enable individuals to adapt to new situations and acquire new skills. According to research by Mok and Wong (2020), lifelong competences include skills such as critical thinking, problem-solving, creativity, communication, collaboration, and self-regulated learning. A study by Boud and Garrick (2015) found that transversal competences such as critical thinking and problem-solving are essential for success in a rapidly changing world. Similarly, a study by Gao and Mupinga (2013) found that lifelong learning, a key component of lifelong competences, is crucial for individuals seeking to master a non-linguistic specialty.

Important aspects of lifelong competences are the ability to communicate effectively with others as well as digital competences. This includes both verbal and nonverbal communication, as well as the ability to work collaboratively with others. In their study, Yaqoob, Waqas, and Hussain (2020) found that effective communication skills are essential for success in a non-linguistic specialty, as they enable individuals to collaborate effectively with others and share their knowledge and expertise. The ability to use technology effectively is essential for individuals seeking to remain competitive in a rapidly changing world. According to Zembylas and Vrasidas (2005), digital competences are becoming increasingly important in a range of non-linguistic specialties, including engineering, healthcare, and business.

The importance of lifelong competences in mastering a specialty cannot be overemphasized. In a study by Shernoff, Kratochwill, and Stoiber (2019), it was found that students who possessed lifelong competences such as critical thinking and problem-solving skills were more likely to excel in science, technology, engineering, and mathematics (STEM) fields. The study concluded that lifelong competences are crucial for success in non-linguistic specialties. Similarly, in a study by Huda, Zulkardi, and Darmawijoyo (2019), it was found that lifelong competences such as collaboration and communication skills were essential for success in the field of mathematics. The study concluded that students who possessed these competences were more likely to excel in mathematics. Furthermore, in a study by Matos, Soares, and Ferreira (2019), it was found that lifelong competences such as creativity and self-regulated learning skills were essential for success in the field of architecture. The study concluded that students who possessed these competences were more likely to excel in architecture.

Bringing the national higher education system in line with global standards requires the creation of effective systems for ensuring quality lifelong education and the application of a competency-based approach to determining the quality of professional training for graduates of higher education institutions. In Ukrainian scientific and pedagogical discourse, as well as in the world, readiness to implement the principles of continuous education is a mandatory criterion for assessing the quality of professional training (Holford J., et al. 2018) and the level of professional development of individuals (Isaienko S. A. & Ilyina O. V. 2011; MacFarlane K. 2019).

Researchers exploring ways to address acute problems in the professional training of modern specialists in medicine (Groenwold, R. H. & Knol, M. J. 2013), engineering (Lychuk, M., et al. 2021), physical education (Dereka, T. H. 2018), and other fields propose interesting ideas for introducing a competency-based approach. At the current stage of development of Ukrainian higher education, there is a need for the development of theoretically substantiated, practically significant, and convincing conceptual approaches to the organization of a continuous education system for professionals in the transport industry, since theoretical and practical issues related to ensuring a comprehensive system of continuous education and applying a competency-based approach in the process of professional training for future specialists in the transport industry remain insufficiently researched.

Research Purpose and Methodology. High-quality professional training in the field of transport is inherently linked to the implementation of principles and approaches to continuous education and a competency-based approach to assessing the results of professional training in higher education institutions. Due to a lack of theoretical and practice-oriented research on this issue, the aim of this study is to design and experimentally verify the effectiveness of a model for developing lifelong education competences in future transport engineers in higher education institutions.

Lifelong learning is considered now as a principle of education, a quality of the learning process, and a condition for the development of personality (Billett, S. 2018). The basis for the reform of the vocational training system for professionals in the European education space is made up of key competences for lifelong learning, which were formulated in the program document “The Key Competences for Lifelong Learning – A European Framework” back in 2007 (The Key Competences for Lifelong Learning – A European Framework 2007) and updated in the subsequent edition (ANNEX to the Proposal for a Council Recommendation on Key Competences for Lifelong Learning, Brussels, 2018). These competences include: competence in communicating in the native language; competence in communicating in foreign languages; digital competences; mathematical competence and basic competences in science and technology; learning skills; social and civic competences; competences in initiative and entrepreneurship; competences in cultural self-awareness and expression (Ibid). In our research, we consider these key competences as basic components for determining the structure of lifelong learning competences. Equally important for us is the understanding that changes in the structure of professional activity, market demands, requirements, and/or employer preferences have a huge impact on the structure and essence of lifelong learning competences (Kim, H. & Lee, Y. 2020). It is also undeniable that the period of obtaining higher professional education is a period of forming basic lifelong learning competences (Sachsenmeier, P. 1978).

The *hypothesis* of our study is based on the assumption that the application of pedagogical technologies, methods, and techniques in accordance with the identified pedagogical conditions, will contribute to the formation and development of lifelong learning competences among future transport engineers during their professional training.

Based on the analysis of documents from the European Union in the field of education and science, scientific publications representing the opinions of world experts, theoreticians, and practicing instructors, we have formulated the theoretical and methodological principles of research and our own vision of the structure of lifelong education competences for professionals in the field of transportation.

In the next stage of the research, pedagogical conditions for developing lifelong learning competences were identified. This included pedagogically guided motivation of future transport industry professionals towards developing and enhancing their lifelong learning competences, implementation of teaching methods that promote the development of lifelong learning competences during professional training, and fostering professional qualities in future transport engineers based on conscious acceptance of both general human and professional values. In the study, pedagogical technologies, methods, and techniques effective in forming the mentioned competences were identified, namely the main types of active learning methods – methods of modelling the features of professional activity during learning (business games, project-based learning, Case-Study method with preparation of individual or “team” reports and presentations), step-by-step construction method of the process of performing “production” tasks, and the use of the latest information and computer technologies in education.

The authors of the study designed a model for developing lifelong education competences for professionals in the transportation industry. They identified criteria (motivational-axiological, content, organizational-technological, communicative) and levels (basic, intermediate, sufficient, high) of formation of these competences.

Our research was conducted using the traditional steps for this type of research: descriptive measurement, implementation of a formative experiment, and summative measurement. At the final stage of the study, an analysis was conducted, the obtained results were compared, and their validity was checked using the Student’s t-test.

Formation of the research sample

At different stages of the research, students from the 2nd and 3rd year of the Bachelor’s degree programs in specialties 273 “Railway Transport” and 275.02 “Transport Technologies (on Railway Transport)” of State University of Infrastructure and Technologies (Kyiv) were involved, with a total of 276 people. An online valid sample calculator was used to form the sample for the study. For the above-mentioned population of respondents (276), the size of the valid sample is 44 individuals, which was taken into account when forming the experimental (EG) and control groups (CG). The experimental and control groups each consisted of 22 individuals. Comparative analysis was carried out within existing academic groups, and students in both the experimental and control groups studied according to typical programs. In the control group, lectures, seminars, and practical classes were conducted using typical methods, while in the experimental group, active learning methods were applied in accordance with the peculiarities of the educational courses. The results of the descriptive (initial) assessment conducted in the experimental and control groups are presented in Table 1.

The comparison of the results of the descriptive measurement in the experimental and control groups indicates their similarity at the stage prior to conducting the pedagogical experiment. Thus, the largest number of students in both groups demonstrated an intermediate level of development of Communicative competences, followed by the group of students with a basic level of development of this indicator. The third and fourth largest groups were comprised of students with a sufficient and high level of development of Communicative competences, respectively. The two-tailed P value for Communicative competences equals 0,6453. By conventional criteria, this difference between the experimental and control groups is considered to be not statistically significant. We observe a similar picture regarding the levels of development of Organizational competences. The two-tailed P value

for Organizational and activity competences equals 0,5483. By conventional criteria, this difference between the experimental and control groups is considered to be not statistically significant.

Table 1

Comparison of initial levels of lifelong learning competences formation (descriptive measurement)

| | Lifelong learning competences and their formation levels (%) | | | | | | | | | | | | | | | | | | | |
|----|--|--------------|------------|------|---------------------------|--------------|------------|------|-----------------------|--------------|------------|------|----------------------------|--------------|------------|------|------------------------------|--------------|------------|------|
| | Communicative competences | | | | Informational competences | | | | Cognitive competences | | | | Organizational competences | | | | Self-development competences | | | |
| | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High |
| EG | 36,3 | 45,4 | 13,7 | 4,6 | 4,6 | 40,9 | 45,4 | 9,1 | 22,7 | 54,5 | 18,3 | 4,6 | 22,7 | 59,1 | 13,7 | 4,5 | 49,9 | 31,9 | 9,5 | 9,1 |
| KG | 38,0 | 43,0 | 14,2 | 4,8 | 4,5 | 28,7 | 57,3 | 9,5 | 23,5 | 52,2 | 19,5 | 4,8 | 28,5 | 57,3 | 9,5 | 4,7 | 52,2 | 28,8 | 9,1 | 9,5 |

More than half of the students in both groups showed a sufficient level of development of Information competences, and more than a third showed an average level of development of these competences. The proportion of students in the experimental and control groups with a high level of development of Information competences was about 9%, and with a basic level was under 5% in each group. The two-tailed P value for Information competences equals 0,5689. By conventional criteria, this difference between the experimental and control groups is considered to be not statistically significant.

The largest number of students in both groups demonstrated an intermediate level of Cognitive competences (54,5% in the experimental group and 52,2% in the control group). A sufficient level of Cognitive competences prior to the pedagogical experiment was established in 18,3% of students in the experimental group and 19,5% of students in the control group. Approximately one third of students demonstrated a basic level of Cognitive competences (22,7% in the experimental group and 23,5% in the control group). The proportion of students with a high level of Cognitive competences was less than 5% in both groups. The two-tailed P value for Cognitive competences equals 0,7903. By conventional criteria, this difference between the experimental and control groups is considered to be not statistically significant.

The picture of the development of Self-development competences in both groups is quite similar too: about half of the students demonstrated a basic level (52% in the experimental group and 50% in the control group), about a third of the students had an intermediate level (32% in the experimental group and 29% in the control group), sufficient level was found in 9% of students in the experimental the control groups, a high level was found in 9% of students in both groups too. The two-tailed P value for competences of self-development equals 0,5457. By conventional criteria, this difference between the experimental and control groups is considered to be not statistically significant.

Tools for collecting and processing statistical data

Data on the levels of Communicative competences were obtained through the “Assessment of Communicability and Organizational Abilities” test (Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012)). The levels of Information competences were determined through the survey “Study of the Development of ICC of Students” (Feshchuk, Yu. V. (2009)). Data on the development of Cognitive competences in future transport engineers were obtained through tests to determine the level of students’ knowledge in disciplines developed by the authors. To measure the development of Organizational competences, the “Research on Different Types of Organizational Culture” questionnaire by R. Harrison (Psychology Today (2020) was used. Data on the levels of Self-development competences in students were determined through the questionnaires by E.F. Zeer (Lychuk, M. et al. 2021). Quantitative methods were used to carry out the research tasks, including assessment and analysis of the test results performed by students in both groups, as well as surveys for students and teachers. STATA Software (n/d) was used for analysing quantitative data.

Results. After conducting a pedagogical experiment using the above-described diagnostics, summative measurements were taken. Their results are presented in Table 2.

Table 2

Levels of development of lifelong learning competences (after pedagogical experiment)

| | Lifelong learning competences and their formation levels (%) | | | | | | | | | | | | | | | | | | | |
|----|--|--------------|------------|------|---------------------------|--------------|------------|------|-----------------------|--------------|------------|------|----------------------------|--------------|------------|------|------------------------------|--------------|------------|------|
| | Communicative competences | | | | Informational competences | | | | Cognitive competences | | | | Organizational competences | | | | Self-development competences | | | |
| | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High | Basic | Intermediate | Sufficient | High |
| EG | 9 | 32 | 32 | 27 | - | 23 | 45 | 32 | 9 | 14 | 59 | 18 | 9 | 32 | 45 | 14 | 27 | 36 | 23 | 14 |
| KG | 7 | 43 | 27 | 23 | 5 | 18 | 59 | 18 | 18 | 45 | 36 | 9 | 18 | 45 | 32 | 5 | 41 | 36 | 14 | 9 |

The comparison of indicators between the initial and formative stages of the pedagogical experiment indicates that positive changes took place in all lifelong learning competences among both the students in the experimental and control groups.

The most noticeable changes are in the indicators of the levels of Cognitive competences in the experimental group. The proportion of students with a basic level decreased to 9% (while in the control group it decreased to 18%); with an intermediate level, it decreased to 14% (while in the control group the indicator increased by 7% to 45%); with a sufficient level, it increased to

59% (while in the control group it only increased to 36%); the proportion of students with a high level of Cognitive competences in the experimental group increased four times (to 18%), while in the control group it increased by only 5%.

The dynamics of positive changes in the levels of Communicative competences formation are somewhat similar in the experimental and control groups, although the indicators of the experimental group are better. After the pedagogical experiment, a basic level was demonstrated by 9% of students in the experimental group and 7% of students in the control group; the proportion of students with an intermediate level of these competences in the experimental group decreased by 13% (in the control group it did not change). The number of students with a sufficient level of Communicative competences formation increased in both groups (by 19% in the experimental group and 13% in the control group), while the number of students with a high level of Communicative competences formation increased by almost 20% in both groups.

The analysis of changes in the development of Information competences revealed an interesting picture. In the control group, the main “shifts” affected only the indicators of the intermediate and high levels of formation of these competences (the former decreased by 10% and the latter increased by 9%). The indicator of a sufficient level increased only by 2% in the control group, and the indicator of a basic level slightly increased up to 5%. At the same time, in the experimental group, we observe the following dynamics: the basic level decreased by 5%, the intermediate level decreased by 18%, the sufficient level remained unchanged, and the indicator of a high level increased by 23%.

Regarding the formation of Organizational competences after the pedagogical experiment, in the experimental group, the indicators of the basic and intermediate levels decreased (by 14% and 19% respectively), while the indicators of the sufficient and high levels increased (by 31% and 9% respectively). The picture is somewhat different in the control group: the indicator of the basic and intermediate level decreased by 10% and 12% respectively, while the indicators of the sufficient level increased up to 32%, and the indicator of the high level slightly increased.

The dynamics of changes in the levels of formation of Self-development competences are similar in the experimental and control groups: the indicators of the basic level decreased by 23% in the experimental group and by 11% in the control group; the indicators of the intermediate, sufficient, and high levels increased in the experimental group by 4%, 14%, and 5%, respectively, and in the control group the indicators of the intermediate, sufficient levels increased by 7% and 5% respectively, and the indicators of the high level remained practically unchanged.

Statistical analysis of the results of the pedagogical experiment using the Student's criterion gave a value of $t_{\text{experiment}} = 3,081$ with a value of $t_{\text{critical}} = 2,0211$. Therefore, the active teaching methods used in the experimental group during the pedagogical experiment showed greater effectiveness in developing lifelong learning competences in future transport engineers.

Limitations of the study

It should be recognized that the main limiting factor of this study is the short time period of the pedagogical experiment (one academic semester). In addition, we identified insufficient development of diagnostic methods for researching lifelong learning competences, as well as operational and effective methods of obtaining information from employers regarding changes in labour market demands.

Discussion. After the final measurements, which overall confirmed the hypothesis of our study, we would like to make some comparisons between the expected and obtained results of the conducted pedagogical experiment.

As expected, the most noticeable shifts were observed in the levels of formation of Cognitive competences among future transport engineers. However, it should be noted that it is extremely difficult to develop the ability to analyse, synthesize, compare logical, abstract, and critical thinking in all students without exception in a short period of time during the pedagogical experiment. Rather, it can be said that there was an effective improvement in previously acquired skills, or the foundation was laid for further identification of Cognitive competences in future transport engineers (Saccomanno, B. 2017). This statement is supported by the fact that only 9% of students with the lowest (basic) level of Cognitive competences formation were identified in the experimental group after the pedagogical experiment, while only 18% of those with a high level of cognitive competency formation were identified (4,6% before the pedagogical experiment).

Positive changes in the levels of formation of Communication competences among students in the experimental group turned out to be less impressive than we expected (Homolová, E., & Vašáňová, Z. 2019). After analysing the data obtained and discussing them with the participating instructors of the experiment, we can express our consideration that developing students' ability to communicate effectively in both Ukrainian and foreign languages requires more instructional hours than what is provided in the curriculum of the major.

The dynamics of changes in the level of development of Information competences overall corresponded to our expectations. However, the emergence of new products and opportunities will require future transport engineers to constantly improve their own Information competences in order to maintain the level of their formation. This statement is equally significant in shaping and developing Organizational competences in future transport engineers, despite expected significant changes in the levels of their formation among students in the experimental group.

In the competences' structure of lifelong learning, we believe that the most important place is occupied by the Self-development competences. It is this component of lifelong learning competences that requires special attention from researchers and higher education teachers (Smith, R. 2018). Changes in the indicators of the levels of Self-development competences, recorded among the students in the experimental group at the final stage of our study, are not very impressive at first glance: more than half of the students demonstrated a basic or intermediate level of development in these competences (although the indicators of the experimental group significantly exceeded those of the control group). We believe that the actual “manifestation” of this structural component of educational competences throughout life occurs somewhat delayed, since at this stage of professional training of future transport engineers (the first semester of the second year of the educational-professional program), competences in self-development and self-realization are actively established in the structure of the student's personality. In addition, the limiting factors of this study, stated above, should also be taken into account when analysing the achieved results.

The experimental model of lifelong learning competences formation among students has confirmed the significance of the pedagogical conditions identified in the study. However, the pedagogical-led motivation of future transport engineers towards the

development of their own lifelong learning competences has proven to be an extremely important and effective lever in activating the position of student participants in the experiment towards the formation of their own lifelong learning competences.

The greatest difficulty in preparing the pedagogical research was the lack of convenient and proven effective methodologies for identifying changes in the requirements/desires of employers in the transportation field. Furthermore, currently the feedback between higher education institutions and the establishments where graduates are employed is either ineffective or requires adjustment or restoration. We believe that establishing connections between employers and higher education institutions, developing similar methodologies for collecting and processing such information, and widely introducing the analysis of such information into the practice of higher education institutions would enable them to “tune” their educational and professional programs, enhance the quality of professional training for future professionals, and ultimately ensure the high competitiveness of their graduates.

Conclusions. Pedagogical conditions for the development of lifelong learning competences have been identified in the study, along with pedagogical technologies, methods, and techniques that are effective for developing these competences. A model for the development of lifelong learning competences for transport engineers has been designed. Based on data analysis before and after conducting a pedagogical experiment, the hypothesis that the effectiveness of developing lifelong learning competences among future transport engineers significantly increases when basic types of active learning methods are applied during professional training, such as modelling the peculiarities of professional activity during training (business games and simulations, project method, Case-Study method with preparation of individual or “team” reports), step-by-step construction of the process of performing “production” tasks, and the latest information and computer technologies. It has been established that the most significant pedagogical conditions for the effective development of lifelong learning competences are pedagogical-led motivation of future transport engineers to develop and enhance lifelong learning competences; implementation of methods that contribute to the development of lifelong learning competences during professional training; and development of professional qualities among future transport engineers based on a conscious perception of the system of universal and professional values.

As our research results have shown, the application of an experimental model for developing lifelong learning competences in future transport engineers has the greatest positive impact on the formation and development of students’ Cognitive, Informational, Organizational competences, as well as Self-development competences. Further research is necessary to establish more effective ways of influencing the formation and development of the Communicative competences component of lifelong learning competences to achieve higher levels of proficiency. Further research and development are also required to diagnose and measure the levels of formation of individual structural components of lifelong learning competences. It is also necessary to establish effective feedback between employers and higher education institutions for the collection and timely analysis of structural-functional changes in professional activities and changes in the labour market requirements for professional characteristics (competences) demanded by professionals.

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