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Efficiency of dual education in training qualified specialists in the automotive industry

Abstract. The study aimed to determine the effectiveness of dual learning for training automotive industry professionals. Dual education combines theoretical training at an educational institution with practice at an enterprise in a ratio of 30-40% to 60-70%. This system is becoming an increasingly popular model of education. This is most relevant in industries that require highly skilled personnel. The automotive industry is one of the sectors where dual-system education is central in training specialists who meet the current needs of the labour market. The study covered such key aspects as the analysis of the theoretical foundations of dual education (studying the models and advantages of this training system); the assessment of the state of dual education in the automotive industry of Ukraine; and the impact of dual education on the training of specialists. The study determined that dual education can be an effective method of training qualified specialists, including in the automotive industry. Graduates of dual education have better practical skills, higher employment rates and higher salaries than graduates of traditional programmes. The study also identified several factors that contribute to the effectiveness of dual education. This includes cooperation between educational institutions and businesses. It ensures that dual education programmes meet the current needs and demands of the labour market and are flexible and adapted to changing workplace conditions. A well-organised mentoring practice at the enterprise provides graduates with the necessary skills and knowledge. Participants in dual education programmes were more motivated, motivated for their future profession and career, and can choose or change their specialisation during practical work at the workplace. The study results can be used in the formation of educational programmes, improvement of educational and methodological support of higher education institutions, and development of pedagogical models for training automotive industry specialists

Keywords: vocational education; vocational training; profession; practical training; employment

INTRODUCTION

The issue of effectiveness of education is one of the most important for both applicants and employers. Formal education is the basis on which further higher education, including non-formal and informal education, is built. According to the NUS (New Ukrainian School) standards, the key skill of a graduate is the ability to learn throughout life, which allows them to adapt to changes in society. Scientific and technological progress is developing rapidly, and some professions that were relevant 10 years ago are becoming unclaimed in the labour market. Therefore, modern-day graduates have to change in a fairly short time, take

additional training or even change their profession. In addition to the reasons mentioned above, global events such as the COVID-19 epidemic and the large-scale invasion of Ukraine by the Russian Federation in February 2022 have also made many adjustments. As a result, representatives of many professions have started working remotely, and combining several professions has become popular. As a result, theoretical knowledge has become even more important in practical application.

Dual education was first introduced in Germany in the last century (Gonchar, 2021). Every year, about half of the

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graduates of basic education in Germany receive education in the dual system. Most of them are employed at the companies where they studied. The prerequisite for the emergence of dual education was the need for vocational training to meet the requirements of the constantly changing labour market. In Ukraine, a pilot project on dual education lasted from 2015 to 2017 in vocational education institutions. The press service of the Ministry of Education and Science of Ukraine (MESU) reports that as of 1 January 2023, 27% of vocational and technical education institutions in Ukraine operate in dual mode, and 5% of students are trained in 117 professions (Trojan, 2023). Over a thousand enterprises were involved in this system during the three years of piloting.

The Scientific and Methodological Centre for Higher and Professional Higher Education has developed the "Concept for the Development of Dual Education" (Regulatory and legal support..., 2023), methodological recommendations and tools for the implementation of dual education. However, according to researchers of dual education in Germany, for more effective implementation of the dual education system and cooperation with employers, it is necessary to develop an updated legislative framework, educational programmes and modern professional standards, modernise vocational education institutions, change the approach to the training of higher education teachers and the approach to education in general (Rindfleisch & Maennig-Fortmann, 2020). This will allow for the transition from traditional to non-formal and informal learning, as they make it possible to best utilise the creative potential and abilities of students, and to acquire key professional and social competencies. Among the foreign researchers on the relevance of dual learning are R. Ermawati (2019), H. Ertl (2020), and K. Hähn *et al.* (2019), who considered the introduction of practical education in basic, secondary and vocational education institutions, as well as various aspects of dual education in the training of automotive specialists.

As such, R. Ermawati (2019) investigated vocational training in the context of the Industrial Revolution and new professional skills in the automotive industry, in particular, the effectiveness of teaching and the features of practice-oriented learning. It is emphasised that practical experience in the workplace is essential for successful employment and further career development. Mastering new technologies in practice affects the quality of education and the final product of industry. Therefore, the traditional model of education, where most of the material is theoretical, is less effective than the dual form. K. Hähn *et al.* (2019) explored dual education as a process of transition from study to employment and outlined 20 cases from various industries, including the automotive sector. The study noted that the successful implementation of dual education has improved the employment rates of graduates. In addition, industrial production reduces the cost of human resources. The successful interaction of all parties involved in dual education affects the development of the economy of the region and the country.

H. Lund & A. Karlsen (2020) analysed the relationship between vocational education and training institutions and industry, in particular the role of skilled workers in the introduction of technical innovations and, on the other hand, the improvement and adaptation of educational programmes to the needs of modern production. It is emphasised that the mismatch of educational material with the needs of industry has a negative impact on the quality of specialists. On the other hand, the innovations that students work within the workplace are gradually being introduced into the educational process. As such, the imbalance between the demands of the labour market and the supply of the education market is levelled.

The experience of European and Eastern countries (Germany, Czech Republic, India, Turkey, China) is quite successful: most graduates who have studied in dual education were employed, positively impacting the social and market economy of the country, shaping the competitiveness of both the individual industry and the economy as a whole. Therefore, the study of dual education implementation is closely related to economic issues: free competition in a particular profession significantly increases the productivity of learning and the welfare of society.

Therefore, the study aimed to address aspects of the effectiveness of the dual education system for training specialists in the automotive industry. Following this goal, the following tasks were set: to analyse the models of dual education in other countries (Germany, Austria, Switzerland), to determine the current state of dual education in the automotive industry in Ukraine, to study the impact of dual education on the employment of students, their professional qualities and employment rate.

MATERIALS AND METHODS

The study included an analysis of vocational and higher education institutions that train automotive professionals. A comparative analysis of the education systems operating in higher education institutions and vocational education institutions of Ukraine was conducted. Higher education institutions that provide dual-form education were analysed: Kryvyi Rih National University, National University of Zaporizhzhia Polytechnic, National University of Water and Environmental Engineering, Volodymyr Dahl East Ukrainian National University, Ukrainian State University of Science and Technology, Kharkiv National Automobile and Highway University. In particular, the study used analytical data according to the Analytical Report on the Implementation of the Pilot Project in Professional Higher and Higher Education Institutions for the Training of Specialists in the Dual Form of Education.

The study included an analysis of regulatory and legal documents, Regulatory and legal support for the implementation of dual education (2023), which ensure the implementation and functioning of the dual education system. The study analysed the Concept of training specialists in dual education, the peculiarities of its implementation, functioning and impact on several important sectors,

including educational, economic, professional and industrial; analysed the Methodological Recommendations and the Toolkit for the implementation of dual education. The author analysed the impact of the dual form of education on the modernisation of the content of education following the modern content of professional and occupational activities, establishing partnerships and cooperation between higher education institutions (HEIs) and employers, improving the quality of training of qualified personnel, increasing motivation, etc.

The study examined the criteria and factors that influence the successful cooperation between higher education institutions and automotive enterprises: the distance between the educational institution and production, the availability of appropriate curricula and educational methods, material and technical resources, the availability and number of specialities in which dual education is provided, the percentage of enterprises involved and the results of their interaction with educational institutions, the specifics of the educational process, etc. The advantages and disadvantages of the dual form of education in comparison with the regular form are studied. The factors and reasons that affect the effectiveness of the implementation and functioning of the dual form of education (for educational institutions, employers and

students), as well as the dynamics of dual education in Ukraine over the 4 years of the pilot project on the introduction of dual education are analysed. The experience of implementing dual education in Ukraine and in such countries as Germany, Austria, Switzerland, China, and India was analysed. The study addressed the peculiarities of implementing dual education in these countries, in particular, the methodology for developing educational programmes and disciplines, the practice of concluding trilateral agreements between participants in dual education and its results, and the specifics of training automotive industry specialists.

RESULTS

The development of key competencies of students is envisaged and justified in the NUS (New Ukrainian School), but this system has been implemented in Ukrainian education for only 7 years. That is, higher education does not introduce these competencies in a cross-cutting way but based on the specification and speciality. Citing data from the MESU press service, I. Shevchenko (2019) noted that 175 higher education institutions use the dual education system (as of 01.01.2023), of which only one-third train automotive specialists. The number of students studying under this system is only 5% of the total number (Fig. 1).

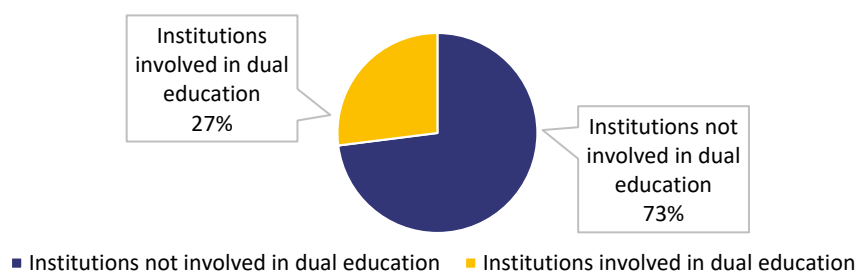


Figure 1. Institutions involved in dual education

Source: compiled by the author based on Analytical report (2023)

Thus, it is possible to state that despite the dual form of education existing in Ukraine, this area is still underdeveloped in practice for several reasons. In particular, only a part of higher education institutions provides educational services in the field of Industrial Engineering, and even fewer of them – do in the field of Automation and Instrumentation. The Faculty of Mechanical Engineering and Transport at Kryvyi Rih National University is a case in point. It trains specialists in the following specialities: 131 Applied Mechanics, 133 Industrial Engineering, 274 Road Transport and 275 Transport Technologies. Graduates of this faculty are practising engineers who can work at enterprises, institutions and various holdings in Ukraine and Europe in the automotive industry. The automotive production facilities operating in Ukraine were considered: ZAZ (Zaporizhzhia Automobile Plant), PJSC Eurocar (Zakarpattia region), Bogdan Corporation (with facilities in Cherkasy, Lutsk, Kremenchuk and Chernihiv), KrASZ (Kremenchuk Automobile Assembly Plant), LAZ (Lviv Bus

Plant), BAZ (Boryspil Automobile Plant), KhAZ (Kharkiv Automobile Plant), TATRA-Yug LLC (Kamianske, Dnipro region). Kamianske, Dnipropetrovsk region), Murovokurovetskyi Machine-Building Plant (Vinnytsia oblast), Stryi Auto (Stryi Bus Plant, Lviv oblast) (Members of the Association of Automobile Manufacturers..., 2022).

Calculating the distance between Kryvyi Rih National University and the nearest production facility shows that the distance to Kamianske (TATRA-Yug) is 129 kilometres, and to Kremenchuk (KrASZ and Bogdan) is 200 kilometres. The other enterprises are located within 300-1000 kilometres. Therefore, cooperation of an educational institution under the dual education system is possible only with two or three production facilities, and even in this case, the distance between them significantly complicates the situation. Thus, the distance between the educational institution and the institution where the practical part of the training takes place is a significant obstacle to the successful implementation of dual-form education. In addition,

according to the results of the survey, there is a need to develop and improve the methodological framework, curricula, and trained teachers in higher education and vocational education institutions. According to the analytical report on the results of the implementation of dual education (which lasted from 2019 to 2022), in 2023, a total of 197 students received dual education. Of these, only 21 were in the automotive industry. At the Kryvyi Rih National University, mentioned above, only 3 students received dual-form education in the field of Industrial Engineering in 2022-2023 (Analytical report..., 2023). Notably, during the duration of the project, the number of dual-form education students increased from 441 to 553 in 2023. For objective reasons, their number was reduced in 2022, but the situation changed during the year.

The results of a survey of higher education institution representatives as part of the pilot project showed that some educational institutions still do not see the difference between full-time internships and dual enrolment, even though an information campaign has been conducted throughout the project (Analytical report..., 2023). All institutions that participated in the survey on the benefits of dual-mode noted that it is an effective and efficient system compared to the traditional form of education. There is an increasing need for qualified specialists in the automotive industry (in particular, due to the consequences of military operations in Ukraine), but partnerships with higher education institutions are still not regulated. Due to these and other objective reasons, the introduction of the dual form of education has several difficulties. It is the organisation of the educational process, as it must be aligned with both the individual study plan and the requirements and conditions of the employer, i.e. an individual educational trajectory must be developed. This requires additional negotiations (in the absence of a signed agreement) with employers. The survey of higher education institutions (as part of the project) showed that they lack developed methodological recommendations from the Ministry of Education and Science of Ukraine, of which at the time of the survey (2023) there were only recommendations for specialists in agricultural educational institutions.

One of the reasons that hinder the use of the dual form of education is low student motivation. The number of dual enrolments for bachelor's degrees was 197 and for master's degrees – 356 (as of 2022-2023). This situation is caused by an insufficient information campaign that would allow to widely highlight the benefits of the dual education system for students while presenting the industries interested in as many specialists as possible. However, difficulties also arise on the part of employers, who sometimes view students as full-fledged employees, forgetting the need for them to acquire theoretical knowledge (according to the dual education formula, 30% theory to 70% practice). In addition, some enterprises wanted guarantees that the student would remain employed at the enterprise after graduation, although they cannot demand such obligations

under the law (Analytical report..., 2023).

Among the problems are those caused by the full-scale invasion of Ukraine by Russia. Several companies were occupied or have ceased to exist altogether. On the other hand, there is a great need for qualified specialists who could provide high-quality automotive services, restoring vehicles for the needs of the Armed Forces of Ukraine. Due to the hostilities, some teachers and students changed their place of residence – they became internally or externally displaced persons, and some enterprises were relocated to other regions, which also had a negative impact on the implementation of dual education. There is also no updated full list of enterprises that are ready to work in the dual education format. For the same reason (martial law), distance learning was introduced in most educational institutions, and therefore the dual education process was absent, as most specialities cannot perform work tasks remotely (except for IT specialities).

According to the results of the analytical report of the pilot project for the implementation of dual education (Analytical report..., 2023), the employer response is as follows: out of 178 industrial facilities that cooperated with educational institutions, 128 trained only one student, and only 5% of enterprises trained more than 10 students. The percentage of automotive professionals trained in dual education is low. Employers also noted that dual education is the most successful and effective form of training and are ready to continue to cooperate with educational institutions in this area. At the same time, they noted that they prioritise quality over quantity (hiring fewer students but with more efficiency), as this greatly increases the competitiveness of the institution and meets the real needs of the labour market. Among the top 10 companies implementing dual education is a machine-building company (Krasnyansky JV Agromash LLC). However, regarding cooperation with the Kryvyi Rih National University, which trains automotive specialists and was taken as an example, it is not possible as the distance between them is more than 500 kilometres.

As a result of the analysis of the Concept of training specialists in the dual form of education and methodological recommendations for its implementation, conducted as part of this study, it can be stated that a significant number of enterprises are interested in cooperation with higher and vocational education institutions in the dual form (Regulatory and legal support..., 2023). First, this solves their main problem – the shortage of qualified personnel. This is due to both the popularisation of the dual education system and the understanding of its prospects for all parties (student – educational institution – employer). During the implementation of the pilot project, the participating companies were convinced that the dual form of education is the most profitable and effective: it meets all the basic requirements of the labour market and the company itself, allows for significant time and resource savings in training truly highly qualified specialists without spending money and time on their retraining and allows the student

to adapt to the production process much faster (as well as, to the team, which contributes to the development and improvement of communication between employees, the ability to work in a team, jointly solve complex problems, be proactive and responsible), to innovative technologies that are being introduced faster than the educational programme of the educational institution. Addressing the

events of 2022 that influenced the course of the pilot project on the implementation of the dual education system, and according to the results of the analysis, the initiators of cooperation agreements on dual education were mostly educational institutions (54%), and equally (23% each) employers and students, respectively (Fig. 2).

According to the analytical report of the pilot project,

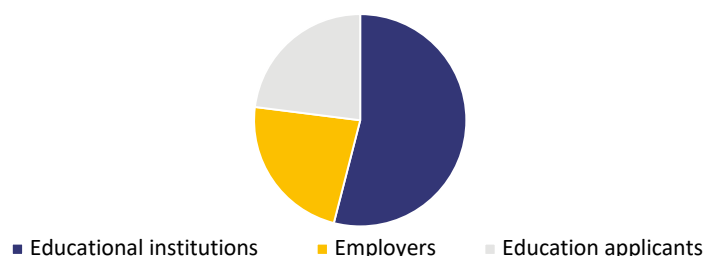


Figure 2. Initiators of the agreement on dual enrolment

Source: compiled by the author based on Analytical report (2023)

in the first years of the dual form of education, mainly technical and engineering, and agricultural enterprises were invited to cooperate. However, in the following years, medical institutions, pre-school and school education institutions, representatives of medium and small businesses, city councils and even military units employed the practice. This shows that the dual form of education is effective in all industries. To make it easier to use, the MESU has developed a Toolkit for implementing dual education, which provides step-by-step instructions for all participants (students – educational institutions – employers) (Tools for implementing..., 2023).

Students who were also interviewed as part of the pilot project noted that dual education is not only a source of additional knowledge, but also a motivation to build a successful career, and improve the quality of education (as the vast majority of respondents noted that offline learning is less productive than online learning), and an opportunity to receive financial rewards (including salaries from the company and certain types of bonuses and incentives). Among the reasons why students switched to dual education, the main one is financial, as well as gaining practical experience and the opportunity to have a job immediately after graduation. Competition in the labour market also contributed to the transition to dual education, as it allowed students to gain practical experience in the workplace and had many more advantages in employment than ordinary graduates. Among the shortcomings identified during their studies, students mentioned a significant gap between theory and practice, which they were able to overcome thanks to the dual form. In addition, with dual education, students were able to use their study time much more efficiently, as the distance learning mode, adopted by many institutions, allowed them to devote some of their time to practical training. When analysing their experience of dual education, students say that it allows them to work in their field of study, while other students have to change their profile

or retrain over time to meet the needs of the labour market. It is also noted that the outdated material and technical base of educational institutions do not contribute to better learning, as the equipment and facilities of enterprises have long been more modern and more accessible for innovation. Therefore, most respondents – students – believe that the dual form of education is much more effective, and promising and provides real practical experience. That is why 91% of students plan to stay working at the company where they received their practical education.

During the first years of the dual education system, only a small proportion of students (less than 50%) planned to work at an enterprise after graduation, but after 2022 the situation changed dramatically: two-thirds of students (74%) continued to work at the enterprise after graduation. Even though in some cases the company and the educational institution were in different cities, students planned to change their place of residence to continue cooperation with the company. This is also evidence that dual education is an effective means of addressing many issues in both education and the labour market. One of the biggest advantages of dual education is the opportunity to gain practical experience with further improvement. For example, electric and hybrid cars were developed in European countries, while Ukrainian manufacturers do not produce these types of cars. There are many owners of cars with electric motors in Ukraine, therefore the demand for their maintenance is also high. Practice at automotive companies provides an experience that would be impossible in an academic theoretical setting. Accordingly, students emphasise the need to digitise the educational process, which will significantly improve the legal side (trilateral agreements), as well as the production and educational ones.

The results of the analysis of the experience of introducing dual education in Ukraine and abroad (in countries such as Germany, Austria, and Switzerland) showed that the effective implementation of this system in the auto-

omotive industry reduced the shortage of personnel, led to the improvement of the dual education programme in the automotive industry, and influenced the employment of students. As a result, changes in the overall state of the national economy were recorded. Thus, China's experience shows that learning is highly effective when theoretical knowledge is combined with practical experience during the educational process. In this case, the outcome of the educational process (future specialists) correlates with the labour market and the needs of producers (employers). Since some German automotive companies have production sites in China, Chinese educational institutions have been implementing the experience of German vocational training to train highly qualified automotive specialists. Thus, the advantages and disadvantages of both training systems were identified and the most successful educational practices for the implementation of dual education were combined. Chinese strategy of higher technical education maximised practical experience while studying at an educational institution.

Improving competencies in the development of professional qualifications is part of the educational experience in India. When training automotive professionals, much attention is paid to the development and improvement of specific practical competencies. The peculiarities of the region (Southeast Asia) caused the need to improve the labour market, raise living standards, and create a successful career. Therefore, improving the quality of vocational education and key competencies of automotive professionals is a priority for higher and vocational education institutions. Ukrainian experience in implementing dual education is less than a decade old, while in other countries, it dates to a hundred years. For instance, in Germany, where the foundations of dual education were laid in the late nineteenth and early twentieth centuries. The success of the training, in which 30% is theory and 70% is practice, has led to the spread of this experience to other countries. J. Li (2019) compares the experience of China and Germany in implementing dual education, emphasising its high efficiency. The strong development of technology in both countries has led to changes in the education sector, and dual education can meet the needs of industry for qualified specialists who already have experience in production. In Ukraine, the functioning of dual education is not as widespread as in other countries, and this is due to the peculiarities of the economic, educational and legislative spheres. However, despite the rather short period of implementation of dual education, certain results are notable (Analytical report..., 2023).

Comparing the experience of implementing dual education in Ukraine and European countries, Y. Dovgenko *et al.* (2021) noted that Ukrainian higher education institutions are just starting to work in this direction, as previously practical training of students was only possible in vocational education institutions. University students acquired only theoretical knowledge, and after employment, they had to spend time acquiring skills at work, which in turn affected their competitiveness. In Austria and Swit-

zerland, the dual education system is successfully practised (Opushko, 2023; Kucher, 2023). Students not only acquire practical work skills but also complete course or diploma projects following employer requests. Such projects are paid for (and therefore the HEI has additional funds) and have an applied value, i.e., can be applied in practice. In Ukraine, dual education is implemented in several types: group and individual (e.g., Volodymyr Vynnychenko Central State Pedagogical University). Group education is part of the educational programme and is included in the curriculum. Individual education is formed following the applications of students themselves or requests from employers for a specific number of students.

Given that the education sector is of particular importance among others (as it has to provide specialists for all other sectors, given the rapid changes in society), the introduction of dual education is one of the most effective solutions for the successful development of the economy and society as a whole. Compared to other countries, Ukrainian higher education institutions are at the stage of developing mechanisms of interaction and cooperation between educational institutions, employers and students (Dovgenko *et al.*, 2021; Semenovska *et al.*, 2023). Due to several objective reasons, the number of students studying in dual forms decreased in Ukraine in 2022-2023 (Analytical report..., 2023). However, their number is gradually increasing. However, for the results of dual education to be truly high, this process needs to be continuous, as technologies are developing too fast, and the education sector must meet all the requirements of the labour market, considering innovative practices.

Currently, there is no ongoing consultation and support of students' projects by trade unions and enterprises in Ukraine, which negatively affects the organisation of training and the choice of future profession. According to the pilot project report, only a small proportion of students said that mentors (supervisors) from the enterprise sufficiently advised on the production and educational process. In other cases, there was no consultation schedule, and contact between the mentor and the student or the HEI took place only when necessary. However, in some HEIs (Taras Shevchenko National University of Kyiv, Kherson State Agrarian and Economic University), communication between representatives of the institution and the enterprise was continuous.

The introduction of the dual education system in the world was associated mainly with technical specialties, but its use is also appropriate in other industries. As for the automotive industry, it is a dual form of education that can provide it with highly qualified specialists. A survey of representatives of 164 companies as part of the pilot project showed a high interest of employers in cooperation with higher education institutions in the dual form of education, as it can effectively address the problem of staff shortages and ensure the quality implementation and development of innovations at the enterprise. The main advantage of the dual education system is that the company itself, in cooperation with the educational institution, can decide

what knowledge and skills will be acquired during the learning and practical application process. In this way, employers can choose specialists with a specific profile that meets the requirements of production: this reduces recruitment costs and reduces the risk of getting an unqualified employee.

According to the Regulation on dual education, this form of education can significantly reduce the shortage of personnel caused by the demographic situation, as it enables students to consider themselves a full member of society (receiving monetary rewards in the form of bonuses or salaries, contribution to the development of production, etc.) (Regulatory and legal support..., 2023). According to the results of a survey of dual education students, they are also interested in this form of education, as it provides an opportunity to study with further career development at the enterprise, receive money, highly qualified work, promotion, etc. During the two years of the pilot project (2021-2022 and 2022-2023), all dual-enrolled students (35 and 27 people, respectively) signed a trilateral agreement and continued their studies in cooperation with enterprises. In addition, all surveyed students signed an employment contract with an enterprise and held relevant positions (145 positions in 2023). 96% of respondents (261 students) said that the dual form of education is the most effective and promising (Analytical report..., 2023).

The largest number of students in dual education are in technical specialties (locksmiths, multi-disciplinary engineers, etc.). The transport system is particularly in need of specialists who already have practical skills in production. Therefore, the automotive industry has a high need to cooperate with higher education institutions to implement dual education, as the final product and labour productivity depends on both the level of theoretical training and the ability to apply it directly during the production process. The intensive development of technologies and innovations and their implementation in production in the automotive industry require specialists who can quickly adapt to production processes. The dual system is, in fact, a continuous education: from acquiring theoretical knowledge to applying it in practice throughout the entire training and after employment.

According to a survey of students in the pilot project, the most difficult part was combining simultaneous study in two places: HEI and on-the-job training. To some extent, this is due to the lack of a well-established mechanism of interaction between the educational institution and the enterprise. However, most respondents (96%) are satisfied with the results of their dual education, and all students plan not only to continue their studies in this form but also to cooperate with the company in the future with the prospect of career growth. Germany's experience in implementing dual education shows that this system has resulted in the lowest youth unemployment rate in Europe (2017) (Rindfleisch & Maennig-Fortmann, 2020). However, Ukraine is still in the process of transitioning to a dual system of education in vocational and higher education institutions, as it is difficult for HEIs to quickly reorient

themselves to meet the needs of employers.

Summing up all the above, the study established that all parties involved in the dual education system consider it an effective tool for solving several issues. With the development and digitalisation of production processes, the automotive industry needs even more specialists with practical experience in production. The constant changes and innovations in this industry mean that the curricula of higher and vocational education institutions must be adapted to these changes. However, with all the shortcomings and difficulties faced by the project participants, the dual form of education has significant advantages over other forms (internships, training, work placements, etc.). If several legal, regulatory, and methodological issues are resolved, this form of education can become a leading one in the field of education and can overcome the imbalance between the demands and needs of the labour market and available specialists. Thus, according to the Concept of training specialists in the dual form of education, the effective implementation of this system will help to solve several important educational, economic, professional and industrial issues. These include modernising the content of education following the modern content of professional and occupational activities, establishing partnerships and cooperation between HEIs and employers, improving the quality of training of qualified personnel, increasing motivation, etc.

DISCUSSION

The study demonstrated that dual education is a very effective model for training automotive specialists. Students studying in a dual programme acquire competencies that meet the real needs of employers. But the biggest advantage is that they gain work experience directly in production. This greatly enhances their competitiveness in the labour market and significantly increases their chances of finding a job. The results of this study correlate with the relevant results of studies conducted both in Ukraine and in foreign countries. H. Ertl & B. Hemkes (2019) analysed the German experience in implementing dual education, emphasising that it is the dual form of education that is most effective. Vocational education in Germany is an important factor in the transition from education to career. However, there is competition between educational institutions that provide only academic knowledge and vocational education and training institutions that operate in a dual form. However, the latter have a significant advantage, as they provide many more opportunities for further employment. Similarly, in Ukraine, most students and employers emphasise that dual education is the most effective among others.

T. Maier & S. Steeg (2019) investigated the competitiveness of dual degree students among others who received only academic knowledge. A survey conducted among employers determined that positive practical experience gained through dual education is much more effective in increasing the chances of getting a job. Since the automotive industry is one of the fastest growing (in particular, the transition to new fuels requires a fun-

damentally new engine structure and other mechanisms), education must be adapted and modernised to meet the needs and demands of the industry.

One of the objectives of the study was to determine the role of higher and vocational education institutions in training automotive industry specialists. This was also emphasised by H. Lund & A. Karlsen (2020) that skilled workers capable of implementing innovative technologies are of great importance in manufacturing industries. Their study substantiates the concept of interaction between industry and vocational education and training institutions. The analysis conducted by the researchers in two Norwegian production regions showed that the introduction of innovative educational programmes (dual form) in vocational education and training institutions, adapted to both modern and future production, significantly affects the competitiveness of manufacturers. The researchers emphasise the empirical component of the study, which demonstrates the theoretical concept of education modernisation, and emphasise the key role of qualified specialists in the effective implementation of the latest technologies in production. Ukrainian employers emphasise the important role of HEIs and vocational education in training specialists in the dual form, but the short time of dual education in Ukraine does not cause high employment results for students in this form.

In a monograph by S. Krone *et al.* (2019), the success of students who studied in dual mode compared to other entrants was empirically investigated. The researchers analysed several components, including subsequent employment, students' competitiveness in job search, impact on salaries, etc. The study covered one year and identified the reasons why dual education students have an advantage in career development compared to regular graduates. These include high-quality intensive training, flexibility of forms and methods of education, and support of such students by training companies interested in the formation and development of highly qualified specialists. The constant cooperation of employers, and their support of the educational institution at all stages of education, has contributed to the fact that both parties (the institution and the company) have benefited from the advantages. Such close interaction has a positive impact on the development of the region's economy and the country, which in turn affects the quality of life, social development, etc. According to scientists, the dual form of education itself contains transitional models and structures that help modernise the education system. In Ukraine, it is still difficult to talk about the development of the regional economy, which is influenced by the introduction of dual education, because the number of students studying in this form is quite small.

Similarly, the automotive industry in Ukraine is developing rapidly. Accordingly, there is a need for numerous specialists who can quickly navigate changes and ensure the process of creating and maintaining cars. However, only a small number of higher education institutions are ready to provide employers with highly qualified specialists with practical skills in the workplace for several reasons. The

study demonstrated that despite the existence of numerous theoretical works and research papers on dual education, there are still no developed curricula, methodological support, or forms and methods of interaction between educational institutions and manufacturing enterprises. This affects the quality of specialists who are employed after receiving higher or vocational education.

This study focused on cooperation between the education and production sectors. The results showed that in Ukraine there are almost no or only declarative programmes for the effective functioning of dual education. The same is stated in a study by M. Baitullah & W. Wagiran (2019), which analysed cooperation between higher education institutions and the labour market. The researcher highlighted the strategy of educational institutions in the field of vocational education, namely the procedures, forms and assessment of learning outcomes for further cooperation with industry. The study covered the administration of the educational institution, representatives of the employment service and heads of the HR department of the enterprise that cooperated with the educational institution. As a result of the interviews, the researchers concluded that the cooperation of the educational institution in this area began with a visit to the production site identification of needs, and analysis of the proposals that the institution could provide following the training profile and potential. In addition, the role of the teacher in the training of specialists was noted. In particular, the cooperation between the two parties took the form of training designed to improve the skills of students in technology and science; synchronisation and adaptation of curricula to meet the needs of industry; internships as an effective method of learning theoretical knowledge and the same time a means of feedback from industry representatives; tests and certification work; production fairs, etc. This study concluded that effective and timely cooperation between educational institutions (vocational and higher education) offering dual education and manufacturing enterprises has a significant impact on the development of the industry (in particular, the automotive industry) and the high competitiveness of both the students and the manufacturing facility.

The issue of introducing dual education applies not only to vocational schools but also to higher education institutions. For instance, N. Tastanbekova *et al.* (2021) addressed the aspects of using the dual form of education in higher education institutions. The study noted that this form of education raises students' awareness of the specifics of professional activity. The author addressed the specific competencies of the student at different levels: from educational programmes to the production process. The study analysed the competence aspect of implementing dual education, namely, from participation in scientific and practical conferences (where the academic component is implemented) to solving specific production tasks (where the practical component is revealed). According to the author, the use of dual education in higher education institutions also affects the psychological aspect of em-

ployment, as this model of education increases the level of motivation during study and employment, adaptation to the work process and mutual trust.

The results of this study coincide with the results of a study conducted by T. Viola (2020), which analysed innovative teaching methods (including dual education) in the automotive industry. The surveys showed a rather ambiguous attitude of students toward the dual form of education: some considered it too burdensome. However, employers, on the contrary, were interested in employees who already had practical experience when applying for a job. The study notes that the dual form can be combined with other innovative forms, such as cooperative learning and internships. An analysis of cooperation with employers in the automotive industry showed that they need qualified specialists capable of rapid adaptation, as this industry is one of the fastest growing and most innovative. Vocational and higher education institutions are usually limited to conducting laboratory classes that are detached from the realities of production. In other words, manufacturers want a well-established system of cooperation with educational institutions, because the efficiency and quality of production is directly proportional to the quality of employees' education. Therefore, according to the respondents (automotive employers), the main problem was the lack of awareness of students of production requirements. The low level of practical problem-solving in the workplace could not be compensated for by a high level of theoretical knowledge. To overcome this problem, the company had to spend a lot of time, which in turn affected the overall production rate and volume. Therefore, effective cooperation between educational institutions and enterprises should be aimed at overcoming these problems. This study also showed a mismatch between employers' needs for highly qualified specialists and the ability of higher education institutions to provide such specialists. This is due to the lack of a well-established procedure for students to gain practical experience within the dual form of education. In addition, there are other factors, such as the distance between the educational institution and the enterprise, non-adapted curricula, etc.

The study examined the benefits of a dual education system for training automotive professionals. The rapid development of technology and the automotive industry has led to a shortage of personnel with certain competencies. The possibilities of dual education have a high potential for their training, although the dual education system is only beginning to be implemented in Ukraine. This is also highlighted by N. Tkachenko & A. Hrytsenko (2023) emphasising that the main essence of the dual education system is the distribution of educational and practical tasks between the educational institution, enterprise and the state (labour market). According to the researcher, the benefits of dual education are provided to all participants: students, employers, and the state. However, as for the automotive industry, there are certain difficulties. Among them are objective reasons: unemployment, which is only growing in the context of a full-scale war, the prevalence

of theory over the practice in educational institutions due to the peculiarities of educational programmes, and most importantly, the imbalance between the demand for jobs and the availability of graduates of certain professions (in particular, over the past decade, the number of applicants for IT professions, economics and the law has increased, but technical and engineering specialities are still in demand in the labour market). According to N. Tkachenko & A. Hrytsenko (2023), transport companies are now in need of specialists with modern competencies due to the increased demand of society for transport services, which has changed significantly. This includes the digitalisation of infrastructure (mobile applications, management, etc.), automation of various processes (from production to management), as well as the transition to robotic production, the introduction of autopilot systems, etc. Therefore, the professional development of students studying in the dual form takes place with the constant support of managers who are directly aware of all production processes and can teach them how to act in specific situations and on real equipment, not in the laboratory of an educational institution.

The same aspects mentioned above are also emphasised by M. Pikula (2023) and O. Kravchenko *et al.* (2020). Scientists emphasise that the introduction of dual education is a very effective means of training future automotive professionals. However, they note that in the 2021-2022 academic year, only 7 students studied in the dual form of education at the National University of Water and Environmental Engineering (Rivne). As mentioned above, the percentage of HEIs that offer dual education is quite small. Meanwhile, the automotive industry is in the greatest need of such specialists, as not only the design of motor vehicles but also maintenance and technical equipment are constantly evolving and being updated. Computerised diagnostics and programmes for managing production and management processes are becoming increasingly developed.

H. Lund & A. Karlsen (2021) noted that vocational education and training institutions play an important role in regional economic systems. Qualified specialists influence the introduction and development of innovative technologies in production. The same conclusions can be drawn from the results of this study. K. Grupp & C. Hindley (2021) discussed the advantages of dual education (practical training) over traditional forms. In particular, the study emphasises the effectiveness of learning, in which the practical application of knowledge prevails over theoretical knowledge. The study was based on a survey and interviews with students who had completed their bachelor's degree. The survey results showed the high efficiency of dual and hybrid forms of education. A survey of students in Ukrainian higher education institutions had similar results.

The results of the study by N. Jalinus (2021) demonstrated that blended and integrated learning, which includes innovative approaches, increases the level of creativity, and flexibility of thinking and develops the key competencies necessary for a modern graduate to be successful in employment. This study has shown that em-

ployer surveys on the implementation of dual education in Ukraine also show that dual education graduates are more successful in their future careers. R. Kurniawan *et al.* (2021) and H. Maksum *et al.* (2024) noted that the professional quality of automotive specialists trained according to traditional models is not perfect. This results in a low level of employment of automotive workers. It is emphasised that it is practice-oriented training that can meet the requirements of employers for future graduates, including experience in the use of innovative technologies, practical skills in high-tech equipment, etc.

The peculiarities of the implementation of dual education were discussed by S. Suyitno (2022) and J. Witte & C. Felser (2019) in an analysis of experimental learning, during which students conduct research in practice: at automotive manufacturing enterprises, thus improving the theoretical knowledge gained in the educational institution. The practical application of knowledge was also discussed by B. Sudarsono (2020), emphasising the need for industrial practice in the training of automotive specialists. The study noted that this is how the necessary competencies and skills of a highly skilled worker are formed. J. Siswanto (2019) and M. Hernández-de-Menéndez *et al.* (2019) also addressed the topic, analysing the best practices of active learning and methods of implementing dual education experience. M. Nurtanto *et al.* (2020) and V. Poschauko & E. Kreuzer (2024) highlighted the need to improve the competencies of automotive professionals, including throughout their lives.

The digital and technological transformation of working conditions leads to the formation of specific competencies of students – future professionals – which are difficult to develop based on theoretical knowledge alone. Scientists emphasise the importance of dual and continuous education for workers in technical industries, including the automotive sector. The results of this study also indicate that dual education is the most effective form of education for automotive professionals. Thus, dual education is beneficial for improving the quality of education and further employment of graduates. However, its implementation requires support from the state, employers and educational institutions. The introduction and effective functioning of dual education can help Ukraine address the shortage of qualified specialists and increase the competitiveness of the Ukrainian economy in the global market.

CONCLUSIONS

Dual education, which is just beginning to be implemented and developed in Ukraine, is an effective means of training highly qualified automotive professionals. The ability to

apply the theoretical knowledge gained at an educational institution without interrupting studies is a significant advantage of this system compared to others. According to surveys of the pilot project participants, the effectiveness of the dual form of education is confirmed by all three parties: students, employers (business representatives), and higher and vocational education institutions. The growing demand for highly specialised professionals has led to qualitative changes in the education system, such as the introduction of dual education. The study determined that in Ukraine, only a fraction of enterprises cooperate with educational institutions to implement dual education, and the percentage of students enrolled in this form is also low. However, despite the difficulties faced by the participants in the pilot project, it can be concluded that dual education is a promising area in education. This is also evidenced by the growing trend in the number of participants (students and businesses) in dual education. However, there are still many aspects that need to be explored to make the results of dual education more effective. These include the development of teaching and learning materials, financial and legal support from the state, systematic analysis of the quality of education, work with government officials and trade unions, development of a systematic approach to the implementation of dual education, work in secondary education institutions (career guidance), creation of a database of vacancies and enterprises operating in dual form, etc.

The study had certain limitations: the inaccessibility of some data due to martial law, limited opportunities to communicate with students and representatives of enterprises, insufficient development of study programmes (including individual educational trajectories – according to the survey of HEIs), lack of a feedback procedure between all participating parties, etc. With comprehensive support from the state, the Ministry of Education and Science of Ukraine, and employers for the implementation of the dual education system, the above problems can be eliminated. Prospects for further research may include improving the educational and methodological support of higher education institutions, qualitative changes in educational programmes in line with innovative changes in society, development of a regulatory framework and recommendations for the implementation of dual education.

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CONFLICT OF INTEREST

None.

REFERENCES

- [1] Analytical report on the results of the fourth year of the pilot project in vocational pre-university and higher education institutions for the training of specialists in the dual form of education. (2023). Retrieved from https://nmc-vfpo.com/wp-content/uploads/2024/01/dual-studi_4year_22-01_compressed.pdf.
- [2] Baitullah, M.J.A., & Wagiran, W. (2019). Cooperation between vocational high schools and world of work: A case study at SMK Taman Karya Madya Tamansiswa. *Journal of Vocational Education*, 9(3), 280–293. doi: 10.21831/jpv.v9i3.27719.

- [3] Dovgenko, Y., Yaremenko, L., & Yaremenko, Y. (2021). Implementation of dual education in higher education: benefits and risks. *Economy and Society*, 28. doi: 10.32782/2524-0072/2021-28-29.
- [4] Dual Education. Methodological recommendations. (2023). Retrieved from <https://era-ukraine.org.ua/dualna-osvita-metodychni-rekomendatsii/>.
- [5] Ermawati, R. (2019). Profile of vocational learning in the era of industrial revolution 4.0 (studies at department of automotive vocational high school). *Journal of Physics: Conference Series*, 1273, article number 012015. doi: 10.1088/1742-6596/1273/1/012015.
- [6] Ertl, H. (2020). Dual study programmes in Germany: Blurring the boundaries between higher education and vocational training?. *Oxford Review of Education*, 46(1), 79-95. doi: 10.1080/03054985.2019.1687438.
- [7] Ertl, H., & Hemkes, B. (2019). Permeability from the perspective of vocational education and training: A future-oriented stocktaking. In F. Bünning, M. Frenz, K. Jenewein & L. Windelband (Eds.), *Transitions from the perspective of vocational education and training* (pp. 515-530). Bonn: Federal Institute for Vocational Education and Training. doi: 10.57694/401.
- [8] Gonchar, L. (2021). Development of dual education in Germany in a historical context. *Professional Pedagogics*, 1(22), 32-40. doi: 10.32835/2707-3092.2021.22.32-40.
- [9] Grupp, K., & Hindley, C. (2021). The dual study program from the students' perspective. In *Practice-oriented university teaching* (pp. 259-268). Wiesbaden: Springer. doi: 10.1007/978-3-658-32393-6_22.
- [10] Hähn, K., Krone, S., & Ratermann-Busse, M. (2019). *Company case reports on dual studies*. Duesseldorf: Hans Boeckler Foundation.
- [11] Hernández-de-Menéndez, M., Vallejo Guevara, A., Tudón Martínez, J.C., Hernández Alcántara, D., & Morales-Menendez, R. (2019). Active learning in engineering education. A review of fundamentals, best practices and experiences. *International Journal on Interactive Design and Manufacturing (IJIDeM)*, 13, 909-922. doi: 10.1007/s12008-019-00557-8.
- [12] Jalinus, N. (2021). *Developing blended learning model in vocational education based on 21st century integrated learning and industrial revolution 4.0*. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(9), 1239-1254.
- [13] Kravchenko, O.L., Borisyuk, I.Y., Vakolia, Z.M., Tretyak, O.M., & Mishchenia, O.M. (2020). Models of introduction of dual professional education. *International Journal of Higher Education*, 9(7), 94-106. doi: 10.5430/ijhe.v9n7p94.
- [14] Krone, S., Nieding, I., & Ratermann-Busse, M. (2019). *Dual study-and then? An empirical study on the study-to-work transition process of dual study graduates*. Dusseldorf: Hans Bockler Foundation.
- [15] Kucher, O. (2023). International experience of implementing dual education. *Alfred Nobel University Journal of Pedagogy and Psychology*, 2(26), 70-82. doi: 10.32342/2522-4115-2023-2-26-8.
- [16] Kurniawan, R., Jaedun, A., Mutohahari, F., & Kusuma, W.M. (2021). The absorption of vocational education graduates in the automotive sector in the industrial world. *Journal of Education Technology*, 5(3), 482-490. doi: 10.23887/jet.v5i3.35365.
- [17] Li, J., Wiemann, K., Shi, W., Wang, Y., & Pilz, M. (2019). Vocational education and training in Chinese and German companies in China: A "home international" comparison. *International Journal of Training and Development*, 23(2), 153-168. doi: 10.1111/ijtd.12151.
- [18] Lund, H.B., & Karlsen, A. (2020). The importance of vocational education institutions in manufacturing regions: Adding content to a broad definition of regional innovation systems. *Industry and Innovation*, 27(6), 660-679. doi: 10.1080/13662716.2019.1616534.
- [19] Maier, T., & Steeg, S. (2019). *Dual study or further training-what increases the chances of a company promotion? Vocational Training in Science and Practice*, 2, 16-20.
- [20] Maksum, H., Purwanto, W., Sugiarto, T., Hidayat, N., Siman, S., & Hasan, H. (2024). The improvement students learning achievement by applying work based learning combined with teaching factory concept. *Jurnal EDUCATIO (Jurnal Pendidikan Indonesia)*, 10(1), 64-72. doi: 10.29210/1202423662.
- [21] Members of the Association of Ukrainian Automobile Manufacturers UkrAvtoprom. (n.d). Retrieved from <https://ukrautoprom.com.ua/category/members>.
- [22] Nurtanto, M., Sofyan, H., Pardjono, P., & Suyitno, S. (2020). Development model for competency improvement and national vocational qualification support frames in automotive technology. *International Journal of Evaluation and Research in Education*, 9(1), 168-176. doi: 10.11591/ijere.v9i1.20447.
- [23] Opushko, N. (2023). Problems of implementing dual education in educational institutions in Austria. *Scientific Issues of Vinnytsia State M Kotsyubynskyi Pedagogical University Section Pedagogics and Psychology*, 73, 102-108. doi: 10.31652/2415-7872-2023-73-102-108.
- [24] Order of the Cabinet of Ministers of Ukraine No. 660-p "On Approval of the Concept of Training Specialists in the Dual Form of Education". (2018, September). Retrieved from <https://zakon.rada.gov.ua/laws/show/660-2018-%D1%80#Text>.
- [25] Pikula M.V. (2023). Efficiency of dual education in the process of training road transport specialists for innovative production technologies. *Bulletin of the National University of Water and Environmental Engineering*, 2(102), 430-437. doi: 10.31713/vt2202335.

- [26] Poschauko, V., & Kreuzer, E. (2024). Engineering education goes lifelong learning: Modularized technical vocational education and training program for the automotive sector. *Procedia Computer Science*, 232, 1799-1808. doi: [10.1016/j.procs.2024.02.002](https://doi.org/10.1016/j.procs.2024.02.002).
- [27] Regulatory and legal support for the implementation of dual education. (n.d). Retrieved from <https://nmc-vfpo.com/dualna-forma-zdobuttya-osvity/>.
- [28] Rindfleisch, E., & Maennig-Fortmann, F. (2020). *Dual education in Germany: From theory and practice to a skilled worker*. Retrieved from <https://www.kas.de/de/einzeltitel/-/content/duale-ausbildung-in-deutschland1-v1>.
- [29] Semenovska, L., Vazhenina, I., & Fazan, V. (2023). Individualization of learning as a development actuality information technological society. *Pedagogical Sciences*, 6(2), 30-34. doi: [10.33989/2524-2474.2023.82.295073](https://doi.org/10.33989/2524-2474.2023.82.295073).
- [30] Shevchenko, I.Y. (2019). Dual education as a basis for staffing to increase the competitiveness of Ukrainian automotive enterprises. *Business Inform*, 2, 171-185. doi: [10.32983/2222-4459-2019-2-171-185](https://doi.org/10.32983/2222-4459-2019-2-171-185).
- [31] Siswanto, J. (2019). Development of model teaching factory in vocational high schools. In *3rd International conference on education innovation (ICEI 2019)* (pp. 163-167). Atlantis Press. doi: [10.2991/icei-19.2019.29](https://doi.org/10.2991/icei-19.2019.29).
- [32] Sudarsono, B. (2020). *Industrial-based practical learning development for teacher competence of automobile technology*. *Journal of Physics: Conference Series*, 1446(1), article number 012062. doi: [10.1088/1742-6596/1446/1/012062](https://doi.org/10.1088/1742-6596/1446/1/012062).
- [33] Suyitno, S. (2022). Investigation of teaching factory (TEFA) implementation in vocational education. *VANOS Journal of Mechanical Engineering Education*, 7(1), 34-43. doi: [10.30870/vanos.v7i1.14202](https://doi.org/10.30870/vanos.v7i1.14202).
- [34] Tastanbekova, N., Abenova, B., Yessekeshova, M., Sagalieva, Z., & Abildina, G. (2021). Development of professional skills in the context of higher school dual education. *International Journal of Emerging Technologies in Learning (iJET)*, 16(10), 179-193. doi: [10.3991/ijet.v16i10.19373](https://doi.org/10.3991/ijet.v16i10.19373).
- [35] The influence of dual training on the quality of skilled workers in the automotive industry in Germany. (2020). Retrieved from <https://hdl.handle.net/10419/269203>.
- [36] Tkachenko, N., & Hrytsenko, A. (2023). Dual education as an effective tool for the formation of professional competence of future transport industry specialists. *Science and Technology Today*, 10(24), 330-339. doi: [10.52058/2786-6025-2023-10\(24\)-330-339](https://doi.org/10.52058/2786-6025-2023-10(24)-330-339).
- [37] Tools for implementing the dual form of education. (2023). Retrieved from <https://era-ukraine.org.ua/instrumentariy-shchodo-vprovadzhennia-dualnoi-formy-zdobuttia-osvity-dfzo/>.
- [38] Trojan, I. (2023). *Learning and earning: What is dual education and how it works abroad and in Ukraine*. Retrieved from https://docs.google.com/document/d/1jRNuoQy7M_qLkx7tHqfe7jLXW03qpPc/edit.
- [39] Viola, T.B. (2020). *Innovative adult education and human resource models sn the domestic automotive industry: Needs and implementaion*. Retrieved from https://ppk.elte.hu/dstore/document/654/T%C3%B3thn%C3%A9_Borb%C3%A9ly_Viola_t%C3%A9zisf%C3%BCzet_angol.pdf.
- [40] Witte, J., & Felser, C. (2019). The effectiveness of dual education in Germany: Evidence from the BIBB BIBB database. *Vocational Education and Training in Europe*, 32(2), 113-132.

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Ефективність дуальної освіти у підготовці кваліфікованих фахівців в автомобільній галузі

Анотація. Метою дослідження було визначення ефективності функціонування дуального навчання для підготовки фахівців автомобільної галузі. Дуальна освіта поєднує теоретичну підготовку в навчальному закладі з практичною роботою на підприємстві у співвідношенні 30-40 % до 60-70 %. Така система навчання стає все більш популярною моделлю освіти. Найбільше цього потребують галузі, де потрібні висококваліфіковані кадри. Автомобільна промисловість – один із секторів, де навчання за дуальною системою відіграє значну роль у підготовці фахівців, які відповідають сучасним потребам ринку праці. Проведене дослідження охопило такі ключові аспекти, як аналіз теоретичних засад дуальної освіти (вивчення моделей та переваг цієї системи навчання); оцінка стану дуальної освіти в автомобільній галузі України; вплив дуальної освіти на підготовку фахівців. Дослідження показало, що дуальна освіта може бути дієвим методом підготовки кваліфікованих фахівців, у тому числі й для автомобільної промисловості. Випускники, що навчалися за системою дуальної освіти, володіють кращими практичними навичками, мають вищий рівень зайнятості та заробітну плату порівняно з випускниками традиційних програм. Дослідження також визначило ряд факторів, що сприяють ефективності впровадження дуальної освіти. Зокрема це співпраця між навчальними закладами та підприємствами. Вона гарантує, що програми дуальної освіти відповідають актуальним потребам і запитам ринку праці, є гнучкими й адаптованими під зміни виробничих умов. Якісно організована наставницька практика на підприємстві забезпечує випускників необхідними навичками та знаннями. Як правило, учасники програм дуальної освіти більш мотивовані, мають чітке уявлення про свою майбутню професію та кар'єру, вони можуть обрати або змінити спеціалізацію протягом практичної роботи на виробництві. Результати дослідження можуть бути використані при формуванні освітніх програм, удосконаленні навчально-методичного забезпечення закладів вищої освіти, розробці педагогічних моделей підготовки фахівців автомобільної галузі

Ключові слова: професійне навчання; професійна підготовка; фах; практичне навчання; працевлаштування