



Dual education as a tool for assurance the education of sustainable development

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Abstract:

The article substantiates the necessity of introducing the dual education elements into professional training of future specialists. They are listed. As a result of the SWOT analysis for the following process it was defined its strengths (VET regulation by principles of a market economy, increased demand in the labour market for dual education graduates, VET quality corresponded to employers' requirements; close cooperation between government and business-sector for VET issues; mutually beneficial VET for the state, enterprises and VET institutions; increasing students' motivation to learning; increasing the prestige of VET) and weak (lack of legal support for dual form of education; imperfection and obsolescence of the material and technical base of P(V)E institutions; insufficient readiness of teachers to introduce dual form of education; the difficulty of finding appropriate enterprises and setting agreements with employers; employers' reluctance to enter into agreements with students at the beginning of their training; significant time and financial costs for updating the technological park of P(V)E institution; the need for special psychological and pedagogical training of mentors, instructors – production workers; imperfection of mechanisms for implementing multichannel financing of VET). The questions concerning the dual education system in Ukraine were studied by scientists: N. Abashkina, V. Anischenko, I. Boychevska, T. Kozak, N. Nychkalo, V. Radkevych and others.

It is shown that the dual form of education can be a tool for providing education for the sustainable development of society. The features of the dual form of education in Ukraine are analyzed: strengthening the practical component of VET; intellectualization and individualization of VET; the implementation of VET in a real production environment; development of social partnership in VET institution; conformity of VET in VET institution with the regional infrastructure; mentor system introduction; creating innovative educational and production environment for VET. The organizational basis for VET education introduction in P(V)E institutions is given to ensure sustainable the development of society.

1. Introduction

The finite resources of our planet, region or country inevitably lead to the need to decrease resource and energy consumption, reduce waste, introduce environment-friendly technologies and circular economy, be socially responsible, preserve cultural and local traditions. The socio-economic conditions of Ukraine's development changing in the context of European integration, demographic, foreign policy and intrastate processes causes certain transformations in all spheres of public life, including education and industry (Nychkalo, 2014). The recent reforms in the system of professional (vocational) education (P(V)E) of Ukraine are aimed at strengthening its practical focus, creating an innovative work-study environment in professional (vocational) education schools (P(V)E schools) and engaging social partners, in particular employers, in these processes. Accordingly, it becomes essential to study international experience in the development of vocational education and training (VET) and rely on the most relevant and productive practices, including dual



education (Denmark, the Netherlands, Germany, Norway, Singapore) (Radkevych, 2017). In this regard, the United Nations Environment Program (UNEP) has identified the following strategic goals of education in terms of sustainable development: to train qualified specialists for all major sectors of the economy; to ensure equal access to education for benefit of a healthy and productive life; to integrate environmental issues into degree programmes and public awareness programmes.

Education for sustainable development (ESD) can and should use all the positive achievements of traditional natural science and environmental education enriching it with social, economic and cultural contexts taking into account local characteristics (UNESCO, 2015). It must be acknowledged that there is no single model of sustainable (balanced) development of society. Every country should define its priorities and programmes of action, choose its specific goals and objectives, based on local environmental, social, economic conditions, and describe the best ways to address them. ESD is a dynamic concept encompassing all aspects of the education, staff training and education of the population in order to train, educate and acquire the necessary knowledge and skills so that people of all ages and social backgrounds can achieve sustainable (balanced) development. It is a process of constant perception and learning. Educators should always be ready to reconsider the previously established views in response to changes which are happening and will happen shortly. Given this, the main objectives of teaching staff in P(V)E schools are as follows: to help future skilled workers to understand the universal importance of the strategy for sustainable (balanced) development of society; to engage pupils in discussing the issues of sustainable (balanced) development of society, in particular in future professional activities; to teach pupils to address such issues critically from different perspectives; to shape pupils' thinking based on the ideas of the strategy for sustainable (balanced) development of society and the need to act in accordance with it. Therefore, it is essential to shape "systematic thinking" and develop "ability to get to the essence of the problem" while training young people. One can accomplish these objectives within the framework of dual vocational training of future skilled workers. Indeed, it provides a balance in the relations between all participants in this process (the state, P(V)E schools, enterprises or organizations and future skilled workers) and meets their interests.

Although environmental education is not the equivalent of ESD, it is directly related to it. ESD is much broader since it covers many social and economic issues (UNESCO, 2014). Besides, the implementation of ESD will help to teach pupils from P(V)E schools to think ahead and predict the future. It is also essential that teachers should be able to explain to pupils the relevance of the strategy for sustainable (balanced) development of society from professional, personal and civic points of view. To a certain extent, these issues are addressed in lessons, in particular in P(V)E schools. Only an open discussion about such vital issues enables pupils to analyze prospects and discover ways how to solve contemporary problems. Given the changes in education content driven by a competency-based approach, it is critical to update and reinforce the practical component of P(V)E. According to some national and international experts (Avagyan, Furmanets, & Leu, 2017), these issues and objectives can be overcome and fulfilled after introducing dual vocational training of future skilled workers. Dual training is a rather promising and, at the same time, strategically important form of the educational process.

2. Methods, techniques and data collection process

Theoretical analysis of scientific psychological and pedagogical literature, regulatory documents, interpretation of the selected material – to determine and analyze the features of dual education in Ukraine; synthesis, systematization and generalization – to describe the organizational basis for dual education implementation in Ukraine. SWOT analysis – to identify strengths and weaknesses, opportunities and threats of introducing the elements of dual education in the training of future skilled workers in Ukraine. Thus, this paper aims to analyze the characteristics of dual education in Ukraine and define organizational principles of its implementation as a tool for providing ESD.

3. The outcomes of the study

Prerequisites for the Introduction of Dual Education in Ukraine. In Ukraine, ESD implies changing the functions of participants in the educational process in P(V)E schools. Instead of being mere transmitters of knowledge,



teachers begin to create favourable conditions for their pupils to acquire this knowledge. Thus, they teach them to express and defend their points of view, choose between alternatives consciously, be responsible for their choices and predict their consequences, listen and understand others, learn to respect democratic decisions, resolve conflicts civilly, negotiate and interact (Ministry of Education and Science of Ukraine, 2016).

It is essential to consider many aspects when attempting to implement ESD in Ukraine through the introduction of dual training for skilled workers as a tool for it. For one, the system of P(V)E of Ukraine has started to introduce the elements of dual education into vocational training of skilled workers pretty actively. However, it still lacks proper theoretical and methodological support. The authors have conducted a SWOT analysis on the introduction of elements of dual education in vocational training of future skilled workers and analyzed these elements to understand the characteristics of such training better.

According to some German researchers (Euler, 2013), the most productive elements of dual education are as follows: a three-fold mission of the education system (economic productivity, social integration, individual development); a public-private partnership; a multi-channel financing of VET; social recognition of VET; training of mobile workers able to adapt to changing conditions of the labour market promptly; training under production conditions; constant professional development of teaching staff, mentors, instructors (production workers); codification, versatility and optimality of P(V)O school standards; various additional programmes of dual training; scientific and methodological support of VET on a regular basis.

Since 2015, these elements have been implemented into vocational training of skilled workers on a pilot basis. In the years that followed (2017 and 2018), certain P(V)E schools in the number of 49 and 211 respectively were invited to participate in this process. Since then, they have been implementing the elements of dual education in training in specific professions (over 50 and 100) systematically (Ministry of Education and Science of Ukraine, 2017).

The overall results obtained from the SWOT analysis (Kulalaieva, 2018) have confirmed the following. Its advantages include regulating VET by market economy principles; increasing the demand for graduates with dual education; adjusting the quality of VET to the requirements of employers; promoting close cooperation between the government and the business community regarding VET; being mutually beneficial for the state, enterprises, P(V)E and pupils; boosting pupils' motivation towards learning; enhancing the prestige of VET. Its disadvantages are as follows: the lack of legal support for dual education; deficient and outdated facilities in P(V)O schools; a low readiness of teaching staff to implement dual education; difficulties finding suitable enterprises and employers; employers' unwillingness to enter into agreements with first-year pupils; time burdens and significant financial costs spent on upgrading technological parks in P(V)O schools; the need for specialized psycho-pedagogical training of mentors and instructors (production workers); underdeveloped mechanisms for implementing a multi-channel financing of VET.

The opportunities arising as a result of the introduction of dual education into vocational training of future skilled workers involve connecting theory and practice in the educational process; updating facilities in P(V)O schools; helping pupils to choose a future profession wisely; reducing youth unemployment; enhancing the competitiveness of P(V)O schools; combining theoretical training and distance learning; introducing innovative pedagogical technologies, methods and techniques (cases, business games, projects) into the educational process. However, the process of implementing dual education may bring negative results, too. It refers to a decrease in enrolment of pupils, termination of training in specific professions due to economic instability and lack of employers' orders for such workers; refusal of enterprises to finance vocational training of workers; reduction of state investment in P(V)E; a low interest of enterprises in cooperation with P(V)E schools regarding dual education; a gradual reduction of time for comprehensive training.

The SWOT-analysis proves that the main components of dual vocational training in P(V)E schools are the following: the legal framework for providing dual education; career counselling (career guidance and identification); modular and competency-based standards of professions in the VET system; the system of training and advanced training of teaching staff, taking into account the requirements of enterprises; the institute of mentors for representatives of enterprises; innovative and multidisciplinary centres (technological parks, resource centres) within the VET system; independent evaluation of pupils' learning outcomes.

Analyzing the Characteristics of Dual Education in Ukraine. In Ukraine, one can observe an active introduction of the elements of dual education into vocational training of future specialists (Cabinet of Ministers of Ukraine, 2018). At the same time, it leads to the establishment of the Ukrainian system of dual education



with its specific features. The latter include enhancing the practical component of dual vocational training of future skilled workers; promoting intellectualization and individualization of vocational training; providing vocational training under the conditions of real production; developing social partnership in P(V)E schools; adjusting vocational training of skilled workers to regional infrastructure; establishing the institute of mentors; creating an innovative work-study environment in P(V)E schools.

These features are in full compliance with Drew's principles of ESD. They involve transformations and changes for the sake of a sustainable (balanced) future; lifelong learning, systematic thinking; ability to predict one's environment-friendly actions to improve the future; critical thinking; interactive learning through action; broad cooperation (Drew, 2019).

The practical component is reinforced through the introduction of various types of work-based learning (WBL), in particular apprenticeships, to attract social partners, companies, chambers and VET providers and stimulate innovation and entrepreneurship (Leu, 2018). Such acquisition of knowledge and skills by pupils through direct (or simulated) activities in a professional context is based on practice-oriented approaches and helps pupils to acquire knowledge, master skills and develop competencies necessary for professional fulfilment (Puhovska et al., 2017). WBL is also widely used in the programmes of preparatory, initial, further and advanced training. Also, it can help to change professional focus or expand the so-called set of professional skills. In general, WBL programmes can be characterized as flexible and adaptive. They are based on partnerships, opportunities to learn individual, full or line-up courses or those not provided in the general course of vocational training. Still, the requirement for doing such courses may arise from some production needs of the enterprise at a particular stage of its operation. Thus, WBL creates a win-win situation in which both the needs of pupils and enterprises, branches or industry are fully met by the level of training of skilled and talented employees. The implementation of WBL into dual education will contribute to improving educational systems of vocational training for future workers skilled in various fields; updating the goals, content, methods, technologies and tools of vocational training; designing an innovative work-study environment in P(V)E schools; creating effective mechanisms of public-private partnership in P(V)E schools; promoting the functioning of P(V)E schools as independent entities in the labour market; shaping common goals and interests in P(V)E schools and enterprises (Kulalaieva, & Leu, 2018). WBL is seen as a powerful tool for developing skills and abilities directly in the workplace; increasing labour productivity; strengthening cooperation between all participants in the educational process. Its extremely high potential helps to optimize time, efforts and resources (human, material and financial).

The VET system is intellectualized through updating the content of education, teaching methods and training the teaching staff of the new generation. It refers to increasing access to higher specialized education for teaching staff in P(V)E schools and introducing advanced information technologies into the content of education. In general, these measures provide the transition to a new model of training specialists responsible for the production of high-tech products and able to predict further environment-friendly actions. Accordingly, industrial production is being modernized. It contributes to further elaboration of a qualitatively new model of VET, focused on the development of the nation's intellectual potential and the preservation of the environment.

In the context of dual education, vocational training of future skilled workers is also characterized by specific individualization (Abashkina, 1998). However, masters of vocational training play the leading role in this process since they, together with teaching staff in P(V)E schools, provide high-quality training for skilled workers. Some statistical data show that the masters of vocational training in Ukraine teach 18 pupils at the same time, whereas German colleagues conduct classes only for 3-4 pupils. To overcome this very issue, one should balance between the requirements of teachers, masters of vocational training, coordinators of dual education from both P(V)E schools and enterprises and mentors when planning vocational training of skilled workers. It will also help to develop pupils' professional competencies more effectively. Also, the implementation of dual vocational training should include the following:

- theory: promoting self-study and distance learning; employing digital educational resources, smart and innovative educational technologies;
- practice: organizing educational trips to enterprises; acquainting pupils with the production process; inviting leading experts to conduct workshops; providing regular information and methodological support; creating a unified database of information and methodological materials with full access to them to



all interested parties, in particular the participants in the educational process, under conditions of dual education (teaching staff, pupils, mentors).

Such individualization also implies work-based learning models understandable to all participants in the educational process; full educational and methodological documentation (both for theory and practice); a systematic interviewing of pupils, teaching staff and mentors regarding the quality of workplace training at the enterprise; recommendations, regulations and instructions on workplace safety during industrial training; a systematic enhancement of psycho-pedagogical competencies of mentors from enterprises and professional competencies of teaching staff in P(V)E schools.

The characteristics of dual vocational training for future skilled workers also include industrial training. It may cause some difficulties and risks in the operation of economic entities employing pupils from P(V)E schools under such training. They are as follows:

- impossibility of concluding an agreement on the matter of providing dual vocational education to underage pupils (only parents or legal representatives of pupils are entitled to conclude such an agreement with P(V)E schools and economic entities);
- difficulty in forming a list of economic entities providing pupils with employment or work-study sites for practical training; difficulty in coordinating the cooperation with them (given the changes in the number of employment agreements and work-study sites provided by each economic entity for practical training);
- lack or non-compliance with the requirements of modern standards for work-study sites for practical training;
- costs spent on the creation of new employment (with no vacancies available) or redundancy and further recruitment;
- a probability of pupils' failing to fulfil their responsibilities or producing faulty products;
- costs spent on payment for mentors, as well as the organization of pilot exams;
- lack of mechanisms for creating effective organizational and legal forms of interaction between economic entities and P(V)E schools;
- several restrictions related to the underage of many pupils.

Thus, it is vital to create optimal models of beneficial cooperation between P(V)E schools and economic entities during the vocational training of future skilled workers in real production. As for employers, it is essential to reduce costs, develop and improve competitiveness in the labour market. In regards to P(V)E schools, it is crucial to improve the quality of vocational training, enhance the competitiveness in the market of educational services and raise the prestige of vocational professions. In the case of pupils, it is necessary to ensure proper payment for them, help them to adapt to the workplace and motivate them towards constant professional development.

The development of social partnership also plays an essential role in dual vocational training of future skilled workers in P(V)E schools. It can help P(V)E schools to discover changes in production technologies and workplace management timely, study the requirements of employers for professions, as well as new employment functions and necessary competences, and conduct a functional analysis of professional activities. At the same time, enterprises obtain the employees they need, and their HR-services do not waste time and costs searching for the so-called best working staff. According to Molchanova, a social partnership should be considered as social dialogue and the establishment of relations adequate to the market reality between education and employers (Molchanova, 2007). In the VET system, it is a partnership between certain P(V)E schools and social groups of this professional community. Regarding the methods of structural cooperation, social technologies include the following: taking into account the interests of partners, significant values; applying the methods of extreme support, meaningful action, alternatives, mediation techniques.

Molchanova believes that the basic principles of social partnership are the following: equality of the parties; respect and consideration of the parties' interests; the parties' interest in contractual relations; assistance to the state in strengthening and developing social partnership on a democratic basis; compliance by the parties and their representatives to laws and other legal acts; full rights of the representatives of the parties; free will to choose when discussing matters within the area of work; voluntary acceptance of obligations by the parties; the reality of the obligations accepted by the parties; obligation to fulfill collective agreements, contracts; control over the implementation of collective agreements, contracts; responsibility of the parties and their representatives for non-compliance with collective agreements, contracts of their making.



During 2013 and 2015, the staff members of the Institute of VET of the NAES of Ukraine identified and justified the main trends in the development of social partnership in the system of P(V)E (Svystun, Yelnykova, & Petrenko, 2014): deepening the cooperation between employers and P(V)E schools as a priority area of social partnership in the VET system; prioritizing a local modelling of social partnership at the level of a specific P(V)E school; synthesizing social partnerships and a marketing approach in managing the VET development; expanding the range of consumers of P(V)E and parties interested in social partnership; preserving stereotyped organizational barriers in social partnership between P(V)E schools.

The study on the trends in social partnership development in P(V)E has helped the authors to reveal the fundamental laws, dynamics and discover the ways how to enhance the implementation of social partnership in the management of VET development. It mainly involves elaborating and implementing the model of social partnership, as well as local and regional projects on social partnership. The indicators of social partnership are the following: a clear vision of the parties on social partnership as one of the crucial conditions for creating a positive image of P(V)E schools in the market of educational services; the availability of plans, programmes and agreements on cooperation with social partners, in particular as regards industrial placement of pupils and employment of graduates; the adjustment of conditions for social partnership to regional conditions of VET development; both documents and results confirming the effective interaction between P(V)E schools and their social partners; the availability of information on social partnership on official websites of P(V)E schools. The obtained results prove that social partners are full participants in the educational process. The interaction with them is the key to assuring the quality of vocational training of future skilled worker since it significantly reduces the adaptation period of graduates and increases their demand on the principle of social order.

Also, there are many loopholes in the legal framework that should regulate social partnership development. Indeed, the functions and responsibilities of economic entities as social partners of P(V)E schools are not defined. The independence of P(V)E schools is not assured in terms of elaborating documents on educational planning together with employers. There are no mechanisms to stimulate and motivate economic entities to cooperate with P(V)E schools regarding dual vocational training of future skilled workers. Moreover, there are no relevant documents enabling mentors from enterprises to improve their psycho-pedagogical competencies.

Therefore, an essential characteristic of dual vocational training is mentors (some enterprise employees, who transmit the acquired experience and knowledge to pupils during practical training and facilitate their adaptation to the workplace) at the enterprises which provide pupils with employment. At the same time, these enterprises are obliged to appoint a mentor to a pupil (at a hazardous work environment, a mentor may be assigned to one pupil only).

The main categories of mentoring are development, personal development and professional adaptation of future skilled workers in the workplace. It must be acknowledged that successful professional adaptation indicates the appropriate choice of the profession. Also, it helps to develop a positive attitude in the worker to his or her professional activities and reconcile social and personal motivation towards work. At present, mentoring is seen as a factor contributing to the axiological adaptation of young people to a particular profession and involving them in professional culture.

The criteria for their selection include: work experience in the field and at the enterprise; knowledge about the qualification requirements for the profession (field) under mentoring; knowledge about the requirements of legal acts on workplace safety and organizational and administrative documents defining the rights and duties of the employee, the provisions of the collective agreement; specific experience and appropriate qualification required for safe practices in accordance with the requirements of workplace safety; knowledge about the specifics of production at the enterprise; readiness to adopt new technologies, methods of work and information; the necessary organizational and pedagogical skills; knowledge about different teaching methods; ability to control the performance of tasks assigned to the employee; the necessary personal qualities, including discipline, responsibility, sociability; no cases registered against them in terms of violation of work and performance discipline and disciplinary sanction over the past year (Ministry of Social Policy of Ukraine, 2017). It is rather difficult to disagree with these criteria since the change of the mentor's role and functions requires that his or her competencies, being tools for powerful influence on pupils, should be transformed.



The process of professional adaptation has two interdependent sides: professional and sociopsychological. The first is related to the successful completion of vocational training. The second implies becoming part of the production team, adopting and accepting its behavioural norms. During this time, they join professional traditions, comprehend the social importance of their professional activities and shape a stable professional stance at work. They obtain professional knowledge and skills during the first months of industrial training. However, it takes them much time (up to several years sometimes) to learn how to resolve issues related to social and psychological adaptation in the production environment. Although their knowledge, skills and abilities often characterize professional adaptation of young workers, their stable positive attitude towards their professional purpose should not be neglected. Indeed, it much contributes to revealing the creative power of professions. This factor is of particular social and psychological importance for young people. They strive to enrich the content of their work and expand the range of their professional opportunities, and a mentor can help them to do this. Therefore, psychological compatibility of the mentor with the employee is exceptionally essential. It depends on the characteristics of their perception, attention, thinking and emotions. Makarenko indicated, “educators should maintain cooperation with pupils and help them acquire knowledge consciously, rather than make them learn by rote” (Makarenko, 1951).

Mentoring allows one to exchange knowledge, social experience and psychological support for pupils at the workplace and during professional development. The personality of the mentor is key to the successful (or vice versa, destructive) influence of this method on staff development. One’s enthusiasm for teaching is reflected in his or her willingness to share experience, communicate information clearly, sociability and initiative, emotional stability and understanding of pupils’ emotional state. The mentor needs to know the views, beliefs, aspirations, hobbies, interests, affections, temperament, character and other psychological characteristics of pupils. Ushinsky wrote, “The educator should strive to find out about the person who he or she really is, his or her weaknesses, extraordinary and mundane, petty and spiritual needs. The educator must know how the person treats his or her family, society, others and himself or herself” (Ushynskiy, 2004).

The most common methods of mentoring are persuasion, influence and a personal example. The method of persuasion appeals to pupils’ consciousness, mind, prudence, beliefs and values. By way of a personal example, the mentor demonstrates the pattern of adequate behaviour or points to the person whose behaviour may be considered exemplary. This method is intended for the bandwagon effect since it is implemented without stopping the mentor from performing his or her duties. During the entire period of training, the employee remains in employment and continues to solve professional tasks. Moreover, the educational process itself is built on their implementation. Therefore, the problem of eliminating the possible mismatch between pupils’ theoretical training and practical activities is also solved.

The perks of mentoring for adapting and training future skilled workers are undeniable. Indeed, pupils learn in the workplace, gain relevant practical skills and experience, develop teamwork skills, a sense of obligation, social competency and become more mature. A personality-oriented approach to learning allows taking into account the personal characteristics of pupils. At the same time, mentoring helps to simplify and accelerate the process of adaptation in the work environment. It also accelerates the process of comprehending corporate values and a culture of workplace safety, increases pupils’ satisfaction with work. Also, it boosts pupils’ motivation towards acquiring skills and improves an interpersonal and professional interaction between employees. Finally, mentoring can reduce the turnover of personnel at the enterprise and allows pupils to earn decent money and choose a future career.

The defining characteristics of dual vocational training include the creation of an innovative work-study environment in P(V)E schools. An innovative work-study environment is a set of pedagogical, organizational, managerial, programmed, methodological, technological and information conditions and corresponding resources of P(V)E schools and enterprises providing high-quality training of competitive, skilled workers for innovative development of the country’s economy. It is essential to create such work-study environment for dual vocational training in P(V)E schools to ensure the compliance of VET content defined by state standards with the requirements of modern production, innovative technological processes and technical support. One can create it only if the system of skilled workers’ training is based on the partnership between the enterprises and P(V)E schools.

The Modern Professional Education Concept states that a modern educational environment encompasses technological, social and physical surroundings (accessible, innovative, business-oriented, open, inclusive,



value-oriented, developmental, motivating), programmes, technologies, teaching aids and intelligent design which foster the acquisition of lifelong competencies (Cabinet of Ministers of Ukraine, 2019). It should ensure the transition to a systematic introduction of IT in all types of educational activities, the creation of online platforms with educational and methodological materials for learners and educators and the use of e-textbooks, content libraries, SMART complexes, new information technologies, multimedia tools for learning and social, professional networks. Besides, one can observe that high-tech centres and laboratories for training and practice are established, as well as start-ups, simulation centres, educational and production clusters are incorporated in the educational process. All these conditions bring together the content of education and production since technological processes, equipment and production engineering are the source for shaping the content of P(V)E. The latter involves professional knowledge, abilities, skills, whereas general professional, professional and core competencies correspond to the content of specialists' professional activities in production. In P(V)E schools, pupils also study the technologies, equipment and devices used in production. The similarities in activities are reflected in the process of industrial placement and the performance of practical tasks in production following the applicable technological regulations. The similarities in values involve the unity and equivalence of technical, technological, social and humanistic values of the modern specialist, which are also the values of labour, production, science, technology, society and personality.

The creation of an innovative work-study environment in P(V)E schools implies the real involvement of strategic partners, in particular employers, in the development of a new content of P(V)E based on professional standards and competencies; the participation in the establishment of innovative infrastructure of P(V)E schools, as well as control over the quality of professional education. The integration of P(V)E and production aims to provide the labour market with highly qualified personnel and increase the investment attractiveness of P(V)E.

An innovative work-study environment is based on the following ideas: introducing the requirements of professional standards into educational activities and shaping a new content of vocational training on this basis; developing pupils' productive and creative skills so that they can acquire general professional, professional and core competencies required by modern high-tech production; ensuring the investment attractiveness of curricula in P(V)E schools for employers by taking into account their requirements when developing modular competency-based programmes; enhancing accessibility, openness and high quality of modern professional education through the use of modern information and innovative educational technologies; integrating science, education and production, thus ensuring the introduction of the latest industry innovations and equipment into the educational process; developing personnel, economic, methodological, scientific and information resources in P(V)E schools due to the participation of strategic partners.

In addition, employers help to introduce a new content of professional education, which meets the requirements of high-tech production: by developing software and teaching materials which ensure the implementation of P(V)E standards in vocational professions; developing new universal and professional competencies in graduates, adequate to the requirements of the modern labour market (employee loyalty, ability and willingness to work in a team, versatility, flexibility, mobility and adaptability to new types of professional activities; professional creativity, capability for self-study and self-development, independence and responsibility for results; systematic and analytical thinking, ability to apply IT in professional activities); elaborating modular programmes of advanced vocational training and professional development of the unemployed by profession within the framework of an innovative curriculum under contracts with employers and employment services.

Given this, new industry-based information and educational technologies are used. They include the following: the module-based educational process; the project method; case technologies; communicative, reflexive, game technologies; contextual learning. Besides, it has become common to create a system of consulting and scientific and methodological support of teaching staff and leaders of work-study units in the field of development and implementation of modular programmes into dual vocational training. Much attention is paid to the development of professional competency in the administration, teachers and masters of vocational training in P(V)E schools regarding the development of information and communication technologies and monitoring of VET quality.

The application of flexible modular technologies of vocational training under the Concept of P(V)E Development is one of the areas in quality assurance of the labour force. The modular and competency-based approach involves the modular compilation of training in a particular profession, which focuses on learning



outcomes, that is the acquisition of the competencies required to perform professional duties (Anishchenko, 2012). Its implementation makes the elaboration of individual and group training programmes more flexible. Also, it helps to train specialists for the needs of rapidly changing production, create relevant conditions for training specialists both in educational institutions and in production, develop and implement P(V)E standards on the principles of systematicity, flexibility, transparency, continuity and individualization.

In general, the creation of an innovative work-study environment in P(V)E schools under the conditions of dual vocational training makes it possible to ensure the modern quality of vocational training and retraining of workers and specialists for the primary industries with the involvement of social partners; to connect the educational and professional interests of the individual, the needs of the labour market and the scope of training of these specialists; to restore the prestige of vocational professions and recognize the values of practice-oriented education.

The parameters characterizing the quality of such an environment are modality, breadth, intensity, awareness, resilience, emotionality, generality, dominance, coherence, social activity and mobility (Yasvin, 2001). Modality is a typical characteristic of a work-study environment (defined by Korchak as “dogmatic”, “carefree”, “career”, “creative”). Breadth is a structural and content-related characteristic of the environment (it defines structural and functional components of the environment, as well as the organizational culture of P(V)E schools). Intensity is a structural and dynamic characteristic (it shows how well P(V)E schools are provided with material and technical resources and describes the organizational potential of these schools’ management system). Awareness is an integral characteristic of the motivation of all participants in the educational process towards common productive activities and responsibility for their results. Resilience characterizes the stability of the work-study environment over time. Emotionality describes the positive emotions of the participants in the educational process they have when working together, as well as the correlation between emotional and rational aspects of the environment. Generality describes how well the activities of all participants in the educational process are coordinated, which is reflected in the functioning of the work-study environment. Dominance defines the importance of the work-study environment as one of the core values for the participants in the educational process. Coherence identifies the level of influence of the work-study environment on the participants in the educational process and its consistency with the influences of other factors on them. Social activity is the level of socially significant productivity of the work-study environment for the society. Mobility is the ability of the work-study environment to evolve following the demands of the environment where the participants in the educational process operate.

Particular attention should be paid to such factors in the work-study environment as free access of teaching staff and pupils to an appropriate infrastructure and information resources needed for training, as well as educational activities within the curriculum; safety of life and health of pupils and teaching staff in P(V)E schools; satisfaction of pupils’ educational needs and interests; clear and understandable policies and procedures for resolving conflicts.

Another characteristic of dual vocational training of future skilled workers is its compliance with regional infrastructure. Since according to the state policy in the field of P(V)E of Ukraine “Modern Professional (Vocational) Education” up to 2027 (Cabinet of Ministers of Ukraine, 2019), a new model of professional education management expands the powers of regional authorities and councils of professional education, leaders of educational institutions and realizes the mechanisms of interaction between central and local executive authorities and self-government. At the regional level, the following steps should be taken: to analyse labour market (to determine the need for training qualified personnel and placing a regional order); manage and fund activities and develop professional education; organize activities of regional councils of professional education and supervisory boards of P(V)E schools; create a network of P(V)E schools; license P(V)E schools; develop social partnership; provide advanced training for teaching staff.

The developers of this concept believe a regional approach to training human resources can ensure that educational services meet the real needs of the economy, mobilize the intellectual and material resources of the region, identify the state and prospects of economic development taking into account the educational potential of the region.

Under such conditions, it is vital to consider the issues of forecasting regional needs for skilled workers and analyse the regional labour market (marketing and monitoring technologies) and evaluate professional qualifications obtained during non-formal and informal education. To this end, it is necessary to intensify the

participation of businesses in the reproduction of labour resources; to involve social partners in the educational and methodological work of P(V)E schools; to expand the involvement of social partners in conducting regular market research on the dynamics of changing expectations and demands of the market of educational services; to provide prompt scientific and analytical support of management decisions made by leaders of P(V)E schools on the development of social partnership; to develop the marketing of long-term social partnerships of P(V)E schools with various participants in social partnership; to create networks of social partnerships of P(V)E schools at the regional, national and international levels to enhance their prestige in the eyes of target audience and maintain a positive image of P(V)E schools; to strengthen constructive social relationships with graduates and between them as an essential resource for enhancing the quality of educational services and employment for graduates.

Organizational Principles of Dual Education Implementation in Ukraine as a Tool for Providing ESD. The implementation of professional education under sustainable development of society must take into account marketing, dialogical, educational and information aspects. Marketing sees changes in the behaviour of every individual for the sake of balance in decision-making and cost-benefit assessment. Dialogues ensure the establishment of mutual understanding and continuous cooperation between the authorities, non-governmental organizations, business structures, different population groups, individuals. Learning promotes the acquisition of new knowledge, abilities and skills, as well as sustainability in the business, economy and everyday life. Information sharing gives access to information on sustainable development and the state of the environment, as well as specific achievements in this area.

Therefore, successful implementation of dual vocational training as a tool for providing ESD requires that the organizational principles of dual education in P(V)E schools should be specified.

The authors assume that the most relevant of them for P(V)E of Ukraine in terms of ESD are as follows (Kulalaieva, Romanova, & Romanov, 2019): legislative regulation of interaction, functions, duties of all participants in P(V)E; development of models and mechanisms of public-private partnership, in particular cooperation between P(V)E schools and economic entities, which involve appropriate methods of motivation and encouragement of social partners to participate in dual vocational training of future skilled workers; creation of a particular independent platform for systematic monitoring of the labour market both at the state and regional levels and prompt response to its needs, that is targeted professional focus, which involves all participants in P(V)E with clearly defined functions, responsibilities and powers; systematic advanced training of teaching staff which implies mastering the latest production technologies and establishing the institute of mentors; optimization of professional theoretical training of future specialists in P(V)E schools, focused on the use of e-textbooks, educational resources, content libraries, SMART complexes; modernization of facilities in P(V)E schools (technological modernization of workshops and laboratories, creation of regional multidisciplinary resource centres, equipment of educational and practical centres with modern technologies; construction of technological parks); social protection of pupils, which includes decent and safe conditions for training in P(V)E schools and in the workplace, health insurance, appropriate remuneration and adaptation to professional activities.

3. Conclusions

Therefore, the system of dual education, that is at present being launched in Ukraine, is characterized with the following specific features: strengthening the applied component of professional training (provides time, efforts and resources (human, material, financial) optimisation); intellectualization (assures upgrading education content, professional training methods and forming pedagogical personnel of new generation) and individualization of professional training (forces professional training quality rise, demands high competence of masters for industrial training in VET schools and trainers at enterprises); conducting professional training in real working conditions (needs creating the optimal models of interaction for training institutions and enterprises); social partnership development in P(V)E schools (creates possibilities for on time defining new industry and work management technologies); relevance of VET in a P(V)E school to regional infrastructure (realizes interaction mechanisms for central and local authorities of execution and self-governance); introducing mentorship system (development, behaving and professional adaptation for future qualified workers' professional activity); creating innovative education-industrial environment in a P(V)E school (assures



accordance of VET content (defined by state standards) to the demands of modern industry, innovative technological processes and technical supply). The defined confirms that dual education will force the balance for relationship of all education process participants and is one of tools for assuring education for sustainable development.

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