

Monitoring and Usage of Project Technologies in Vocational (Vocational-Technical) Education Institutions

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Abstract: *The article reveals the main results of the ascertaining phase of the experiment of the research project "Methodical principles of developing the project technologies for the professional training of future qualified workers of agrarian, construction and motor transport industries", which consist in the diagnostic analysis of educational project activities in the institutions of vocational (vocational-technical) education. The analysis of the responses of teaching staff of vocational (vocational-technical) education institutions conducted by the authors showed the need to facilitate their readiness to develop project technologies in the training of future qualified workers, the creation of educational and methodological support for project activities in the professional training of students, namely: developing the corresponding methodological recommendations, textbooks etc. The obtained results showed that the teachers are aware of the essence of the project activity in the training of future qualified workers, but not all of them have mastered effective methods and techniques for the application of project technology. Some contradictions were found when teachers noticed the positive influence of such technologies on students' motivation and performance, and at the same time, they argued that these technologies are limited in use. It is determined that the rational application of educational project technologies in vocational (vocational-technical) education institutions promotes the development of the professional competence of the future qualified workers.*

Keywords: *project technology; educational project activity; professional training; vocational (vocational-technical) education institutions; readiness.*

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1. Introduction

The modern orientation of society on sustainable development and a balanced economy places essential requirements for a qualified worker as an active subject who has wide general educational, general technical and professional knowledge, skills and abilities, high qualification, easily orientates oneself in production, is professionally mobile and capable for employment in the labour market. Technological and scientific innovations change our life and direct the receiving knowledge process into industry one which is aimed at developing learning ability of students Accordingly, the use of effective modern technologies is actualized with the aim of forming the key and professional competences of future qualified workers, among which the important place belongs to the project training. This issue of modern education requires methodological substantiation.

The analysis of recent studies and publications. Due to the rapid development of the information and communication technologies, there has been a significant increase of literature regarding their use in teaching activities. Some details on these issues, namely can be also found in the works of M. Karpushyna, I. Bloschynskyi, A. Nakonechna, and K. Skyba (2019) dealing with the enhancement of Ukrainian border guards' training, and using some computer programs to intensify the learning process of these military specialists (Bloschynskyi, 2017a). Such scholar as I. Bloschynskyi also revealed the significance of informational and communication technologies usage during independent foreign language professional training of future Border Guard officers who study on specialty «State border security and protection» according to the first (bachelor) level of training of higher education for passing state examinations. Special attention is given to working out of teaching material (vocabulary decks and cards) for the future border guard officers' training according to the following sections of Anki program: studying of nouns, adjectives, pronouns, verbs, word combinations, expressions for interviewing of foreign citizens, etc. (Bloschynskyi, 2017b).

Besides, network technologies should not be considered as a purely technical phenomenon. Today, they have entered the person's world quite deeply and organically, penetrating into both all socio-cultural practices, up to the everyday life, and his physiological nature. The researcher A.-I. Diaconu (2019) presents interesting ideas about changes in a person's professional sphere. Regarding changes in the network space of education, we should pay attention to the influence of information and network technologies on the participants of the educational interaction because

according to I. Melnychuk, L. Rebukha, T. Zavgrodnia and I. Bloschynskyi (2018), education helps the people “to successfully implement their expertise both in the changing conditions of the modern world and in future professional activities” as it broadens their outlook.

Some scholars also consider that “information exchange and communication media allow us to cover long distances ...”. (Hanaba, Miroshnichenko, Shumovetska, Makohonchuk, Halimov, Bloschynskyi, 2019). The issues of creating warm-up as a means of fostering target-language performance in a particular English class at its initial stage in the form of an interview based on quasi-professional communication have been revealed in the research of (Karpushyna et al., 2019).

Some scholars such as I. Melnychuk, I. Drozdova, I. Savchak, and I. Bloschynskyi (2019) emphasise that higher school instructors’ pedagogical skills need certain improvement according to the changes of the 21st century and its demands in order to become a “basis of educational strategy for development of students’ professional training. Of a particular interest are the research works of the last years of (Ball, 2012; Kobernyk, 2011; Stepaniuk, 2012), in which are reflected the essence and structure of the educational project activity, the conditions of its introduction into the educational process, namely of the vocational education are revealed.

Regarding neuropedagogical issues some authors examined Chinese students’ intercultural adaptation experience in foreign universities that depends on effective interpersonal communication, which improves language proficiency, motivation, and promotes students’ interaction with representatives of foreign cultures. They state that developed by them interviews and questionnaires with the international students were compiled and processed to determine the main problems of adaptation from physiological, socio-psychological, sociocultural, academic points of view (Bilotserkovets et al., 2020).

Other significant study which underlines the principles of online pedagogy and enriches abilities of orthopedically disabled learners including family members provide an example of open resources education within a frame of counseling and guidance. It shows how open education resources could be motivation for social learning within the life as part of the life-long learning philosophy (Altinay et al., 2018). The study by V. Marinescu presents the opinions and attitudes towards on-line set of courses for Romanian students who were enrolled in an on-line learning project in “Area studies” - namely, East Asia Studies (Marinescu, 2017). Concerning neuropsychological researches some authors investigated differences in the formation of personality traits for children with various language disorders

and children who do not have language disorders from a neuropsychological perspective in urban areas (Panisoara et al., 2019).

The **objective of this paper** is to monitor the use of project technology by teachers in vocational (vocational-technical) education institutions during the professional training of future qualified workers.

2. Research Methods

In this study a mixed method approach has been employed: analytical, pedagogical projection, modelling, diagnostic (questioning, testing, expert evaluation); empirical; statistical, pedagogical experiment with different methods of mathematical statistics.

3. Results

Providing high quality professional training for graduates of vocational (vocational-technical) education institutions (V(VI)EI) requires the involvement of each student in productive educational and cognitive activities, the formation in future professionals of such competencies as research, informational, communicative, the ability to independently acquire the latest knowledge and effectively apply it in practice. Project activity as a practical implementation of the idea of productive learning corresponds exactly to such requirements.

Taking into account the relevance and expediency of project training in vocational (vocational-technical) education, in the Institute of Vocational Education and Training of the National Academy of Education Sciences of Ukraine the staff of the Laboratory of Technology for Vocational Education during the years 2016-2018 has been carrying out the research work "Methodical principles of developing the project technology for professional training of future qualified workers of agrarian, construction and motor transport industries". The following methods were used in the research: analysis of philosophical, psychological and pedagogical, educational-methodical literature, normative-legal documents, educational documents and results of educational and production activity of students, synthesis, comparison, classification, systematization and generalization of theoretical and experimental data, simulation, empirical methods (conversation, questioning, method of expert evaluation, pedagogical experiment with quantitative and qualitative analysis of results); statistical methods (frequency analysis, computer tools for statistical processing of experimental data (SPSS statistical package, Microsoft Excel program).

During the theoretical analysis of modern scholarly works on the problem, the essence of the definitions used in the study was formulated and refined. Namely, we view *methodical principles of developing the project technology* as a complex of interconnected and interdependent methods, forms and means of planning, organization, motivation, control, analysis and adjustment of project vocational training aimed at increasing the effectiveness of vocational training of students of V(VI)EI.

Educational project activity in the V(VI)EI is an educational and cognitive independent activity of students with the participation of the teacher as a coordinator, aimed at the result achieved through the solution of a professional task theoretically or practically meaningful for them. The types of project technology include the following (by type of training projects): web quests, research, practice-oriented, creative, role-based projects, etc.

The focus of our research on the development and application of project technology by teaching staff in the training of future qualified workers led to the statement of the problem of the readiness of the teachers and the formation of students' readiness for the project activity.

The *readiness of the teaching staff of vocational-technical education institutions for the project activity* is considered as a coherent internal personal formation, which includes motives, values, professional I-concept, professionally important qualities, professional knowledge, abilities, skills, methods of activity that ensure the effectiveness of this activity. In the structure of the specified readiness, we distinguish the following components: motivational-value (motives and values of this activity, professional orientation of teachers); personal (professional I-concept, personal qualities, self-management ability); cognitive (knowledge about effective technology of project training for vocational (vocational-technical) education, knowledge of the main categories and concepts of project vocational training, knowledge of psychological and pedagogical conditions of application of project professional training technology); activity component (the ability to determine the objectives of the project professional training; to develop project objectives, to motivate and stimulate the students to the project activity in vocational training; to apply various types, methods and forms of project professional training; to establish feedback in the project professional training and to make the appropriate adjustment; form the technological map of the project).

The *readiness of the students of vocational-technical education institutions for the project activity* is defined as a coherent internal personal formation, characterized by their ability to independently acquire the necessary

knowledge, individual and group fulfilment of cognitive, research, design and other tasks that result in the creation of educational products. We have substantiated the structure of such readiness, and determined that it consists of motivational (awareness of the goals, motives of the project activity in professional training); content (knowledge of the essence of the project activity, methods and forms of group interaction) and personality-activity (informational-analytical, organizational, communicative, technological skills, reflexive abilities, etc.) components.

In order to study the readiness of teachers and students for the project activity, the staff of the Laboratory of Vocational Training Technologies of the Institute of Vocational Education and Training of the National Academy of Education Sciences of Ukraine developed an appropriate instrumentarium (questionnaires for teachers and students). To ensure greater objectivity, the surveys were conducted anonymously. To explain the rules of the questionnaire, the participants were offered an instruction. The questionnaires included both open and closed questions, as well as their combination (in closed questions, it was also suggested to indicate, optionally, their own answer).

Taking into account that the research had to cover a large sample of respondents, an on-line survey form was selected using the Google Forms web service. This service makes it possible to place an electronic version of the questionnaire, collect and quickly process the survey results, and also copy the collected material for further processing in special statistical programs, namely SPSS.

In the survey of pedagogical staff of V(VT)EI about the state of using the project technology in teaching activities, took part 2184 teachers from all regions of Ukraine. Among them: 814 teachers of V(VT)EI who train motor transport industry specialists, 1220 V(VT)EI teachers who train construction industry specialists, and 891 V(VT)EI training specialists in the agrarian sector. Given that it is considered enough to engage 400 people for conducting mass surveys (for a tolerance of 5 %), this sample can be considered fully representative.

Among the respondents there were persons of different ages and sexes. Most of the questioned teachers work in professional lyceums (50.4 %), the smallest number (5.1 %) – are in vocational education centres. Among the respondents, the largest part is of those who teach subjects of vocational-practical training (40,83 %), then – vocational-theoretical – (31,2 %), social-humanitarian – (16,1 %), scientific-mathematical – (15,8 %), general vocational – (11,4 %) and physical training – (3,9 %). The survey was attended by teaching staff who have different qualification categories,

pedagogical title/status and work experience, which also confirms the representativeness of the sample of the research.

In the course of the survey, we determined what experience of implementation of the project activity in the training of future qualified workers the teachers of V(VT)EIs have. The summary of the obtained results is presented on Fig. 1.

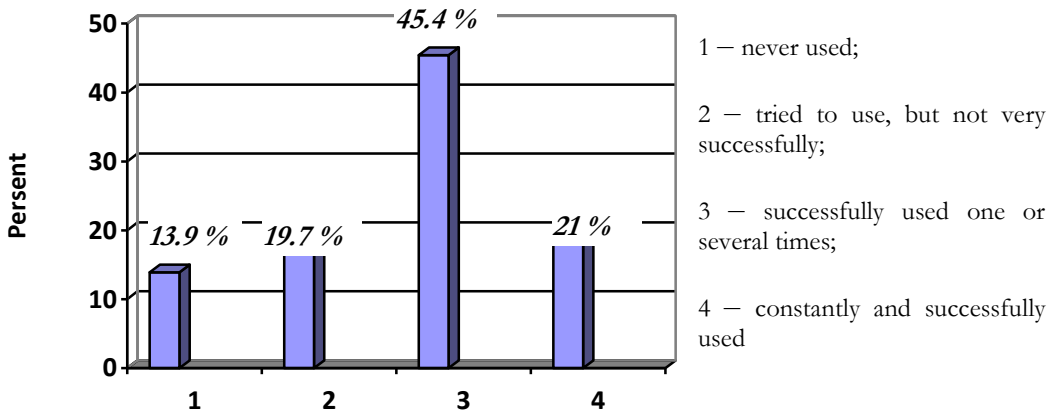


Fig. 1. Distribution of teachers V(VT)EIs by experience of project activity implementation in training of future qualified workers

Therefore, for the majority of teachers the use of project technology is not of a systematic nature. The percentage of teachers who are characterized by a stable successful practice of using such technologies is slightly higher than the number of those who tried to implement project technology in the training of future qualified workers, but did not obtain any positive results. Almost 14 % of the questioned teachers have never used project technology.

Among those pedagogical workers who actively develop, constantly and successfully implement project technology in the training of future specialists, the majority are those who prepare future qualified construction workers (Fig. 2).

By their numbers, the teachers who prepare the future qualified workers of the motor transport sector differ insignificantly, and the least significant this indicator is for teachers who train future qualified workers of the agrarian sector.

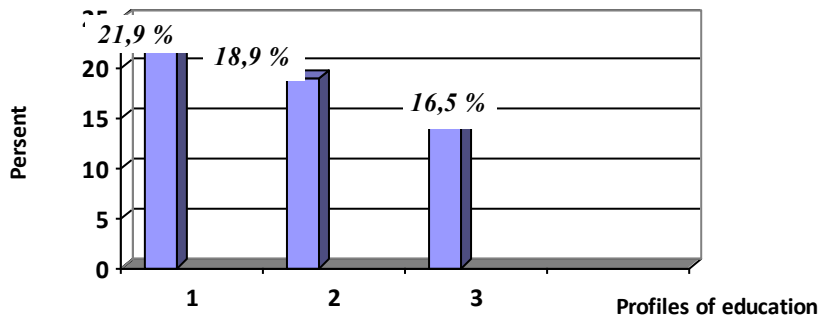


Fig.2. Comparison of the number of teachers V(VT)EIs (in %), who constantly use the project technology according to training specialization of future qualified workers:

1 – construction; 2 – motor transport; 3 – agriculture.

There is a significant divergence in the use of technology of project professional training by teachers of various subjects (Fig. 3).

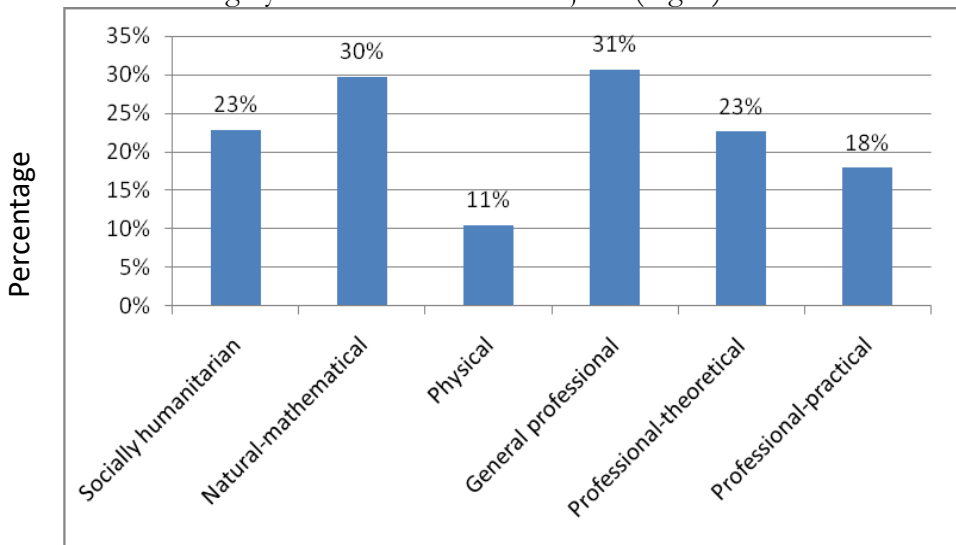


Fig. 3. Comparison of the number of teachers of V(VT)EIs, who constantly use project technology, by professional training (in %)

Much more often, project technology is used by teachers of general-vocational subjects (30.6 %) and scientific-mathematical training (29.7 %), and much less – by physical training teachers (10.5 %). First of all, it is connected with the scope of these subjects, the presence of certain teaching and methodical provision (support).

Interviews with methodologists of the educational (scientific) - methodical centres (cabinets) of vocational-technical education gave the opportunity to make a rating of project technologies by the frequency of their development and use by the teachers of V(VT)EIs:

- 1 – information projects;
- 2 – research projects;
- 3 – practice oriented projects;
- 4 – creative projects;
- 5 – role-based projects;
- 6 – web-quests.

Therefore, most often during the training of future qualified workers, teachers are turning to the development of information projects, the product of implementing which is the educational information that can have a diverse presentation (summary, composition, essay, dictionary, multimedia presentation, etc.). Also, teachers develop research projects, which involves students studying certain phenomena using empirical methods (for instance, questionnaires, interviewing). A lot less frequently during the training of future qualified workers, teachers develop web-quests that involve students solving problems with elements of the role-playing game, for the completing of which Internet resources are used.

Teachers also use research projects in which students study certain phenomena using empirical methods (eg, questionnaires, interviews). Teachers use practice-oriented, social and creative design technologies much less during the professional training of future skilled workers. Especially difficult for them was the use of web-quests, which involve students completing a problem task with elements of a role-playing game, for which the Internet resources are used.

4. Discussion

During the study, we found out the teachers' opinions about the benefits (opportunities) and disadvantages (constraints) of project technologies in the training of future qualified workers. To do this, the questionnaire included open questions. The answers received were grouped

into several categories, which are based on the frequency of such responses (Table. 1).

Table 1. Advantages and capabilities of project technologies in the training of future qualified workers (according to teachers' assessment)

№ /	Categories of answers	Examples of answers
1.	Formation of research skills of students, capability of self-education	<p>Independent research and search activity of students.</p> <p>Developing in students the ability to use research techniques: gathering information, analysing from different points of view, putting forward hypotheses, ability to draw conclusions.</p> <p>Students do not only receive the sum of knowledge. They also learn to acquire knowledge on their own, applying them to solve new cognitive and practical tasks.</p> <p>Students develop cognitive skills and creative thinking; the teacher has the opportunity to rationally distribute his/her time.</p> <p>Students have an ambitious, independent and proactive position in their studies.</p> <p>Development of research, technological and informational competencies in students.</p>
2.	Promoting the professional development of students	<p>Students are better developing thanks to individual work.</p> <p>Students develop critical thinking.</p> <p>Development of students' creativity; advanced learning; opportunity to explore the issue.</p> <p>Students have the opportunity to study some of the discipline issues more deeply, to show initiative.</p>
3.	Teamwork	<p>Better cooperation with students.</p> <p>Group activities.</p> <p>Development of communicative skills, ability to work in a team.</p> <p>Provide an opportunity for students to see the result of team work, to unite through solving the problem at hand.</p>
4.	Increase of the practical orientation of the professional training	<p>Acquisition of practical experience by students.</p> <p>Improvement of vocational and practical training of students.</p>

№ /	Categories of answers	Examples of answers
5.	Ensuring the effectiveness of professional training	Increasing the effectiveness of theoretical and practical vocational training.
6.	Achieving a better mastery of the content of the training material	Promote better perception and memorization by students of learning material. Opportunity for the students to acquire more information.
7.	Motivation, actuation of educational activity	Increase of the motivation of students to study. Students perform feasible and interesting tasks. The students' interest in learning is increasing.
8.	Providing an Individual Approach	Opportunity to implement an individual approach in teaching the students.
9.	Opportunity for creative activity of teachers	Possibility of use in distance learning. Variety of learning forms. Availability and versatility, time saving. The best opportunity in teaching subjects.
10.	Negative answers	Difficult to answer. I do not use it. I do not see the benefits. No benefits.

Therefore, the teachers of V(VT)EIs stated the following advantages of project technology in professional training of future qualified workers: promotion of professional development of students, formation of their professionally important qualities. There are quite a lot of those who paid attention to the greater effectiveness of these technologies in comparison with others, their practical orientation, provision with their help of better mastering of the content of the educational material, the possibility of increasing the individualization of training. At the same time, there were opinions that these technologies have no advantages, although there were few such responses.

The disadvantages of project technology in the training of future qualified workers in general were fewer than advantages, and they were less diverse. They are grouped by frequency of use as follows (Table. 2).

Table 2. Disadvantages and restrictions of project technologies in the training of future qualified workers (according to teachers' assessment)

№ /	Categories of answers	Examples of answers
1.	Insufficient level of material and technical base	Lack of Internet resources. Lack of computer equipment in the classrooms. Insufficient capability of implementation. Problems in access to the Internet. Limited financial security. Insufficient amount of computer, multimedia equipment.
2.	Time limits	Not enough time at the lesson/class. Excessive time consuming. The preparation of the project requires a lot of time (1 – 1,5 months). It takes more time to study a particular topic.
3.	Students' unreadiness	Student's passivity. Weak motivation of students. Lack of interest of students. V(VT)EIs' students need more control from the teacher, so some will simply not perform the task. Students do not always like this teaching method. Possible unequal contribution of students to work. It is difficult to objectively evaluate the work of each student.
4.	Additional complications, teacher's unreadiness	It takes a lot of time to (individually) train students, to prepare them for a new kind of activity, not everyone manages to do it as it should be done. It is necessary to take into account the level of preparation of students and skills of independent work. The need for continuous training and control by the teacher. It is difficult for the teacher to control the learning process, and the result is not always effective. Preparing a project takes a lot of time, and the result does not always justify itself. Students need to adjust to the mutual-learning mechanism. Lack of experience with application of project technology. Not everyone has access to project technology, little awareness.
5.	Features of the	The load of curriculum.

№ /	Categories of answers	Examples of answers
	organization of the learning process, special conditions	Some teachers believe that project technology can be used when teaching only certain subjects, for example, special disciplines. It is difficult for teachers to plan actions related to the project activity.
6.	Negative answers	Difficult to answer. No disadvantages.

It was also noted in future skilled workers that a positive attitude towards project technologies is interrelated with cognitive processes, because the key is the ability to manage emotions so that they not only influence but also guide the learning process. This is facilitated by neuropedagogy (Klementovich, Levanova & Stepanov, 2016). Students need to be taught to be aware of and control their feelings and behavior. It is important that they understand when they are negative or sad and do not know how to control their emotions.

In addition, high levels of stress complicate the learning process, so it is very important to create a favorable learning atmosphere, without stress, and teach students to manage their anxiety. However, to increase the productivity of learning helps not only the ability to manage negative emotions, but also the study of material that can evoke positive emotions. This material is remembered better and for a long time. This is called conscious learning.

5. Conclusions and prospects for further research

The analysis of the answers of the teachers of the V(VT)EIs about the experience of using the project technologies testifies to the need for the readiness of the teaching staff of V(VT)EIs for the project activity in the training of future qualified workers, the development of teaching and methodical support for project training in the professional training of V(VT)EIs students, namely: methodical recommendations, textbooks etc. Most teachers considered as a disadvantage of project technology in the training of future qualified workers the insufficient level of material and technical base (computers, multimedia, Internet access). The problem of inefficient use of these technologies in terms of time constraints is also identified. A significant number of respondents noted the lack of readiness of V(VT)EIs students for the project activity in vocational training, first of all, due to their differences in cognitive, intellectual capabilities, levels of

theoretical and empirical knowledge. Teachers expressed fears that the implementation of the technology, in particular, in aspects of control, organization of work of students, will increase the intensity of their work. It was also mentioned that there is a lack of available competencies of teachers for the implementation of project activities in professional training. In general, the results indicate that teachers are aware of the essence of the project activity in the training of future qualified workers, but not all employ methods and techniques that can increase the productivity of project technology. We also found some contradictions when teachers noticed the positive influence of such technologies on students' motivation and performance, and at the same time, they argued that these technologies are limited in terms of students' interest.

It is determined that most teachers develop and use project technologies in the training of future specialists non-systematically; Only one fifth of the questioned teachers is constantly and successfully developing and using such technologies, among which prevail the ones that train future specialists in the construction industry.

It is established that the most active in the development of project technologies for the training of future qualified workers are the teachers, who teach subjects of general vocational and scientific-mathematical training.

It is revealed that the potential of project technologies for the training of qualified workers in the motor transport, construction, and agrarian sectors is not fully exploited: preference is given to certain types of projects, in particular informational; insufficient attention is paid to the development and application of interdisciplinary projects, and IT capabilities are not fully used.

To the directions of further research, we adhere educational and methodological support of the project activity in the V(VT)EIs, the training of teachers for it, as well as the spread of the successful experience of its implementation in the system of vocational (vocational-technical) education in Ukraine.

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