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THE ROLE OF TRAINING MATERIALS IN IMPROVING THE QUALITY OF VOCATIONAL EDUCATION AND TRAINING: PREVIOUS EXPERIENCE AND CURRENT STATE

Abstract. Vocational education and training (VET) is an integral part of the Ukrainian educational system and an important component of the country's reconstruction both now and in the long term, due to the large-scale Russian invasion of Ukraine. Given this, VET institutions in Ukraine should adapt to the unfavourable conditions of the ongoing Russian-Ukrainian war and train qualified workers in accordance with the requirements of the current labor market. As a result of the martial law in Ukraine, starting on February 24, 2022, VET institutions subsequently switched to distance learning, and then, depending on the security situation in the certain region, provide educational services in three different formats (full-time, distance and mixed). By that time, Ukrainian students already had experienced distance learning due to the COVID-19 pandemic and the introduction of quarantine measures, so this was not a new challenge for most participants in the educational process. However, other problems that had existed in providing quality VET for some time before have crystallized. It is about the proper methodological support of the educational process, one of the main components of which is the availability of the required educational materials. The working hypothesis of this article is that one of the key factors influencing the provision of quality educational services in the VET system is the availability and accessibility of training materials (textbooks), which should be up-to-date, reflect the current needs of society and take into account the needs of the business sector. To test this hypothesis, the article analyzes in detail the survey covering 25 Regional Educational and Methodological Centers of Vocational Education in Ukraine, which was conducted by the authors in 2020. The study found, among other things, that it was an imbalance between the available number of textbooks and the real need for quality educational literature in a number of professions; nearly 50% of vocational training textbooks were outdated and did not reflect trends and changes in the relevant sectors; some textbooks were published in Russian in the Soviet era etc. However, in recent years, the situation with the provision of materials for VET education and its accessibility has improved significantly, and today the vast majority of educational materials are available online and are concentrated on several electronic platforms. In order to facilitate and increase the efficiency of further use of educational literature, the authors

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propose to create a unified e-platform for VET, which will host training materials (textbooks) not only in Ukrainian, but also English-language resources that have proven to be of high quality, in particular, from EU countries.

Keywords: vocational education and training, training materials, textbooks, skilled workers, wartime period.

JEL classification: I21, I28, C10.

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In recent years, Ukraine has been implementing wide-ranging reforms in the field of vocational education and training (VET), aimed primarily at popularizing this level of education; developing public-private partnerships and meeting the regional labor market needs of highly skilled professionals. The reforms were also focused on decentralizing the management and financing of the VET system and developing it based on the best EU and world practices. The achievement of the stated objectives requires the improvement of the content and quality of VET, an important component of which is the quality of modern training materials.

During the period since Ukraine gained independence, namely more than 30 years, the country's VET system has changed significantly. As statistics show, the number of VET institutions has decreased by 576, or by almost 54% (in 1991 there were 1246 VET institutions, at the beginning of 2023 – 670). This situation was mainly due to the reorganization of these educational institutions and the deterioration of the social and economic situation in Ukraine. As a result, according to the data of the State Statistics Service of Ukraine, the total number of VET students as of January 01, 2023, amounted to 230 474 persons, of whom 107 591 were admitted in 2022. Given

this, the number of VET teachers was reduced to 30 201 as of January 1, 2023.

Since February 24, 2022, as a result of the full-scale invasion of Ukraine by Russia, vocational education in Ukraine has been operating under difficult martial law conditions. VET institutions, as well as institutions of other educational levels, carry out educational activities in the full-time, distance or mixed format, depending on the security situation in the regions, guided by the recommendations of the Ministry of Education and Science of Ukraine [1]. According to the operational information of the Departments of Education and Science of the Regional and Kyiv city-military administrations, at the beginning of the academic year 2022/2023, most VET institutions (326 institutions, or 56%) provided the educational process in a mixed format, 176 institutions (30%) – only distance and 77 institutions (13%) – full-time (Fig. 1). As of January 1, 2023, the number of VET institutions providing education in a mixed format decreased by 43 units (283 institutions, or 49%), however, the number of VET institutions providing education only remotely increased by 3 units (179 institutions, 31%) and only full-time – by 37 units (114 institutions, 20%).

The dominant form of organization of the educational process in the VET system was mixed form, i.e. a kind

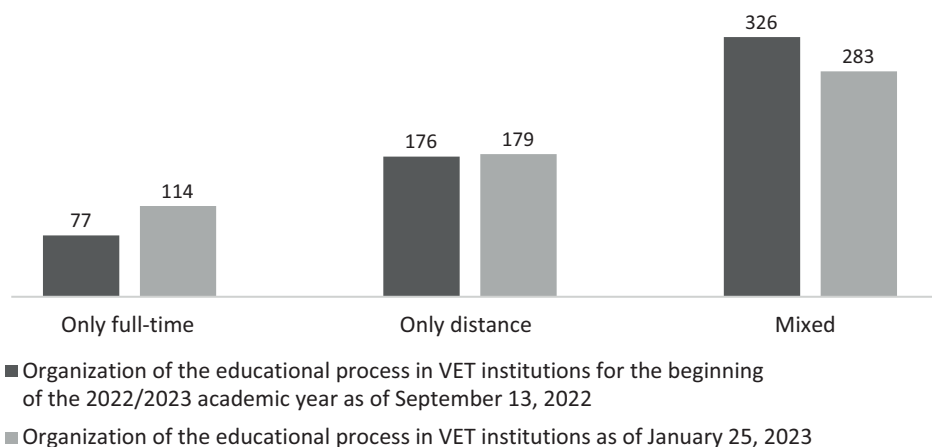


Fig. 1. The number of VET institutions providing training as of September 13, 2022 and as of January 25, 2023, units

Compiled by the authors based on operational information from the Departments of Education and Science of the Regional and Kyiv city military administrations.

of combination of face-to-face and online meetings of participants in the educational process. A mixed form of training in VET institutions necessitates the transformation of interrelated key components of learning: technologies, techniques and methods of learning [2, p.118]. In particular, one of the priority tasks in the process of training skilled workers in modern conditions of mixed learning is to provide students with modern publications (textbooks). Primarily we are talking about the use of electronic textbooks, the advantages of which include, inter alia, the convenience of use in mixed and distance forms of training, the ability to ensure individualization of students' work with the content of the textbook (which can be prepared and automatically corrected by the software for formative assessment of students), the introduction of interactive interaction of participants in the educational process with the textbook, etc. These aspects develop

the cognitive interest of students, provide visualization and simplicity of presentation of educational material, and contribute to the formation of key competencies of students, as well as their digital literacy and communication skills [2, p. 120].

It is important to emphasize that since 2015, the training of qualified workers in the Ukrainian VET education system is based on the Ukrainian State standards for vocational education grounded in modular and competency-based education approaches. State VET standards were developed in accordance with Ukrainian legislation and the EU Framework Programme on Key Competences for Continuing Education, approved by the European Commission on 17 January 2018 [3]. To date, 239 standards have been approved in Ukraine on a competency basis for the training of specialists in working professions. However, a significant negative factor, according to the researchers [4], is the

discrepancies in the quality of the VET to the requirements of employers, on the one hand, and the incompatibility of the education content and teaching methods with the demand of the labor market and the needs of the individual, on the other. The renewal of the VET content in Ukraine is not sufficiently dynamic and has fallen far behind the rapid changes in economic sectors. Therefore, one of the national strategic priorities for the development of VET until 2023 was to ensure that its content and quality meet the needs of the modern labor market [5].

Modern educational and methodological support is necessary to ensure that a future skilled worker has an appropriate level of knowledge, skills and abilities. However, the content and methodology for training qualified specialists in the VET system in Ukraine lag behind the world's best trends. In addition, the licensing procedure for new VET specializations is quite complex [6]. In addition, the literature review indicated that very often educational literature used to train qualified specialists in any profession was published much earlier than the relevant VET standard, sometimes in Russian (since there was no equivalent of a specific textbook in Ukraine). Most of the titles of the textbooks did not correspond to the teaching discipline and hence do not fully correspond to its content [7].

Since 2010, Ukraine has been an active participant in the Turin process of monitoring and analyzing VET policy using evidence-based data. The results of the last round of the Turin process, which took place in Ukraine between 2018 and 2019, revealed that there was a shortage of modern

Ukrainian-language textbooks in VET institutions that reflect changes in the social and economic life of Ukrainian society in the corresponding branches of production and services [8, p. 68]. Many professions in which skilled workers were trained were not provided with modern textbooks in Ukrainian following the requirements of the current VET standards.

In the context of these problems, it is important to study the qualitative and quantitative issues of VET in Ukraine in terms of the use of textbooks for training skilled workers, taking into account the challenges posed by the economic situation and changing labor market needs. The terms "quality" and "quality assurance of vocational training and education" cannot be defined exhaustively and comprehensively. Rather, it is a social construct whose interpretation depends on the values, objectives, stakeholder resources, and the overall context. In the VET system, quality is sometimes expressed in compliance with certain standards (professional qualification and educational standards, etc.), i.e. the set of knowledge, skills, and abilities that a person must possess in order to perform a particular function or occupation.

VET quality assurance is an attempt to ensure that the system and its participants (i.e. VET institutions) can provide services that meet these standards on an ongoing basis [9]. In the documents "Assuring Quality in vocational education and Training. The role of accrediting VET providers" [10, p. 199] and "Promoting quality assurance in vocational education and training the ETF approach" [11, p. 51] developed by the European Centre for the Development of Vocational

Training (Cedefop) and the European Training Foundation, respectively, the concept "quality" refers to the set of characteristics that affect the ability to meet the stated needs and requirements that were meant.

Hence, VET quality assurance programs and tools can focus on various aspects where factors are considered important in the activities of VET institutions responsible for providing relevant education services. One of the supporting tools of the European Quality Assurance Framework is a set of defined indicators that can be used by countries to ensure quality in the VET system: the relevance of quality assurance systems for VET providers; investment in teacher and master training; level of participation in VET programs; level of completion of VET programs; application of acquired skills in the workplace; unemployment rate; spread of vulnerable groups; mechanisms to identify training needs in the labor market; schemes to improve access to EQAVET (European Quality Assurance in Vocational Education and Training) [12].

These indicators were used by the Ministry of Education and Science of Ukraine in the preparation of methodological recommendations for the development of an internal quality assurance system of education in VET institutions [13]. In this paper, one of the components of VET quality assurance is the creation of an educational environment that encourages education applicants to acquire common professional and key competencies and interdisciplinary skills, as well as a healthy lifestyle. Also, a space for information interaction and socio-cultural communication among

participants in the educational process, such as a library, an Information and Resource Centre, etc., should be created in the educational institution. The following, in particular, are highlighted as key components of VET quality assurance: the educational institution meets the technological requirements for the teaching and methodological support of educational activities, and the resources of the library/Information and Resource Centre are used to develop the information and communication competence of the education applicants.

Given the fact that this article suggests that one of the key factors influencing the provision of quality educational services in the VET system is the availability and accessibility of training materials (textbooks), which should be up-to-date, reflect the current needs of society, labor market, and needs of business, it is advisable to conduct a literature review on this issue. Another important thing is that quality assurance for skilled workers depends, among other things, on the availability of high-quality training materials for students [14; 15].

The new paradigm of vocational education has determined the need to develop a pedagogical and psychological system for organizing the educational and cognitive activities of students, which should be based not only on innovation in this field of knowledge, skills and competencies, but also be technological, enabling the transition from teaching to self-learning [16; 17]. The main instrument of the VET is the development of the competencies required for the performance of professional duties. At present, it is not possible to imagine studying VET without qualification studies covering,

on the one hand, labor, production, basic skills, and, on the other hand, curriculum development [18].

The availability of quality, up-to-date and accessible textbooks is one of the important and popular aspects of curriculum development and learning processes. One of the reasons for this popularity is that educational publications offer teachers a specific set of guidelines and activities to be followed. It is often believed that textbooks can contribute to curriculum change by helping teachers to improve the learning process [19].

A review of the literature on issues similar to those raised in this article has enabled us to identify some publications that are most useful to the hypothesis and key findings of the study. Thus, Novota et al. [20], note that the rapid development of science and technology has revealed high standards for graduates of educational institutions. In this context, the education system must prepare graduates to enter the labor market. However, there is a downward trend from year to year in the level of training of VET graduates. One of the reasons for the low level of education is the lack of quality textbooks. It is therefore necessary to provide textbooks of the highest quality in terms of both context and teaching to ensure the expected level of education. The textbook should contain not only encyclopedic information, but also be attractive to students and offer them an interesting way of learning, motivate students to work systematically, set individual learning rates, and encourage students to develop reading skills and creative thinking. Based on a survey of students in VET institutions in Slovakia, the authors state that a printed textbook

is now the main training tool among Slovak students. The authors conclude that electronic textbooks cannot replace written ones, but only supplement them.

In an article examining Hungarian textbooks in fashion issues published for Hungarian fashion design students, Csanák [21] analyzes book content, expert estimates, sales statistics, and accessibility in libraries. The analysis concluded that the availability of high-quality teaching materials in VET is a guarantee that students will acquire knowledge that meets the requirements of the labor market. A similar opinion is held by Kmecová [22]. Studying the effectiveness of school education based on textbook comparisons, the author notes that the main purpose of education is to prepare students for life, prepare graduates, with a certain professional profile, and who can express themselves in real life. In this sense, the only way such training can be provided is through the use of high-quality theoretical and practical teaching components, namely textbooks and teaching materials.

In assessing the quality of textbooks by experimental, expert and statistical methods, the author concludes that providing educational institutions with new textbooks created in accordance with new advances in science and technology plays an important role in achieving educational goals. In the teaching of professional subjects, it is recommended to constantly evaluate the quality of textbooks based on the results of the educational process, to monitor the didactic effectiveness of textbooks, and to determine which educational function of individual textbooks does not correspond to the expected quality. I. Kmecová shares the opinion of the authors of this

article that the introduction of new textbooks and teaching materials can improve the quality and efficiency of the educational process. In analyzing the process of adopting textbooks to the learning process, Dragana M. Gak [23] argues that there is no textbook perfect for every teacher, for every group of students, and in every learning situation. Depending on how the textbooks are used (under what conditions), there are both advantages and disadvantages of working with them in the course of the study, and the article presents a list of the most typical of them. What one teacher sees as an advantage may be a disadvantage for another. According to the scientist, the main advantage is that the textbook is the program of the course, it defines the subject, the way of studying information in a certain direction. Students receive a road map of the course, knowing what and in what order will be taught. The textbook contains a set of visual recommendations, exercises, reading materials, etc., optimizing the teacher's time when searching for or developing educational material. It also serves as a basis for assessing the student's performance in learning, as many of them contain tests, questions for monitoring knowledge, etc. Training publications may also contain additional supporting materials such as a teacher's guide, a video, a CD, worksheets, and others. Among the most common shortcomings of textbooks, experts note the following: the contents and examples do not correspond to real conditions, do not reflect the interests and needs of the applicants; the information is in a language that does not correspond to the original; the content is not in line with the curriculum and is boring; the

teacher has problems with the use of the textbook, for example, because of the lack of exercise, outdated content, long process of adaptation to the curriculum, etc. [24].

Adapting the textbook to the real needs of education applicants is a complex and time-consuming process. Given the above, Dragana M. Gak invites teachers to use textbooks as a guide to action, while creatively changing, evaluating, developing, eliminating, or supplementing existing material with additional resources and regularly assessing applicants' satisfaction with textbooks [25]. This approach is the key to the successful acquisition of the necessary competencies for successful further employment.

Without high-quality, modern teaching and methodological support, it is impossible to prepare a competitive skilled worker capable of fully developing his or her skills in the future. To sum up, the success of VET graduates in the labor market consists of the following points: VET students acquire the skills needed by employers; VET provides decent employment; VET ensures vocational training in professions that are in high demand in the labor market; quality VET offers good career opportunities [25]. The chosen profession also plays an important role, as usual, a person wants to do what he or she likes and tries to succeed in his career [26].

When studying issues related to VET quality assurance in Ukraine about textbooks used to train skilled workers, authors pay particular attention to professions that are popular among students. It should be noted that the professions currently mastered by students of VET institutions are integrated (expanded) and offer a wider

range of employment opportunities. For example, a student who acquires the main profession of "agricultural tractor driver" simultaneously acquires such professions as "locksmith-repairman" and "motor vehicle driver". In addition to the main profession of "hairdresser (hairdresser-designer)", "manicurist" or "makeup artist" are simultaneously acquired [27]. Therefore, the content of textbooks used by VET applicants should reflect the integrated nature of the profession, providing as much information as possible on both the main and related professions.

To achieve the purpose of this study, we will consider the research issues, which can be conditionally divided into two stages: before 2020 (when the authors conducted an empirical study on the availability of textbooks in VET institutions) and the post-2020 stage, which involves an overview of the main trends in educational policy in the Ukrainian VET system (which coincided with such crisis periods as the coronavirus pandemic and Russia's armed invasion of Ukraine).

In August-October 2020, the authors conducted a study on the needs and availability of textbooks for VET institutions, which should be analyzed in more detail to better reflect the current situation. As a result, information was collected towards which textbooks (printed, electronic, both printed and electronic) were used to ensure the educational process of training skilled workers, which textbooks were not available, and which need to be developed. The study was conducted through a questionnaire using Google Forms. These forms consisted of three modules, each of which was designed to provide reliable data on the training

materials used in Ukrainian VET institutions. The questionnaires were three Excel-format tables filled in by the staff (responsible persons) of the Regional Training and Methodological Centres of VET in Ukraine (namely, the title of the profession, the title of the textbook, the author (authors collective), and the year of publication) in terms of the following three modules:

- *module 1*: data on the availability of vocational training textbooks for students;
- *module 2*: data on vocational training textbooks not available for students but already published;
- *module 3*: data on vocational training textbooks that do not exist and need to be developed for students.

Thus, printed, electronic, as well as both printed and electronic textbooks on vocational training were studied in the context of the above-mentioned three modules. Electronic, as well as both electronic and printed publications, were included in the study, as they were widely used in the VET system to support distance learning [28].

By type of questions used in the survey, all questions were open-ended.

Module 1 "Available vocational training textbooks for students". The purpose of this part of the survey was to find out which training textbooks (printed, electronic, both printed and electronic) were used to support the educational process by profession, to determine their number, year of publication and level of provision of textbooks to students.

In module 1, respondents were asked to provide the following information:

1. Name of the profession.
2. Title of the textbook.
3. The author (author's collective) of the textbook.

4. Type of publication (printed, electronic, both printed and electronic).

5. Year of publication.

6. Level of students' provision with textbooks, %.

The latter was calculated by the formula:

$$x = 100a/b, \quad (1)$$

where x – the level of students' provision with textbooks (%); a – the actual availability of vocational training textbooks (number of copies); b – number of students studying the subject (persons).

Module 2. "Vocational training textbooks not available for students but already published". This part of the survey aimed to identify which vocational training textbooks (printed, electronic, both printed and electronic) are insufficient to prepare students for their professions.

Module 2 asked respondents to indicate:

1. Name of the profession.

2. Title of the textbook.

3. The author (author's collective) of the textbook.

4. Type of publication (printed, electronic, both printed and electronic).

5. Year of publication.

6. The current need for vocational training textbooks, number of copies.

The current need for a vocational training textbook is calculated by the formula:

$$y = b - a, \quad (2)$$

where y – the current need for vocational training textbooks (*number of copies*); a – the actual availability of vocational training textbooks (number of copies); b – number of students studying the subject (persons).

Module 3. "Vocational training textbooks that do not exist and need to be developed". The purpose of this part

of the survey was to find out which textbooks (printed, electronic, both printed and electronic) currently need to be developed.

In module 3, respondents were asked to provide the following information:

1. Name of the profession.

2. Title of the textbook.

3. The author (author's collective) of the textbook.

4. The current need for vocational training textbooks, number of copies.

The current need for a textbook for vocational training was calculated according to the formula (2).

The target group of the survey covered twenty-five Regional Training and Methodological Centres of vocational education in Ukraine (except the Autonomous Republic of Crimea and the temporarily occupied territories of the Donetsk and Luhansk regions), 710 VET institutions, 5020 teachers for vocational training. It should be noted that the Regional Training and Methodological Centres of Vocational Education were chosen as the target group since these Centres provide information support for the educational, training, and production processes in VET institutions. The process of collecting information on the questionnaire forms is presented in Fig. 2.

According to Fig. 2, the process of collecting information for the three modules, which consisted of questionnaires, was as follows.

1. Questionnaire forms were sent as an official letter from the Directorate of Vocational Education of the Ministry of Education and Science of Ukraine to the Regional Training and Methodological Centres of vocational education. The content of the modules, the form of submission, and the written explanation

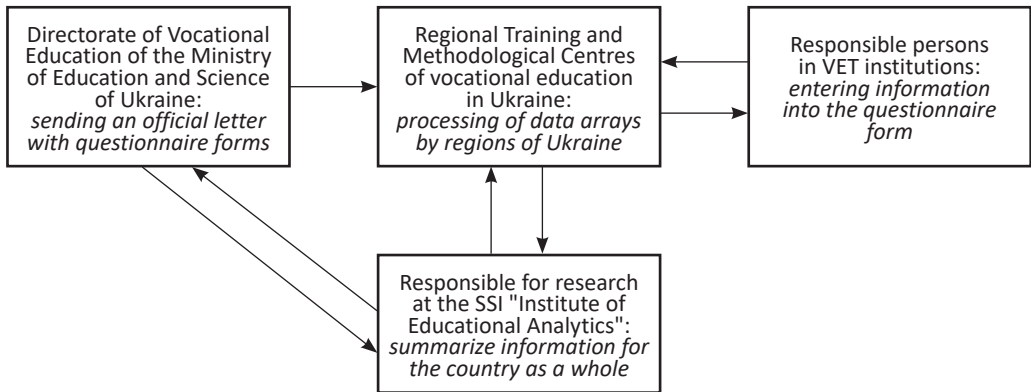


Fig. 2. The process of collecting information on questionnaire forms

Compiled by the authors.

of the accuracy of the information required were developed by the authors of this manuscript and agreed with the above-mentioned Directorate.

2. The received letter with questionnaire forms was forwarded to the Regional Training and Methodological Centres of vocational education to VET institutions in their regions.

3. The responsible persons in VET institutions (namely, deputy directors of teaching and educational work) provided the relevant information and prepared a report on the institution in Excel (.xlsx) format, and sent the result to the Regional Training and Methodological Centres of vocational education of their region.

4. Regional Training and Methodological Centres of vocational education created a report by region in .xlsx format and sent information by e-mail to the SSI "Institute of Educational Analytics".

5. The authors of this manuscript – researchers of the SSI "Institute of Educational Analytics" responsible for this study, finalized and aggregated the dataset for the three modules discussed above.

As was previously mentioned, the survey was conducted between August

and October 2020. By pre-filtering the names of the textbook title tables (in .xlsx format), it was found that textbooks for general subjects such as economics, mathematics, general electrical engineering, general safety at work, etc., were mentioned in addition to vocational textbooks. A similar situation arose with the indicator "Author or author's collective", the field of which was not filled in each column of the table. Therefore, special attention was paid to filtering, avoiding repetition, and removing empty table cells to create an objective picture of the provision of textbooks.

Dataset analysis for module 1 "Available vocational training textbooks". The generalized schematic result for module 1 is shown in Fig. 3.

According to the section "Name of the profession", 82 professions were identified, including 25 professions of national importance, the list of which is determined by the Government of Ukraine. These professions are the most scarce, unique in the national labor market, and in demand among employers.

Concerning the indicator "Title of the textbook" used to provide vocational

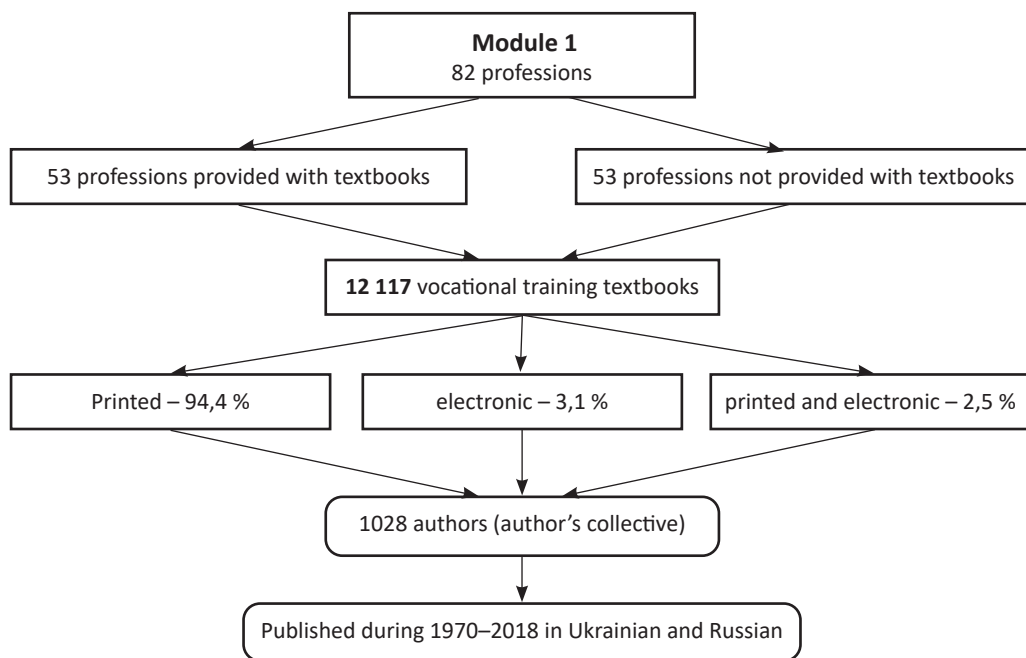


Fig. 3. Summary result for module 1 "Available vocational training textbooks"

Compiled by the authors.

training by profession, respondents indicated 12117 titles of vocational training textbooks, which were used to train skilled workers. The vast majority of these textbooks were printed publications – 11442 (94,4%), the number of electronic was 374 (3,1%) and only 301 (2,5%) were available in both electronic and printed format.

These 12117 titles of textbooks on vocational training according to the characteristic "Author or author's collective" belonged to 1028 authors (author's collectives). According to the respondents' answers about the year of publication, these textbooks were published during 1970–2018 and were devoted mainly to cooking technology, construction, and repair of cars, tractors, and basic welding.

Regarding the level of availability of textbooks, it is estimated that 53 out of

82 professions were covered by 100% of textbooks.

At the same time, these professions were provided with textbooks only for 50%: "office worker (accounting)", "accountant for registration of accounting data", "cheesemaker", "jeweler". 38% of students were provided with textbooks for the profession of "landscaper". The study recorded a shortage of textbooks on professions such as "offset flatbed printer" (34,1%), "operator on artificial insemination of animals and poultry; veterinary nurse" (26%). The worst situation was revealed within the profession of "window decorator, painter, florist", where the level of provision with textbooks was only 7,8%.

To illustrate the outcomes of the three modules and to draw further analytical conclusions, it is necessary to focus on

the most popular occupations among students in VET institutions out of the 82 professions identified in Module 1, among which were also the most popular professions among students which are of national importance.

As shown in Fig. 4, in 2020, the 10 most popular among students professions in VET institutions were the following: "cook", "motor vehicle driver", "confectioner", "wheeled vehicle mechanic", "agricultural tractor driver", "electric gas welder", "hairstylist", "agricultural machine mechanic", "plasterer", and "manual welder". In this context, attention should be drawn to the

fact that the professions most popular among students are characterized by a high rate of self-employment, i.e., they allow a person to work independently and earn high salaries. More recently, according to OECD, individual self-employment has been associated with the development of a free-wage economy and alternative forms of work. More than half of all workers in developing countries are self-employed [29–31]. For example, a hairstylist or a plasterer provides services to a client and receives a salary "in an envelope", i.e., they receive a fee for the work they have done directly. This fact is quite

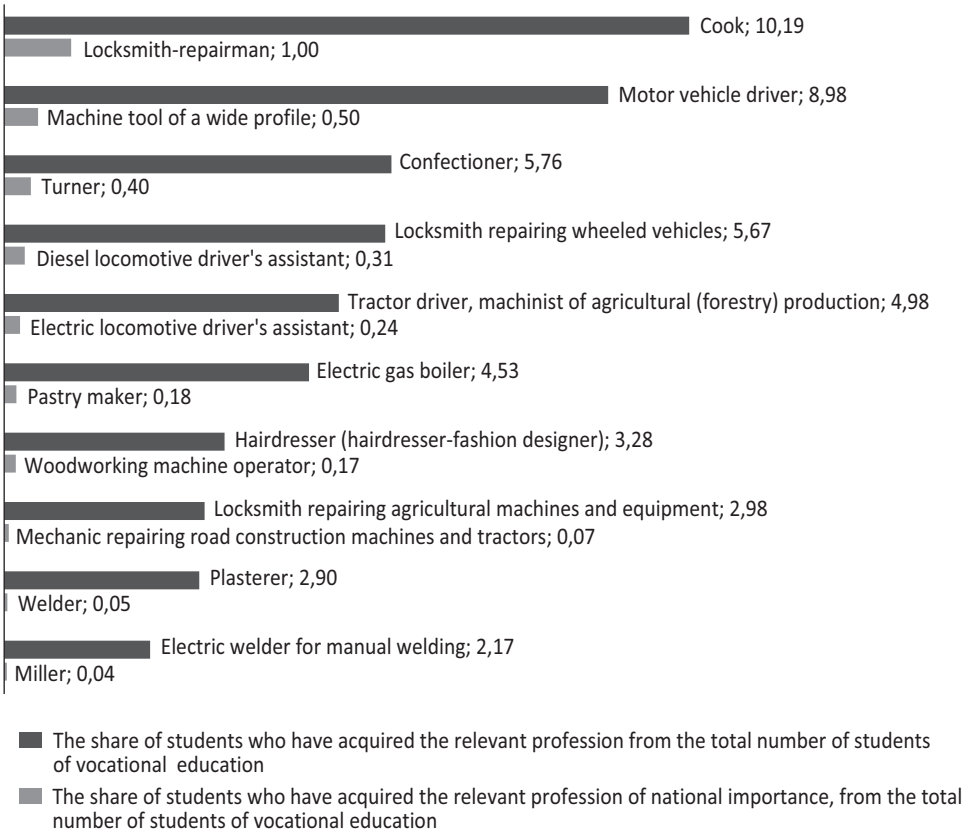


Fig. 4. Proportions of students who have acquired a certain most popular profession and a certain most popular profession of national importance, in the total number of students of VET institutions, %

Compiled by the authors.

common in the Ukrainian labor market, the regulation of which requires the introduction of effective regulatory and legal mechanisms.

The 10 most popular among students professions of national importance are "locksmith-repairman", "machine operator of a wide profile", "turner", "assistant driver of a diesel locomotive", "assistant driver of an electric locomotive", "baker", "woodworking machine operator", "repairman of road construction machines and tractors", "welder", "miller". Hence, from the total number of graduates of vocational schools in 2020, 51,4% studied in the 10 most popular professions, and only 2,9% – in the 10 most popular professions of national importance. It should be noted that these most

popular professions (generally among students and of national importance) were provided with vocational training textbooks at 100%.

The generalization of the dataset for *module 2 "Vocational training textbooks not available for students but already published"* is presented in Fig. 5.

According to the section "Name of the profession" 79 professions were identified out of 82 specified in module 1. The respondents' replies on the names of textbooks, which are not available but already published, showed that 4326 VET textbooks were required to support the educational process. Of these, 3463 (80,1%) are printed publications, 270 (6,2%) – electronic and 593 (13,7%) are both printed and electronic publications. The above-mentioned

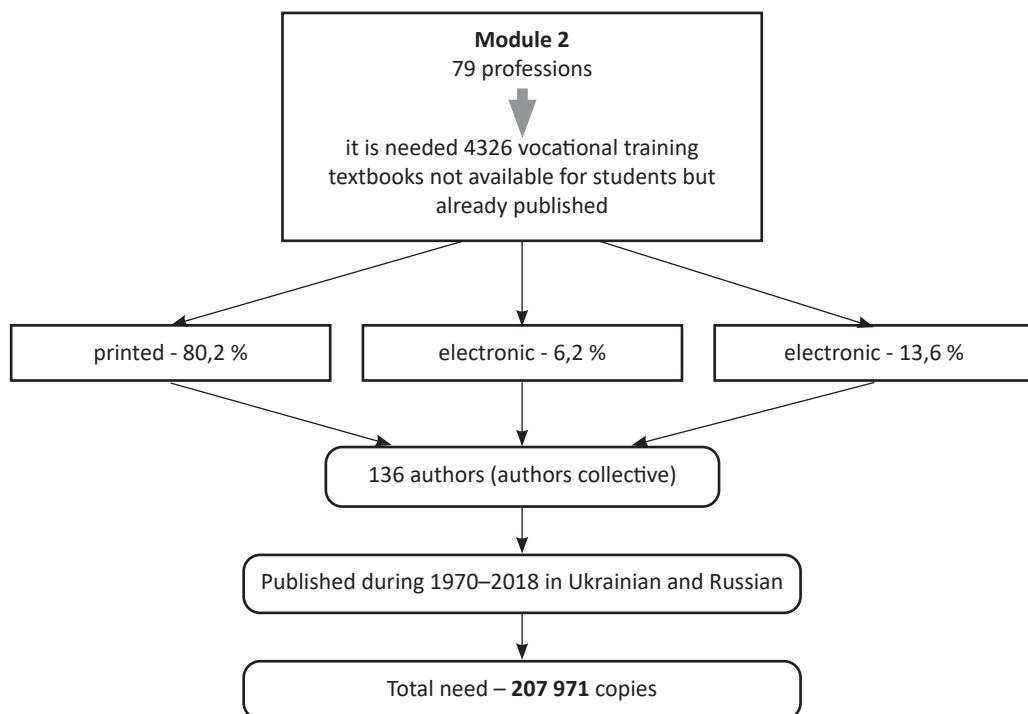


Fig. 5. Summary result for module 2 "Vocational training textbooks not available for students but already published"

Compiled by the authors.

textbooks on vocational training belong to 136 authors (authors' collectives), these editions were published during 1970–2020 in russian and Ukrainian. The total need for textbooks that exist but were not available amounted to 207971 copies.

Information on the need for vocational training textbooks, which have already been published but were not available for the 10 most popular professions among students (Table 1) and the 10 most popular professions of national importance (Table 2) is described below.

As can be seen from Tables 1 and 2, more than 5000 up-to-date textbooks were required to train skilled workers in the most popular professions (generally among students and of national importance), which should reflect the latest technological developments in

engineering, construction, food processing, metalworking, and agro-industry.

Dataset analysis for *module 3* "Vocational training textbooks that do not exist and need to be developed". The generalized schematic result for module 3 is shown in Fig. 6.

In the "Name of the profession" section, 75 professions out of 82 specified in module 1 were identified. Respondents' responses on the names of textbooks that do not exist and need to be developed indicated that 2218 vocational training textbooks need to be developed to support the educational process. In particular, the number of printed publications was 987 (44,5%), electronic – 104 (4,6%), and 1127 (50,8%) – both printed and electronic publications.

The total need for vocational training textbooks, which were not available

Table 1

Information on the vocational training textbooks, which have already been published but were not available for VET students according to the most popular professions as of 2020

№	The most popular professions among students	Title of the textbook used for vocational training by profession	Type of publication	Year of publication	Current need, number of copies
1	Cook	Ukrainian cuisine	Print	2018	1300
2	Motor vehicle driver	Driver's manual	Print	2019	350
3	Agricultural tractor driver	Industry technology and technical means of railway transport	Print and electronic	2007	400
4	Wheeled vehicle mechanic	Maintenance of the car and electrical equipment	Print	2018	470
5	Confectioner	Technology of flour confectionery production	Print and electronic	2018	260
6	Electric gas welder	Manual arc welding	Print	2006	180
7	Hairdresser (Hair-designer)	Sanitation and hygiene of hairdressing	Print	2010	643
8	Agricultural machine mechanic	Agrotechnology	Print	2019	59
9	Plasterer	Building materials science	Print	2019	450
10	Manual welder	Electric arc welding technologies	Print	2006	140
Total number					4 252

Compiled by the authors.

Table 2

Information on the need for vocational training textbooks, which have already been published but are not available for VET students according to the most popular professions of the national importance as of 2020

№	The most popular professions among students	Title of the textbook used for vocational training by profession	Type of publication	Year of publication	Current need, number of copies
1	Locksmith-repairman	Locksmith business	Print	2020	350
2	Machine operator of a wide profile	Fundamentals of the theory of metal cutting	Print	2020	80
3	Turner	Turning business	Print	2019	50
4	The assistant driver of an electric locomotive	Diesel locomotives and diesel trains	Print	2011	120
5	The assistant driver of a diesel locomotive	Tolerances, landings, and technical measurements	Print and electronic	2019	120
6	Baker	The technology of production of bakery and flour confectionery	Print	2019	150
7	Woodworking machine operator	General-purpose woodworking machines	Print	2016	25
8	Repairman of road construction machines and tractors	Road cars: manual	Print and electronic	2013	30
9	Welder	Equipment and technologies of welding works	Print	2019	50
10	Miller	Turner, 2nd category	Electronic	2006	25
Total number					1 000

Compiled by the authors.

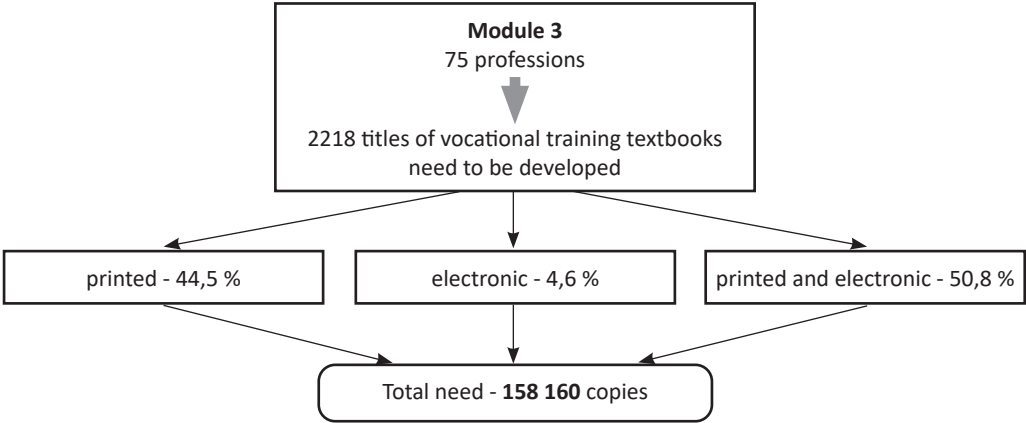


Fig. 6. Summary result for module 3 "Vocational training textbooks that do not exist and need to be developed"

Compiled by the authors.

but need to be developed, was 158160. Table 3 provides information on the need for such textbooks for the 10 most popular professions, as well as for the 10 professions of national importance among students.

Table 3

Information on the need for vocational training textbooks, which do not exist and need to be developed, for the most popular professions (generally among students and of national importance) as of 2020

№	Profession	Title of the textbooks, which have already been published and need to be developed	Type of publication	Current need, number of copies
Top 10 the most popular professions				
1	Cook	Collection of recipes	Print and electronic	1200
2	Motor vehicle driver	Construction of new foreign cars	Print	30
3	Agricultural tractor driver	Maintenance and repair of agricultural machinery	Print and electronic	100
4	Wheeled vehicle mechanic	Construction and operation of wheeled vehicles	Print and electronic	950
5	Confectioner	Drawing and modeling for confectioners	Print and electronic	810
6	Electric gas welder	Assembly of metal structures	Print and electronic	950
7	Hairdresser (hair-designer)	Basic hairstyles	Electronic	125
8	Agricultural machine mechanic	All about combining harvesters of foreign production	Print and electronic	25
9	Plasterer	Plastering works (integrated course of modular training)	Electronic	100
10	Manual welder	A detailed description of various welding processes and means	Print	75
Top 10 professions of national importance				
1	Locksmith-repairman	A general course in plumbing	Print and electronic	210
2	Machine operator of a wide profile	Structure and rules of control of machines with software control and their repair	Print and electronic	240
3	Turner	Turnery	Print and electronic	90
4	The assistant driver of an electric locomotive	Construction and repair of electric locomotives of direct current	Print and electronic	240
5	The assistant driver of a diesel locomotive	Operation of industrial railway locomotives	Print	60
6	Baker	Confectionery production equipment	Print and electronic	150
7	Woodworking machine operator	Modern woodworking machines and tools	Print	25
8	Repairman of road construction machines and tractors	Tractor engines	Print	45
9	Welder	Semi-automatic welding technology	Print	97
10	Miller	The latest materials in metalworking	Print	60
Total current need				5 582

Compiled by the authors.

As can be seen from Table 3, to prepare skilled workers in the most popular professions (generally among students and of national importance) it is necessary to develop vocational training text-

books devoted to automobile construction, welding technology, machining, construction of modern woodworking machines, modeling of modern hairstyles, new materials in metalworking, etc.

Thus, despite the large number of training textbooks that were used to train qualified personnel, there was a problem of obsolescence of the teaching materials contained therein, which are not in compliance with approved VET standards. Considering that quality assurance in VET institutions is an attempt to ensure that the system and its participants (i.e. educational institutions) can provide services that consistently meet these standards, based on the research results, at present, this condition has not been fully met.

In general, the main findings of the study covering 25 Regional Educational and Methodological Centers of Vocational Education in Ukraine on the issues of availability of textbooks in the Ukrainian VET system as of 2020 include the following aspects. Thus, the vast majority of training textbooks used by VET teachers to prepare qualified personnel were printed editions published during 1970–2018. Electronic textbooks and textbooks, which were published in both print and electronic formats, were used only to a limited extent because of their small number. At the same time, almost every VET institution used the old library collection for the educational process (these are russian-language textbooks published during 1973–1986). About 50% of the vocational textbooks were outdated and do not reflect trends and developments in such fields as construction, industry, engineering, agro-industry, and trade. It should be emphasized that special attention was given to the 20 most popular occupations among students of VET institutions, with the most popular professions of national importance, financed from the State budget. The results of the study showed that all

these most popular professions were fully equipped with textbooks. Also, it was found that VET institutions were most lacking in printed textbooks and textbooks that were both printed and electronic. In addition, it identified the urgent need to develop electronic textbooks and textbooks that are simultaneously available in both electronic and printed formats.

However, in recent years, there has been a positive trend in Ukraine in terms of the availability of textbooks in the VET system. Among the factors that have influenced this situation are the results of the previous study, as it was comprehensively conducted at the national level for the first time and allowed to identify key problems. In addition, crisis phenomena such as the Covid-19 pandemic and Russia's armed aggression against Ukraine have accelerated the introduction of digital tools to optimise the learning process, which has been and continues to be filled with quality educational literature, training materials and textbooks.

In particular, during the period of martial law in Ukraine, taking into account the modern mixed form of educational process in VET institutions, much attention is paid to the development of modern electronic textbooks. In 2022, the Ministry of Education and Science of Ukraine, with the support of international partners, launched the Vocational Education Online platform, an all-Ukrainian platform for distance and mixed learning, created on the basis of the All-Ukrainian School Online (specifically for students of VET institutions, teachers and independent applicants for professional qualifications). The resources of this platform contain modern e-textbooks

on popular professions [32]. In addition, it is worth mentioning the electronic library created on the website of the Institute of Education Content Modernization, which also contains free access to e-textbooks and study guides for VET students [33]. As of May 2023, this platform contains 27 modern e-textbooks for the most popular professions (in particular, 6 textbooks published in 2019, 8 in 2020, 7 in 2021, 1 in 2022, and 5 in 2023). Another valuable e-resource is the World of Professions online platform developed by the NGO "Institute of Professional Qualifications" and the website of the Ministry of Education and Science of Ukraine, which contains online resources for vocational school students [34].

Thus, we can conclude that the situation with the provision of educational materials in electronic format for the Ukrainian vocational education system has improved significantly, which indicates progress in this area. However, we think that additional measures should be taken to achieve even greater achievements and to make optimal use of educational literature. It is recommended that

a unified e-platform for vocational education and training be created, which would be a centralised resource that stores all learning content, including textbooks. This concentration of materials in a single electronic repository would provide easy access for users to view and download. This would also contribute to more efficient use of resources and convenience for all participants in the vocational education system. An integral part of such a system is also to ensure access to textbooks in printed format, as their physical availability is extremely important for some professions. Retaining the option of using printed textbooks supports variability and takes into account the needs of different users. In addition, given Ukraine's active movement towards joining the European Union, it is important to consider the possibility of introducing English-language textbooks recommended for use in vocational education in EU countries. This will allow Ukrainian students and professionals to have access to global educational materials and will help to increase their international competitiveness.

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РОЛЬ НАВЧАЛЬНИХ МАТЕРІАЛІВ У ПІДВИЩЕННІ ЯКОСТІ ПРОФЕСІЙНОЇ ОСВІТИ: ПОПЕРЕДНІЙ ДОСВІД І СУЧАСНИЙ СТАН

Анотація. Автори статті мають на меті дослідити важливість навчальних матеріалів у системі професійної (професійно-технічної) освіти (П(ПТ)О) України в контексті сучасних викликів та попередніх тенденцій. Останніми роками в Україні проводяться важливі освітні реформи, включаючи систему П(ПТ)О. Ці зміни насамперед спрямовані на поліпшення якості професійної освіти, підвищення її привабливості для абітурієнтів і здатності підготувати висококваліфікованих робітників, які відповідають потребам сучасного ринку праці. Для успішної реалізації цих освітніх

трансформацій важливо, серед іншого, забезпечити учасників навчального процесу якісними й сучасними навчальними матеріалами. З метою відстеження основних тенденцій щодо забезпечення навчальними підручниками учнів П(ПТ)О було детально проаналізовано результати національного дослідження, у межах якого проведено опитування в 25 регіональних навчально-методичних центрах професійної освіти України у 2020 р. У статті також враховано вплив пандемії COVID-19 та введення воєнного стану в Україні у зв'язку зі збройною агресією РФ, що призвело до встановлення в закладах П(ПТ)О переважно змішаного формату навчання та сприяло впровадженню низки цифрових інструментів і наповненню онлайн-ресурсів навчальними матеріалами, у т. ч. для П(ПТ)О. Запропоновано розробити й запровадити єдину електронну платформу для П(ПТ)О із сучасним, якісним та інтерактивним навчальним контентом, де, зокрема, буде розміщено навчальні й методичні матеріали. Крім того, з урахуванням активного руху України до Європейського Союзу, важливо розглянути можливість упровадження англomовної навчальної літератури, рекомендованої для використання в закладах П(ПТ)О країн ЄС.

Ключові слова: професійна (професійно-технічна) освіта, навчальні матеріали, підручники, кваліфіковані робітники, воєнний період.

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