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## EFFECTIVE PARTNERSHIP WITH BUSINESS AS A MEANS OF IMPROVING THE QUALITY OF EDUCATION IN THE FIELD OF INFORMATION TECHNOLOGIES

*The quality of education in the field of information technology depends on the use of modern tools of cooperation between universities and leading companies. Micro-credentials, which are rapidly spreading throughout the world, are among the new innovative tools. On the example of the SoftServe company, the experience of using dual study, non-formal study, professional training of teachers is analyzed. Problems are identified and models of SoftServe cooperation with universities are described, which increase the employability of graduates.*

*One of the important criteria that determine the quality of education is consideration of labor market requirements in education standards and educational programs (EP). This criteria is also among the main ones that are considered in the process of accreditation of individual EP. In the system of vocational education and training, the balance between the content of education and the requirements of employers is ensured by the fact that the training of specialists is carried out on the basis of list of professions (professional qualifications), and both the standards of vocational education and individual educational programs are built based on relevant professional standards.*

*In the field of professional pre-higher and higher education, the situation is more complicated, since the training of students is based on the list of specialties (established on the national level), and the relationship between individual specialties and the corresponding professional qualifications and standards is much more complicated, sometimes even ambiguous. In these conditions, it is critical that institutions of higher education, especially technological ones, cooperate as closely as possible with the relevant enterprises of the region, professional organizations, and individual employers. Such a phenomenon has already become typical in the field of information technologies (IT). One of the factors that directly affects this is the desire of IT companies and, especially, students to find employment as soon as possible, which in turn has a significant impact on the change in the market of educational services: short educational programs, dual education, non-formal and informal education are becoming more and more popular.*

*Keywords: models of dual study, non-formal and informal education, micro-credentials.*

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## ЕФЕКТИВНЕ ПАРТНЕРСТВО З БІЗНЕСОМ ЯК ЗАСІБ ПІДВИЩЕННЯ ЯКОСТІ ОСВІТИ В ГАЛУЗІ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ

*Якість освіти в сфері інформаційних технологій в значній мірі залежить від використання сучасних форм та інструментів співпраці університетів із провідними компаніями. В числі нових інноваційних інструментів зараз виступають мікрокваліфікації, які швидко поширюються в цілому світі. На прикладі компанії SoftServe проаналізовано досвід застосування дуальної форми навчання, неформального навчання, професійного вишколу викладачів. Виділені проблеми та сформульовано моделі співпраці SoftServe із університетами, які підвищують готовність випускників до працевлаштування.*

*Одним із важливих критеріїв, що визначають якість освіти, є врахування вимог ринку праці в освітніх стандартах та освітніх програмах (ОП). Цей критерій також є одним з основних, які враховуються в процесі акредитації окремих ОП. У системі професійно-технічної освіти баланс між змістом освіти та вимогами роботодавців забезпечується тим, що підготовка фахівців здійснюється на основі переліку професій (професійних кваліфікацій), а стандарти професійної освіти та індивідуальні освітні програми будуються на основі відповідних професійних стандартів.*

*У сфері фахової передвищої та вищої освіти ситуація складніша, оскільки підготовка студентів здійснюється на основі переліку спеціальностей (встановленого на національному рівні), а зв'язок між окремими спеціальностями та відповідними професійними кваліфікаціями і стандартами набагато складніший, іноді навіть неоднозначний. У цих умовах критично важливо, щоб заклади вищої освіти, особливо технічні, якомога тісніше співпрацювали з відповідними підприємствами регіону, професійними організаціями та окремими роботодавцями. Таке явище вже стало типовим у сфері інформаційних технологій (IT). Одним із факторів, який безпосередньо впливає на це, є бажання IT-компаній і, особливо, студентів якомога швидше працевлаштуватися, що, в свою чергу, має значний вплив на зміну ринку освітніх послуг: дедалі більшої популярності набувають короткі освітні програми, дуальна освіта, неформальна та інформальна освіта.*

*Ключові слова: моделі дуального навчання, неформальне та інформальне навчання, мікрокваліфікації.*

### Introduction

One of the important criteria that determine the quality of education is consideration of labor market requirements in education standards and educational programs (EP). This criteria is also among the main ones that are considered in the process of accreditation of individual EP. In the system of vocational education and training, the balance between the content of education and the requirements of employers is ensured by the fact that the training of specialists is carried out on the basis of list of professions (professional qualifications), and both the standards of vocational education and individual educational programs are built based on relevant professional standards.

In the field of professional pre-higher and higher education, the situation is more complicated, since the training of students is based on the list of specialties (established on the national level), and the relationship between individual specialties and the corresponding professional qualifications and standards is much more complicated, sometimes even ambiguous. In these conditions, it is critical that institutions of higher education, especially technological ones, cooperate as closely as possible with the relevant enterprises of the region, professional organizations, and individual employers. Such a phenomenon has already become typical in the field of information technologies (IT). One of the factors that directly affects this is the desire of IT companies and, especially, students to find employment as soon as possible, which in turn has a significant impact on the change in the market of educational services: short educational programs, dual education, non-formal and informal education are becoming more and more popular.

The SoftServe company is one of the leaders in the IT sector, has over 10,000 employees, a significant number of whom work in the Western region of Ukraine. The rapid development of the IT market, which was somewhat slowed down, but not stopped, by the Ukrainian-Russian war, has as a result a shortage of personnel. Therefore, it is not surprising that SoftServe closely cooperates with more than 60 higher education institutions of the region. Hundreds of students at these universities, starting from the third year of study, work in the company. To say that their level of training and the modernity of the programs satisfy SoftServe would be a significant exaggeration. And it is not surprising that since 2019 the company has significantly intensified a cooperation with higher education institutions, using all possible tools: dual education programs, teacher training, short training courses, joint development of EP and their expert evaluation, scientific laboratories, etc. So, for example, almost a thousand students participate in 20 dual study programs, more than 4,350 teachers have improved their qualifications, 170 programs of individual academic disciplines have been updated, students working at SoftServe have access to the UDEMY educational platform and specialized online courses developed by the company.

The main problems that hinder SoftServe cooperation with educational institutions are:

- inconsistency of the content of EP with the rapidly changing needs of the labor market, they are too theorized, not saturated with practical components, the selective blocks of disciplines they contain are oriented more towards teachers than students;
- insufficient personal experience of teachers in information technologies and tools used by the company in commercial projects development;
- insufficient development of students' soft skills;
- terminological misunderstandings between the EP designers and the company's mentors during the modernization of the EP as a whole and individual modules;
- recognition in EP and individual disciplines of learning outcomes obtained by students in the process of practical work and professional development within the company.

Among the other modern educational innovations, dual study deserves special attention. A dual form of education is an in-depth, integrated form of education for those who are ready to combine study in an educational institution and gaining experience during real work in companies. In October 2019, the Ministry of Education and Science of Ukraine initiated a pilot project in professional pre-higher and higher education institutions to train specialists using a dual form of education. The analytical report on the results of which was published last year [1]. Currently, in the legislation of Ukraine, namely in the regulations of Ukraine "On Education", "On Professional Pre-Higher Education", dual education is legalized, and this creates appropriate conditions for the implementation of this form of education in the activities of higher and professional pre-higher education institutions.

The use of elements of dual education has gained special importance since 2020, when firstly the COVID-19 pandemic and then the Russian intervention made the traditional educational process, based on university classrooms and laboratories, impossible. Institutions of higher education lost a significant part of their capacity to provide quality education and began to look for help from outside, primarily among employers. SoftServe, among other technology oriented companies, immediately began to introduce new opportunities, initially developing 3 dual education programs with leading Lviv universities. As always, when new approaches to the educational process are introduced, the testing of various organizational models has begun, using the appropriate possibilities of legislation.

Today, the SoftServe company uses two main models of dual training:

1. "Classical model" - when practical training, which is provided in the professionally oriented disciplines of the program, is implemented in the company mainly during the implementation of real projects.
2. "Online model" - when students, while working in the company, obtain part of the necessary learning outcomes by individual (under the systematic supervision of mentors) training on specialized platforms (both open access and internal). Recognition of the obtained learning outcomes (as those obtained in non-formal education) is based on the internal Regulations of each higher education institution.

The "classical model" provides students with the opportunity to apply their academic knowledge and skills in real work settings where they can apply theoretical concepts to practical tasks and collaborate with professionals in the relevant field. During the development of real projects in the company, students can gain valuable practical experience, develop communication and interpersonal skills, and the ability to work in a team. The "classical model" of dual study contributes to students' deeper understanding of the practical aspects of their profession, and also helps them determine their professional interests and goals. It also helps align university education with the needs of the

labor market, as companies can actively influence the curriculum and produce the specific skills and knowledge required in a particular industry.

In addition, this model facilitates the deepening of partnerships between universities and companies, ensuring the exchange of knowledge, resources, and expertise. Students participating in this model get a unique opportunity to build a network of professional contacts and establish connections with specialists in the relevant field. However, this is a more complicated model to implement because it involves a lot of bureaucratic procedures: such as the concluding of a bilateral or tripartite contract, and an employment contract.

In addition, the introduction of dual study often causes resistance from teachers, since part of the credits of the educational program or even academic courses are officially transferred to the company, which leads to a decrease in the overall educational load, and sometimes to a reduction in staff.

"Online model" uses the possibilities of recognition of learning outcomes obtained in non-formal and informal education introduced in 2022 by the Ministry of Education and Science of Ukraine. Students, working in the company and performing real projects at the same time, have access to a variety of educational resources, which can be both open for general access and internal, depending on the specific project. These resources may include video lessons, e-courses, interactive tasks, tests. Enrollment of acquired knowledge and skills into university educational programs takes place based on the internal regulations of individual institutions of higher education, which recognize the learning outcomes acquired by students during work at the company and their independent learning on platforms. This model promotes flexibility and individualization of learning, as students can learn at their own pace and choose the resources that best suit their individual project trajectories. It also facilitates interaction between students and mentors, creating a virtual community where knowledge, experience and practical skills can be shared.

"Online model" shows new opportunities for students and companies in improving the quality of education in the field of information technologies by combining academic knowledge with practical work experience in real conditions. Based on the "online model", the SoftServe company is currently co-operating with more than 15 institutions of higher education, 20 EP in the Information technologies subject area have been updated. Students note that with the help of this model it is possible to effectively allocate their time, focus on the work project and at the same time get all the necessary knowledge required by the university curriculum. This model is a great challenge for responsible and conscientious students who are ready to take responsibility and really want to become professionals while studying at the university.

Obviously, in both cases, the work begins with a joint analysis and modernization of educational programs (lasts approximately 6 months), and includes preliminary training of students in soft skills, which is funded by the company during the second year of study. Further, based on the results of the assessment, students are selected for dual education programme, which continues in the 3rd and 4th years of study, on a competitive basis.

We should emphasize that the main factors inhibiting the expansion of the range of programs using elements of dual study and the recognition of the learning outcomes gained in non-formal education are: fears of teachers that reducing the classroom load will lead to a staff reduction, a certain mistrust of the academic community regarding the quality of learning outcomes in non-formal education, significant company's expenses for the participation in dual form of education and the lack of a guarantee that the student will continue to work for the company after graduating from university.

As already noted, the SoftServe company pays special attention to improving the qualifications of teachers at partner universities, creating opportunities for them to study new information technologies and tools and promoting professional development. For this purpose a set of certificate programs, specialized webinars, short-term internships, and trainings, etc. are used.

Today, micro-qualifications (micro-credentials) begin to play a crucial role in professional development and life-long learning, the need for their widespread use is emphasized in the European Strategy for the Development of Skills and Abilities [2]. Since the beginning of 2020s several important recommendations concerning the micro-credentials development and implementation have been published by UNESCO [3], European Training Foundation (ETF) [4] and European Center for the Development of Vocational Education (CEDEFOP) [5]. In different forms micro-credentials have been used for a long time, but there is no generally accepted understanding of them, formats of description, assignment methods, approaches to their mutual recognition both at the domestic and international levels. In this regard, in 2021, the European Commission, after carrying out special studies in cooperation with the CEDEFOP, published the Council Recommendation on a European approach to micro-credentials for lifelong learning and employability [6]. These recommendations define micro-credentials as the record of the learning outcomes that a learner has acquired following a small volume of learning; these learning outcomes will be assessed based on transparent and clearly defined criteria. They can be independent or combined with other credentials (educational achievements) and are also supported by quality assurance in accordance with agreed standards in the relevant sector or area of activity. This document recommends to EU members and candidates for membership the introduction of micro-credentials to national qualification systems, offers the main principles and approaches to their development and implementation, as well as the formats of their description in the relevant certificates.

Many countries and international professional organizations (for example, the European Consortium of Massive Open Online Courses (European MOOC Consortium) [7], Latvia [8] and others) have published special

analytical reports with the aim to promote the use of micro-credentials both in education and professional development.

Since the introduction of micro-credentials into the system of qualifications must consider national characteristics, this problem becomes particularly relevant for Ukraine, as a candidate for EU membership. At various levels, we have already started discussing the expediency and possibilities of using micro-credentials in education and in the professional development, the first scientific publications and proposals have appeared [9].

The introduction of micro-credentials is particularly effective in the field of information technologies for the establishment of effective cooperation between universities and IT companies, the implementation of digital technologies into the educational process, and the improvement of the effectiveness of dual education.

The above-mentioned European Consortium of Massive Open Online Courses gives the following recommendations on the formatting of micro-credentials:

- the total students workload is 4-6 ECTS credits,
- learning outcomes relate to levels 6-8 of the European Qualifications Framework (EQF) with the possibility of extension to levels 4 and 5,
- assessment takes place in accordance with accepted quality assurance standards,
- reliable identification of the person must be ensured during the assessment,
- have a direct relationship with the needs of the labor market,
- the final certificate of micro-credentials must contain information about the content of the course, learning outcomes, their level in relation to the EQF, the amount of ECTS credits.

Micro-credentials can also play an important role in creating opportunities for both students and workers to gain professional qualifications that are defined by relevant professional standards. By its structure, the professional standard (based on which professional qualifications are assigned) is hierarchical: the qualification covers a number of work functions, for the performance of which it is necessary to possess a certain set of professional competences, each of which is a combination of relevant learning outcomes. According to the national law in Ukraine, both full and partial qualifications are based on job functions, which greatly reduces their flexibility. In addition, the development and approval of professional standards is a long procedure, as a result of which the newly created standards may lose their relevance. This second one, especially applies to the field of information technologies. At the same time, micro-credentials can be designed on a set of professional competencies needed by employers today, and educational institutions and qualification centers have the right to use them for the professional development of employees and meeting the needs of the labor market.

In general, according to SoftServe opinion, micro-credentials should be developed with the aim of: acquisition of certain technologies by students; specialization by choosing appropriate selective blocks of disciplines within the framework of a broad programme of bachelor's training. In the latter case, a significant role can be played by corporate and occupational standards, the development of which is currently being initiated by SoftServe company specialists.

### Conclusions

A close partnership between universities and technology companies is a modern trend in the development of education and is especially effective in the field of information technology, where IT companies conduct specialized training in their academies, offer a wide selection of specialized online courses. The formalization of the received learning outcomes in the form of relevant documents can be carried out both by formal education institutions through the inclusion of training results in their educational programs, and by qualification centers through the mechanisms of recognition of the outcomes of non-formal and informal training, which are accredited at the state level and ensure the quality of final assessment and the qualifications obtained.

Undoubtedly, the organization of specialists training by dual study in the system of higher and professional pre-higher education is a more complex, time-consuming process, as it requires a more careful balancing of the interests of the parties. Therefore, the cooperation of employers, educators, scientists, public and international organizations is crucial for the development and implementation of different models of dual education for students, contributes to increasing of the higher education institution ability to provide education and training of better quality and meeting the current and future labor market demands.

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