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# ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ В ОБРАЗОВАНИИ

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## SUPPORTING THE DEVELOPMENT OF DIGITALLY COMPETENT VET TEACHERS IN SERBIA AND RUSSIA

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**Abstract.** *Introduction.* In the modern educational space, an intensive digital transformation is currently taking place, which imposes new requirements for teacher competencies. This determines the relevance of setting goals and solving problems in order to develop up-to-date models for improving the qualifications of teachers of vocational education and training (VET). The paper discusses the current state of the development of digital competencies of teachers and teachers of Serbia and Russia in line with the European Digital Competence Framework (DigComp) and the European Digital Competence Framework for Educators (DigCompEdu). The paper includes an analysis of the peculiarities of vocational education and training systems, as well as the directions of further training of teachers, conducted by participants in the international project “Professional Development of Vocation Education Teachers with European Practices (Pro-VET)”. In order to better understand national contexts, the content of the reports of the participating countries of the project was analysed in the context of the EU policy and strategy for the development of digital competency of VET teachers. In this article, the authors focus on exploring digital competencies

required of VET teachers within the European Digital Competence Framework for Educators (DigCompEdu) to identify digital competencies and development needs of Serbian and Russian VET teachers when working in online learning environments.

The *aims* of the research are the following: 1) to compare the educational needs of Russian and Serbian VET teachers in the development of their digital pedagogical competencies; 2) to identify the theoretical and practical base for VET teachers' digitally competent development programme design in the context of online learning according to the best European practices in the field of VET.

*Methodology and research methods.* The development of the model was based on learning theories, didactics and practical approaches to soft skills development in online learning environments. The research has been conducted by the means of document analysis, theoretical analysis and synthesis methods, comparative method, modelling method and expert estimation method.

*Results and scientific novelty.* Key aspects of VET teacher training systems in Russia and Serbia are compared and needs in development of digital pedagogical skills of Russian and Serbian VET teachers are identified. A developed model of VET teachers' digitally competent development programme design in the context of online learning according to best European practices in this fields is represented by two components: structural and functional. The structural component of VET teachers' digitally competent development model contains: learning theories and didactics, adult learning theories, soft skills development approaches in online learning, learning outcomes development approaches. The functional component of the model contains: national and European educational policy, strategies in the field of digitalisation of education and the development of digital competencies of teachers, European Union policies related to online learning; pedagogical, psychological and didactical design parameters of the content of advanced training programmes in the context of e-learning.

*Practical significance.* The demonstrated model is being tested in the framework of the implementation of the international Pro-VET project supported by ERASMUS+. Methodological approaches, procedure and tools of VET teachers' digitally competent development are being developed and tested. The application of digitally competent development programmes ensures the transparency of training and allows for the correlation of national and international training programmes as well as the development of academic and professional mobility of VET teachers. The process of designing such educational training programmes in online environment for VET teachers has begun at some universities in Russia and Serbia (participants of the project). The developed online training programmes can be used as a basis to design more quality online courses beyond the Pro-VET project in the sphere of professional development for VET teachers.

**Keywords:** digital competence, the European Digital Competence Framework for Educators (DigCompEdu), pedagogical skills, soft skills, Vocational Education and Training (VET), VET teacher education, VET teachers' educational needs, professional development, e-learning, Pro-VET.

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## РАЗВИТИЕ ЦИФРОВЫХ КОМПЕТЕНЦИЙ ПРЕПОДАВАТЕЛЕЙ ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ И ОБУЧЕНИЯ В СЕРБИИ И РОССИИ

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**Аннотация.** Введение. В современном образовательном пространстве происходит интенсивная цифровая трансформация, которая предъявляет новые требования к компетентности преподавателя. Это определяет актуальность постановки и решения проблемы разработки современных моделей повышения квалификации преподавателей профессионального образования и обучения (ПОО). В статье обсуждается текущее состояние развития цифровых компетенций преподавателей ПОО Сербии и России в соответствии с европейскими рамками цифровизации образования (DigComp) и цифровой компетентности преподавателей (DigCompEdu); представлен анализ особенностей систем профессионального образования и обучения, а также направлений повышения квалификации педагогов, проведенный участниками международного проекта «Повышение квалификации пре-

подавателей профессионального образования и обучения по европейским практикам (Pro-VET)». С целью лучшего понимания национальных контекстов проанализировано содержание докладов стран – участников данного проекта в контексте политики и стратегии ЕС в области развития цифровой компетентности преподавателей ПОО. Выявлены соответствующие образовательные потребности сербских и российских преподавателей ПОО и цифровые компетенции, которые, согласно европейской рамке цифровой компетентности преподавателей (DigCompEdu), необходимы педагогам ПОО для работы в онлайн-среде обучения.

*Цели исследования:* 1) сравнить образовательные потребности российских и сербских преподавателей ПОО в развитии их цифровых педагогических компетенций; 2) определить теоретическую и практическую основы разработки модели развития цифровой компетентности педагогов в контексте онлайн-обучения в соответствии с лучшими европейскими практиками в области ПОО.

*Методология и методы исследования.* Разработка указанной модели базировалась на теориях обучения, дидактики и практических подходах к развитию гибких навыков в онлайн-среде обучения. Исследование проводилось с помощью анализа документов, теоретического анализа, сравнительного метода, методов синтеза, моделирования и экспертной оценки.

*Результаты и научная новизна.* Сопоставлены аспекты системы подготовки преподавателей ПОО в России и Сербии, определены их потребности в совершенствовании цифровых компетенций. Разработана модель развития цифровой компетентности преподавателей ПОО, включающая два компонента: структурный и функциональный. Структурный компонент, представленный теориями обучения и дидактики, теориями обучения взрослых, определяет подходы к выработыванию мягких навыков в онлайн-обучении и использованию его результатов. Функциональный компонент, который основывается на национальной и европейской образовательной политике, стратегиях в сфере цифровизации образования и развития цифровых компетенций педагогов, политике Европейского союза в области онлайн-обучения, содержит педагогические, психологические и дидактические параметры дизайна содержания программ повышения квалификации в контексте электронного обучения.

*Практическая значимость.* Указанная модель тестируется в рамках реализации международного проекта Pro-VET. Разрабатываются и тестируются методологические подходы, процедуры и инструменты совершенствования цифровой компетентности преподавателей ПОО. Применение программ повышения квалификации в сфере цифровых технологий обеспечивает прозрачность и сопоставимость национальных и международных образовательных программ, а также способствует развитию академической и профессиональной мобильности преподавателей ПОО. В университетах России и Сербии (участниках проекта) создаются программы онлайн-обучения для преподавателей ПОО на базе разработанной модели. Данные программы могут стать основой для разработки эффективных онлайн-курсов за пределами проекта Pro-VET в сфере повышения квалификации педагогов ПОО.

**Ключевые слова:** цифровая компетентность, европейская рамка цифровой компетентности для преподавателей (DigCompEdu), педагогические навыки, мягкие компетенции, профессиональное образование и обучение (ПОО), преподаватели ПОО, потребности преподавателей ПОО, повышение квалификации, онлайн-обучение, Pro-VET.

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## Introduction

Fast and drastic change in an ever-digitalising working life particularly influences vocational education and training (VET) as highly qualified employees are in demand throughout the world of work. How to find a balance between VET education and demands set by working life, is a question to which answers are being sought everywhere in the world. In some countries VET education strongly emphasises learning at work and teachers are almost like staff members of a company. Whereas elsewhere VET education is mainly institutional based without adequate connections to working life. Being able to integrate and use technology for VET and connect it to learning at work, involves VET teachers having a set of sufficient digital skills and appropriate pedagogical skills to support online learning in subject specific topics. This analysis on selected country reports (Russia, Serbia, Finland, Ireland, Germany and the Netherlands) on VET teachers' digital skills and competences was conducted in order to better understand the specific contexts and identify development needs required within the Pro-VET project.

Pro-VET (Professional Development of Vocational Education Teachers with European Practices), co-financed by the European Commission through its Erasmus+ Capacity Building in Higher Education (CBHE) programme, aims to answer the strategic needs to enhance and modernise VET systems in Russia and Serbia by reforming in-service VET teacher training in both countries. The overarching aim is to develop VET teachers' professional skills by focusing on four specific objectives by: 1) training higher education (HE) teachers in European VET pedagogical initiatives and proven best practices; 2) upgrading technology e-labs to produce and disseminate vocational open online courses

(VOOCs); 3) creating online in-service training courses for VET teachers, and, 4) setting up a VET-ETN (VET Educator Trainer Network) to consolidate the role of VET teachers in VET development and co-design roadmaps for VET development in cooperation with respective Ministries of Education in Russia and Serbia.

The national Russian ‘Strategy for Workforce Training and Skills Development (2013-2020)’, ‘Concept of development of lifelong learning for adults in the Russian Federation for the period until 2025’ and the action plan ‘Improving competences of teaching staff at vocational studies’ (action VO-SS06) which is also a part of the Serbian ‘Strategy for Education Development until 2020 (SEDS)<sup>1</sup>, aim to revamp and modernise the VET systems in Russia and Serbia. The governments in both countries aim to tackle the shortage of qualified and capable VET teachers and trainers. Furthermore, experiences gathered from previous projects implementing different aspects of European VET principles and tools in Serbia and Russia, have indicated a clear need to design and develop vocational online open courses to upskill VET teachers (trainers, mentors, tutors) to achieve a new level of VET integration and mobility.

However, VET teachers’ obligation to continuously develop their skills and competences to keep up with requirements set in the digital era, is needed not only in Serbia and Russia, but in Europe also. A number of EU-level reports have pointed out that the VET sector differs greatly from country to country and is more complex than any other education sector due to the necessity of interlinking pedagogical frameworks with industry, employment and social policy<sup>2</sup>. The emerging future trends of VET indicate, for example, that work-based learning will expand further; more hybrid qualifications and flexible reskilling and upskilling opportunities will be needed to meet rapid structural and technological changes<sup>2</sup>. It is generally agreed within EU countries that the need for competent teachers and trainers is essential for high quality VET education. Therefore, it is crucial to develop VET teachers’ digital professional competences so that they are equipped to meet the requirements of local and national and international work life environments.

## **European Digital Competence Framework for Teachers**

Digitalisation is a term that can be found in all fields of working life and education. It is ubiquitous, it is transforming societies, the ways in which we work, learn, and communicate with each other. Thus, sufficient digital competences are required of all citizens in order to function in digitally transformed societies, but especially from VET teachers and other educators as they are role models for future learners and workers. As professionals dedicated to facilitat-

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<sup>1</sup> Strategy for Education Development until 2020 (SEDS), Ministry of Education, Science and Technological Development, Republic of Serbia. (2012). Available from: <http://www.mpn.gov.rs/wp-content/uploads/2015/08/STRATEGIJA-OBRAZOVANJA.pdf>

<sup>2</sup> Cedefop (2018). European cooperation in VET: one process, many stops. Developments in vocational education and training policy 2015-17. Luxembourg: Publications Office. Cedefop reference series; No 110. Available from: <http://data.europa.eu/doi/10.2801/033929>

ing learning and teaching, all educators need, in addition to the general digital competences for life and work, educator-specific digital competences to be able to effectively use digital technologies for teaching.

Digital pedagogical competence frameworks have been developed to support teaching personnel, educational institutions, and policymakers in developing effective and meaningful criterion-based competence development [1]. The UNESCO's ICT Competency Framework for Teachers (ICT-CFT)<sup>1</sup> has three successive stages of development emphasising that teachers should be able to enhance collaboration, creativity and problem solving among students using ICT. The same stages have been expanded by the European Framework for Digitally Competent Educational Organisations to create a common Digital Competence Framework for Educators (DigCompEdu) [2].

The common European DigCompEdu framework has a scientifically sound background based on the work carried out by the European Commission's Joint Research Centre (JRC), on behalf of the Directorate-General for Education, Youth, Sport and Culture (DG EAC). The framework aims to respond to the awareness among many European Member States that educators need a set of digital competences specific to their profession in order to be able to seize the potential of digital technologies for enhancing and innovating education. The DigCompEdu framework aims to capture and describe the educator-specific digital competences. It is intended to be at all levels of education, from early childhood to higher and adult education, including general and vocational education and training, special needs education, and non-formal learning contexts.

Digital competence can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society [2].

DigCompEdu considers different competences areas with a total of 22 competences organised in six Areas<sup>2</sup>. Area 1 focuses on the professional environment; Area 2 on sourcing, creating and sharing digital resources; Area 3 on managing and orchestrating the use of digital tools in teaching and learning; Area 4 on digital tools and strategies to enhance assessment; Area 5 on the use of digital tools to empower learners; Area 6 on facilitating learners' digital competence. Areas 2-5 account for the digital pedagogical competences that educators need to make efficient and innovative use of digital technologies in supporting the whole learning process. Areas 1 and 6 indicate that educators' digital competence goes beyond the concrete use of digital technologies within teaching and learning. A set of descriptors is defined for each competency<sup>3</sup>. The Framework also proposes a progression model to help educators assess and develop their digital competence. It outlines six different stages through which an educator's digital competence typically develops, so as to help educators identify

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<sup>1</sup>UNESCO ICT Competency Framework for Teachers. 2011. Available from: <https://unesdoc.unesco.org/ark:/48223/pf0000213475>

<sup>2</sup>The European Framework for the Digital Competence of Educators (DigCompEdu). Available from: <https://ec.europa.eu/jrc/en/digcompedu/framework>

<sup>3</sup>The same.

and decide on the specific steps to take to boost their competence at the stage they are currently at [2]. Being a digitally competent educator not only requires a teacher to consider the overall environment, in which teaching and learning encounters are embedded, but also to enable learners to actively participate in life and work in a digital age.

VET teachers play a key role in the lifelong learning continuum by providing young people with the initial qualifications they need for a smooth transition into the ever digitalising labour market, as well as offering adults opportunities to upskill and reskill throughout their professional career (European Training Foundation, 2018). VET teachers have an important role of contributing to learning outcomes and achievement, as well as acting as role models for the appropriate and critical use of digital technology in the learning process. Conversely, VET teachers themselves need to learn and catch up with the latest developments in order to improve their competences. Thus, continuing professional development of digital skills and competences is essential.

EU countries have diverse VET system models, and subsequently, diverse professional development initiatives. This is evident also among the partner countries in the Pro-VET project (Finland, Germany, Ireland and the Netherlands). In some of the partner countries the increased efficiency and innovativeness of VET have become more prominent in the policy agenda. Also, digital and online learning has been part of the response to challenges such as defunding and the attractiveness of VET. However, all partner countries in the project offer professional development training initiatives focusing on the pedagogical use of ICT and open educational resources.

## **Vocational Education and Training in Russia**

The national development of Russia is mainly determined by the expanding global processes of internationalisation, integration, informatisation and technologisation that influence all spheres of public life including inter alia science and education. The Russian Federation (RF), among other European countries, is currently developing a new model of digital economy aimed at supporting sustainable economic growth, increasing productivity in various fields and industries, producing a competitive workforce, and improving the standard of living of the population of Russia in general. Vocational education and training are highly instrumental in meeting these aims and challenges.

The national development needs for VET studies in Russia are influenced by both the peculiarities of the structural, institutional, managerial and regulatory framework of the system of vocational education and training, and the diversity and complexity of the goals and objectives facing the country on its path to the digital economy.

The Russian VET education context is extremely wide and diverse. Training in VET programmes is provided by 4627 organisations including 3273 professional educational organisations and 586 branches, 338 educational



institutions of higher education and 430 branches. Among which 4118 organisations are state and municipal, 509 organisations are private<sup>1</sup>.

The number of VET students is 2 997 955 people, of which 2 550 301 are studying full-time. 93.5% of students study in state and municipal organisations, 6.5% study in private. 81.9% of students are enrolled in middle-level training programmes, and 18.1% of students are enrolled in skilled workers and employees training programmes<sup>1</sup>.

Training is carried out in 229 professions and 265 vocations of VET. More than a half of the students study in VET programmes related to Engineering and Technology. The chart in Fig.1 shows the distribution of students by field of study.

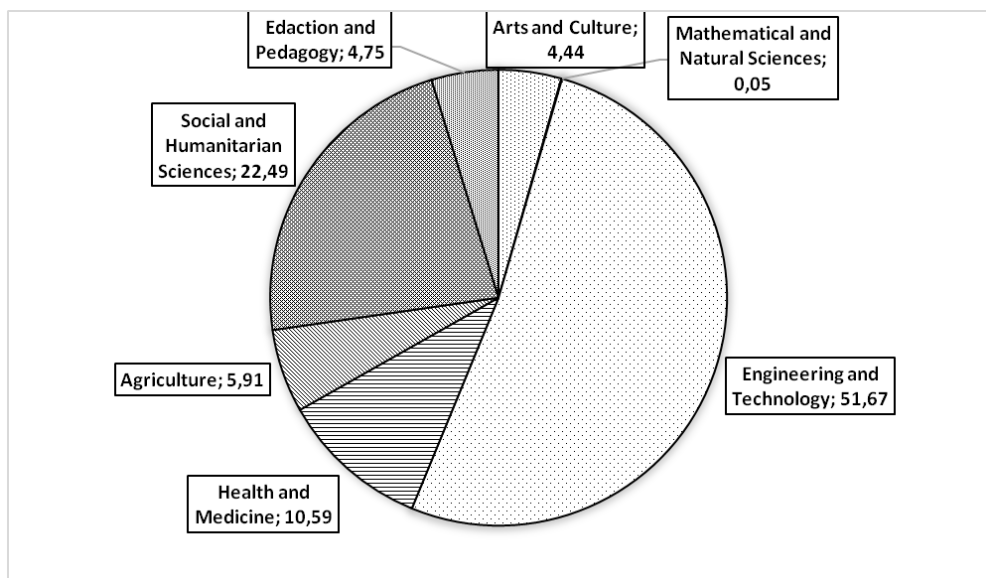


Fig. 1. Distribution of VET students by field of study

The total number of VET programmes is more than 38000. The ratio of programmes using e-learning at the end of 2019 was 22,93%, using distance learning technologies was 8,24% of programmes<sup>3</sup> where more than 700000 students were studying. VET programmes' parameters are presented in Table 1.

However, the situation radically changed in April 2020 in Russia when all educational organisations, including VET, began to implement distance learning using various educational technologies.

<sup>1</sup>The results of monitoring the quality of training in 2019. News Bulletin. M.: MIREA – Russian Technological University, 2019. 39 p.

Table 1

## Number of students using e-learning and distance learning

VET programmes	Total Number	E-learning			Distance learning		
		Number of programmes	Number of students in e-learning		Number of programmes	Number of VET students in programmes	
			blended learning	e-learning		Blended learning	distance learning
Middle-level training	28212	6706	541769	4600	2623	191633	3097
Skilled workers training	10173	2095	108641	170	539	23837	65

Russia's VET system employs 196596 teachers and trainers, including 23125 trainers providing practical instruction. 88% of teachers and trainers were awarded in higher education, and only 10% of them obtained secondary and post-secondary vocational education. 96% of teachers and almost 50% of trainers providing practical instructions have university level education, see Table2<sup>1</sup>. The average age of VET teachers was 46,6 years in 2019.

Table 2

## The characteristics of the education level of VET teaching staff

Teaching staff	Total	Educational organisation				
		HE		VET		
		All vocations	Pedagogical vocations	Middle-level training programmes		Skilled workers training programmes
All vocations	Pedagogical vocations					
Teaching staff	196596	174680	118104	18535	7050	1968
- VET teachers	140725	135244	92967	4679	1884	195
- VET trainers	23125	11628	5578	9715	3156	1457

Moreover, 1,49% of all VET teachers and trainers hold academic degrees and 0,01 - academic titles, see Table 3.

<sup>1</sup> Consolidated report in the form of federal statistical observation No. ЦПО-1 "Information about the educational organization that carries out educational activities on educational programmes of vocational education" at the beginning of the 2019/20 school year, Ministry of Education of the Russian Federation. Published January 13, 2020. Available from: <https://docs.edu.gov.ru/document/11cb97d9bbd427c234720b0d69007a6d/>

Table 3

## Number of academic degrees and titles of VET teachers and trainers

Teaching staff	Total, people	Academic degrees and titles				
		Academic degrees			Academic titles	
		Doctor of science	Candidate of science	PhD	Professor	Assistant professor
Teaching staff	196596	338	7190	32	225	1886
- VET teachers	140725	326	6583	30	217	1790
- VET trainers	23125	3	48	0	2	7

The number of employees with a WorldSkills expert certificate is 9198, of which 7292 are VET teachers and trainers. The number of employees holding the certificate of the WorldSkills Russia Union with the right to participate in the assessment of the demonstration exam according to WorldSkills standards is 16365 people, of which 13418 are VET teachers and trainers.

### **VET teacher education**

In general, the training of VET teachers is carried out in the form of formal, non-formal and informal education. Teacher and VET teacher education in HE organisations, including aspects of the development of competencies in vocational pedagogy, – has been studied by E. M. Dorozhkin, et al. [3]. Occupational standard “Teacher of vocational education and training, additional vocational education” established that teachers should have training in the field of vocational pedagogy. Type and level of education are chosen by the employer (VET organisation), as it determines the needs for training VET teachers.

The regulatory role in determining the requirements and legislative for the formal VET teachers’ education belongs to the Ministry of Science and Higher Education and Ministry of Education in Russia. Requirements for VET teachers and trainers include prior experience of working for organisations in the relevant vocational field and a professional development course or internship once every three years.

Currently, the formal education of VET teachers is carried out in two main areas:

- systemic VET teachers’ education at the level of higher education – specialised multi-level vocational and pedagogical education in the system of “bachelor’s degree, master’s degree and postgraduate study”;
- non-systemic VET teachers’ education in additional vocational programmes (so called APE system)

VET teacher education at HE level in the system of “bachelor’s degree – magistracy – postgraduate study” is carried out by HE organisations having a state license and accreditation, subordinated to the Ministry of Science and Higher Education RF (up to 2018 inclusive – the Ministry of Education and science). Education in this system is regulated by the Federal State Educational

Standards (FGOS) for Higher Education at undergraduate, graduate and post-graduate levels.

APE training programmes are aimed at improving and (or) obtaining new competencies necessary for occupational and vocational activities, and (or) increasing professional level within the framework of existing qualifications. Advanced training programmes in vocational pedagogy are available only to VET teachers with basic pedagogical education. Upon completion, a certificate of advanced training is issued (for state accredited programmes – state-recognised certificate).

Vocational retraining programmes are aimed at obtaining the competence needed to accomplish new vocational activities acquiring updated qualification. Retraining programmes in vocational pedagogy are available for all categories of VET teachers. Today, a large number of VET teachers need retraining programmes, because they do not have basic pedagogical education, but have education in other areas (technical, economic, etc.). Upon completion, a diploma of vocational retraining is issued (for state accredited programmes – state-recognised diploma).

Piloting new projects improving the qualifications of teachers and in-service trainers as well as WorldSkills standards experts is an innovative area for enhancing the qualifications of VET teachers at the national level.

### ***Professional development needs***

All teachers, including VET teachers, are obliged to attend at least one in-service training programme every five years. That said, VET teachers need more opportunities for professional development, particularly in active learning methods and learning in groups. Their chances of a successful adaptation to school teaching standards, especially with challenging classrooms, could be increased by providing a specific induction and adaptation period to support their basic motivation and prevent the flow out of young teachers from schools due to low job satisfaction.

There is a great number of training programmes for professional development of education personnel of higher and secondary schools in the field of ICT in Russia. Since 2016, along with the efforts aimed at implementation and management of various digital initiatives, the government has launched the project “Modern digital educational environment in Russia”. The major goal of the project is to create conditions for gradual quality improvement and expansion of lifelong learning opportunities for all categories of citizens through the development of the Russian digital educational environment.

According to the Ministry of Education, 101025 teachers use personal computers in the educational process. Over 80% of teachers went through advanced training and (or) professional retraining in the previous 3 years, and in the field of ICT – 27,16% teaching staff (28,92% VET teachers and 18,26% VET trainers). In the 2018-2019 academic year, more than 40% of teachers improved their qualifications in the field of information and communication technologies – 12,70% teaching staff (13,6% VET teachers and 8,45% VET trainers)<sup>4</sup>, see Table 4.

Table 4

## Number of trained VET teachers and trainers during 2017 – 2019

Teaching staff	Total	Advanced training or professional retraining for the period from 2017 to 2019			Advanced training or professional retraining in the 2018-2019 academic year		
		All CPD	Pedagogical CPD	ICT CPD	All CPD	Pedagogical CPD	ICT CPD
Teaching staff	196596	152007	120086	32613	86651	53369	15256
– VET teachers	140725	117952	94192	27237	68714	42343	12884
– VET trainers	23125	18585	14217	2596	10967	6447	1202

The growing interest of Russian teachers and educators – towards digital online forms of teaching and learning is due both to the general trends in the development of information society and desire of educational institutions to change the vector of their activities towards innovation, technology, accessibility, flexibility and professionalisation of education. Integration of digital technologies into teaching practices requires rethinking of teachers' roles in planning curriculum and using ICT with the aim to enhance and transform learning. Digital advances cause education system to regularly update and reform teacher training education and teachers' professional development, including aspects of the professional and pedagogical competencies in the digital environment development, ensuring that all teachers can harness technology for education [4, 5].

It is more important to study and understand how modern students learn and to design learning environments, learning spaces, student support and modes of teaching that may afford different learning needs and styles. Placing the learner at the centre of education process (student-centred approach) will help to ensure that appropriate pedagogies are employed, whether the course is labelled as vocational or academic.

To meet the advanced needs of current students, some educational institutions in Russia are already demonstrating a smooth transition to ICT or tech-based learning environments, thus incorporating different technologies and multiple learning modalities into their curricula, programmes, and courses. For these ends, educators combine and offer a variety of teaching/learning approaches, methods and styles, from traditional “face-to-face” to “distance” classes, all under the auspices of “e-learning”.

There are still those who argue that the core concepts and standardised knowledge-transmission model in education and training should not radically change. They are worried that teachers may become redundant due to the ubiquitous use of ICT and digital technology in education and are sceptical about any benefits that may bring. In fact, tech-based methods and technologies do not limit the need for teachers but require redefining their roles from that of instructors to that of constructors, facilitators, coaches, and creators of new tech-based study content. Teachers should strive to achieve high level of ICT-literacy and ICT-competence, allowing them to develop, design, deliver, implement, and evaluate their own copyright and third-party online courses and programmes.

### **VET Teacher Education in Serbia**

The gaps between formal and the real VET practice in the Republic of Serbia could be defined firstly through a gap between what is learned in VET and what is required at the workplace. Secondly, a gap between what the formal required teacher competences are and what the applied teacher competences are in practice. Thirdly, a gap in the cooperation between schools/curriculum/pedagogy and work life and, finally, a gap in classroom technology used in practice and the possibilities educational technology can offer.

One of the crucial measures for increasing the relevance of education in Serbia is the adoption of the Law on the National Qualifications Framework in the beginning of April 2018<sup>1</sup>. The goals of the National Qualifications Framework<sup>2</sup> are based on the needs of the labour market and the society. In addition, it ensures that the entire education system is oriented towards learning outcomes, building the competencies which are defined by the standard of a given qualification, as well as the affirmation of the importance of key, general and inter-curricular competencies for lifelong learning.

The competent body for VET teacher education and training is the Ministry of Education, Science and Technological Development of the Republic of Serbia. The Ministry defined the Strategy for Education Development in Serbia (SEDS) until 2020<sup>1</sup>, as well as the direction of VET teacher professional development. SEDS includes the strategic goals for the development of teachers and the entire teaching profession. One of the main goals is the professional development of teachers at all levels, and in the Action Plan for Implementation of SEDS, it is defined as the action related to improving teacher competencies in vocational studies (VO-SS06). It would imply the effective implementation of the adopted regulations in the field of selection and promotion of teachers in vocational education and through the increasing involvement of experts from the industry in the teaching process.

It is also important to note that during 2019 the development of the Strategy for the Development of Education in Serbia until 2030 had begun, within which part of the reforms and directions of developing of educational policy will be devoted to the education and professional development of teachers of vocational studies [6, p. 451].

Currently there are two levels of VET teachers in Serbia (Figure 2). On one side, the VET teacher profession is well developed within secondary schools, and a close connection to industry is clearly defined in the Law on Dual Education that was adopted in 2017. In practice, its effectiveness has been noticed since its adoption. On the other side, good practice at secondary schools affected the VET sector at HEIs too. In 2019, the Law on the Dual Model of Studies in higher education was adopted and it proposed that every HEI form an Employers' Council. It should provide more engagement of experts in creating curricula following the needs of the labour market, better opportunities for student apprenticeship and more practical knowledge for VET teachers.

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<sup>1</sup>Law on the National Qualifications Framework of the Republic of Serbia (Official Gazette of the Republic of Serbia No. 27/18). Available from: <http://www.parlament.gov.rs/upload/archive/files/lat/pdf/zakoni/2018/689-18%20lat.pdf>

<sup>2</sup>National Qualifications Framework, Republic of Serbia. 2018. Available from: <http://zuov.gov.rs/wp-content/uploads/2018/01/NQFS.pdf>

Today, VET teachers at HEIs have no obligation to attend training or other forms of professional development nor to improve pedagogical and methodological competences. Due to inadequate legislation, there is a lack of standardisation in the teaching profession. The current system of teacher education does not provide a high-quality solution because, on one hand, teacher education faculties emphasise pedagogical competences of future teachers and pay less attention to professional skills. On the other hand, faculties that educate teachers of particular subjects develop primarily professional skills, while ignoring pedagogical-psychological-methodical (PPM) competences.

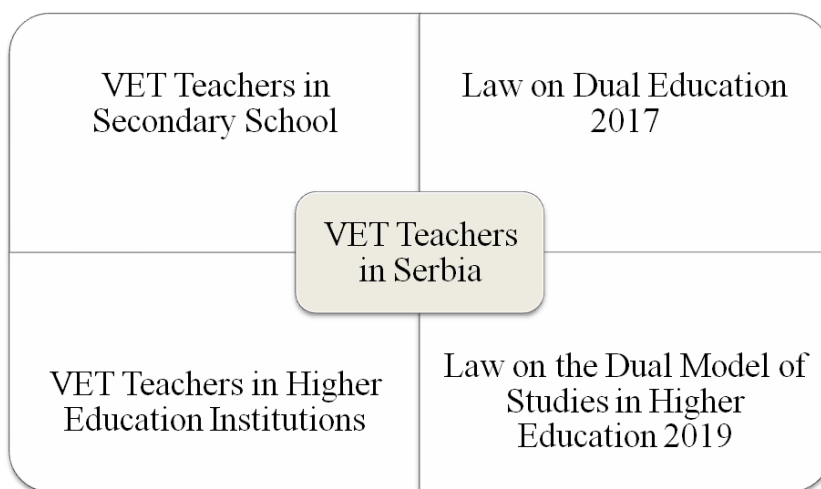


Fig. 2. VET teachers in Serbia – two levels

According to the Strategy for Education Development in Serbia<sup>1</sup> the quality of teachers is “undoubtedly a key factor in the quality of education”. The objectives related to teaching staff defined in this strategy are:

- more than 50% of teachers have doctorates, relevant scientific or professional results in the field of their teaching, and other teachers have excellent practical knowledge, skills and results achieved during the work of at least three years in the field relevant to the study programme;
- a system for professional and pedagogical training and professional development of the teaching staff has been established.

However, since the adoption of SEDS, there have been no significant systemic activities in terms of improving initial teacher education. Improving the quality of initial education mainly relies on individual engagement, from the level of faculty to individual teachers at higher education institutions (Progress Report on the Action Plan for the Implementation of the Strategy for Education Development in Serbia by 2020, p. 29)<sup>1</sup>.

<sup>1</sup>Progress report on Action plan for the implementation of the Strategy for the period 2015-2018. (2018). Available from: <http://www.mpn.gov.rs/wp-content/uploads/2018/08/AP-SROS-IZVESTAJ-15jun-Eng.pdf>

Competences of teachers are reduced to a scientific title and results of scientific research, as defined in the existing standards and normative quality assurance practice. Development training of teacher competences related to the teaching methodology, i.e. an ability to organise an effective learning process has been negligible. Only a few educational institutions have implemented some form of teacher training in this field.

### **Professional development needs**

Renewal and development of the teaching staff are some of the major challenges Serbia is facing<sup>1</sup>. According to SEDS, the quality of teachers is a key factor in the process of raising the quality of education, and in order to emphasise that a special teacher education strategy has been set up. It should follow teachers' development from the introduction phase to teachers' work, through the process of constant monitoring and revising their professional capacity. The national strategy set up several crucial goals in the domain of teacher education, but since its adoption in 2012, it has been noticed that:<sup>2</sup>

- There were no significant systematic activities in terms of improving initial teacher education;
- Standards of teacher competencies and their professional development are still in progress;
- NCHE prescribes the mandatory minimum criteria for the selection of teachers at higher education institutions (HEIs);
- Continuous Professional Development (CPD) of teachers was introduced by the Rulebook in 2016;
- Digital Competence Framework named Digital Age of Teacher was published in 2017;
- CPD is provided by several national initiatives and the largest among these initiatives is Teacher Training Programme that was set up in 2018.

Provided the fact that without quality teaching staff there is no quality education, the Action Plan predicts recognising the need to support and improve the work of teaching staff in higher education. Currently, the programme for acquiring teacher competences in the field of pedagogical-psychological and didactic-methodical training of teachers is being implemented.

Great opportunities provided by modern information technology have not been sufficiently exploited and applied in the system of vocational education of the Republic of Serbia. In the past few years, the main limitation in their implementation was the lack of funding for these technologies (especially in state vocational schools), and then the inadequate training and inertness of teachers to apply this technology.

The importance of continuing professional development of VET teachers is firmly recognised in Serbia. The reform of teachers' professional development

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<sup>1</sup>Law on Higher Education (Official Gazette of RS, No 88/2017, 27/2018 – other law and 73/2018). Available from: [https://www.paragraf.rs/propisi/zakon\\_o\\_visokom\\_obrazovanju.html](https://www.paragraf.rs/propisi/zakon_o_visokom_obrazovanju.html)

<sup>2</sup>Progress Report on the Action Plan for the Implementation of the Strategy for Education Development in Serbia by 2020. Available from: <http://www.mpn.gov.rs/wp-content/uploads/2018/08/AP-SROS-IZVESTAJ-15jun-Eng.pdf>



was started in Serbia in 2002, and a legal obligation for continuing professional development of teachers was introduced. Subsequently, the process of teacher training was further developed and improved through policy definition and the creation of a system of teacher professional development at the national level [6, p. 451]. Since that period, formal regulation has been adopted and improved. Now, the necessity for the CPD of teachers is defined and details are presented in the Law on the Foundations<sup>1</sup> of the Education System (2017).

Despite such efforts, some findings of the research that was conducted in 2016 by the European Training Foundation (Figure 5), still underline the need for further improvement, especially the field of VET teachers. It is recommended that the development system of CPD for VET teachers' needs to be considered as a separate component within the comprehensive CPD system [7, p.12].

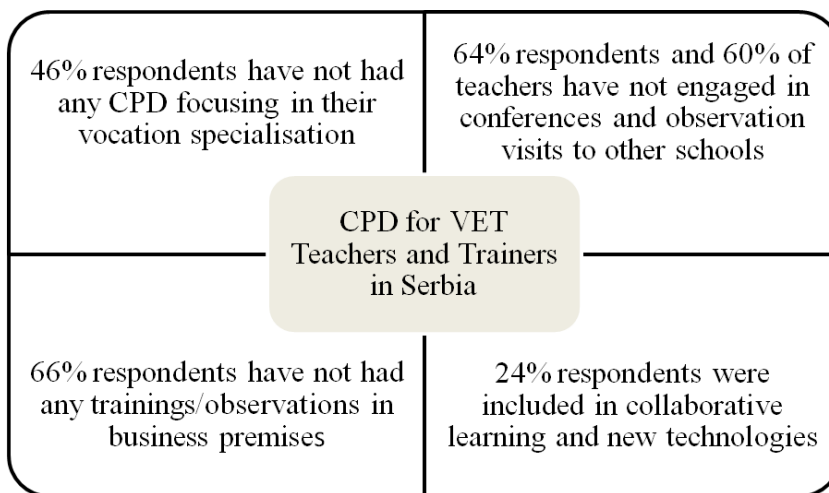


Fig. 3. CPD for VET teachers and trainers in Serbia (Maksimović, I., 2016 [7])

General conclusions emphasise that 46% of respondents from the Serbian VET schools have not had any CPD that is closely connected to their vocational specialisation, and 66% of them have not had any industry-related visits. Further, a significant percentage of respondents have not taken part in the conferences and observations held in the other schools. The other important point of this part of the research is that 24% of VET teachers collaborate and use modern technologies in everyday teaching activities.

The Action Plan for Implementation of Strategy for Education Development until 2020 envisages and emphasises the need for modernisation and implementation of new models of learning and information and communication technologies (VO-ZD23) and also envisages the popularisation of distance

<sup>1</sup>Law on the Foundations of the Education System (Official Gazette of RS, No 88/2017, 27/2018 – other law, 10/2019, 27/2018 – other law, and 6/2020). Available from: [https://www.paragraf.rs/propisi/zakon\\_o\\_osnovama\\_sistema\\_obrazovanja\\_i\\_vaspitanja.html](https://www.paragraf.rs/propisi/zakon_o_osnovama_sistema_obrazovanja_i_vaspitanja.html)

learning. To encourage teachers in using online platforms and digital tools in teaching, the national Ministry published the Digital Competence Framework – Digital Age Teacher in 2017.

The introduction of new contemporary forms of teaching will require significant changes in the organisation and operation of education institutions, in the process of teaching and communicating with students and non-teaching staff. However, those institutions that implement modern forms of learning will be able to create a significant competitive advantage over other institutions.

The creation of a high-quality online course should have grounds in the research of teachers' needs, and it should cover some of the specific demands of VET teachers' development. For the requisite of the creation of an online course in the Pro-VET project, research was conducted among 125 VET teachers in Serbia (Figure 4). They were asked to self-assess soft skills, ICT skills, and pedagogical and psychological competencies.

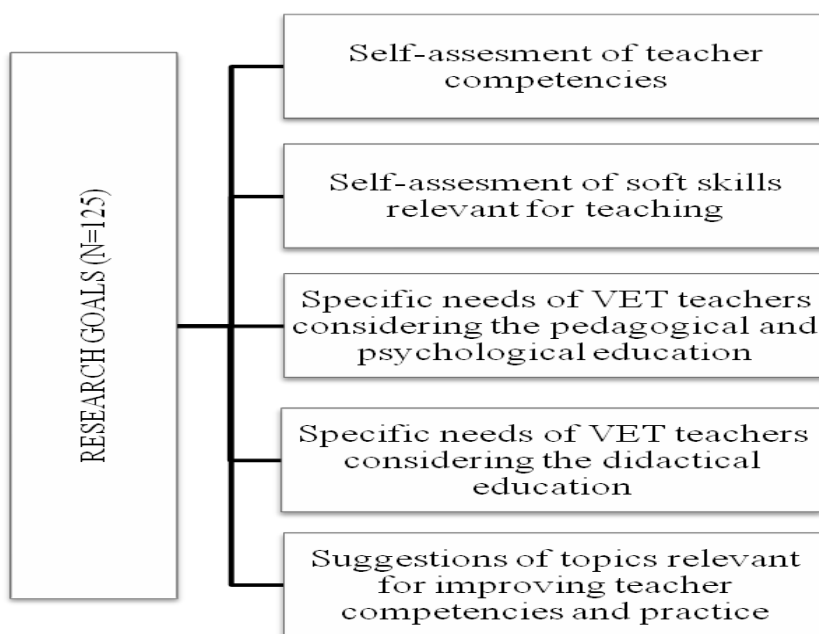


Fig. 4. Educational needs of VET teachers in Serbia [8]

The results indicate that 31,5% of VET teachers have not received any pedagogical and psychological knowledge neither in their formal nor informal education. Also, 31,4% have gained this knowledge through personal initiatives. The results also show that VET teachers are willing to learn more, especially about innovative methods of teaching and learning, new educational technologies, ICT in education, cooperative learning, group activities and team working skills.

## Results and Discussion

Our research and analysis of the country reports reveals that there are contradictions between current trends in the globalisation of education and the lack of harmonisation of national training systems for VET teachers in Russia and Serbia compared to some European practices in this field. Contradictions also appear between the needs for the development of VET teachers' digital competencies and the lack of development of theoretical and methodological models for such programmes for VET teachers. These problems are especially relevant in the current situation when distance learning is required in connection with the COVID-19 pandemic.

Design of the VET teacher's digitally competent development programme model was carried out in several stages. The analytical stage included the analysis and comparison of teacher training systems in the national educational systems of Russia and Serbia. At the modelling stage, a theoretical model for the VET teacher's digitally competent development programme was developed.

Research methods applied: document analysis, theoretical analysis and synthesis methods, comparative method, modelling method and expert estimation method.

Analysis of the research problem in the educational aspect allowed us to determine the following principles of VET teacher's digitally competent development.

1. Coordination of programmes with the basic principles and trends in the development of education at the world and European levels that solve four basic tasks in accordance with the framework for the development of European education 2020 (ET 2020 framework) <sup>1</sup>.

2. Use of relevant modern learning theories and didactics and educational principles of course design for intensive re-training in e-learning context.

3. Coordination of programmes with development trends of the national (Russian and Serbian) professional qualifications system in the field of digital competencies in Europe (The Digital Competence Framework 2.0 – DigCom; European digital Digital Competence Framework for Educators – DigCompEdu).

The criteria for refinement of the model and selection of the model components content were the educational needs of Russian and Serbian VET teachers in the development of competencies identified during the research.

The developed theoretical model of VET teacher's digitally competent development programme design in the context of online learning is represented by two components: structural and functional.

1. The structural component VET teacher's digitally competent development model contains relevant theories – Learning theories and didactics, Adult learning theories, Soft Skills development approaches in online learning, Learning outcomes development approaches.

*Learning theories and didactics.* The most relevant theories were identified as follows: behaviorist learning theory [9,10]; cognitive and constructivist learning theory (J. Piaget, L. Vygotsky, E. Glaserfeld, J. Mattar, etc) [11-15];

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<sup>1</sup> European Policy Cooperation (ET 2020 framework). Available from: [https://ec.europa.eu/education/policies/european-policy-cooperation/et2020-framework\\_en](https://ec.europa.eu/education/policies/european-policy-cooperation/et2020-framework_en)

connectivist theory (S. Downes, G. Siemens etc) [16-23]; self-regulated learning theory (B. Zimmerman, E. Panadero, etc) [24; 25]; theory of multiple intelligence (H. Gardner, etc) [26, 27].

*Adult learning theories.* The most well-known is Knowles' (1990) learning theory of andragogy. Andragogy – tapping into prior experience. Knowles stated that adults could only be successful with an approach designed directly in line with their own characteristics since there were significant differences in learning characteristics between adults and children [28]. Andragogy relates to transformational learning: revealing perspectives to create insight moments. Transformational learning theory explains how adults learn through such insight moments. The theory is rooted in the belief that learning takes place when the new meaning is imparted to an earlier experience or an old meaning is reinterpreted and seen in new light (J. Mezirow, etc) [29-31]. Andragogy relates to experiential learning: tying reality to create meaning. The experiential learning theory states that the essence of adult learning is making sense of experiences. Adults learn best when they learn by doing. They learn best when they are directly involved with – “experiencing” – the learning instead of memorising numbers and definitions from books [32, 33, 34].

*Soft Skills development approaches in online learning.* Researchers and practitioners use a variety of terms for “soft skills”. They have different aspects and can also be termed social skills, transversal competences, social competences, socio-emotional skills, social and emotional skills, generic competences, some of transferable skills, even basic and life skills, character skills or personality traits. Some international research projects or institutions use the term “21<sup>st</sup> century skills”, whereas the Organisation for Economic Co-operation and Development (OECD) uses the terms “key competencies”<sup>1</sup>, “skills for social progress”<sup>2</sup>. There is a European project – Measuring and Assessing Soft Skills Project, which focuses on VET in line with the European Reference Framework. This framework defines several key competencies needed for personal development, work, citizenship, and employment, necessary for life-long learning<sup>3</sup> [35]. Many researchers classify soft skills as non-cognitive skills. Here we underline EI (Emotional Intelligence) by D. Goleman [36], critical thinking or problem solving. Soft skills include both social, interpersonal skills and meta-competences, i.e. the capacity to work on competences, to reframe and transfer them from one field to another, even from informal to formal learning. Soft skills must also be conceptualised in a broad sense, as competences transferable from job to job, from company to company, from one economic sector to another. Soft skills training online (in the

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<sup>1</sup> OECD (Organisation for Economic Co-operation and Development), Definition and Selection of Competencies: Theoretical and Conceptual Foundations (DeSeCo), Summary of the final report Key Competencies for a Successful Life and a Well-functioning Society (Paris: OECD Publishing, 2003)

<sup>2</sup> OECD, Skills for Social Progress. The Power of Social and Emotional Skills. OECD Skills Studies (Paris: OECD Publishing, 2015)

<sup>3</sup> Key Competences for Lifelong Learning – A European Framework. Available from: [http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l\\_394/l\\_39420061230en00100018.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_394/l_39420061230en00100018.pdf)

process of VET teacher digital competences development) is challenging, but not impossible. It is important to offer teachers opportunities to work together in a collaborative and safe e-learning environment. The emphasis is that teachers can learn from each other and with the help of authentic, complex and real-life problems. It is important to think carefully about what kinds of tasks are included in online course to achieve this. Often the same methods than are employed in face-to-face situations can be used, though, they need to be applied and suitably adapted for online contexts. Cooperative learning approach and methods [37], in which teachers work in small groups on an assigned task, under the guidance of the facilitator who monitors the groups. Methods of problem- and project-based learning [38, 39], when participants work in small groups to solve a problem and are guided by a tutor, can be used also online. Also, reciprocal learning can be applicable where teachers work in pairs and are committed to help each other reach a learning goals set by the tutor. Particularly useful are tasks where critical reflection is required. Then students carry out specific tasks that enhance their reflection and metacognitive skills [40]. Authentic learning (S. Revingtonetc) technologies also must be used [41].

*Learning outcomes development approaches.* Methodology and methods of defining learning outcomes [42, 43] is the main component of the educational programme [42-45].

2. Functional component VET teachers' digitally competent development model contains relevant theoretical content: national and European educational policy and requirements, European Union policies on online learning; pedagogical, psychological and didactical design parameters vis-a-vis content in e-learning context.

*National and European educational policy and requirements to online learning.* To know more about European Union policies on online learning, we refer to the presentation developed by Dr. V. Harberts and Dr. A. Saniter, and the European Framework for the Digital Competence of Educators [2, 46]. Educational Principles of Course Design for Intensive Re-training. Course developers should be mindful of the following principles: openness, transparency, accessibility, quality, online, innovative [35].

The list of online learning technologies is used for distance learning, electronic learning, mobile learning, blended learning technologies, virtual educational environments, educational services and platforms, technologies of online courses design, e-learning methodologies from guide for designing and developing e-learning courses [47].

Pedagogical, psychological and didactical design parameters vis-a-vis content in online learning context (some aspects of learning motivation, activities, communication) developed by Pro-VET team member Prof. Frank de Jong and Dr Pieter Seuneke [48, 49].

The model is being tested in the framework of the implementation of the international Pro-VET project supported by ERASMUS+, and methodological approaches, procedure and tools of VET teachers' digitally competent development are being developed and tested.

## **Conclusion**

This paper discussed the current status of VET teachers' digital pedagogical competences and tried to pinpoint the areas for further development in Serbia and Russia in line with the European Digital Framework and Digital Competence Framework for Educators. The analysis of the country reports revealed that VET teachers, not only in Russia and Serbia but also in EU countries, need to learn and catch up with the pedagogical and digital developments in order to improve their competences. Thus, continuing professional development online pedagogy and digital skills and competences are essential.

The application of teachers' digitally competent development programme design ensures the transparency of training programmes, allows the correlation of national and international training programmes and the development of academic and professional mobility of VET teachers. The process of educational programmes design in accordance with the developed model has begun at universities in Russia and Serbia involved in the training of VET teachers.

It is not only technical skills that need retraining, rather it is the pedagogical approach that VET teachers choose that will determine the technological choices. A combination of subject knowledge, technological and pedagogical knowledge are required for implementing emerging online learning (Mishra & Koehler) [50]. The quality online pedagogy has its foundation in teachers' pedagogical thinking and capacity i.e. their repertoire of teaching strategies and their ability to form partnerships with students in mastering the process of learning.

The use of digital technology is then pervasive and it is used to discover and master content knowledge as well as enable the deep learning goals of creating and using new knowledge in the world [51]. This kind of thinking calls for a 'high-level' use of technology where it is used for collaboration and creativity as areas 1 and 6 in the DigCompEdu framework indicates. The use of technology should accelerate learning relationships between students and other learning partners such as teachers, peers, tutors and mentors. Also, students' engagement and responsibility in their own learning, metacognitive skills and a dialogical, collaborative model of teaching and learning should be emphasised, as mentioned in the DigCompEdu framework

VET teachers' digital competence goes beyond the concrete use of digital technologies within teaching and learning. Being a digitally competent VET teacher, requires not only the consideration of the overall environment, in which teaching and learning encounters are embedded, but also facilitating learners to actively participate in life and work in a digital age.

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