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NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

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НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

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IDENTIFICATION OF TEACHING COMPETENCIES AMONG TVET INSTRUCTORS TOWARDS THE REALIZATION OF 4TH INDUSTRIAL REVOLUTION

Abstract. Developing in the field of technical and vocational education and training (TVET) continuously is a challenge for the career of TVET instructors to maintain their success. It is very necessary to encourage teachers for making progress in teaching and efficient learning. It is also of great importance to have the ability to understand the skills that are required by their job needs. From a broader perspective, those trained through the processes of vocational learning will meet the labor market's skill needs. In the aftermath of this study, teaching should be focused on the profile of the teaching competencies of the TVET-instructor. The Delphi approach was the compilation, interpretation, and evaluation of qualitative data in this study. Qualitative data was collected from the 11 expert panels of TVET, based on their skills and experience. The quantitative data were collected using the questionnaire set by the researcher based on the competence of the teaching elements proposed by the Delphi system. The random sampling technique was used as respondents from five selected public skills training institutions in the selection of 106 mechanical engineering and manufacturing technology instructors. Research findings have shown that the dimension of teaching technique is important for teaching profiles of competencies at the instructors of the Public Skills Training Institution TVET. In the context of mastering the competence for the implementation of the 4th Industrial Revolution, the study also found that the use of project-based learning methods is ranked as the lesser in teaching methodology as it should be reinforced at five selected training institutions for public skills.

Keywords: education, teaching, competency, vocational education.

Introduction. It is important to note that when teaching Information and Communication Technologies and other disciplines, it is necessary to rely both on the general experience of pedagogy, world teaching, and education technologies, and on the most modern, innovative developments, addressed both to archetypal structures and processes of development of the intelligence of students (creative and reproductive skills), and properties that are new and only emerging (such as patchwork thinking, thinking, mediated by ICT, etc.). It is important to understand that training in the field of technology should be combined with the improvement of training in the field of the humanities and social sciences and practices: a person is formed and develops as a whole, he cannot be limited to an orientation towards "robotic resistance" and competitiveness in the field of ICT and technology in general. A person is a person, a partner, and a professional, not just a work function. The training of a modern specialist in the sacred by the imperatives of the sixth and seventh technological orders should be global.

Malaysia is concerned that the elements start at the school level when it comes to developing human resources. Hence, Malaysia's education system provides students with the ability to develop their carrier paths as early as the age of seventeen. For example, in secondary school, numerous vocational training courses were provided for those students who showed more interest in the hands-on subject. The Ministry of Education (MOE) has developed a blueprint for an educational reform program that sets out policies, priorities, strategies, and action plans for developing our country's education system to meet the needs and demands of the students from industry.

In 1964 two public technical vocational training institutions were established in Malaysia to provide youth training, namely as the Kemahiran Tinggi Belia Negara Institute (IKBN), Dusun Tua, and the Latihan Perindustrian Institute of Kuala Lumpur (ILP). Essentially, more than 500 public TVET institutions provide different programs at all levels of education. TVET progression from 1964 and there is a lot of institution under TVET such as Giatmara, Kemahiran Mara Institute, Politeknik and in 2012 the transformation of existing vocational schools into vocational schools under the Ministry of Education for Post-Secondary Students (as early as 16 years of age) and diploma graduates (MOE 2012) prompted a major shift in TVET delivery. The goal of Vocational College is to reach 70% graduation in a skilled worker, 20% further study, and 10% as a technopreneur (MOE, 2017). A curriculum includes Technology for Electrical and Electronic Engineering, Civil Engineering Technology, Mechanical Engineering & Manufacturing Technology, Industry, Hospitality and Tourism, Information and Communication Technology, and Vocational College Agriculture.

The vocational school goal is to cultivate students with skills and experience in the vocation sector, in addition to preparing them for higher education. Students must adapt their ideas based on the practical study course they have selected. The practical element of employment should teach students how to solve work environment problems.

A significant part plays in teaching TVET students who need hands-on instruction, expertise, and preparation for TVET instructors. Besides being an educator, they should make an effort to acquire knowledge for the implementation of the Fourth Industrial Revolution, particularly knowledge in their field of expertise and also technical know-how. The improvement of TVET teacher competence may be a factor in contributing to the growth of skills and TVET instructors. Teachers must be prepared to teach as a help in the growth of TVET teacher competency. Preparations that TVET teachers need to undertake start learning resources adapted to the curriculum, teaching strategies, skills, and particularly pedagogy competencies (Asnul et. al., 2020). Teachers should make an effort to explore the best possible way and prepare for the needs of their students while at the same time being more innovative in conveying the subject. Expressed that TVET teachers are highly trained and experienced in the field and can demonstrate skills in teaching delivery and assessment and develop and advance their careers regularly by acquiring more experience and expertise in the field (Guthrie, 2010). This work aims at identifying elements of the profile of teaching the competencies of the TVET instructors.

Method. This research included a sample of students of TVET teachers, from the course in Mechanical Engineering and Manufacturing Technology at five selected Public Skills Training Institutions (PSTI). Delphi Study was conducted in TVET institutions to identify the scopes of teacher profile teacher competency skills. This research is made up of both qualitative and quantitative data. The qualitative analysis approach has been the Modified Delphi technique. Meanwhile, questionnaires were the tools for quantitative analysis. A total of 106 respondents, who are instructors for TVET at five chosen PSTI. The teaching competency was the area for ability in this analysis. The idea and the literature were discussed and reviewed during the planning stage. The process at the stage was defined in figure 1. The concept was examined to determine how important TVET instructors' teaching competency is towards implementing IR 4.0. The study carried out with a conceptual flowchart, focused on constructive literature as illustrated in figure 1.

Result and Discussion. First, as we can remember in the literature review segment, there was plenty of teaching competency definition that appeared in books, posts, and websites. Primarily the argument raised by the previous researcher was about the lack of teaching skills at TVET institutions. Based on the previous teaching skills teachers report, it appears a teacher requires high teaching quality to choose the most suitable teaching strategies, procedures, and learning practices.

The instructor is expected to play an effective role in generating educated, qualified, disposition, character, positive attitude, dedication, and discipline of human capital in organizationally produced technical and vocational education. The role of a TVET teacher is not limited to learning the right technical and vocational skills, as well as generic skills such as language abilities, communication, creativity, ability to meet the challenges, and aiming to achieve the Vision 2020 objectives. Hence, the findings for research questions were explained in the next section to achieve the purposes of this study.

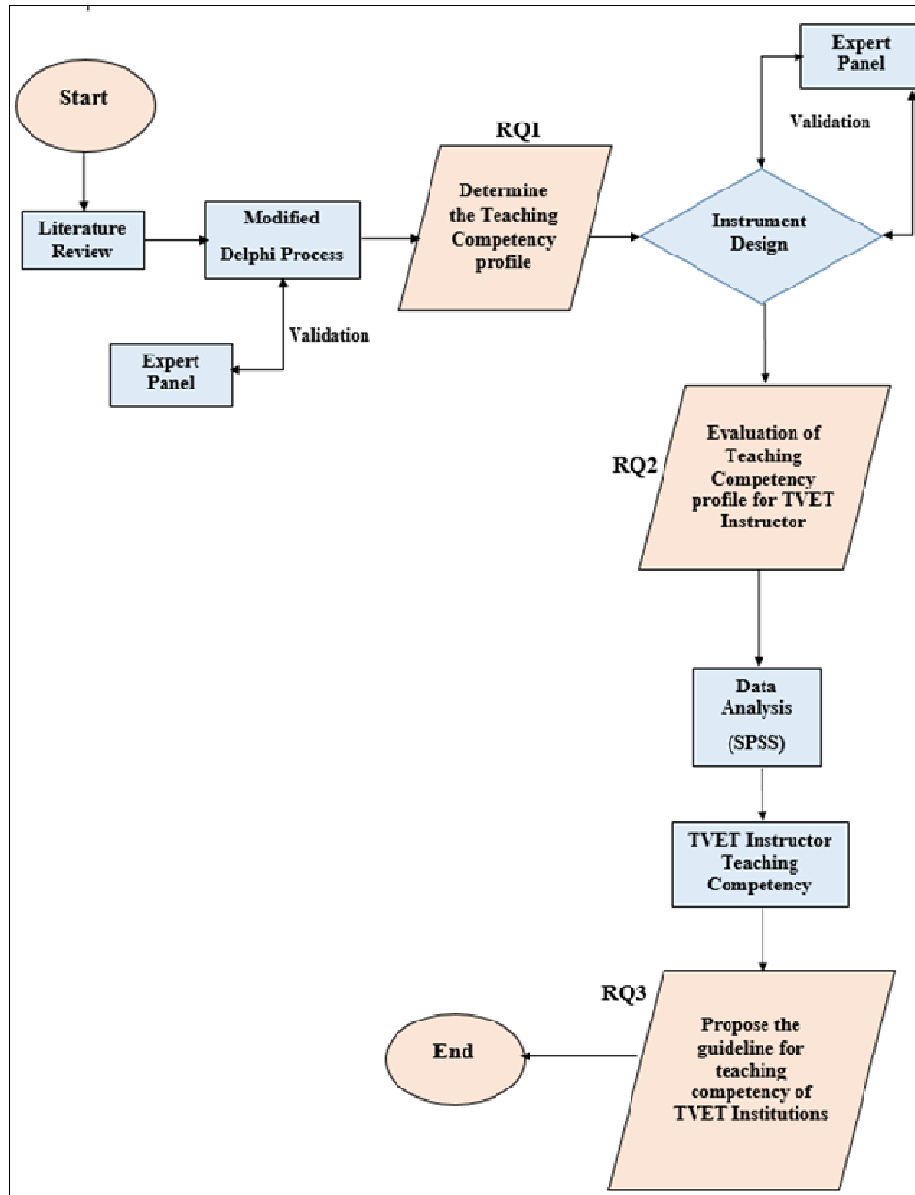


Figure 1 – Flowchart of Study

Elements of Teaching Competencies for TVET Instructor. The Delphi Method was conducted with 11 panels of experts among TVET institutions at the Kemahiran Tinggi Belia Negara Sepang Institute. At first, the researcher comes up with the problem statement and after that, the Delphi method procedure obtained the teaching competency elements for TVET instructors extant ant academic literature provides some theoretical discussion regarding the factors of significance in determining the teaching competency elements among the TVET instructors. During the Delphi method, the expert panel addressed a few issues like the technical expertise that gives instructors the skills. Ultimately, the researcher chooses the teaching skills because the implementation of Industrial Revolution 4.0 is necessary to improve those skills among TVET instructors. If the researchers have created the method, the researcher selects an acceptable three of the panel of experts available to answer the questions and suggestions. The outcome of this Delphi Procedures suggested the core elements for teaching skills, teaching techniques, curriculum and programming modules, and finally the knowledge of the earner. The section below provides a summary of the findings of the Delphi Method Analysis, and the sub-item of the three main teaching skill clusters is mentioned in table.

The Sub elements of Teaching Competency

The Main Elements for Teaching Competency	Sub - Elements for Teaching Competency
	Adopt innovative teaching methods
	Cooperate with colleagues
	Given descriptive assessment
	Use new technology
	Use the project method
	Organize activities outside the classroom
Curriculum and programs modules	Add to basic content with new information
	Use extra material
	Incorporate contemporary issues into the lesson
Knowledge of Learner	Allow students to speak
	Discuss workshop problems with students
	Allow students to do self-assessment

Teaching Methodology. The way the technological expertise is applied, which is included in the 4th IR emergence. The aim of teaching methods at TVET institutions that move from traditional teaching to the combination of applied technologies from Industry 4.0. This item for teaching TVET instructors aspiring to the newly developed and implemented technologies became acquainted with Industry 4.0's true potential and capabilities. To TVET institutions, the concept of education 4.0 is an example; this form of education aims to expose the young and experienced workers to the progressive ideas of business revolution 4.0.

Vocational pedagogy is a series of decisions in which student achievement made by vocational teachers during the student learning process, and observed whether they relate to teaching strategies, pedagogical decisions, or new technologies that could be applied to teaching (OECD, 2011). Vocational pedagogy combines theoretical and practical aspects of teaching and learning that have real-life or real work experience; vocational teachers should be able to teach theoretical and practical aspects of their discipline. When teachers want to take action to improve the consistency of the teaching and learning process, they need to make pedagogical decisions. Pedagogical decisions should not be overlooked in the teaching and learning process, as they relate to the role of teachers in deciding the student learning course and the professional experience of instructors (Prachagool, 2016).

Curriculum and Programmed Modules. TVET's program focuses on a job title that plays a major role in generating skilled and semi-skilled labor in the workplace. MOE launched a new curriculum based on capacity by 80 percent and philosophy by 20 percent. This implementation requires that all teachers at TVET institutions be versatile and receptive to an effective teaching approach. TVET teachers' skills, for instance, teach practical research with example. We relate the practical research of TVET education and its applications in the situation at work. Institutional research laboratories are required, where students can perform or observe experiments while providing technical science information. In Kazakhstan's Institute of Metallurgy and Ore Beneficiation, there are numerous laboratories where future engineers can perform experiments with their qualified supervisors; they also have access to plants and factories (Kenzhaliev et al., 2019; Koizhanova et al., 2020). TVET institutions should also be able to provide the institutions with the latest technology machinery to cater to new information and skills between instructors and students.

Knowledge of Learner. Throughout the training session (OECD, 2011), teachers decided that the best way to do so was to teach in small groups, task guides, and problem-solving methods. When explaining how to do the job, the instructor should avoid taking short cuts, concentrating on expectations that are reasonable but also applicable to the workplace for learners to follow, and testing learner understanding by asking questions. It's because students at TVET institutions have various strengths,

abilities, and levels of experience and are more confident when the teacher is in their community to make sure they do the right practice (Brewer & Comyn, 2015). The teachers should have an open-minded approach to learn, relearn, and unlearn to become skilled vocational practitioners in their respective fields as a result of rapid changes in culture, technology, and the business.

It is important to note that when teaching ICT (Information and Communication Technologies) and other disciplines TVET, it is necessary to rely both on the general experience of pedagogy, world technologies of teaching and upbringing, and on the most modern, innovative developments addressed both to archetypal structures and processes of development of the intelligence of students (creative and reproductive skills), and properties that are new and only emerging (such as patchwork thinking, thinking mediated by ICT, etc.) (Arpentieva et al, 2020; Badalov et al, 2020; Kassymova et al, 2020; Kenzhaliyev et al, 2020). It is important to understand the pros and cons of digital learning and its impact on the development of students' thinking and other functions. It is also important to consider the pros and cons of project-based learning itself: adaptation to an unknown future always relies on a solid foundation, consisting of a well-meaning and high-quality implementation of the experience of generations. There is nothing that arises from scratch and again, without being connected with past achievements and successes. It is also important to understand that training in the field of technology must be combined with the improvement of training in the human and social sciences and practices: a person is formed and develops as a whole, it cannot be limited to an orientation towards "robotic resistance" and competitiveness in the field of ICT and technology in general (Arpentieva et al, 2020; Kassymova et al, 2020). A person is a person, a partner, and a professional, not just a work function. His projects are life projects, not just plans for the development, maintenance, and repair of technical equipment. The training of a modern specialist in the sacred by the imperatives of the sixth and seventh technological orders should be global (Badalov et al, 2020; Kassymova et al, 2020). In this context, it is also important to activate the publication activity of students and teachers, their analysis of their experience in improving project and other teaching methods (Arpentieva et al, 2020; Kenzhaliyev et al, 2020).

Technology innovation continues to alter and change the teaching system and the learning process (Dunwill, 2016; Triyono et al, 2020;). More transition will take place in the future. To keep abreast of the new industrial revolution 4.0 (Ana et al., 2019; Triyono et al., 2020), teachers need to periodically refresh their knowledge of teaching methods, the concept of enhancing the curriculum element, and the various backgrounds of knowledge learners. Teachers have to rediscover and empower themselves with the latest technologies, equipment, and services to reach the 4th IR.

Most teachers do not develop their skills according to innovative technologies and do not have a teaching method, but some innovative teaching methods do happen by chance. The instructor's competencies should be regularly checked by empirical research in conjunction with the improvement research. Teachers' main challenge is to make changes to the vocational education system, and they have to deal with all the changes effectively. The future will be different from past and present in several respects. Education should be effective and efficient learning should take place in the learning process. Teachers should revise their curriculum annually in order to create a good learning atmosphere. Instructors also need new teaching skills to cope with all of these changes and the teachers' credentials need to be redefined.

The professional knowledge, practical skills, and attitudes of instructors towards ICTs are needed because they play an important role in the teaching process (Kumar et al, 2008). Digital competence is a key role in the current global event such as COVID 19 whereby the education system switched from campus-based education to online education in which students can study at home. To examine the ICT skills of TVET teachers in Malaysia, questionnaire items such as ICT understanding, ICT competencies, and ICT attitudes (Abu Obaideh et al, 2012) were used. Based on their study, we found that the ICT expertise of TVET instructors was above average, that the ICT skills of instructors were at a moderate level, and that their attitudes to ICT had been positive. To ensure successful ICT adoption, teachers should be equipped with information and skills (Muktiarni, et al., 2019).

Conclusion. The teaching skills of TVET instructors in Malaysia were at a satisfactory level, while industry and researchers suggested that Malaysia and neighboring countries still lack trained instructors. In summary, the findings of this study came out with the three teaching skills of the TVET teacher which

include teaching methodology, curriculum, and programming element, essentially the knowledge of the learners' personalities. A good teacher should possess all the possible features to sympathize with the learners' conditions and their learning styles. It is beneficial to prepare the current generation of vocational pedagogues for planning, carrying out, and evaluating lessons in a right way.

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4 - ИНДУСТРИАЛДЫ РЕВОЛЮЦИЯНЫ ЖҮЗЕГЕ АСЫРУДА ТЖКБ ОҚЫТУШЫЛАРЫНЫҢ АРАСЫНДА ОҚЫТУ ҚҰЗЫРЕТТЕРІН АНЫҚТАУ

Аннотация. Қазіргі таңда техникалық және кәсіптік білім беру мен оқытуды (ТЖКБ) дамыту ТЖКБ оқытушыларының біліктілігін көтеру міндеті болып саналады. Олардың жұмысының жоғары сапасын қамтамасыз ету үшін үнемі технологиялық (әдіснамалық) және оқытуды түбегейлі жақсарту, оқытушыларды жаңа тәсілдермен және оқыту технологиясымен жетілдіруді қамтамасыз ету қажет. Жаттықтырушылардың мамандық бойынша талап етілетін құзіреттерді анықтау қабілеті жоғары сапалы оқыту мен оқуды қамтамасыз ету үшін қажет. Сонымен бірге, еңбек нарығының құзіреттілік қажеттіліктері білім беру ортасының талаптары мен жағдайларына, кәсіптік оқыту процестері мен күтілетін нәтижелерге сәйкес келуі керек. Сондықтан, бұл зерттеу негізінде ТЖКБ оқытушысының құзіреттілік бейініне назар аударылды. Delphi әдісін қолдана отырып, зерттеліп отырған мәселе бойынша негізгі эмпирикалық мәліметтер жиналды, олар талданды және бірқатар сапалы мәліметтер түрінде ұсынылды. ТЖКБ мамандарының 11 тобынан сапалы мәліметтер жиналды: олардың білімі, дағдылары мен тәжірибелері жалпы зерделеуге алынды. Delphi процесінде бұрын анықталған оқу элементтерінің құзыреттілігін түсінуге бағытталған авторлық зерттеу сауалнамасын қолдану арқылы сандық деректер жиналды. Машина жасау және өндіріс саласындағы 106 мұғалімді іріктеуде кездейсоқ іріктеу әдісін қолданды. Бұл жаттықтырушылар респондент ретінде кәсіби шеберлік мамандарын дайындайтын бес түрлі мемлекеттік оқу орындарында жұмыс істейді. Зерттеу нәтижелері студенттердің ТЖКБ оқытушыларының құзіреттілік бейінін игеруді қамтамасыз ету үшін оқыту әдістемесінің болуы мен жетілдірілуі қажеттігін көрсетеді. Төртінші өнеркәсіптік революцияның (алтыншы және жетінші технологиялық тәртіпке көшу) талаптарын орындау үшін қажетті құзыреттерді игеру тұрғысынан жобалық оқытуды енгізу мен оңтайландырудың маңыздылығын ерекше атап өту қажет. Жобалық оқыту әдісін кеңінен қолдану оқытудың әдіснамасына азырақ сәйкес келеді, оны мемлекеттік басқарудың бес таңдалған институтында жетілдіру қажет. Осы технологиялардың көмегімен ақпараттық-коммуникациялық технологияларды және басқа пәндерді оқыту кезінде педагогиканың жалпы тәжірибесіне, оқыту мен білім берудің әлемдік технологияларына, сонымен бірге архетиптік құрылымдар мен студенттердің зияткерлік даму процестерін қарастыратын заманауи, инновациялық әзірлемелерге де сенім арту қажет (шығармашылық және репродуктивті дағдылар) және жаңа және пайда болатын қасиеттер (мысалы, ойша ойлау, АКТ арқылы ойлау және т.б.). Сандық оқытудың ұтымды мен жағымсыз жақтарын және оның оқушылардың ойлау және басқа да функцияларын дамытуға әсерін түсіну маңызды. Сондай-ақ, жобалық оқытудың жақсы жақтары мен кемшіліктерін ескерген жөн: белгісіз болашаққа бейімделу әрдайым ұрпақтар тәжірибесін байыпты және сапалы жүзеге асырудан тұратын сенімді негізге сүйенеді. Технологиялар саласындағы оқытуды гуманитарлық және әлеуметтік ғылымдар мен практикада оқытуды жетілдірумен ұштастыру қажет екенін түсіну керек: адам тұтастай қалыптасады және дамиды, ол «роботтық қарсылыққа» бағдарлаумен және жалпы АКТ және технологиялар саласындағы бәсекеге қабілеттілікпен шектелмейді. Адам – тек жұмыс функциясы емес, тұлға, серіктес және кәсіпқой. Алтыншы және жетінші технологиялық бұйрықтардың маңыздылығына байланысты заманауи маман даярлау жаһандық сипатта болуы қажет.

Түйін сөздер: оқыту, оқыту, құзіреттілік, техникалық білім.

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ВЫЯВЛЕНИЕ ПЕДАГОГИЧЕСКИХ КОМПЕТЕНЦИЙ СРЕДИ ПРЕПОДАВАТЕЛЕЙ ТПО ДЛЯ РЕАЛИЗАЦИИ 4-Й ПРОМЫШЛЕННОЙ РЕВОЛЮЦИИ

Аннотация. Развитие в мире технического и профессионального образования и обучения (ТПО) является вызовом совершенствования профессии инструкторов ТПО. Для обеспечения высокого качества их работы необходимо постоянное технологическое (методическое) и содержательное совершенствование их подготовки, обеспечение освоения инструкторов новыми подходами и технологиями обучения. Способность инструкторов определять компетенции, требуемые профессией, очень важна, чтобы гарантировать высокое качество преподавания и обучения. При этом потребности в компетентности рынка труда должны соответствовать требованиям и условиям образовательной среды, процессам и ожидаемым итогам профессионального обучения. Поэтому данное исследование было сосредоточено на профиле преподавательской компетентности преподавателя ТПО. С помощью метода Дельфи были собраны основные эмпирические данные по изучаемой проблеме, они были проанализированы и представлены в виде ряда качественных данных. Качественные данные были собраны на примере 11 групп экспертов среди ТПО: изучению подвергались их знания, умения и опыт в целом. Количественные данные были собраны с использованием авторской исследовательской анкеты, ориентированной на осмысление компетенций учебных элементов, выделенных ранее в процессе Дельфи. При отборе 106 преподавателей в области машиностроения и производства использован метод случайной выборки. Эти преподаватели работают в пяти различных государственных учебных заведениях, готовящих специалистов в сфере профессиональных навыков в качестве респондентов. Результаты исследования показывают необходимость наличия и совершенствования методологии преподавания для того, чтобы гарантировать усвоение учащимися профиля компетенций в преподавателях ТПО. В контексте освоения компетенций, необходимых для осуществления запросов четвертой промышленной революции (перехода к шестому и седьмому технологическому укладу), нужно особенно подчеркнуть важность внедрения и оптимизации проектного обучения. Широкое использование метода обучения на основе проектов классифицируется как меньшее в методике преподавания, что должно быть улучшено в пяти выбранных государственных учебных заведениях по обучению навыкам. Важно отметить, что при обучении информационно-коммуникационным технологиям и иным дисциплинам с помощью этих технологий необходимо опираться как на общий опыт педагогики, мировые технологии обучения и воспитания, так и на самые современные, инновационные разработки, обращенные как к архетипическим структурам и процессам развития интеллекта учащихся (творческим и репродуктивным умениям), так и свойствам, являющимся новыми и только формирующимися (такими как лоскутное мышление; мышление, опосредованное ИКТ, и т.д.). Важно понимать плюсы и минусы цифрового обучения и его влияния на развитие мышления и иных функций учащихся. Также важно учитывать плюсы и минусы собственно проектного обучения: адаптация к неизвестному будущему всегда опирается на наличие прочной основы, состоящей из хорошо осмысленно и качественно реализуемого опыта поколений. Также важно понимать, что подготовка в сфере технологий должна сочетаться с совершенствованием подготовки в сфере гуманитарных и социальных наук и практик: человек формируется и развивается как целостность, он не может ограничиваться ориентацией на "роботоустойчивость" и конкурентоспособность в сфере ИКТ и технологий в целом. Человек – личность, партнер и профессионал, а не просто рабочая функция. Подготовка современного специалиста в связи с императивами шестого и седьмого технологических укладов должна носить характер глобальной.

Ключевые слова: обучение, преподавание, компетенция, техническое образование.

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