The professional training of future teachers of labor training depends on the level of professionalism of teachers, the infrastructure of the ICT educational environment, the frequency of updating the digital skills of teachers and their ability to transfer their own skills to students. Technologies are actively introduced into teacher training programs, which should be accompanied by the development of skills of both teachers and students. However, in practice, teachers for various reasons may not use ICT enough in the learning process. For example, a teacher's lack of confidence, or the need to develop their own professional skills in the use of ICT, or the lack of instructions on the use of ICT can lead to a reduction in the frequency of integration of technology in the practical activities of students. Given that labor training requires specialized software, the problem of teacher training through ICT can be exacerbated. As a result, in the future the specialist due to the lack of existing digital skills loses the potential for employment and implementation in professional activities.

The purpose of the article is to identify the features of professional training of future teachers of labor education and technology by means of information and communication technologies.

LITERATURE REVIEW

The subject of labor training (crafts) in education is understood as a dialogue between the manufacturer (developer) of the artifact and the materials. Students and teachers view holistic craft as a willingness to reflect, entrepreneurial behavior, a variety of skills, the use of diverse materials (LEPISTÖ, LINDFORS, 2015; BENIĆ, 2018). Veeber, Syrjäläinen, Lind (2015) view labor learning as a "multidisciplinary phenomenon, and that learning and practicing crafts promotes the understanding of diversity and challenges in life". In the process of learning, students gain skills that can be applied in further activities and society.

For the first time, the subject of the craft was clearly defined as one subject for all students without division into textile crafts or technical crafts. This affected the organization of teaching and training. However, over time, trends in education such as lifelong learning, the development of digital skills through the integration of ICT, creativity have influenced teacher training: these trends have begun to be taken into account in basic education (PORKO-HUDD, PÖLLÄNEN, LINDFORS, 2018). For example, ICT is used in teacher training to ensure collaboration, creativity and digital skills. In a case study, Vartiainen et al. (2016), organized at the University of Eastern Finland as part of the course of information and communication technologies (ICT) for craft students (N = 13) revealed the active participation of students in the development and self-organization of the learning environment in search of common
objects and use of various tools and technologies for the collection, processing, organization and exchange of information (VARTIAINEN et al., 2016).

Universities use different approaches to teaching craft teachers. Based on observations of the learning process and analysis of curriculum documents of four European and one American university curriculum Kokko (2021), similarities and differences in approaches to learning were identified. The similarity of approaches concerned the pedagogy of acquiring basic skills and the tendency to continue craft traditions. The differences included broader learning goals and promising career paths for students. The following approaches to the study of crafts in high school are identified: 1. Educational crafts. 2. Traditional crafts. 3. Critical crafts. 4. Cultural heritage of crafts. 5. Crafts based on design (KOKKO, 2021).

In Finland and Latvia, teacher training is combined with other subjects or is a separate training course. In these countries, the value of labor training has changed, and subjects have been included in training programs for a variety of reasons. For example, one of the reasons for inclusion is the value of making artifacts by students in everyday life. Industrialization has led to the need to train professionals who are able to ensure the manufacture of products for the national economy (VEEBER, SYRJÄLÄINEN, LIND, 2015). With the development of the digital economy, green economy, the goals of teacher training have changed again: there is a reassessment of traditions, culture, increasing the value of eco-products and their use in various spheres of human life (GARBER, HOCHTRITT, SHARMA, 2018).

According to the change of values and goals of the use of handicraft products, the goals of professional training of future teachers of labor education and their specialization change. Technology integration has also affected the goals of training programs. Accordingly, different countries have different pedagogical models for training future teachers, and different levels of ICT use in training institutions affect the structure of the training model. Therefore, a greater level of use of digital technologies can ensure the orientation of professional training on the formation of digital skills of students and their application in future professional activities (product design, design) (PÖLLÄNEN, URDZIŅA-DERUMA, 2017).

A review of the scientific literature indicates the lack of comprehensive research on the use of ICT in the training of teachers of labor training. In particular, there are no studies on the factors influencing the use of ICT, teacher training, which depends on the development of digital skills of students, and the level of use of ICT by students. Therefore, this study examines the relationship between teacher training in the use of ICT - the level of use of ICT by students in the learning process.

METHODOLOGY

The study used a quantitative methodology for evaluating the results of the OECD Teaching and Learning International Survey (TALIS) ("an international, large-scale survey of teachers, school leaders and the learning environment in schools"), conducted in 2018 in 48 countries. Selected research - teachers and school leaders working in schools providing lower secondary education (ISCED Level 2, including level 3 (upper) secondary education, which is the stage before tertiary education). The sample is formed on the basis of a stratified two-stage sampling probability plan. Teachers, as objects of the second degree or secondary sample, were randomly selected from the list of teachers for each of the randomly selected teacher training institutions. Training facilities were the objects of the primary sample. The target sample size was: 20 teacher training institutions in the country, 5 training teachers for 1 institution and one director of each institution. Survey data were processed using statistical analysis in the software environment SPPS Statistics 22.0. Pearson and Spearman correlation was chosen by statistical methods to explain the direction and strength of the relationship between the use of ICT in teaching, the need for professional development, the shortage of digital technologies, and the level of preparation of teachers for the use of ICT. The main hypotheses of the study were:

- Hypothesis 1. The professional training of future teachers of labor training depends on the level of teacher training (teacher training courses, ICT instruction).
- Hypothesis 2. The professionalism of teachers determines their confidence in the use of ICT, the level of use of ICT by students in the learning process.
- Hypothesis 3. Insufficient professional training of teachers necessitates the professional development of their digital skills.

RESULTS

Different countries have different levels of teacher need for ICT skills, as teacher training depends on teachers’ ICT skills. This problem needs to be solved. For example, Vietnam, Japan, Colombia, and Georgia have the highest level of need for professional development of digital skills (Figure 1). The lowest level of demand is in Denmark (11.20%), United States (10.20%), United Arab Emirates (9.60%), Belgium (9.40%), Slovenia (8.50%), Alberta (Canada) (8.40%), Turkey (7.50%), England (UK) (5.30%). This situation may be due to the constant dynamic development of new technologies and their introduction into the educational activities of teachers for the training of teachers of labor training.

Figure 1. Teachers reporting a high level of need for professional development in ICT skills for teaching in OECD countries, 2018, %

Source: OECD (2021).

Among the problems of professional training of teachers of labor training - the lack or inadequacy of digital technologies for teacher training, which increases the risk of insufficient professional development, the development of digital skills. Lack of funding for higher education institutions may be the cause of this problem. For example, in the least developed countries - the largest shortage of digital technologies: Viet Nam (81.70%), South Africa (64.60%), Colombia (63.90%), Saudi Arabia (61.00%), Brazil 59.00%), Portugal (55.40%), Romania (49.80%), Kazakhstan (44.80%). The lowest level of deficit in the most developed countries: Austria (17.80%), Netherlands (16.20%), Belgium (16.10%), England (14.50%), Norway (10.70%), Sweden 10.30%), Shanghai (China) (9.90%), Malta (5.90%).
Figure 2. Principals reporting shortage or inadequacy of digital technology for instruction in OECD countries, 2018, %

Source: OECD (2021).

On average, in OECD countries, 51.74% of teachers who "often" or "always" allow students to use ICT for project development or learning activities (Figure 3). At the same time, the rate of use of digital technologies by students does not depend on the socio-economic development of the country. For example, the highest level of technology use by students in the educational process in the educational environment in the following countries: Denmark (90.40%), New Zealand (79.80%), Australia (78.20%), United Arab Emirates (76.80%), Colombia (70.80%), Russian Federation (69.00%), Mexico (68.70%), Turkey (66.60%). On the other hand, in France the figure is 36.10%, in the Czech Republic - 35.40%, in Austria - 32.90%, in Korea - 29.60%, in Belgium - 28.90%, in Shanghai (China) - 24.30%, in Japan - 17.90%.

Figure 3. Teachers who 'frequently' or 'always' let students use ICT for projects or class work in OECD countries, 2018, %

Source: OECD (2021).

On average, for 56% of teachers, the use of ICT for student learning purposes was included in formal education or training (Figure 4). This indicator can determine the future professional training of teachers who have taken courses in the use of ICT in formal education, students in education. For many countries, the integration of ICT teaching courses remains a challenge. For example, in Norway the figure was 45.90%, in Lithuania - 45.30%, Georgia - 44.80%, Czech Republic - 44.50%, Austria - 40.50%, Spain - 38.00%, Sweden - 36.70%.
On average, 42.8% of teachers feel ‘well prepared’ or ‘very well prepared’ for the use of ICT for teaching (Figure 5), which confirms the problem of teacher training, and as a consequence - the problem of knowledge transfer in the use of technology in the future. teachers of labor training. In United Arab Emirates (86.10%), Viet Nam (80.00%), Mexico (79.70%), Saudi Arabia (71.80%), Russian Federation (71.50%), Turkey (71, 30%), Romania (69.50%), Kazakhstan (68.80%) the highest level of confidence of teachers in their own preparation for the use of digital technologies.

In most countries, the use of ICT in education as an element of formal education is implemented in 64% of cases, in 36% of cases teachers note the lack of use of ICT in education (Table 1).
Table 1. Combination table Country * Elements in formal education: Use of ICT for teaching

| Country                  | Elements in form. educ: Use of ICT for teaching | Total |
|--------------------------|-------------------------------------------------|-------|
|                          | Yes     | No     |       |
| Australia                | 1390    | 797    | 2187  |
| Colombia                 | 1709    | 448    | 2157  |
| Czech Republic           | 1124    | 1443   | 2567  |
| Denmark                  | 496     | 503    | 999   |
| Georgia                  | 849     | 945    | 1794  |
| Malta                    | 521     | 294    | 815   |
| Viet Nam                 | 2057    | 110    | 2167  |
| Turkey                   | 2396    | 1148   | 3544  |
| Buenos Aires Autonomous City (Argentina) | 639   | 519    | 1158  |
| Total                    | 11181   | 6207   | 17388 |

Source: calculated by the author based on the OECD (2021).

There is little connection between the country and the use of ICT in education: Pearson’s correlation is 0.045 with a significance level of 1%, which means that the educational environment determines the digitalization of education and digital training of students more than political programs at the national level.

Table 2. Correlation Country * Elements in formal education: Use of ICT for teaching

| Meaning                     | Asymptotic rms error a | Approximate $T^b$ | Approximate Value |
|-----------------------------|------------------------|-------------------|------------------|
| Interval / interval R Pearson | 0.045                  | 0.008             | 6.001            | 0.000^c       |
| Ordinal / ordinal Spearman’s correlation | 0.046                  | 0.008             | -6.017           | 0.000^c       |
| Number of admissible observations | 17388                  |                   |                  |                |

a. Not assuming the null hypothesis.
b. Use of the asymptotic rms error in the assumption of the null hypothesis.
c. Based on normal approximation.

Source: calculated by the author based on the OECD (2021).

Professional development of digital skills of teachers on average in countries is 65% of teachers, while 35% say no development (Table 3). The highest level of professional training of teachers in Australia, Colombia, Georgia, Vietnam, Turkey. The lowest level of professional development - in the Czech Republic, Denmark, Malta.

Table 3. Combination table Country ID * Areas professional development ICT skills for teaching

| Country                  | Areas professional development ICT skills for teaching | Total |
|--------------------------|------------------------------------------------------|-------|
|                          | Yes     | No     |       |
| Australia                | 1386    | 705    | 2091  |
| Colombia                 | 1489    | 452    | 1941  |
| Czech Republic           | 1086    | 1417   | 2503  |
| Denmark                  | 439     | 511    | 950   |
| Georgia                  | 1268    | 510    | 1778  |
| Malta                    | 376     | 394    | 770   |
| Viet Nam                 | 1919    | 185    | 2104  |
| Turkey                   | 2093    | 1271   | 3364  |
| Buenos Aires Autonomous City (Argentina) | 643   | 359    | 1002  |
| Total                    | 10699   | 5804   | 16503 |

Source: calculated by the author

The professional development of digital skills of teachers does not depend on the country (Table 4). With a significance of 1%, it can be stated that there is low feedback between the development of ICT competencies and the country (-0.034).
Given that 65% on average have professional development of digital skills of teachers, it is advisable to analyze the need for development (Table 5). For example, in Australia, 17% of teachers noted no need, 36% low demand, 37% medium demand, 10% high demand. The level of digital skills development needs varies from country to country. The highest levels of demand are in Colombia (72%), the Czech Republic (53%), Georgia (69%), Malta (51%), Vietnam (91%), and Argentina (58%). On average, the level of development needs is 57%, while the actual trainings and courses is 65%.

The need to develop digital skills of teachers does not depend on the country (Table 6). This means that there is differentiation and there are different features of the use of ICT in learning and features of the development of digital skills.
DISCUSSION

Given the identified features of the use of ICT in the training of teachers of labor training, it is advisable to form a number of trends that are important in educational activities and should be implemented in the educational environment.

Collaborative design and learning based on technologies are increasingly used in the training of future teachers of labor education and technology. This trend is driven by the need for "creation of new ideas, products, and models to tackle emergent and complex problems that challenge people to cross boundaries of their existing communities and prevailing knowledge" (VARTIAINEN et al., 2016). One of the main trends in the field of handicrafts is digital and machine crafting, eco-crafting using natural materials, knowledge of traditions and the introduction of elements of creativity in traditional handicraft products (DOLLAR, 2020). Therefore, the vocational education of future teachers is important for the maintenance and development of textile traditions (KOKKO, RAISÄNEN, 2019), and technology contributes to the combination of tradition and creativity, joint interaction of participants in product development, and the formation of new knowledge. A separate issue is the increase in the level of manufacturability of craft education (NIIRANEN, HILMOLA, 2016) and digital skills, especially for women, to bridge the gender gap in teacher training. The manufacturability of education in the field of training future teachers of labor training and technology is one of the most pressing issues discussed in the scientific literature (KOKKO, KOHIA, KANGAS, 2020).

Training should be based on creativity, collaboration, problem solving, the ability of teachers to use technology to create new knowledge, empowerment and productivity. Craft education programs emphasize the student’s creative skills for problem solving, various design tasks, and design development. In addition, curricula include the development of projects of artifacts, independent planning of work by students (RONKKO, MOMMO, AERILA, 2016).

CONCLUSION

The analysis of the results of the Teaching and Learning International Survey (TALIS) on ICT for teaching allows us to draw the following conclusions:

1. Countries are differentiated according to the level of need for professional development of digital skills.
2. There is a lack or inadequacy of digital technologies used to instruct teachers, which increases the risk of insufficient professional development, the development of digital skills.
3. Differentiation of the level of application of technologies by students in the process of educational activity in the educational environment.
4. Differentiation according to the level of inclusion of the course on the use of ICT in order to teach students to formal education or teacher training.
5. Low level of teachers’ confidence in their own preparation for the use of ICT for teaching (42% feel ‘well prepared’ or ‘very well prepared’).

Identified trends in the use of ICT in the training of future teachers of labor training indicate that professional training depends on the level of teacher training (teacher training courses, briefings on the use of ICT). The professionalism of teachers determines their confidence in the use of ICT, the level of use of ICT by students in the learning process. In addition, insufficient professional training of teachers necessitates the professional development of their digital skills. Further research on this issue should be aimed at studying what digital skills are formed in the process of professional training of future teachers of labor training and how the development of digital skills affects creativity.
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Professional training of future teachers of labor education and technology by means of information and communication technologies

Formação profissional de futuros professores de educação e tecnologia do trabalho por meio de tecnologias de informação e comunicação

Formación profesional de futuros docentes de educación laboral y tecnología a través de las tecnologías de la información y la comunicación

Resumo
O objetivo deste artigo foi identificar as características da formação profissional dos futuros professores de educação e tecnologia do trabalho por meio de tecnologias de informação e comunicação. A metodologia da pesquisa baseia-se em uma análise estatística de correlação dos resultados da pesquisa estruturada da Pesquisa Internacional de Ensino e Aprendizagem da OCDE (TALIS), realizada em 2018 em 48 países. Amostra de pesquisa - professores e líderes escolares que trabalham em escolas que proporcionam ensino médio mais baixo. Os resultados possibilitam o estado das seguintes características da formação profissional dos futuros professores da formação do trabalho. Identificada falta ou inadequação das tecnologias digitais para a formação de professores, o que aumenta o risco de desenvolvimento profissional insuficiente, dominando habilidades digitais.

Palavras-chave: Formação de professores de formação de mão-de-obra. Habilidades digitais dos professores. TIC na formação de professores. Habilidades digitais de professores de formação profissional.

Abstract
The purpose of this article was to identify the features of professional training of future teachers of labor education and technology by means of information and communication technologies. The research methodology is based on a statistical correlation analysis of the results of the structured survey the OECD Teaching and Learning International Survey (TALIS), conducted in 2018 in 48 countries. Sample of research - teachers and school leaders working in schools providing lower secondary education. The results make it possible to state the following main features of professional training of future teachers of labor training. Identified lack or inadequacy of digital technologies for teacher instruction, which increases the risk of insufficient professional development, mastering digital skills.

Keywords: Training of teachers of labor training. Digital skills of teachers. ICT in teacher training. Digital skills of teachers of labor training.

Resumen
El propósito de este artículo fue identificar las características de la formación profesional de los futuros profesores de educación laboral y tecnología por medio de las tecnologías de la información y la comunicación. La metodología de investigación se basa en un análisis estadístico de correlación de los resultados de la encuesta estructurada de la Oecd Teaching and Learning International Survey (TALIS), realizada en 2018 en 48 países. Muestra de investigación - maestros y líderes escolares que trabajan en escuelas que ofrecen educación secundaria inferior. Los resultados permiten establecer las siguientes características principales de la formación profesional de los futuros profesores de formación laboral. Se identificó la falta o insuficiencia de tecnologías digitales para la instrucción docente, lo que aumenta el riesgo de un desarrollo profesional insuficiente, dominando las habilidades digitales.

Palabras-clave: Formación de docentes de formación laboral. Competencias digitales de los profesores. Las TIC en la formación del profesorado. Habilidades digitales de los docentes de formación laboral.