SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2024
ORGANIZATION AND MANAGEMENT SERIES NO. 213

ASSESSMENT OF THE QUALITY OF TEACHER TRAINING IN THE AREA OF DIGITAL COMPETENCES

Danuta MORAŃSKA

Humanitas Academy, Sosnowiec; danuta.moranska@gmail.com, ORCID: 0000-0002-6903-3658

Purpose: The purpose of this article is to point out the main directions for research quality education teachers in the area of digital competencies.
Design/methodology/approach: In content done analysis Letters indicators result in Politics Digital Transformation Education (PCTE) and proposals Validation competence digital.
Findings: Based on the analysis, we presented suggestions for defining digital teachers' competence levels. The solutions presented constitute proposal additions. Letters indicators result in Politics Digital Transformation Education (PCTE).
Originality/value: The article is of a nature overview.
Keywords: digital civilization, education, teachers' digital competencies.
Category of the paper: Literature review.

1. Introduction

One of the key challenges of modern civilization is to provide society with the opportunity to develop the competencies necessary to function efficiently in digital technologies.

Meeting the challenges related to the development of expected competencies includes several activities, among which the adaptation of the education system to current expectations is of great importance. Defining in 2006 and 2018, a catalog of critical competencies in the lifelong learning process (Recommendations, 2006, 2018) initiated a series of activities concerning modifying education systems and their adaptation to civilizational changes. This process continues uninterrupted, among others, due to permanent technological changes caused by introducing new solutions based on artificial intelligence and the need to protect against cyber threats.

The pace of development of competencies expected in society depends on changes in the education system. In recent years, work has been underway in Poland to describe activities aimed at adapting the way educational tasks are carried out to the requirements of modern times. Some of the essential documents that refer to this issue in our country are the Digital

Competence Development Program (PRKC, 2023) and the Digital Transformation of Education Policy (PCTE, 2024), which is a strategic document defining the state policy and planned activities undertaken in the area of digitization of education in the short term (until 2027), medium term (until 2030) and long term (until 2035). The document describes the coordination, planning, and evaluation principles of diagnosed and defined goals. The tasks and directions of action of all entities operating in the field of education have also been specified. The PCTE specifies the strategy and indicates methods and tools to achieve a fully digital education system in its assumptions. The most significant changes concern teaching methodology, which considers modern methods that support the development of students' creativity, digital competencies, and social competencies in an environment that uses the latest achievements in digital technology. It was considered necessary to shape the skills of responsible use of digital tools. Expectations towards teachers' competencies to carry out these tasks were clearly formulated. According to the authors, the PCTE identified ten areas that require intervention. These include (PCTE, 2024, pp. 29-56):

1. Evaluation of the state of digital education and the use of educational technology by students.
2. Change of the current core curriculum for preschool and general education.
3. New technologies, including artificial intelligence in school.
4. Teaching methods, digital didactics, digital teaching resources.
5. Teacher training and development.
6. Equipment for students, teachers and schools.
7. Educating digital professionals.
8. Digital Security.
9. Changing the organization of schoolwork.
10. Support for teachers and schools in the digital transformation process.

It is essential to emphasize the great value of the document in connection with the comprehensive approach to issues related to reforming education in Poland to adapt the entire system to civilizational change holistically. Attention was also drawn to the synergy of individual activities. It is worth emphasizing that among the listed areas was the preparation of teaching staff responsible for shaping key competencies, including students' digital competencies. In the face of the civilizational challenges facing Polish society, not only has the education of future teachers and their professional development undoubtedly become essential, but the method of verifying the effects of these activities has also become essential. After all, the efficiency of meeting contemporary educational challenges in the digital, constantly changing reality depends on the scope and level of teachers' digital competencies. Undoubtedly, the effects of introducing changes in education related to implementing the Digital Transformation of Education Policy (PCTE) depend on the quality of teachers' preparation.

2. Policy Digital Transformation Education (PCTE) – Challenges for education system

As mentioned, in September 2024, a resolution was adopted to adapt the Polish education system to contemporary civilization requirements. This resolution described the necessary actions to create conditions for the effective implementation of solutions included in the new core curriculum, EU documents, and other documents defining the strategy for the development of society in the digital era.

The most important part of the document (PCTE) consists of ten chapters (listed in the Introduction), which create a decalogue of actions exhausting the most critical areas requiring intervention. They address the issues most important for developing digital education and primary for the digital transformation of the school and the entire education system. An integral part of the document are the annexes (PCTE, 2024, pp. 128-166):

- Annex 1. Diagnosis.
- Annex 2. Action Plan.
- Annex 3. Schedule.
- Annex 4. List of result indicators.

Teacher education issues are described in detail in three areas:

- **New technologies, including artificial intelligence in schools** (area 3, PCTE, p. 30).
  The document paid particular attention to the presence of artificial intelligence in the life space of modern society and its impact on the activity of teachers and students. It was noted that the available solutions have specific educational values. Hence, they should be included in offering educational activities, developing skills in managing digital intelligent solutions (e.g., robot programming), and using currently widely available generative artificial intelligence (e.g., ChatGPT). The use of exemplary solutions in education will allow students to become familiar with the mechanisms of artificial intelligence, ways of using it, and the threats it can bring to human activity and life. It can also provide support for the teacher and help in the educational and personal development of the student, as well as in the organization of school work. Attention was drawn to the need to develop solutions that introduce these tools to educational institutions to benefit educational processes while minimizing the risk of threats and ethical violations. The need to introduce legislative regulations and educational support for teachers was also emphasized.
- **Teaching methods, digital didactics, digital teaching resources** (area 4, PCTE, p. 33).
  The document refers to the need to change the teaching methodology by moving from expository teaching to activating methods that prefer active learning using methods and means provided by digital technologies. It emphasizes the need to use the opportunities

created by technologies to support students in the process of constructing knowledge, especially in the case of special educational needs. In this environment, students learn through action, developing their skills, constructing their knowledge based on the knowledge they already have, and expanding it. When describing this model of learning, attention was drawn to research conducted in the field of cognitive psychology. Constructivism and constructionism are currently, especially in the technological environment, the leading concepts of students' cognitive development, making a significant contribution to how the development of their skills and competencies, especially digital ones and others, is perceived. The critical research in this area was conducted by Jean Piaget (individual constructivism), Lev Vygotsky (socio-cultural constructivism) (Mietzel, 2003, pp. 91-133; Klus-Stańska, 2010, pp. 263-285) and Seymour Papert (constructionism) (Papert, 1996). The priority assumption adopted by the researchers was the empowerment of the learner and the establishment of conditions that determine the effectiveness of the learning process. It was emphasized that the natural complement to these concepts is computational thinking, which defines the thought processes (ways of reasoning) accompanying the student when formulating problems and their solutions in a form that allows for their effective implementation using a computer, other digital technologies, as well as in an environment without technological support. The cited concept concerns the development of design thinking. At the same time, the issue of adapting digital didactics to young people with special educational needs is essential here, as well as taking into account the limitations that prevent participation in stationary education conducted in educational institutions. Attention was drawn to the need to develop and improve remote and hybrid education methods that can help overcome these limitations. In order to implement these concepts, it is necessary to provide all students and teachers with access to high-quality digital educational tools and resources. This approach must finally be officially introduced into educational policy in Poland. This need has been communicated for many years by many Polish educators, including Boleslaw Niemierko (1999), Dorota Klus-Stańska (2010), and Stanislaw Dylak (2000).

- **Teacher training and development** (area 5, PCTE, p. 37).
  Adequate preparation of teachers is crucial for the development of students' competencies, including, in particular, digital competencies. That applies to all teachers, regardless of the stage of education and the specialization they represent. The document emphasizes that "preparing teachers both to carry out classes by the applicable core curriculum of general education, as well as due to emerging new technologies and by the assumptions of universal education design related to the introduction of rational improvements" (PCTE, p. 8), is crucial for the development of students' competences in general, and digital competences in particular. The resolution refers to the regulation of the Minister of Science and Higher Education of July 25, 2019, on the standard of

education preparing for the teaching profession (Journal of Laws of 2024, item 453), specifying the scope of preparation of all teachers to use digital technologies, as well as teaching with their help. It was noted that the responsibility for the quality of implementation of this task rests with universities conducting teacher education. This task was considered crucial for implementing the digital transformation of education.

In conclusion, it should be emphasized that in addition to preparing new teaching staff for kindergartens and schools, the offer of universities in the field of teacher education should include various forms of professional development of teachers. This task was also entrusted to teacher development institutions. According to the provisions of the resolution, the state financially and organizationally supports it. It was emphasized that a good-quality development offer for teachers of all subjects in the area of using digital tools should be permanently available to interested teachers.

It is essential that it is up-to-date, responds to the needs and expectations of teachers, and also covers issues that change over time and are essential from the state's point of view, such as the impact of using technology on students' mental and physical health, cyberculture, digital citizenship, socialization in the digital world. In order to ensure the proper functioning of teacher education, close cooperation between the Ministry of Education and the Ministry of Science and Higher Education is necessary.

The presented characteristics of the assumptions contained in the resolution of the Council of Ministers: Digital Transformation Policy of Education, presented in the concept, constitute a coherent and internally complete document describing the actions that should be taken to introduce Polish education to the educational path of the 21st century. The entire strategy is based on an in-depth analysis of solutions already functioning in other countries and on a diagnosis of the current state of the Polish education system.

Teachers' education quality – critical criteria

Foreseeing a method of verifying the quality of implementing the tasks described in the assumptions is necessary. Therefore, the PCTE is supplemented by Annex 4, which contain*s the list of result indicators* and a description of the evaluation of the effects of the actions taken concerning, among others, education. Based on the description of the results, it should be assumed that the established indicators aim to verify the quality of the actions taken. Determining the quality of teacher education is an equally complex process as assessing the overall quality of education. In order to accurately assess whether teacher education is effective and of high quality, various aspects of professional preparation, competencies, and the effectiveness of educational processes should be taken into account. Determining the quality of teacher education requires a holistic approach that considers not only theoretical knowledge and pedagogical skills but also practical competencies, professional experience, and professional attitudes of teachers.

The critical criteria that help determine the quality of teacher education can be divided into two areas of activity: preparation for the teaching profession and professional development of in-service teachers.

Preparation for the teaching profession includes:

- the teacher training program, its scope and relevance, and the integration of theory and practice,
- methodological skills in relation to the latest achievements in pedagogy and psychology,
- professional internships and apprenticeships,
- external assessments and accreditations of teacher training institutions,
- the achievements of teacher education graduates measure the effectiveness of the educational process.

In turn, in the area of professional development of active teachers, the following are of crucial importance:

- teachers portfolio,
- commitment and pedagogical skills,
- mentoring support and creating professional networks consist of creating a support system and a platform for exchanging experiences for teachers.

There is no doubt, as emphasized above that the quality of a teacher's work is decisively influenced by having up-to-date pedagogical and psychological knowledge, methodological skills, and a high level of digital competencies that enable the implementation of educational tasks with students and support their learning process in the digital reality. Achieving such formulated effects requires high-quality education and improvement of teachers' competencies. It is also necessary to use objective forms of assessment of the knowledge possessed by teachers, e.g., by obtaining confirmation of obtained qualifications with appropriate certificates, micro-credentials, or authorizations. The lack of solutions in Polish education law that enable reliable certification of digital competencies possessed by teachers poses a severe risk of delays and difficulties in adapting the entire education system to the requirements of digital civilization.

3. List of indicators PCTE result and quality education teachers

One of the most basic standards, ISO 9000, officially defines quality. According to this definition, "quality is a certain degree of features inherent to a given product, which simultaneously meets the requirements of a specific group of recipients" (Rogala, 2014, pp. 536-545). Considering the expected level of teachers' digital competencies as a characteristic, the challenge becomes how to measure them.

In social research, the concept of evaluation is popularly used. It involves an objective assessment of a project, program, or policy at all stages, i.e., planning, implementation, and measurement of results. It should provide reliable and valuable information, allowing the knowledge acquired in this way to be used in the decision-making process. "Evaluation is a systematic study conducted using various methods, consisting of data collection, analysis, assessment, and reporting on results. Its aim is to estimate (in relation to clearly formulated criteria) the quality and value of the process and the effects of implementing public interventions" (Olejniczak, 2008, p. 22).

Considering the presented interpretations of the concepts of quality and evaluation, one should approach the proposals for assessing the effects of PCTE implementation described in Annex 4 with reserve, recognizing that at the stage of task implementation, this issue will be supplemented and expanded (Annex 4). Meanwhile, most of the indicators included in the document defining the level of implementation of the tasks included in it are based on self-assessment. The problem is that many indicators are based on declared data. For example:

3. New technologies, including artificial intelligence in school, p. 3	W3.2. Percentage of teachers declaring their ability to use artificial intelligence-based tools in teaching
4. Teaching methods, digital didactics, digital teaching resources, p. 5	W4.6. Percentage of teachers conducting compulsory education classes in primary or secondary schools who assess that their competencies in all areas of the DigCompEdu framework are at level B1 or higher
5. Teacher education and development, p. 6	W5.1. Percentage of graduates of teaching specializations who assess their competencies in all areas of the DigCompEdu framework as being at level B1 or higher

Some activities included in the schedule need to be evaluated. For example:

3. New technologies, including artificial intelligence in school	Development of examples of the use of artificial intelligence to prepare teachers to individualize work with students and conduct classes in their subject
4. Teaching methods, digital didactics, digital didactic resources	Development of digital teaching solutions
5. Teacher training and development	Development of a system for certifying the quality of training outcomes for teachers

From the point of view of social research methodology, this is the most subjective and, therefore, the least reliable method of collecting scientific data, often making it difficult to obtain reliable knowledge on the researched topic.

The declaration indicates low scientific value, while reliable verification of learning outcomes is essential. That involves examining the ability to apply knowledge according to B. Niemierka's Taxonomy of Educational Objectives ABC (Niemierko, 2002) and B. Bloom's Taxonomy of Educational Objectives (Armstrong, 2010).

4. Rate quality education - level obtained/possessed competence – proposal research

Competencies should be understood as dispositions regarding knowledge, skills, and attitudes that allow tasks to be performed appropriately (Filipowicz, 2014). Digital competencies, conversely, are understood as a harmonious composition of knowledge, skills, and attitudes that enable living, learning, and working in a digital society (using digital technologies). The most crucial thing in this respect is the relationship between competencies and the tasks performed, and these tasks may be related to the performance of various social roles. The case article refers to the role of a teacher.

A key role in assessing competencies is played by defining behavioral indicators of isolated competencies, which are defined as observable behaviors that allow for the identification and assessment of the occurrence of a given competency in an individual (Filipowicz, 2014). In order to properly conduct teacher competency research, it is necessary to develop a competency profile covering the scope and level of competencies necessary/desirable in the teaching profession. In practice, competency profiles are used, among others, to design career paths, assessment and development activities. That allows for the definition of a competency model containing a list of competencies with their names and definitions, an observational scale, development guidelines, questions for a competency test, and questions for a qualification interview (Filipowicz, 2014).

The essential feature of social research is that it is a carefully designed procedure subject to rigorous analysis. Progress depends on the results of research using appropriate methods. The choice of method depends on the specificity of the researched object (e.g., the number of people studied) and the situation (where and in what conditions the research is carried out). This choice is superior to the choice of technique and tools. Proper preparation for research should include research objectives, the subject of research, formulated research problems, the choice of method, technique, and research tools, determining the research area, and defining the research sample (Krajewski, 2020, pp. 59-110).

It should be remembered that in social research, one of the most critical assumptions is that the researcher maintains research objectivity. Objectivity is a research attitude free from prejudice and a way of presenting results without taking one's own position on them. It is also worth referring here to the credibility of the obtained results. The selection of applied methods and research tools influences research objectivity. Various sources and perspectives should be used to ensure that the obtained research results are not influenced by a single point of view. That allows for objectively assessing the variables studied and determining their value.

In the case of digital competencies, the most objective verification of the competencies is their certification, obtaining a micro-credential, or confirming new authorizations. The most appropriate instruments for certification (certifying the possession of the expected level of

competence) are standardized tools verified in terms of validity and reliability, developed based on adopted standards. In the case of digital competencies, the DigCompEdu standard has currently been adopted . A feature of these tools is their objectivity in assessing competencies. The research methods used must meet the criterion of validity and reliability. It is best if they are standardized. The validity of a research method consists in determining the degree of compliance with which a measurement tool measures what it was designed to measure. It is related to the question of whether researchers managed to measure what they planned to measure (Stanisz, 2007, p. 435).

On the other hand, reliability measures the extent to which the test result reflects the test feature's actual value and to what extent errors of various origins distort it (Brzyski et al., 2010, p. 694). In order to broaden the spectrum of competence verification, self-assessment and assessment by a superior can be additionally used. That is the absolute minimum referred to as a 180-degree assessment. Additional assessments from other perspectives, 270 degrees or a 360-degree survey, allow for a broader and more reliable assessment (Jezierska, pp. 253-272). The obtained results may be burdened with a subjective error depending on the intentions of the people tested.

A way to identify variables (e.g., digital competencies necessary in the teaching profession) is to conduct a qualitative study among experts using the focus group interview method. The result of work in an expert team may be a set of characteristic digital competencies described using definitions and behavioral indicators, as well as a behavioral observation scale selected to assess these competencies, or more precisely – a developmental scale. All experts must accept the developed set of competencies. In this way, a list of teachers' digital competencies can be determined (Table 1). The digital competencies adopted for implementation can be determined using documents (e.g. DigCompEdu, PCTE).

Table 1.
Examples of characteristics of teachers' distinguished digital competencies

Social role	IT skills	Information and communication skills	Functional competencies
Teachers of various levels of education and specializations (preschool, early school education, grades IV-VII, secondary education)	- knowledge of digital tools and their use in designing and implementing educational situations	- use of data sets in the educational process, - managing an educational project in a digital environment, - identifying and counteracting cyber threats	- developing students' digital competencies related to learning

Source: Own study based on expert opinion[1].

[1] An expert opinion defines digital competences specific to various social roles and indicates measurement methods. It was developed by the Polish Information Processing Society Team, which included the author. That is unpublished material. The proposed model for assessing digital competencies uses the 180-degree method. The content presented in the article presents a modified version of the model that is included in the expert opinion.

The division of digital competencies was adopted by *the Framework Catalogue of Digital Competences* (Jasiewicz et al., 2018).

Below is an example description of one of the teachers' digital competencies listed in Table 1 (Table 2).

Table 2.
Characteristics of teachers' digital competence EDUCATIONAL PROJECT MANAGEMENT IN THE DIGITAL ENVIRONMENT

Category	Description
Name	EDUCATIONAL PROJECT MANAGEMENT IN THE DIGITAL ENVIRONMENT *(information and communication competence)*
Definition	Knowledge of the possibilities of functioning in a digital environment. Knowledge and ability to apply project methods in educational processes using IT. Ability to manage a project using IT tools.
Indicators Behavioral	- Plans educational projects in the digital environment. - Chooses a digital environment focused on project management. - Uses IT tools to manage student projects.

Source: Own study based on expert opinion.

The research resulted in developing a proposal for research tools that could be used to measure the level of digital competence of teachers indicated by experts. In relation to the specific digital competencies of teachers, the research recommended a measurement method in the form of teacher self-assessment and observation of teacher behavior by the supervisor. Therefore, a self-assessment sheet (Table 3) and a supervisor assessment sheet (Table 4) of the level of digital competencies based on a scale from A to E were proposed.

Example of a teacher's self-assessment scale for digital competencies:

A. You do not exhibit the desired behaviors associated with a given competency. You make mistakes and need help coping with tasks that require a given competency.
B. You try to behave in the expected way to cope with tasks that require certain competencies. You still make mistakes, but you learn from them.
C. You are independent. You correctly perform most standard tasks that require a given competency. You need help with slightly more difficult tasks, so you make mistakes in new, non-standard situations.
D. You efficiently and flawlessly perform most tasks that require a given competency. You also cope with difficult tasks in non-standard situations. You demonstrate positive behaviors that describe a given competency. You are often held up as a role model for others. You indicate and explain expected behaviors to others.
E. You perform even challenging tasks that ideally require a creative approach to a given competence. You demonstrate a high level of automatism in the actions you perform, as well as new behaviors within a given competence. You set tendencies and trends in a given area.

Below is an example of self-assessment of the level of the proposed competence MANAGEMENT OF AN EDUCATIONAL PROJECT IN A DIGITAL ENVIRONMENT.

Table 3.
Example of self-assessment of the level of the proposed competence EDUCATIONAL PROJECT MANAGEMENT IN THE DIGITAL ENVIRONMENT

Behavioral indicators	Sample survey questions	AND	B	C	D	E
Chooses a digital environment focused on project management	- I distinguish between project management software. - I select digital tools to run projects.					
Plans educational projects in the digital environment	- I am preparing a scenario for an educational project in a digital environment. - I am preparing digital educational materials for a project in a digital environment.					
Uses ICT tools to implement projects	- I prepare a project implementation schedule using applications such as Padlet, Gantt, MS Project. - I present teaching material using IT in design classes.					

Source: Own study based on expert opinion.

An example scale for assessing teachers' digital competencies by their supervisor could include the following levels:

A. There are no desirable behaviors associated with a given competency. The employee makes mistakes and is clearly unable to cope with tasks requiring a given competency.
B. The employee behaves expectedly to cope with tasks requiring the given competencies. He still makes mistakes but learns from them.
C. Independent employee. Correctly performs most standard tasks requiring a given competency. He has problems with slightly more difficult tasks, so he makes mistakes in new, non-standard situations.
D. Efficiently and flawlessly performs most tasks requiring a given competency. Also copes with difficult tasks in non-standard situations. Demonstrates positive behaviors describing a given competency. It is often held up as a role model for others. Indicates and explains expected behaviors to others.
E. Perfectly performs challenging tasks that require a creative approach to a given competency. Demonstrates a high level of automatism in the actions performed and new behaviors within a given competency. Sets trends and tendencies in a given area.

Table 4.
Example *of the Questionnaire for the assessment of teachers' digital competence by the superior* **-** *MANAGEMENT OF AN EDUCATIONAL PROJECT IN THE DIGITAL ENVIRONMENT*

Behavioral indicators	Sample survey questions	AND	B	C	D	E
Chooses a digital environment focused on project management	- Distinguishes project management software. - Select digital tools for project management.					
Plans educational projects in the digital environment	- Prepares a scenario for an educational project in a digital environment. - Prepares digital educational materials for a project in a digital environment.					
Uses ICT tools to implement projects	- Prepares a project implementation schedule using applications such as Padlet, Gantt, MS Project. - Presents teaching material using ICT in design classes.					

Source: Own study based on expert opinion.

5. Summary

The draft resolution of the Council of Ministers - Digital Transformation Policy of Education describes an essential policy of digital transformation of education from the point of view of the development of the information society in Poland. It comprehensively covers several activities to prepare the young generation to function in the digital reality. Its assumptions at the level of strategy are optimistic. However, the most challenging task is to ensure the quality of the actions taken to achieve the intended effects in a coherent and harmonious manner. Therefore, planning indicators are already at the stage of planning specific projects, based on which it will be possible to assess the level of task implementation. Thanks to this, verifying whether the intended effects have been achieved will be possible.

References

1. Armstrong, P. (2010). *Bloom's Taxonomy. Vanderbilt University Center for Teaching*. Retrieved from: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/, 20.10.2024.
2. Brzyski, P., Knurowski, T., Tobiasz-Adamczyk, B., (2003). Validity and reliability of the general health assessment questionnaire SF-20 in the elderly population. *Przegląd Epidemiologiczny, No. 57.*

3. *Council Recommendation of 22.05.2018, on key competencies for lifelong learning (Text with EEA relevance) (2018/C 189/01).* Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=en.
4. *DigCompEdu*. Retrieved from: https://joint-research-centre.ec.europa.eu/digcompedu_en, 10.09.2024.
5. Digital Competence Development Program. *Resolution No. 24 of the Council of Ministers* of 21.02.2023, on the establishment of a government program called the "Digital Competence Development Program" (MP item 318). The document is available on the Digital Competences website - Ministry of Digital Affairs - Gov.pl Portal (www.gov.pl).
6. Dylak, S. (2000). Constructivism as a promising perspective of teacher education. In: H. Kwiatkowska, T. Lewowicki, S. Dylak (Eds.), *Modernity and teacher education*. Warszawa: WSP ZNP.
7. Filipowicz, G. (2014). *Competency management. Corporate and personal perspective.* Warszawa: Wolters Kluwer.
8. Jasiewicz, J., Filiciak, M., Mierzecka, A., Śliwowski, K., Klimczuk, A., Kisilowska, M., Zadrożny, J. (2018). *Framework Catalog of Digital Competences.* Retrieved from: https://www.gov.pl/web/cppc/skalowanie-dobrych-praktyk.
9. Jezierska, J. (2019). Employee evaluation system as an instrument of human resources management. *Konin Socio-Economic Studies, 4/5*.
10. Klus-Stańska, D. (2010). *Didactics in the face of the chaos of concepts and events*. Warsaw: Wydawnictwo Akademickie ŻAK.
11. Krajewski, M. (2020). *On the methodology of science and the principles of scientific writing.* Płock: WN NOVUM.
12. Mietzel, G. (2003). *Psychology of education. A practical handbook for pedagogues and teachers.* Gdańsk: Gdańskie Wydawnictwo Psychologiczne.
13. Niemierko, B. (1999). *Between school assessment and didactics. Closer to didactics*, Warsaw: WSiP.
14. Niemierko, B. (2002). *School assessment without secrets*. Warsaw: School and Pedagogical Publishing House.
15. OECD (2019). *OECD Skills Strategy Poland: Assessment and Recommendations, OECD Skills Studies.* Paris: OECD Publishing. Retrieved from: doi: https://doi.org/10.1787/b377fbcc-en.
16. Olejniczak, K. (2008). Introduction to evaluation issues. In: K. Olejniczak, M. Kozak, B. Ledzion (Eds.), *Theory and practice of evaluation of public interventions. Academic textbook*. Warszawa: Wydawnictwa Akademickie i Profesjonalne.
17. Papert, S. (1996). *Brainstorming. Children and computers.* Warszawa: PWN.
18. Policy Digital Transformation Education (2024). *Resolution No. 98 the Council of Ministers* of 12.10.2024. Retrieved from: https://dziennikustaw.gov.pl/M2024000081 201.pdf

19. *Recommendations Parliament European and of the Council of 18.12. 2006, on competence key in the process learning myself By whole life* (2006/962/EC). Retrieved from: https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32006H0962&from =LT.
20. Rogala, P. (2014). Continuous quality improvement according to ISO 9000 series standards. *Scientific Works of the Wrocław University of Economics, No. 340*, pp. 536-545.
21. Stanisz, A. (2007). *Accessible statistics course using STATISTICA PL on examples from medicine. Volume 3: Multivariate analyses.* Kraków: StatSoft.