**МЕНЕДЖМЕНТ/ MANAGEMENT**

# The manager's digital competencies in education system: a systematic review

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**Abstract.** This paper systematically reviews 34 WoS and Scopus studies, identifies and gives full detail of stakeholders, levels, models, educational technologies, and research prospects in formation and development of digital competencies of practitioners and future managers in education system. The six research questions put forward aim at data analysis. The results have shown that (a) pre-COVID-19 pandemic studies were of a more general, extensive nature; (b) during the COVID-19 pandemic and the post-COVID period, there has been an increase in scientific attention to formation of managers' digital competencies; (c) there is not enough research on issues related to development of digital competencies of future managers; (d) the analysis revealed an insufficient number of studies of such a significant digital competence as Safety; (e) DigComp structure is applicable as a universal basis for professional development of digital competencies of managers; (f) the analyzed papers lack detailed study of such important digital competencies as Information and Data Literacy, Safety, and Problem Solving; (g) analyzed articles lack detailed study of important technologies for the development of digital competencies of the DigCompOrg structure for current managers. A number of practical recommendations are given for the education system in forming and developing digital competencies of managers.

**Keywords:** digital technologies, digital competencies, digital skills, management, manager, education system, COVID-19.

**Introduction**

Managers of any level must be professionals in their fields since many factors occurring in a company depend on them. Accordingly, the manager must be both competent in management terms and have not only industry skills, but also possess digital competencies. Digital competencies are important for shaping managerial competence: the problem of possession of such competencies has become relevant in connection with the COVID-19 pandemic, which illustrated digitalization of key professional activity areas, especially managerial and educational ones. Furthermore, the digital model of economic relations defines new requirements for the training of future managers in education system. In this connection, education system plays a special role in the training of future managers and the development of digital competencies of practicing managers, while practical application of provisions and educational technologies of European programs DigComp 2.2 and DigCompOrg receives central importance.

This paper is devoted to understanding of processes of formation and development of digital competencies of managers in education system researchers used to approach at both the beginning of the COVID-19 pandemic and in the post-COVID period.

**Theoretical Background**
***Digital Competencies of Managers in Education System***

Rapidly changing conditions of both external and internal environment in the company determine new approaches to the process of managing system activities. Digital technology introduction rate and depth of changes in business processes in the company require the head to be able to make decisions in new conditions, which in turn implies presence of competencies other than the traditional manager's set of knowledge. The COVID-19 pandemic has shown that the process of developing and making managerial decisions is transformed following changes in economic realities, thereby challenging the capabilities of management functions in general and the abilities of individual managers to carry out the management process in particular (Kemer and Tekeli, 2022) [1].

In 2020, amidst the COVID-19 pandemic, educational institutions undergone a massive transition to a distance learning format that required accelerating the ongoing digital transformation. Recently, numerous attempts have been made to comprehend the impact of pandemic conditions on educational systems in different countries. The issues of forming and developing digital competencies of practitioners and future managers in education system have received particular importance and relevance. To name but a few, Obradović et al., 2018 investigate competencies of a project manager in the digital age [2]. Shet and Pereira, 2021 suggest management competencies for Industry 4.0 [3]. Sousa and Rocha, 2019 research skills for digital business in detail [4]. Prezioso and Margherita, 2021 study practices of applying organizational strategies in the development of digital skills of managers [5]. All these studies show that education system plays a key role in shaping and developing digital competencies of managers.

By now, various approaches to assessing digital competencies have been developed and tested, and multiple initiatives have been put forward. For instance, in order to identify the key

elements of digital competence and how to assess it, the European Commission has developed the Digital Competence Framework for Citizens DigComp 2.2 (Vuorikari et al., 2022) [6]. The European Framework for Digitally-Competent Educational Organizations DigCompOrg belongs to formalized practice-oriented models designed to study, support, and plan the work of educational organizations that use digital technologies (Kampylis et al., 2015) [7].

Let us take a closer look at educational factors affecting formation and development of digital competencies of managers.

### *Stakeholders and Levels in Formation and Development of Digital Competencies*

Professional managerial competencies (Hard Skills) provided by the traditional system of training managers need substantial revision and improvements in terms of supplementing technical skills in software, ability to analyze information, formulate and address programming issues in conditions of risk and uncertainty of the external environment.

A manager's personal qualities in the context of business process transformation (Soft Skills) need to evolve in order to ensure leadership at all stages of development and decision-making, organization of teamwork, ability to operate in conditions of constantly increasing rate of change.

Formation of leadership and digital competencies of future managers lies in education system – as noted in many studies: Henderikx and Stoffers, 2022 [8]; Gfrerer et al., 2021 [9], Bencsik, 2020 [10]; Jakubik and Berazhny, 2017 [11]. Both amidst the COVID-19 pandemic and in the post-COVID period, there is an increase in the attention of scientists to formation and development of digital competencies in education system. Case in point, Gunathilaka et al., 2022 [12]; Ramos et al., 2021 [13]; Burlacu, 2020 [14] investigate how the work of school teachers has changed in new conditions. Marchisio et al., 2022 show the emerging specifics of distance education [15]. Iivari et al., 2020 explore the leap in acquisition of digital skills by schoolchildren during pandemic [16]. Babina et al., 2022 [17]; Portillo et al., 2020 study perception of education workers of their own digital competencies [18]. Gunathilaka et al., 2022 describe features of the force majeure transition to remote formats compared to standard online-study [12].

In information and knowledge society, where digital technologies are rapidly developing and penetrating deeply into life, discussion of digital competence of university students and teachers has currently become an acute topic. For instance, Mitrovic et al., 2023 are questioning the future project managers' readiness for the digital world [19]. Uzule and Kuzmina-Merlino, 2022 have developed a structure of digital competencies for business and management programs in higher education [20].

Using factor analysis, Navaridas-Nalda et al., 2020 show that one of the defining variables of a school's successful digital transformation is how useful digital educational resources are for school principals and to what extent they are able to be leaders of educational communities [21]. In the study of qualitative aspects of the influence of teachers on the development of ICT skills of students, Siddiq et al., 2016 demonstrate the importance of how much the teacher believes in importance of digital skills for the effectiveness and academic performance of students [22]. Babina et al., 2022 [17]; Pitsiavas and Vlachopoulos, 2015 [23] discuss in detail the issues of leadership style and behavior of school principals and show how these factors affect the effectiveness and trustworthiness of the headmaster perceived by teachers. Leithwood et al.,

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2010 propose a model describing the mechanisms of influence of pedagogical leadership in school on academic performance [24].

A number of authors note the complexity and multilevel nature of the school's digital transformation process, e.g., Elkordy and Iovinelli, 2021 who note that a lack of understanding of the multilayered nature of both technologies and educational context, inadequate goal setting, and insufficient staff qualifications often call into question the success of technological changes in the school [25]. Yet we could not find any publications studying how systematically school principals perceive digital transformation, although they are largely responsible for the corresponding changes in educational institutions, as the study by Navaridas-Nalda et al., 2020 shows [21].

Literature analysis allows us to group all stakeholders in development of digital competencies into three educational levels: school, university, and firm.

### Digital Competencies of the DigComp Model 2.2

There is a certain accumulated set of cases and tools created as part of the European DigComp program (The European Digital Competence Framework for European citizens). Vuorikari et al., 2022 provide the most detailed data on cases and tools [6]. We would like to note that the DigComp program is being constantly improved. The initial version, DigComp 1.0, and latest version, DigComp 2.2, can be found on the official website at https://publications.jrc.ec.europa.eu/repository/handle/JRC128415. According to DigComp version 2.2, there are five areas (spheres) of digital competencies: 1. Information and Data Literacy, 2. Communication and Collaboration, 3. Digital Content Creation, 4. Safety, and 5. Problem Solving.

This model proposes a detailed classification of digital competence, including five areas and 21 digital competencies. This model is used by 21 EU countries and gives recommendations to educate people.

### DigCompOrg Structure Elements

A detailed analysis of schemes concerning which there is extensive experience of empirical practical application is an important stage in describing the changes that educational institutions go through in the course of digital renewal. Most certainly, the European DigCompOrg model pertains to such schemes.

The DigCompOrg model has been developed by European researchers and education experts. One of the tasks that developers set for themselves was to help educational organizations update educational process for the development of digital competencies through regular self-assessment of changes. Description of these competencies can use a set of citizen competencies in the digital era of DigComp 2.2. Subsequently, a set of competencies of DigCompEdu teachers has also been developed.

The DigCompOrg structure consists of seven interrelated key elements and fifteen sub-elements common to all education sectors. Each of these seven elements, which should be considered as parts of one whole, reflects different aspects of the complex process of integration and effective use of digital learning technologies. There is a multitude of descriptors for each of the DigCompOrg elements and sub-elements (Kampylis et al., 2015) [7].

## Materials and Methods

### *Research Questions*

To analyze formation of manager's digital competencies in education system, have set forward four research questions, as shown in Table 1.

Table 1. Research Topics and Questions (RQ) (Own Development)

| Themes | Research Questions (RQ) | Possible Answers Based on Literature |
|---|---|---|
| Characteristics of published articles on formation of manager's digital competencies in education system | RQ1. How many studies Scopus and WoS have and what direction are they taking? RQ2. How are research keywords related? | Article IDs and links. Number of Scopus and WoS articles |
| Analysis of formation of manager's digital competencies in education system | RQ3. Who are the stakeholders in formation and development of digital competencies and at what educational level are they? | 1. Managers 2. School Leaders, 3. Teachers, 4. Students. ---------------------------------- 1. Firm, 2. School, 3. University (own development) |
|  | RQ4. Which DigComp 2.2 model digital competencies of the stakeholders the analyzed articles study in detail? | 1. Information and Data Literacy, 2. Communication and Collaboration, 3. Digital Content Creation, 4. Safety, 5. Problem Solving (DigComp 2.2) |
|  | RQ5. What DigCompOrg structure elements among stakeholders the analyzed articles explore? | 1. Leadership & Governance Practices, 2. Teaching and Learning Practices, 3. Professional Development, 4. Assessment Practices, 5. Content and Curricula, 6. Collaboration and Networking, 7. Infrastructure (DigCompOrg) |
| Compiled by the authors | | |

### *The Search Process*

Research results have been given a systematic review and meta-analysis according to the PRISMA 2020 criteria.

Publications were searched across Web of Science and Scopus databases hereinafter referred to as databases.

The following keywords were used to search for data: Digital competence, Manager, Education. Table 2 shows the search strings.

Table 2. Search Strings Used in Databases

| Web of Science (WoS) | Scopus |
|---|---|
| (TS=("Digital competence" AND (Manager) AND (Education))) | (TITLE-ABS-KEY ("Digital competence" AND Manager) AND (Education)) |
| Compiled by the authors | |

### *Inclusion and Exclusion Criteria*

Search protocol and recommendations for the selection and evaluation of relevant studies were developed as follows:

Search resources: Scopus database and Web of Science database.

Categories and keywords: ("Digital competence"), ("Manager"), ("Education").

Inclusion criteria:

Document type: Article, Conference Paper, Conference Review, Book Chapter.

Publication Stage: Final.

Subject area: Education & Educational Research, Management, Social Sciences, Business, Management and Accounting, Decision Sciences.

Exclusion criteria: Duplicate.

### *Data selection and extraction process*

Databases were searched for articles, then data was extracted. Further on, data was entered into the Excel database. As a result, 55 studies were found in databases, of which 14 in WoS and 41 in Scopus. Data extracted from each article included the author(s), publication title, abstract, keywords, database, publication year, and journal title.

Seven duplicate articles were identified and immediately excluded from the Excel database leaving us with 48 articles. After selection on inclusion criterion, a final total of 34 articles were selected for systematic review.

## Results and Discussion

*RQ1. How many studies Scopus and WoS have and what direction are they taking?*

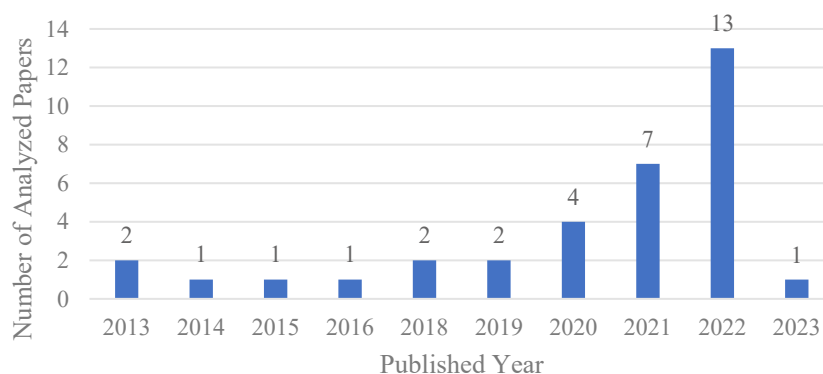We have analyzed the journals and their publication years (Figure 1, Table A1 of the Appendix).



Figure 1 – Analyzed Papers by Year

**Compiled by the authors**

The analyzed articles have been published between 2013 and 2023. No publications on the topic of our research have been found in 2017. The largest number of 13 articles has been published in 2022 (Paper IDs: A4, A10, A12-A21, and A23), followed by 2021 with 7 articles (Paper IDs: A1, A2, A6, A22, A24, A25, and A27) and 2020 with 4 articles (Paper IDs: A3, A26, A28, and A29). No more than 2 articles per year have been published in the rest of analyzed periods. As of March 2023, a single article on the topic of our research has been found in both databases. The analysis also revealed 18 journal articles, 13 conference articles, and 3 book chapters.

The year-by-year analysis of publications allows us to conclude about the increasing attention of scientists in both COVID and post-COVID periods to research issues of formation of manager's digital competencies and identification of education's role in this process. We have also noticed that pre-pandemic studies were of a more general and extensive nature. Case in point, before COVID-19, researchers would mainly focus on identifying common core professional functions and digital competencies corresponding to the knowledge society, studying both formal and non-formal education as an effective way to improve electronic didactic and digital competencies, studying digital competencies throughout life, the use of modern information systems (Pitsiavas and Vlachopoulos, 2015 [23]) and the use of open educational resources for everyday IT support and educational process improvement, the ratio of digital competencies demanded by companies and offered by training centers. Since 2020, the key focus in many studies has narrowed down to issues of formation and development of managers' digital competencies in the context of COVID-19 pandemic. For instance, examine in detail the curricula of continuing additional education at universities during COVID-19; Ramos et al., 2021 [13] focus on studying issues of organizing remote learning and teaching in educational institutions during COVID-19, creating more exact structure of digital competencies for students of university business and Management programs (Uzule and Kuzmina-Merlino, 2022) [20]. Gunathilaka et al., 2022 [12] explore and determine application of digital competencies of teaching staff in pandemic's stressful conditions.

For our study, it was important to find the most cited articles related to formation and development of digital competencies of managers in education system, as shown in Table 3.

Table 3.Journals and Citations of Analyzed Articles

| Journal Name | ID Articles | Citations |
|---|---|---|
| International Journal of Computer Integrated Manufacturing | A27 | 16 |
| Revista Venezolana de Gerencia | A24 | 11 |
| E-Learning, E-Education, and Online Training: First International Conference (eLEOT) | A33 | 11 |

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| Industrial and Commercial Training | A31 | 8 |
|---|---|---|
| Baltic Journal of Economic Studies | A9 | 6 |
| Ried-Revista Iberoamericana De Educación a Distancia | A1 | 5 |
| 2018 IEEE 18th International Conference on Advanced Learning Technologies (ICALT) | A32 | 5 |
| Compiled by the authors | | |

Table 3 shows that the article with the most citations (16) was published in International Journal of Computer Integrated Manufacturing. The title is "Prepared for Work in Industry 4.0? Modeling the Target Activity System and Five Dimensions of Worker Readiness." In this study, on a basis of two-stage comprehensive review of 135 publications, the authors build a model of employee readiness for the requirements of Industry 4.0. This is followed by two articles with 11 citations. The article "Digital Competencies in Managers and Isolated Teachers in the Context of Remote Education in 2020" published in Revista Venezolana de Gerencia by Holguin-Alvarez et al, 2021, analyzes digital competencies in remote learning of 280 managers and teachers. They conclude that teachers have developed a higher level of digital competencies than managers, which emphasizes a higher level of communication and collaboration skills, as well as creation of digital resources. Another article, "A Qualitative Exploration of the EU Digital Competence (DIGCOMP) Framework: A Case Study Within Healthcare Education" published at the conference E-Learning, E-Education, and Online Training: First International Conference (eLEOT) by Evangelinos and Holley, 2014, makes a conclusion that the DigComp structure is applicable as a universal basis for the professional development of digital competencies of managers. The article "Assessing the Relevance of Digital Competencies on Business Graduates' Suitability for a Job," which was published in Industrial and Commercial Training has 8 citations. The article titled "Evolution of Professional Competencies of Accountants of Small Enterprises in the Digital Economy of Ukraine," published in Baltic Journal of Economic Studies has been cited 6 times. Two articles have 5 citations: "Validation of a Platform for Formative Assessment of Teacher Digital Competence in Times of COVID-19" published in Ried-Revista Iberoamericana De Educación a Distancia and "Mass Customization and Paperless Assembly in the Learning Factory for Cyber-Physical-Production Systems: Learning Module 'From Paperbased to Paperless Assembly'," published at 2018 IEEE 18th International Conference on Advanced Learning Technologies (ICALT).

*RQ2. How are research keywords related?*

The study analyzes keywords in the articles under review, as shown in Figure 2. For this purpose, we used VOSviewer, a software for building and visualizing bibliometric networks.
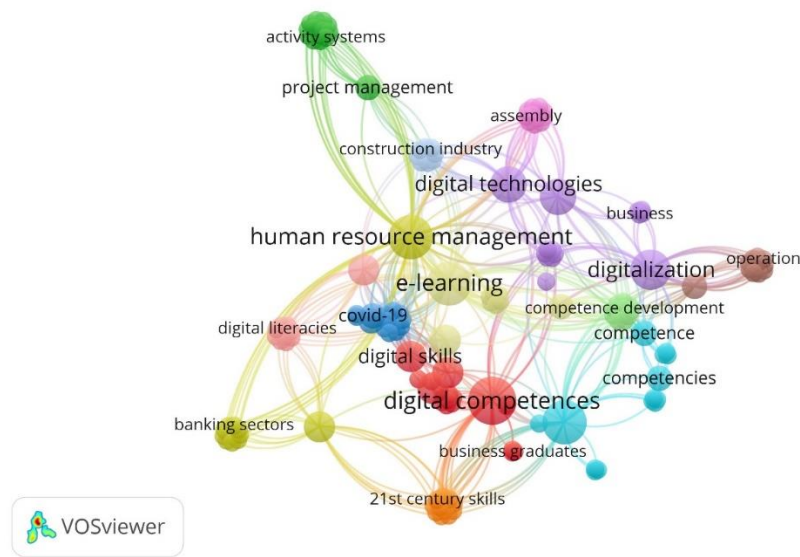
Figure 2 - Research Keywords and Their Relationship

Compiled by the authors

Results of the program analysis of articles found let us identify the following six large clusters: red, green, blue, purple, yellow, and teal. Red (business graduates, business studies, communication, digital skills, education, educational assessment, epidemic, future project managers, information and communication, management training, professional skills, remote education, teacher digital competence, teacher training, universities) we like to conventionally call Digital Competencies; green (activity systems, cross-disciplinary, decision making, embedded systems, human-machine, Industry 4.0, organizational, resource managers, worker competence) is Project Management; blue (covid-19, digital, digital devices, distance learning, education computing, employment, future skills, information use, online education, online teaching, security and defense, stress, students, teachers) is formed by keywords that allow articles to be classified as Digital Education; a group of terms colored yellow (banking sector, basic digital competence, breaking, case study approach, information infrastructure, knowledge infrastructure, knowledge management, semi structured interviews) is designated as Human Resource Management; we conditionally titled keywords from the purple cluster (business, business activities, change, communications activities, continuing education, digital technologies, digitalization, IT-professionals, knowledge society, manufacturing companies, product service, social media) Managers; and teal (collaborative leaning, competence, framework, profile of digital competence, quality education, skills, teachers effectiveness, teacher quality, teaching role, virtual environments) combines research on education issues.

Visualization like this clearly demonstrates that, generally, results of research of formation of digital competencies of future managers at the school level were least actively published.

*RQ3. Who are the stakeholders in formation and development of digital competencies and at what educational level are they?*

Using Excel, we grouped all studies into three educational levels: school, university, and firm (Figure 3).

Figure 3 show that the largest number of analyzed articles were devoted to research of formation and development of digital competencies at the university level (18 articles) where main stakeholders are teachers (11 articles) and students (6 articles). Only 1 article explores the issue of forming and developing digital competencies among university administrators. The bulk of the research has been published since 2019.
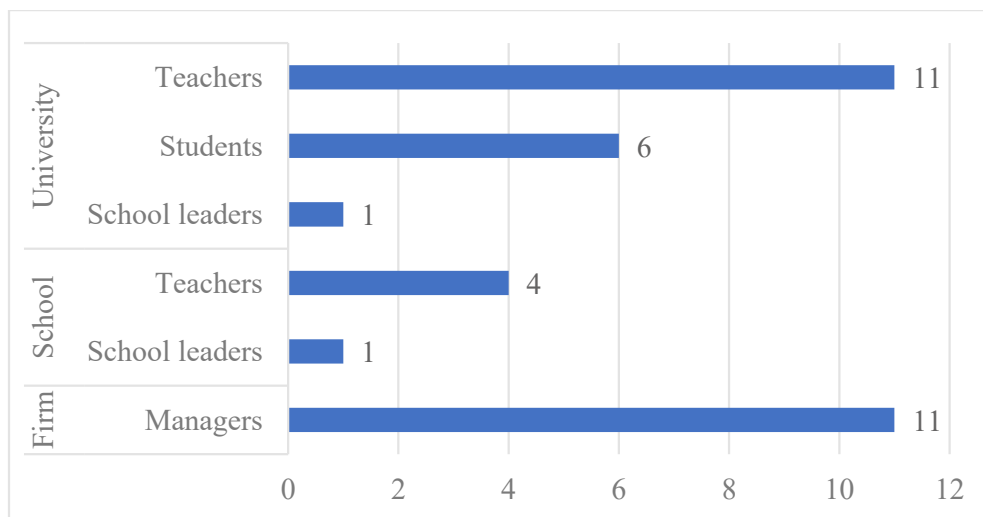


Figure 3 - Stakeholders and Educational Levels in Formation and Development of Digital Competencies
Compiled by the authors

The following is the firm level at which managers themselves are identified as the main stakeholders in studies under review. 11 articles explore formation and development of digital competencies of managers at the firm level. The dynamics by years indicates an increase in research in this area, especially in the post-COVID period.

Interesting are the results of the analysis conducted at the school level, where the main stakeholders in forming and developing digital competencies are the school administrators (4 articles) and teachers (1 article). Case in point, Pitsiavas and Vlachopoulos, 2015 [23] analyze opinions, perceptions, and attitudes of school leaders to the use of ICT in Greek primary education, as well as to the use of information systems in the management of school units. The COVID-19 pandemic and the post-COVID period have seen an increase in the researcher attention to formation and development of digital competencies of school teachers. To name a few, Gunathilaka et al., 2022 [12]; Ramos et al., 2022 [13]; Burlacu, 2020 [14] focus on the issues of digital literacy of teachers, their mental well-being and the effectiveness of remote teaching and learning.

*RQ4. Which DigComp 2.2 model digital competencies of the stakeholders the analyzed articles study in detail?*

Figure 4 shows data on identified DigComp 2.2 model digital competencies among four stakeholders: managers, heads of educational institutions, teachers, and students.
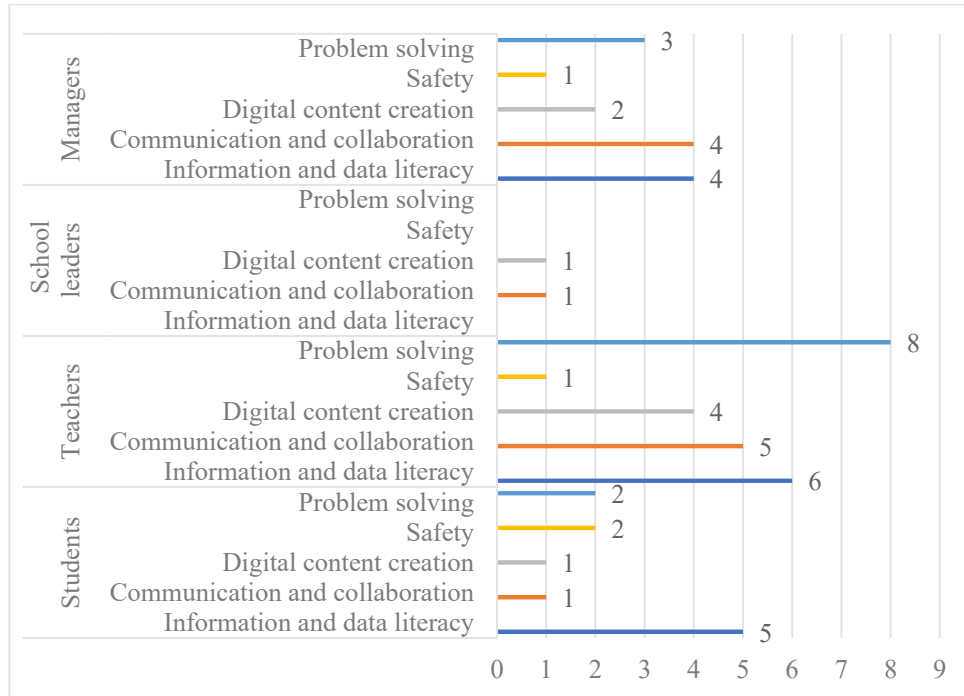


Figure 4 - Stakeholders and Digital Competencies of the DigComp 2.2 Model
Compiled by the authors

The analysis showed the importance for managers to develop the following digital competencies: Information and Data Literacy (Paper IDs: A23, A25, A26, and A32), Communication and Collaboration (Paper IDs: A16, A19, A27, and A31), Problem Solving (Paper IDs: A15, A28, and A31), Digital Content Creation (Paper IDs: A9, A31), and Safety (Paper ID: A31).

Communication and Collaboration (Paper ID: A18) and Digital Content Creation (Paper ID: A11) are significant digital competencies for the heads of educational institutions. It is noteworthy that such important digital competencies for the activities of directors of educational institutions as Information and Data Literacy, Safety, and Problem Solving do not receive detailed research in articles under review.

Teachers in educational organizations need to form and develop such digital competencies as Problem Solving (Paper IDs: A1, A6, A8, A13, A14, A17, A20, and A24), Information and Data Literacy (Paper IDs: A1, A3, A7, A10, A13, and A34), Communication and Collaboration (Paper IDs: A5, A7, A8, A13, and A24), Digital Content Creation (Paper IDs: A2, A5, A13, and A17), and Safety (Paper ID: A13).

For students (future managers), studies under review gave the most detailed analysis for the following: Information and Data Literacy (Paper IDs: A12, A21, A22, A29, and A33), Problem

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Solving (Paper IDs: A21, A33), Safety (Paper IDs: A12, A21), and Digital Content Creation (Paper ID: A21).

*RQ5. What DigCompOrg structure elements among stakeholders the analyzed articles explore?*

The analysis of the articles has shown that in the development of digital competencies for managers, the most effective technology of digital development is Professional Development (11 articles, Paper IDs: A9, A15, A16, A19, A23, A25, A26, A27, A28, A31, and A32).

The analysis of the articles has also shown that only two digital education technologies will be used to develop digital competencies of heads of educational institutions: Leadership & Governance Practices (Paper ID: A11) and Professional Development (Papert ID: A18). It should be noted that articles under review do not study in detail such important technologies for the development of digital competencies as Assessment Practices, Teaching and Learning Practices, Content and Curricula, Collaboration and Networking, and Infrastructure.

The results of the analysis have shown the use of various technologies in the development of digital competencies of teachers. To name a few, the following technologies of digital development of teachers are mentioned most often: Teaching and Learning Practices (Paper IDs: A1, A17, A10, A34, and A5), Professional Development (Paper IDs: A10, A13, A14, and A24), Collaboration and Networking (Paper IDs: A7, A8), Infrastructure (Paper IDs: A4, A6), Content and Curricula (Paper ID: A2), and Leadership & Governance Practices (Paper ID: A3).

For university students (future managers), the most characteristic digital development technologies are as follows: Teaching and Learning Practices (Paper IDs: A21, A29, and A30), Professional Development (Paper ID: A33), Content and Curricula (Paper ID: A22), and Assessment Practices (Paper ID: A12).

**Conclusion**

This research is devoted to formation and development of digital competencies of managers in education system. A systematic research review has shown that (a) pre-COVID-19 studies were of a more general, extensive nature. After 2020, many studies have shifted towards narrower issues of forming digital competencies of managers in the context of the pandemic; (b) during the pandemic and the post-COVID period, there has been an increase in scientific attention to forming and developing digital competencies of school teachers; (c) literature focuses mainly on studying digital competencies of teachers at educational institutions and practicing managers. However, there is very little research on issues related to forming and developing digital competencies of future managers at school; (d) the analysis has revealed an insufficient number of studies of such a significant digital competence as Safety. For heads of educational institutions, there are gaps in research in the study of such digital competencies as Problem Solving, Safety, and Information and Data Literacy; (e) teachers show approximately the same level of digital competencies as students do, although more developed one than that of managers and school principals; (f) the DigComp structure is applicable as a universal basis for the professional development of digital competencies of managers, school principals, teachers, and students; (g) articles under review have shown an interesting trend of not exploring in detail that such important digital competencies in the activities of directors of educational

organizations as Information and Data Literacy, Safety, and Problem Solving; (h) important technologies for the development of digital competencies for existing managers and directors of educational institutions such as Assessment Practices, Teaching and Learning Practices, Content and Curricula, Collaboration and Networking, and Infrastructure are not studied in detail in articles under review.

As practical recommendations for the education system in forming and developing digital competencies of managers, we would like to suggest the following: (1) A combination of formal and informal learning, (2) Introduction of additional education in improving digital competencies of managers, and (3) Adaptation of educational technologies to modern challenges of digitalization.

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**Цифровые компетенции менеджера в системе образования: систематический обзор**

**Аннотация.** В статье проведен систематический обзор и мета-анализ 34 исследований из баз данных WoS и Scopus, который позволил определить и более подробно исследовать заинтересованных сторон, уровни, модели, образовательные технологии и перспективы в исследованиях в формировании и развитии цифровых компетенций практикующих и будущих менеджеров в системе образования. Шесть поставленных исследовательских вопросов были направлены на анализ данных. Результаты показали, (а) исследования до пандемии COVID-19 носили более общий, обширный характер; (б) во время пандемии COVID-19 и постковидный период наблюдается повышение внимание исследователей к вопросам формирования и развития цифровых компетенций менеджеров; (в) в литературе мало исследуются вопросы, связанные с формированием и развитием цифровых компетенций будущих менеджеров в системе образования; (г) проведенный анализ выявил недостаточное количество исследований такой значимой цифровой компетенции как Безопасность; (д) структура DigComp применима в качестве универсальной основы для профессионального развития цифровых компетенций менеджеров; (е) важные цифровые компетенции как Информационная грамотность, Безопасность, Решение проблем в проанализированных статьях подробно не исследуются; (з) важные технологии развития цифровых компетенций структуры DigCompOrg для действующих менеджеров в проанализированных статьях подробно не исследуются. Дается ряд практических рекомендаций для системы образования в формировании и развитии цифровых компетенций менеджеров.

**Ключевые слова:** цифровые технологии, цифровые компетенции, цифровые навыки, менеджмент, менеджер, система образования, COVID-19.

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**Білім беру жүйесіндегі менеджерлердің цифрлық құзыреттері: жүйелі шолу**

**Аңдатпа.** Мақалада WoS және Scopus дереккорларындағы 34 зерттеуге жүйелі шолу және мета-талдау жүргізіліп, бұл мүдделі тараптарды, деңгейлерді, модельдерді, білім беру технологияларын және білім беру жүйесіндегі тәжірибелі және болашақ менеджерлердің цифрлық құзыреттіліктерін қалыптастыру мен дамытуды зерттеулердегі перспективаларды анықтауға және егжей-тегжейлі зерттеуге мүмкіндік берді. Қойылған алты зерттеу сұрағы деректерді талдауға бағытталған. Нәтижелер көрсеткендей, (а) COVID-19 пандемиясына дейінгі

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зерттеулер жалпы және ауқымды екенін көрсетті. 2020 жылдан бастап көптеген зерттеулердің негізгі бағыттары COVID-19 пандемиясы жағдайында менеджерлердің цифрлық құзыреттілігін қалыптастырудың тар мәселелері болды; (ә) COVID-19 пандемиясы және ковидтен кейінгі кезеңде зерттеушілердің менеджерлердің цифрлық құзыреттіліктерін қалыптастыру және дамыту мәселелеріне назар аударуының артуы байқалады; (б) әдебиетте білім беру жүйесіндегі болашақ менеджерлердің цифрлық құзыреттіліктерін қалыптастыру мен дамытуға байланысты мәселелер аз зерттеледі; (в) жүргізілген талдау қауіпсіздік сияқты маңызды цифрлық цифрлық құзыретті зерттеулердің жеткіліксіз санын анықтады; (г) DigComp құрылымы менеджерлердің цифрлық құзыреттіліктерін кәсіби дамытудың әмбебап негізі ретінде қолданылады; (д) ақпараттық сауаттылық, қауіпсіздік, мәселелерді шешу сияқты маңызды цифрлық құзыреттердің егжей-тегжейлі зерттелмегендігі қызықты үрдіс анықталды; (е) қолданыстағы менеджерлер үшін DigCompOrg құрылымының цифрлық құзыреттерін дамытудың маңызды технологиялары талданған мақалаларда егжей-тегжейлі зерттелмеген. Менеджерлердің цифрлық құзыреттіліктерін қалыптастыру мен дамытуда білім беру жүйесіне арналған бірқатар практикалық ұсыныстар берілген.

**Түйін сөздер:** цифрлық технологиялар, цифрлық құзыреттер, цифрлық дағдылар, менеджмент, менеджер, білім беру жүйесі, COVID-19.

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