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UNVEILING DIGITAL CREATIVITY: ENHANCING TEACHERS' CAPACITIES IN THE DIGITAL EDUCATION LANDSCAPE

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Abstract. This article aims to unveil the concept of teachers' digital creativity, recognizing it as one of their fundamental capacities to meet the challenges posed by digital education. The theoretical segment of the article engages in a comprehensive discourse on the concept of teachers' digital creativity. The theoretical discourse is complemented by an empirical study, engaging general education school teachers, to provide insights into their understandings and perspectives related to digital creativity. The empirical study was organized in Lithuanian general educations schools. Eleven interviews with teachers, who are already using digital tools and platforms in their teaching process, were conducted. The research findings not only enrich the understanding of teachers' digital creativity in education, but also lay the groundwork for the further development of a robust framework of teachers' digital creativity, offering practical considerations that may be essential for its effective formulation and implementation.

Keywords: digital education, digital technologies and tools, digitalisation of education, teachers' capacities, teachers' digital creativity.

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1. Introduction

Creativity is claimed today as an essential capacity for people to successfully cope with the social and economic changes that characterize the 21st century and to effectively pursue social inclusion and employment (Organisation for Economic Co-Operation and Development, 2018). Within research discourse, creativity is portrayed as a multifaceted and debated concept, being conceptualized in various manners: as a collection of individual attributes, as a procedure involving the generation of new ideas for individuals and groups, or as a means of creating novel and innovative products emerging from diverse social, systemic, institutional, and practice contexts (Creely & Henriksen, 2019). With the pervasive integration of digital technology into people's daily lives, creativity is undergoing a transformation, giving rise to the growing significance of digital creativity (Boughzala et al., 2020). This concept emerges from the need to address the intersection of creativity and digital technologies. The digital realm offers unique affordances that reshape the ways in which creativity manifests. According to Henriksen et al. (2016), the advent of digital technologies calls for a reconceptualization of creativity, shifting from a general understanding to a specific focus on digital creativity. Consequently, digital creativity is currently a dynamic and expanding discipline with substantial potential (Lee & Chen, 2015).

In the context of education, creativity traditionally refers to the use of innovative and imaginative approaches to teaching and learning. It involves fostering an environment where students can think critically, solve problems, and express themselves in unique ways (Ferrari et al., 2009). As digitalization rapidly expands in the education sector as well, the concept of digital creativity has recently become increasingly relevant to the theory and practice of education (Glăveanu et al., 2019). This notion goes beyond the traditional understanding and emphasizes the need to create a stimulating, supportive, and tailored teaching–learning environment, that meets each student's needs, with the help of technologies (Barajas et al., 2019). Therefore, the concept of digital creativity in education is related to the use of digital technologies aimed at supporting creative pedagogy, such as a learner-centered approach, synergistic collaboration, and knowledge connection (Lee & Chen, 2015). Researchers concur that digital creativity is deemed an essential inaugural phase in bringing about productive change in education and holds significance in enhancing teaching and learning effectiveness (Creely & Henriksen, 2019). Nevertheless, Zagalo and Branco (2015) stress that the concept of digital creativity in education has emerged only recently, leaving the scope, perspective, and primary research topics of digital creativity still insufficiently refined.

The need to discuss digital creativity from teachers' perspectives is driven by the imperative to use educational technologies effectively in teaching and learning. This discourse is also fueled by a current educational trend: the transition from traditional to digital content (Vincent-Lancrin et al., 2022; Daukšienė et al., 2021). Technologies offer numerous opportunities for teachers to organize the teaching and learning process creatively, create and utilize digital content, and interact with students on a more personalized basis. Moreover, strategic documents from the European Commission (2020, 2025) (*Digital Education Action Plan 2021–2027: Resetting Education and Training for the Digital Age* and *European Framework for Digitally Competent Educational Organisations – DigCompOrg*) highlight the importance of high-quality digital educational content and emphasize the role of teachers. Teachers must be able to purposefully create, redesign, and use educational content, considering the needs of learners and the objectives of the subject being taught; these abilities are part of teachers' digital competence. Modern theories of differentiation, individualization, and personalization of education (Shemshack & Spector, 2020) also emphasize the teacher's role in ensuring the quality of digital content, as the digital content selected or created by the teacher best responds to learners' needs (O'Donovan, 2025). Therefore, the concept of teachers' digital creativity emerges as a crucial element, highlighting the need for teachers to innovate and adapt digital tools and platforms and to create digital content creatively to enhance teaching and learning (Bereczki & Kárpáti, 2021).

In Lithuanian education, the need to explore the concept of teachers' digital creativity is particularly highlighted by the lack of scientific research in this field (Rupšienė, 2021). Moreover, this need is driven by practical educational requirements, which include: 1) the ongoing process of updating general education programs; 2) the need to use digital teaching and learning tools and platform's that align with the updated educational content; 3) new methodological requirements allowing teachers to freely choose or create up to 30% of the content they teach; 4) the necessity to develop teachers' digital competence, including the ability to create digital teaching and learning content; 5) ongoing *EdTech* initiatives (Cowling

et al., 2022) that result in the proliferation of digital content sources in education; 6) the need to enhance students' digital skills (Teisės aktų registras, 2022). Due to these changes, teachers are forced to independently decide and construct their own reality within the context of their personal, social, and work environments. In the process of personal learning and development, teachers' creativity using digital technology becomes a necessary means of imparting knowledge to students and developing their skills.

Researchers have extensively studied teachers' practices in integrating digital technologies into teaching and learning from various perspectives. However, earlier literature reviews suggest that only a small number of studies have specifically defined teachers' digital creativity and focused on aspects of it (Bereczki & Kárpáti, 2021). Therefore, the main aim of this article is to explore the concept of teachers' digital creativity, recognizing it as their fundamental capacity essential for addressing the challenges posed by digital education. The theoretical part of the article contributes to developing a comprehensive concept of teachers' digital creativity. The empirical study aims to gather insights directly from general education school teachers, shedding light on their understandings and perspectives on digital creativity. By investigating the lived experiences and perceptions of teachers, the study contributes to understanding how teachers' digital creativity is interpreted and applied in the educational environment. These insights not only enhance comprehension of the phenomenon but also provide practical considerations and essential preconditions for formulating an effective framework that captures the essence of teachers' digital creativity.

2. The theoretical discourse on the concept of teachers' digital creativity

Digital creativity, in a broad sense, can be defined as the ability to work creatively in a digital environment (Sefton-Green & Brown, 2014). In a narrow sense, digital creativity refers to "purposeful, imaginative activities that are driven by digital technologies to produce original and valuable digital results" (Barajas et al., 2019). Zagalo and Branco (2015) emphasize that the concept of digital creativity in education has only recently appeared, so the scope, perspective, and main research topics of digital creativity are still not elaborated broadly.

A detailed analysis of research on digital creativity (Zagalo & Branco, 2015) reveals two approaches:

1) The concept of creativity in the digital age is analyzed, including research on how creativity is understood at a time when more and more activities and working conditions are digitized;
2) The concept of creativity in the digital age is analyzed as fostered by digital technologies by answering the question of how creativity can be supported and enhanced by digital technologies, as well as how creativity can be transformed and made even more digital.

Bruno (2022, pp. 29–42) notes that these two approaches are starting points from which it is important to study and research digital creativity. In the context of education, it is important to design research on teachers' digital creativity at the intersection of these two approaches by disclosing teachers' understandings and perspectives on digital creativity (Cremin & Chappell, 2021).

The early research in education mostly focused on enhancing teachers' personal creativity skills through digital technology. These contexts primarily investigated the impacts of the digital environment on various forms of teachers' personal creativity, including idea generation, problem solving, expressive writing, and artistic production (Yang, 2003; DeRosa et al., 2007). The realm of digital technology offers boundless possibilities for the manifestation of teacher creativity. However, it is important to note that certain studies perceive digital technology as disruptive and potentially contaminating to both education and human minds (Yang, 2003).

The more recent studies emphasize, that teachers, as the main executors of the teaching and learning process, should have capacities to use the possibilities of digital technologies to create original and valuable results for the learner (Cremin & Chappell, 2021). Barajas and Frossard (2018) suggest that teachers' creative use of digital technologies fosters: learner-centered approaches, which involve aligning curricular objectives with students' interests, making learning relevant and engaging, encouraging students' ownership and problem-solving, and prioritizing learning processes over outcomes to foster reflection on their learning trajectory; an open-ended ethos, creating space for uncertainty, exploration, and spontaneity within a secure classroom environment; synergistic collaboration, fostering rich collaborative practices through joint problem-solving and collective decision-making; and knowledge connection, establishing links between content and real-life situations, bridging different domains and disciplines, and situating knowledge in a broader context.

Despite the push for integrating digital technologies into education, there is a notable gap in addressing teachers' capacities to use these technologies creatively. Research indicates a significant need for enhancing teachers' creative abilities with digital tools. This includes not only the technical proficiency to use digital tools and platforms but also the pedagogical creativity to integrate these tools meaningfully into their teaching practices. For instance, some authors (Sica et al., 2019) argue that teachers must develop creative strategies to incorporate digital content in ways that enhance student learning outcomes. Moreover, studies by some authors (Kurvinen et al., 2020) and Organisation for Economic Co-Operation and Development (2024) highlight the importance of personalizing the learning experience through creative use of digital technologies. Personalization can lead to more engaging and effective learning environments, catering to the diverse needs of students. Šliogerienė and Valūnaitė-Oleškevičienė (2017) expand on this by examining the broader social, systemic, and institutional contexts in which teachers operate. They suggest that fostering teachers' creative use of digital technologies goes beyond individual skills, requiring systemic support and professional development opportunities. Moreover Gündoğdu and Merç (2022) emphasize that comprehensive training should be focused both on the technical aspects of digital tools and also on improving creative digital skills of teachers, which needs to be supported by the institution.

The scientific literature (Hollman et al., 2019) raises questions about how to use creatively the advantages of technology to improve the quality of education and overcome technology-related challenges in the teaching and learning process. As the concept of teachers' digital creativity has not yet been fully disclosed, therefore a new and original discourse is being created that combines two relevant concepts – "creativity" and "digitalization" in the aspect of teachers' pedagogical activity.

The scientific literature does not contain detailed studies revealing the directions of overcoming the challenges of digital education based on the digital creativity of teachers. Therefore, a new and original framework of teachers' digital creativity would use scientific insights into:

- Academic literacy (Lea & Street, 1998, 2006; Erentaitė & Žukauskienė, 2011), which allows analyzing how teachers work with various information sources to create training programs, educational activities and their content. Some theoretical principles, if properly contextualized, could be applied to the analysis of digital technology-based teaching–learning process;
- Digital literacy (Leu et al., 2013), which allows analyzing how teachers create digital teaching and learning content;
- Definition of digital competence and existing models (*e.g.*, Redecker, 2017; Learning Path, 2025);
- Modern theories of differentiation, individualization, personalization of education (Shemshack & Spector, 2020);
- Instructional design/learning design, which enables learner-centered technology-enriched didactics and allows the teacher to justify the choice of technology and create scenarios for the implementation and management of effective lessons/learning activities using technology (Kwadzo Sallah et al., 2023; Phungsuk et al., 2017). Instructional/learning design models, *e.g.*, technological pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006), ADDIE (analysis, design, development, implementation, evaluation) model (Valverde-Berrocoso et al., 2022), four-component instructional design model (van Merriënboer & Kirschner, 2018), CAFE (collaborative/communicative, active, friendly, environment) model (Woo et al., 2023), elementary education (Czerkawski, 2016) and others are widely analysed in the scientific literature as playing a significant role in guiding teachers to effectively integrate digital tools and foster digital creativity.

Research that is based on the theories of academic and digital literacy supports the notion that the ability to properly access sources and ethically use the increasingly diverse information available as well as digital media is important for teachers. On the one hand, technology opens up a wide range of digital resources, *e.g.*, open learning resources, electronic learning textbooks, additional digital materials and software (Wiley et al., 2012), on the other hand, they enable teachers to become creators of educational resources (Paskevicius, 2021). In the first case, teachers need to be able to identify the right digital resources for their lessons and evaluate the quality of those resources so that they work best in their classroom. Evaluating digital content requires teachers to apply higher-level knowledge and skills (Wiley et al., 2012). Research shows that teachers struggle to integrate technology, digital content, and pedagogy, in part due to a lack of knowledge and skills in digital content assessment, despite the abundance of programs and resources available (Johnson et al., 2015; Halinen, 2018). In addition, teachers are increasingly involved in the development of teaching and learning content (Hu & Gao, 2021). Teachers create a variety of content, from resources typically used in the classroom, such as handouts, worksheets, lesson plans, presentations, and posters, to online content, such as websites, blogs, online learning environments, and social media. Traditionally, teaching and learning resources were available from educational publishers or physically stored in schools. Today, digital technologies make it possible for teachers to be-

come creators of such resources. As noted in the Organisation for Economic Co-Operation and Development report (van der Vlies, 2020), there are various directions in the development of digital educational content: interactivity, end-user participation, integration, and learning progress at cross-class and cross-disciplinary levels.

Nevertheless, it is important to mention that various official documents and frameworks tend to emphasise "digital literacy" perspectives, prioritising the acquisition of technical and procedural skills of working with digital technologies (Falloon, 2020). On the other hand, researchers are calling for a broadening of the concept of "digital literacy" to encompass personal and socio-cultural factors and are moving towards the concept "digital competence". This also determines the variety of models for acquiring and improving teachers' digital competences, as well as the resources required for this (van der Vlies, 2020).

Definitions of digital competence for teachers (Krumsvik, 2011) divide teachers' abilities to use technology into "using technology for teaching–learning and ability to use technology for critical reflection". The ability to create digital teaching–learning content as a part of digital competence is mostly examined in research in the context of social media, only a few studies provide insights from the perspective of the practice of teachers in general education schools. Some researchers have focused on the emerging role of digital curation, where teachers find, select, re-create, or co-create digital content and support learners (Joosten, 2012). Others have investigated how teachers participate in social media, how they select social media sources and tools, and how they use them in the teaching–learning process (Torphy & Drake, 2019). Still other studies have focused on how teachers use various digital applications and tools (*e.g. Pinterest*) as a resource for creating pedagogical content (Hu & Gao, 2021). A model of digital creativity as a separate competence has been developed within the framework of the project *The DoCENT Competence Framework for Digital Creative Teaching* (Barajas & Frossard, 2017–2019). However, the framework of the project mostly emphasizes digital creativity in the structure of students' digital competence, while less attention is paid to teachers' digital creativity competences.

The need for teachers to create digital learning content is driven by modern educational theories focusing on differentiation, individualization, and personalization. These approaches aim to address the diverse learning needs of students (Starkey, 2020). Teachers are encouraged to design relevant, attractive, and interactive lessons (McKay & Sappa, 2020) to achieve the objectives of differentiated and individualized education (Kinshuk et al., 2016). Personalizing instruction is also a key component (Williamson, 2017). However, some authors (FitzGerald et al., 2018) highlight a significant gap in educational research: while personalization is a critical and popular topic in technology-enhanced learning design, there is still a lack of comprehensive guidance on how teachers can effectively adapt pedagogy, curriculum, and learning environments to meet the varied learning needs and preferences of students through the use of technology. According to Shemshack and Spector (2020), this highlights an ongoing challenge in the field of education. While the theoretical frameworks for differentiation, individualization, and personalization are well-established, practical implementation remains complex. Teachers need not only the tools and content but also the creative strategies to adapt their teaching methods to a digital format. This involves developing innovative pedagogical approaches, creating flexible curricula, and designing adaptable learning envi-

ronments that leverage technology to its fullest potential, ensuring all students can benefit from a personalized learning experience.

Instructional/learning design models may play a crucial role addressing this gap as these models provide structured frameworks that help educators design, implement, and assess learning experiences that are engaging, relevant, and tailored to the diverse needs of students. For instance, the TPACK model, which is a conceptual framework in educational research that elucidates the compyright abuse are often cited as a major problem in "virtual educational marketplaces" (such as *Teachers Pay Teachers* and *Amazon Inspire*. However, studies examining *Pinterest*, *Teachers Pay Teachers*, and other "educational marketplaces" highlight that while teachers expressed trust and perceived value in such marketplaces, they often looked at aspects of source trust and source credibility when looking for another, perhaps a resource created by a more experienced teacher (Torphy & Drake, 2019). On the other hand, research highlights the need for teachers to have skills in finding and selecting digital resources, as failing to identify and locate material in this way may lead to educational content creators missing opportunities to use creative work produced by others and put themselves in a position to be more likely to infringe copyright (Czerniewicz, 2017).

Although the aforementioned issues pose relevant challenges, research shows that teachers believe that creating digital content for teaching–learning is useful and that its use can benefit learning (Leighton et al., 2021). These arguments provide theoretical preconditions for the development of a framework of teachers' digital creativity.

3. Methodology

3.1. Research context

The current empirical study was part of the research conducted during the project *Artificial Intelligence in Schools: Scenarios for the Development of Learning Analytics in Modernizing General Education in Lithuania* (Project no. S-DNR-20-4). During the project, a complex action research was implemented, integrating various activities: academic study of scientific literature, empirical study of educational practitioners' experiences, and creative activities by teachers and researchers in creating educational materials and future scenarios. Eleven Lithuanian general education schools participated in the project activities, focusing on the application of educational technologies in the teaching–learning process (detailed information is available at di-ma.lt, 2025). Teachers, who represented these selected schools and participated in the action research, received training on various aspects of creative work with educational technologies.

The empirical study presented in this article aimed to investigate teachers' understandings and perspectives on digital creativity issues. To achieve this, a qualitative research strategy based on an interpretive (phenomenological) paradigm was selected. This approach allows for a deeper exploration of individuals as personalities, emphasizes the importance of individuation, helps understand the world of human experience, and expresses a subjective approach to ongoing events (Rupšienė, 2007). The study focused on the lived experiences of teachers who excel in using technology for teaching and learning, as they can provide meaningful

insights into nurturing creativity with technology in the classroom. Individual interviews were conducted with these teachers to gain insights into how digital creativity manifests in educational settings and how teachers utilize digital tools to enhance their teaching and students' learning experiences.

3.2. Sampling

The study sample was formed based on purposeful sampling principles, meaning it was a non-probability sample, and the results can primarily be generalized within the sample of this study (Rupšienė, 2007). The sample consisted of 11 teachers with prior knowledge and experience in using digital tools, *e.g.*, *Kahoot!*, *Padlet*, *Slido*, and others, electronic learning platforms such as *e.g.*, *LearnLab*, *Eduten Playground*, *Khan Academy*, and others, learning management systems, *e.g.*, *Google Classroom* and others, and who actively participated in project activities. Purposeful sampling allowed the selection of informants with specific characteristics: teachers with at least two years of work experience and additional training in implementing educational technology in teaching and student learning. These characteristics, according to some authors (Sillat et al., 2023), were considered sufficient to address the study question.

The sample size was in accordance with what the literature views as appropriate for an open-question interview approach since the benefits of such approach might be limited when fewer than 4 cases are chosen or more than 15 (Rupšienė, 2007). The purposeful sampling approach allowed to take in mind participants' teaching subject, backgrounds, such as school type, school location, age, gender, and teaching experience. The characteristics of the sample are presented in Table 1.

Table 1. Sample characteristics (source: created by authors)

Interviewee code	School type	School location	Subject	Age	Teaching experience	Gender
T1	Progymnasium	Urban	History	33	8	Female
T2	Progymnasium	Urban	Geography	38	15	Male
T3	Gymnasium	Urban	Chemistry	45	23	Female
T4	Progymnasium	Urban	English language	36	8	Female
T5	Primary school	Urban	All subjects	27	5	Female
T6	Gymnasium	Urban	Lithuanian language	52	17	Female
T7	Progymnasium joined with non-formal education institution	Suburban	Informatics	35	10	Male
T8	Progymnasium	Urban	Mathematics	49	18	Female
T9	Primary school	Urban	All subjects	48	25	Female
T10	Progymnasium	Suburban	Physics	31	4	Female
T11	Gymnasium	Urban	Mathematics	43	18	Male

3.3. Design of the process

A total of 11 open-question interviews were conducted with teachers. Open-question interviews are flexible and versatile for collecting qualitative data (Kallio et al., 2016), making them an effective means of gathering research data (Magaldi & Berler, 2020). The interviews were conducted via internet communication platforms, specifically *Zoom Communications*. Each interview lasted approximately for 40 min. Before the start of the interviews, information about the peculiarities of conducting remote interviews was provided. The research objectives were explained, and guarantees of anonymity were presented (Archibald et al., 2019). Each interview participant signed a consent agreement form.

3.4. Data collection

The data collection tool was an open-ended questionnaire developed by researchers based on the main themes identified in the literature. Informants were asked questions focused on key aspects such as: *how do you understand the concept of digital creativity in the context of teaching and learning?*, *how do you recognize the role of digital creativity in teaching and learning?*, *how does digital creativity manifest in your teaching and learning process?*, *how do digital tools enhance your creativity?*. These questions aimed to delve into the teachers' understandings and perspectives on digital creativity in their educational practices (Henriksen et al., 2017).

3.5. Data analysis

Individual interviews conducted with participants were transcribed and turned into word processing documents. The qualitative data analysis was conducted using the content analysis method. The informants' responses were first processed by combining semantically similar phrases and statements into categories. In other words, individual but similar opinions were grouped under generalizing labels. Inductive coding was used as a method where the researcher develops codes and categories directly from the data without preconceived notions or predefined codes. This approach is often used when the researcher aims to explore the data in depth to identify patterns, themes, and insights that emerge naturally from the data itself (Miles et al., 2014). This analysis followed four steps (Žydžiūnaitė & Sabaliauskas, 2017): 1) repeated reading of the text; 2) identifying manifest categories based on meaningful words; 3) dividing the content of categories into subcategories; 4) interpreting and justifying categories and subcategories with evidence extracted from the text. After completing this qualitative research procedure, the frequencies of categories were calculated, showing the prevalence of individual opinions and their combinations in the studied sample. This made it possible to identify both common and rare, atypical opinions. It should be noted that in open-ended questions, the specific content of the answers is not imposed on research participants. Participants have the opportunity to highlight and emphasize various aspects of the question and the underlying issues in their responses. The analysis was guided by the theoretical assumption that the text provided by the informant serves as material for content analysis as an educational diagnostic study. This approach reflects the process of personal reflection as an essential aspect of experiential learning (Žydžiūnaitė et al., 2005).

3.6. Data presentation

The study utilized two data presentation methods as suggested by Miles et al. (2014). First, matrix displays, including figures and tables, helped us organize the information in a way that made it easy to review, verify, and draw conclusions quickly. Second, narrative descriptions were used to provide a detailed and descriptive presentation of the findings. To ensure the internal validity of the study, the informants were provided with a study report to obtain their feedback on the results of the study. Informants rated the study report positively. The external validity of the study was ensured by providing a detailed description (Rupšienė, 2007).

3.7. Ethical concerns

Throughout the study, attention was given to prevent any harm to the participating teachers. The two primary ethical considerations were obtaining informed consent and ensuring confidentiality.

4. Results

The results section presents the findings from the study, which aimed to explore teachers' understandings and perspectives on digital creativity in the context of teaching and learning. The analysis of interviews conducted with technology-integration expert teachers revealed six general themes with two subthemes. The thematic map is presented in the Figure 1.

The detailed data analysis with extracted themes (categories) and subthemes (subcategories) is presented in the Table 2.

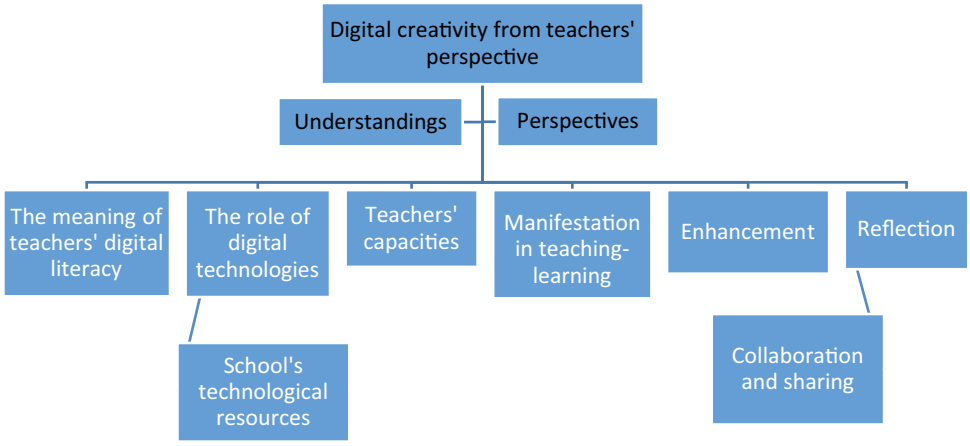

Figure 1. Thematic map on teachers' understandings and perspectives of digital creativity (source: created by authors)

Table 2. Teachers' understandings and perspectives of digital creativity (n = 11) (source: created by authors)

Category	Subcategory	Comment frequency
The meaning of teachers' digital creativity	Understanding of the current state of digital education and going hand in hand with it	10
	Possibility to use flexibly and creatively various digital tools, platforms and devices for creation of the teaching–learning content	10
	Necessity in order to develop students' critical thinking, problem-solving, collaboration, and self-expression by means of technologies	8
	Sinergy of technology and creative thinking	7
	Need in order to enhance the teaching and learning practice and to foster students' learning and their creativity	7
The role of educational technologies for teachers' digital creativity	Understanding of the pedagogical value of educational technologies (tools, platforms, *etc.*)	10
	Skills how to use digital tools for content creation and utilizing them during the teaching and learning	9
	Understanding and applying the wide range of digital tools, platforms and software for content creation, such as design programs, multimedia creation tools, coding platforms, virtual reality, augmented reality, *etc.*	8
Providing schools with technological resources	Importance of information technology infrastructure	8
	Insufficient technological environment in schools	4
Teachers' capacity to work with educational technologies and create educational content	Proficiency in managing educational technologies	9
	Continuous tracking of the newly-developed technological solutions and their benefits	8
	Aligning the curriculum, its content and pedagogical methods with the possibilities of educational technologies	8
	Implementing and developing of innovative pedagogy/digital pedagogy	7
	Development of teachers' capacity within professional development programs	6
Manifestation of the digital creativity in teachers' practice	Using digital tools and platforms to create interactive lessons that engage students in active learning	11
	Using digital tools and platforms for personalized learning content	9
	Utilizing digital platforms that support group work and communication	8
	Designing innovative assessment methods	9
	Integrating gamification elements into lessons	8
Enhancement of the digital creativity with the help of technologies	Searching and/or creating engaging digital teaching and learning content	11
	Combining digital content with traditional content	11
	Organizing collaborative activities	10
	Applying various pedagogical approaches and methods	10
	Applying assessment strategies	9

End of Table 2

Category	Subcategory	Comment frequency
Opportunity for teachers to reflect on their pedagogical activities from the point of view of digital creativity	Thinking about the improvement of teaching and learning process	8
	Possibility and time to design, create and apply	6
	Benefits for the improvement of pedagogical practice	6
Promoting collaboration and sharing	Using digital tools and platforms to facilitate collaborative projects and sharing of ideas, where students can work creatively together	9
	Using digital tools and platforms for providing feedback, and collaborating on creative endeavours	7
	Encouraging teamwork and communication skills	7

Study participants shared their perspectives and understandings of teachers' digital creativity. When talking about the meaning of teachers' digital creativity, informants first of all mentioned, that this concept is strongly connected to the current trends and challenges of digital education. One teacher explained: "Teachers have to gain a deep understanding of the current state of digital education, including emerging technologies, platforms, and pedagogical approaches" (T3). Moreover, according to study participants, "Digital creativity means staying abreast of trends, challenges, and opportunities in the digital education landscape" (T2). In the opinion of some informants, digital creativity is rather a practical issue and is understood as the ability to "[…] utilize various digital tools for content creation" (T3). However, according to other informants, digital creativity is more related to "[…] critical thinking, problem solving, collaboration, self-expression, *etc.* with the help of technologies" (T3). According to interviewees, "Digital creativity in education involves a thoughtful integration of technology and creative thinking" (T3), and this is highly important in order to "[…] enhance the teaching–learning experience, empower students with innovative skills" (T4). To sum up, empirical results indicate that a digitally creative teacher, according to study participants, "[…] effectively integrates technology and digital tools to optimize teaching–learning methodologies" (T1), "[…] engages students, and fosters creativity within the learning process" (T5).

Interviewees talked about the role of educational technologies and their practical value and benefits for the teaching–learning process. According to the study participant, teachers "[…] need to know what digital tools have been developed for some certain subject and how they could support and help teachers in teaching–learning process" (T8). Moreover, according to informants, "it is important to know, which tools provide possibilities to create some content and how teachers can make use of it during the lesson" (T3). Study participants mentioned, that even though "there is enough information about digital tools for teaching–learning in general, but sometimes teachers lack knowledge about content creation by means of digital tools" (T5). According to interviewees, "teachers should be proficient in using a variety of digital tools and platforms relevant to their subject areas, such as interactive educational software, multimedia creation tools, and learning management systems"

(T8). To sum up, according to study participants, teachers are "already advanced in using educational technologies, but less advanced in digital content development by means of these technologies" (T11).

Moreover, the analysis of informants' data reveals the importance of "having a solid technological infrastructure in schools to effectively integrate and optimize the use of technological resources" (T4) for educational purposes. Informants also shed light on the existing issue of "insufficient technological foundations in schools" (T9), indicating the need for investment and improvement in this aspect to enhance the educational experience for students.

Consequently, the next important issue discussed by the informants was the question of teachers' capacity to use educational technologies for creative content creation. According to the study participants, a digitally creative teacher demonstrates "proficiency in management of various digital tools, applications, software, and platforms" (T11) pertinent to education. Their continuous updates in knowledge and skills align "with evolving technological advancements" (T5). Informants pointed, that these teachers "exhibit an open-minded stance, displaying a willingness to experiment with novel technologies and innovative teaching approaches" (T3), "they show a lack of hesitation in exploring diverse methods to determine the most effective strategies for their students" (T4). Therefore, according to study participants, "teachers should be leaders and innovators both from pedagogical and technological points of view" (T11). This, according to interviewees, is a "challenge for teachers' training and professional development" (T9). To sum up, according to study participants, being a competent and digitally creative teacher is related to "first, teachers' personal leadership and innovativeness, second, support from professional development system" (T11).

When talking about the teachers' competence respondents highlighted the multifaceted benefits of teachers' reflective practice. According to interviewees, "encouraging teachers to reflect on their pedagogical activities and giving them time and space for understanding the value of digital creativity would be very crucial" (T2). Informants mentioned, that "teachers are usually overloaded with routine duties and traditional teaching–learning and do not have time for creativity, especially using digital technologies, as this is very time-demanding" (T8). However, on the other hand, according to study participants, "the time for reflective practice would support ongoing improvements in the teaching–learning process, would empowers teachers to use data for informed decisions, ultimately enhancing the overall quality of education" (T11). To sum up, according to informants, "being digitally creative means having some time at the disposal to spend it on creativity issues" (T11).

By revealing how digital creativity manifests in the teaching and learning process, study participants not only explained the phenomenon but also provided valuable examples from their practices. All informants emphasized that digital creativity is primarily evident in the creation of engaging, innovative lessons using various technologies. One teacher stated: "My students are fond of lessons via e-learning platforms. But I need to think about how to organize things creatively so that the lesson would be engaging for students" (T5). Another teacher shared: "I use the *LearnLab* platform for integrated projects. In collaboration with other subject teachers (*e.g.*, mathematics, physics, geography, arts), we suggest a broad topic for students' creative projects, which should be analyzed from the perspective of different disciplines. One example is the topic 'Time', where students prepare creative projects to explore

time in various forms and measures by using the digital resources of *LearnLab* platform" (T11). Additionally, digital creativity plays an important role in developing personalized learning content for students with diverse needs. One of the informants shared: "When I need to differentiate the learning process and draw more attention to the specific needs of my students, I use e-learning platforms that help me do it creatively" (T7). Another teacher added: "Usually, I give additional tasks to my students to be completed via e-learning tools or platforms. They willingly accept these assignments. However, I need to think about how to present them and integrate them with other tasks creatively" (T4). Teachers also noted that technological tools are beneficial for organizing group work and fostering collaboration, provided these tools are used creatively. One study participant remarked: "There are a lot of means of communication and collaboration online, such as collaborative documents, discussion forums, and virtual classrooms, but in order to use them effectively, I need to use them creatively" (T3). Moreover, technologies enable changes in assessment methods, making them more student-oriented and aligned with formative assessment principles. As one participant noted, "Digital portfolios, project-based assessments, and interactive quizzes that provide immediate feedback are very attractive for students" (T6). One significant advantage of educational technologies highlighted by study participants is the inclusion of gamification elements. "During my math lessons, I use the *Eduten Playground* platform. It helps me a lot because my students actually perceive it as a game" (T11). According to informants, "When used creatively, these game-like features can be highly beneficial for both teaching and learning" (T11).

When talking about how digital creativity is enhanced by technologies, research participants emphasized that first of all they are increasingly searching and/or creating digital content for teaching and learning by themselves. As one of the teachers stated, "So creativity is even expressed in the ability to browse the internet and find necessary content" (T11). Moreover, teachers need a creative approach in order to combine the traditional teaching–learning content with the digital one. In the words of the informants, digital technologies allow for creative ways of organising the collaborative work. As some informants stated, "Digital tools such as *Google Docs*, *Microsoft Teams*, and *Padlet* enable my students to collaborate on projects in real-time" (T6). Moreover, study participants stressed that digital technologies enable them to use new pedagogical approaches and methods. According to informants, "This requires teachers' efforts and creativity" (T11). Besides this, teachers' digital creativity is very important in assessment practices. As stated by the informants, "Assessment strategies definitely benefit from technologies" (T5). "Tools like *Seesaw*, *Kahoot!*, and *Flipgrid* provide diverse assessment methods beyond traditional tests. I can use digital portfolios, interactive quizzes, and video responses to assess my students' understanding creatively and dynamically" (T11).

The research findings confirm that digitally creative teachers "motivate students to actively engage in their learning process using digital tools" (T8). They facilitate learning experiences based on "individual student needs, preferences, and capabilities" (T3). Empirical evidence also supports the integration of creativity into lessons through "multimedia elements, interactive presentations, virtual reality, gamification, and other innovative digital strategies" (T5). This approach is implemented by teachers in order to "inspire critical thinking, problem-solving, and imaginative expression" (T7). According to informants, "assignments for students are designed to encourage them to create digital art, videos, presentations, blogs, or websites,

promoting self-expression and talent showcasing" (T7). Study participants also highlighted that the "use of digital platforms that aim to facilitate collaborative projects and group discussions, thereby fosters teamwork and enhances communication skills" (T6). Moreover, as research results show, digitally creative teachers acknowledge and accommodate "diverse learning styles and abilities of students" (T1) within the classroom through a variety of digital resources. They use adaptive learning technologies to suit different learning practices and styles. In conclusion, results confirm that a digitally creative teacher effectively employs technology to inspire, engage, and empower students, fostering an innovative and dynamic learning environment that thoroughly prepares students for the digital age.

5. Discussion

The current empiric study aimed to contribute to the limited body of knowledge on teachers' digital creativity.

Existing research indicates that the expression of teachers' creativity through digital technology is a significant concern in today's secondary school teaching and learning environment (Mgboro et al., 2019). This concern arises from the fact that digital technology has transformed how teachers gather information for their lessons, present it to students, and access a wide range of personal, social, and cultural dimensions of information for teaching and learning. Consistent with this research, study participants emphasized that teachers' digital creativity involves a thoughtful integration of technology and creative thinking. This integration aims to enrich the teaching and learning experience, develop innovative skills, utilize diverse digital tools for content creation, and foster critical skills essential for high-quality teaching and learning.

Current evidence indicates that although the use of technology during the teaching and learning process is steadily increasing, however achieving technology integration is still a complex process of educational change. Achieving the goal of meaningful technology integration does not depend solely on technology-related factors. Ultimately, teachers' personal understanding of the role of technologies is a key to their pedagogical decisions regarding whether and how to integrate technology within their classroom practices (Tondeur et al., 2017). The interviewees underscored the pivotal role of educational technologies in the teaching and learning and their practical benefits. They highlighted the necessity for teachers to be knowledgeable about the specific digital tools available for their subjects and how these tools can effectively support and enhance their pedagogical methods. However, despite the abundance of information on digital tools for teaching and learning, a significant gap remains in teachers' knowledge about content creation using these technologies. While teachers are generally advanced in the use of educational technologies, there is a clear need for improved skills in digital content development.

Current research emphasizes the importance of teachers' digital competence in education, given the versatile digital creation opportunities offered by technology (Bereczki & Kárpáti, 2021). Digitally creative teachers use adaptive learning technologies to accommodate diverse learning styles and abilities, effectively preparing students for the digital age. However, the current study found that teachers' ability to employ digital technologies in innovative

ways often hinges on their individual drive and leadership qualities. Furthermore, cultivating digital creativity requires a significant investment of time and should be integrated with the ongoing professional development of teachers. In essence, the effective utilization of digital tools demands personal initiative and leadership while underscoring the need to seamlessly integrate these skills into the broader framework of teachers' continuous professional growth.

Teachers' understandings and perspectives of digital creativity, as revealed in the interviews, were generally reflected in their technology-based practices. Data analysis demonstrated that, consistent with scientific theories (Bereczki & Kárpáti, 2018), teachers integrated creativity with academic learning. Technology-based, creativity-fostering instruction was embedded within the specific subjects they taught and aimed to benefit all students, not just a select group. The research findings affirm that digitally creative teachers actively engage with digital tools, tailoring learning experiences to individual student needs and preferences. Teachers integrate technologies creatively into lessons using various digital strategies to inspire critical thinking, problem-solving, and imaginative expression.

Theoretical and empirical findings allow defining digital creativity within Lithuanian educational context as teachers' pedagogical proficiency facilitated by digital technologies, producing results that are unique and valuable concerning the learner. In the educational context, creatively teaching with digital tools involves utilizing these technologies to endorse creative pedagogies, encompassing learner-centred approaches, an open-ended ethos, synergistic collaboration, and knowledge creation. This definition includes creativity-relevant skills of teachers (digital literacy, digital competence, pedagogical–technological proficiency, *etc.*). Moreover, it takes in mind characteristics of the environment/context, which may nurture or hinder creativity. These are various social, cultural, economic and political factors may influence teachers' digital creativity (*e.g.*, challenges of digital education and the technological infrastructure teachers work in). Besides, the definition focuses on the tangible or intangible outcomes of the creative process by emphasizing original and valuable outcomes it brings and the learner constitutes the reference point. Thus, the definition contributes to linking two key educational research trends: one on creativity and the other on digital technologies.

On the basis of the research results we shaped the concept of teachers' digital creativity and established a set of characteristic components (Figure 2).

The proposed preconditions highlight four different dimensions of digital creativity, namely, understanding and awareness of digital education landscape, technological proficiency, innovative pedagogy, professional development, creative application. Each of these dimensions is equally important for ensuring the emergence of digitally creative teaching and learning processes. Indeed, the use of adequate teaching strategies would allow for fully exploiting the affordances of the selected digital tools and platforms. Furthermore, a safe and flexible learning environment, paired with supportive interactions between teachers and learners (and among learners themselves), would create the necessary conditions and balance so that the learning activity takes on its full meaning. Also, for the further development of digital creativity capacity, general teachers' digital competences are required. Moreover, supporting the administration of the school and other authorities and collaborative colleagues is one of the most important preconditions to develop digital creativity. Besides, opportunities to reflect on the pedagogical practice are also an important precondition since reflective practice supports

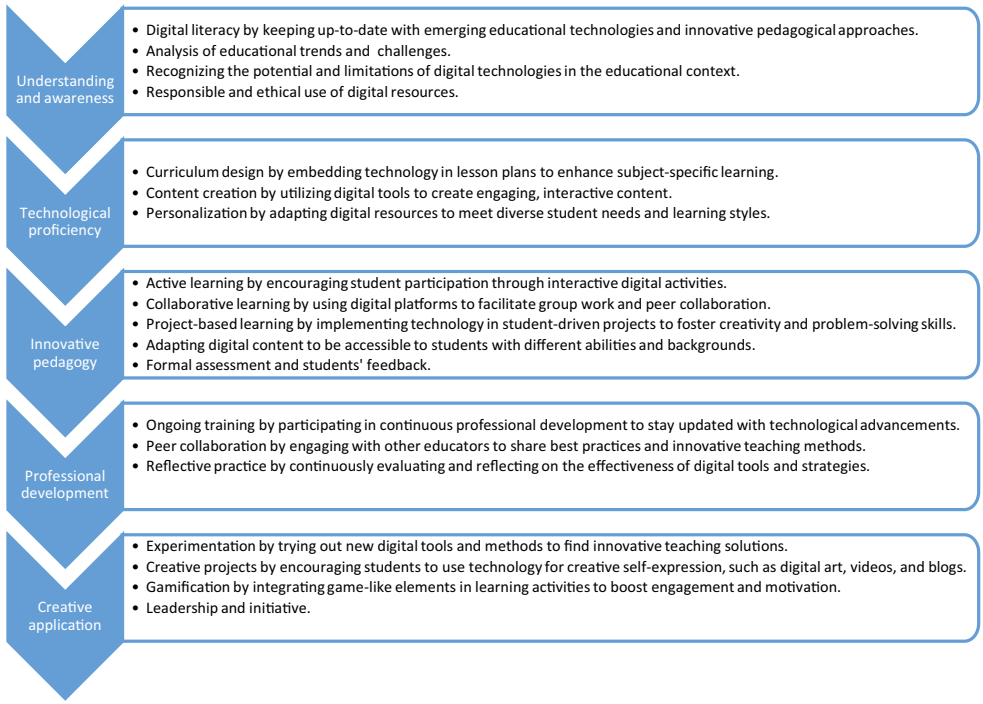

Figure 2. Preconditions for the development of teachers' digital creativity framework (source: created by authors)

ongoing improvements in the teaching and learning process and gives an understanding of the value of digital creativity in general.

The proposed preconditions for the teachers' digital creativity framework provide forward-thinking approach to enhancing teachers' digital creativity in education. The preconditions address multiple facets of digital creativity, from understanding and awareness to creative application practices. This holistic view ensures that teachers are not only equipped with technical skills but also understand the broader implications and responsibilities of using digital tools.

However, the further framework itself could benefit from more detailed guidelines or examples on how to implement these strategies in the classroom. Case studies or practical tips could help teachers translate theory into practice. The framework could elaborate on the types of support systems needed, such as technical support, access to resources, and administrative backing. This would address potential barriers to implementation. The framework could further emphasize the active involvement of students in co-creating digital learning experiences. This would enhance their engagement and ownership of the learning process. With additional details on implementation, support, and scalability, the framework elaborated could serve as a valuable guide for educators aiming to foster a dynamic and innovative learning environment.

6. Limitations

First, the limitations include those typically associated with small qualitative studies, particularly that the findings cannot be generalized. Instead of generalizability, this study supports transferability. By offering a detailed description of the participating teachers' understandings and perspectives, others can assess how applicable the conclusions are to different situations, times, and settings. Second, since the teachers in this study were chosen based on their expertise in technology integration, the findings may only be relevant to similar groups of teachers. However, this expert sample was deliberately selected due to their ability to inform practice and research on digital creativity-fostering activities that are valuable in the classroom. Additionally, participants were secondary school teachers, which could limit the implications of the findings. Future research would benefit from including more traditional classroom teachers and those from other education levels to broaden the scope of this study's findings. Third, data on teachers' understandings and perspectives were gathered through interviews analysis. However, due to project aims, this particular study was just a part of other research, therefore limited observation might not provide a fully accurate depiction of teachers' digital creativity in practice. Future research should consider longitudinal studies to more comprehensively disclose teachers' views, opinion, *etc.* Future research could also include students' perspectives to offer a more comprehensive understanding of the phenomena discussed in this paper.

7. Conclusions

The analysis of literature highlights the importance of equipping teachers with the necessary skills and competencies to work creatively with digital content. This involves understanding academic and digital literacy, with an emphasis on accessing diverse information sources ethically and using digital media effectively. Teachers are not only consumers but also creators of educational resources in the digital age. The concept of digital competence emerges as crucial in this discourse, going beyond technical and procedural skills to encompass personal and socio-cultural factors. Additionally, modern theories of differentiation, individualization, and personalization of education, along with the TPACK framework, further inform the understanding of teachers' digital creativity. The need for teachers to create digital learning content aligns with addressing diverse learning needs, planning engaging lessons, and implementing differentiated and personalized education goals). Therefore, the concept of teachers' digital creativity emerges as a crucial element, highlighting the need for teachers to innovate and adapt digital tools and platforms creatively to enhance teaching and learning.

The empirical study has several implications that could further the promotion of teachers' digital creativity in any country where creativity enhancement and digital literacy are important teaching and learning objectives:

- Teachers' digital creativity involves integrating technology and creative thinking to enrich the teaching and learning experience;
- This integration aims to develop innovative skills, utilize diverse digital tools, and foster critical teaching and learning skills;

- Achieving meaningful technology integration is complex and depends on teachers' personal understanding of technology's role;
- Teachers need to be knowledgeable about specific digital tools and how to use them effectively;
- While teachers are advanced in using educational technologies, they need improved skills in digital content development;
- Teachers' ability to innovate with digital technologies often depends on their drive and leadership qualities;
- Cultivating digital creativity requires time and integration with ongoing professional development;
- Digitally creative teachers use digital tools to tailor learning experiences to individual student needs.

Through a synthesis of theoretical research and empirical findings, we have identified preconditions for developing of a comprehensive framework of teachers' digital creativity. Based on the research results, we propose preconditions highlighting five dimensions of digital creativity: understanding and awareness of digital education landscape, technological proficiency, innovative pedagogy, professional development, and creative application. Each dimension is vital for fostering creative teaching–learning processes, emphasizing the importance of suitable teaching strategies and a supportive learning environment. This comprehensive approach contributes to advancing digital education and enhancing teachers' capacities in the evolving landscape of education.

8. Implications for future research

Given its exploratory nature, our study presents several opportunities for future research at the intersections of teachers' creativity, digital technologies, with implications for theory and practice of education. Future studies could develop and validate the framework of teachers' digital creativity. Such studies could employ both qualitative and quantitative methodologies, focusing on regular teacher groups, different educational levels, and various curriculum areas. Future research could investigate the manifestation of digital creativity in teachers' pedagogical practice and provide detailed guidelines or examples on how to implement these strategies in the classroom. Further research could also elaborate on the types of support systems needed for the implementation of the framework, such as technical support, access to resources, and administrative backing, which have been less explored in previous research.

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