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The Concept of 4C Competences in Pre-School and Early School Education: Challenges, Opportunities and Pedagogical Recommendations

Koncepcja kompetencji 4K w edukacji przedszkolnej
i wczesnoszkolnej – wyzwania, szanse i rekomendacje
pedagogiczne

KEYWORDS ABSTRACT

early childhood
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methods

This article analyses the concept of 4C competences: critical thinking, creativity, communication, and cooperation, as a key component of modern education for preschool and early school-age children. The main objective was to synthesise and organise existing knowledge on these competences and to suggest practical, application-oriented guidelines adapted to the specific context of early childhood education. The methodological framework was based on an analytical review study involving systematic identification, selection, and thematic analysis of publications from academic databases covering the first two decades of the 21st century. The results are presented across four major thematic areas: theoretical foundations, implementation challenges, didactic methods, and pedagogical recommendations. The analysis indicates that the effective development of 4C competences requires conscious didactic strategies, reflective and continuously developing teachers, active engagement of parents and the local community, highlighting the social dimension of fostering future competences, and strong systemic support. The article makes a significant contribution to educational literature by addressing the gap between theoretical discourse and the practical implementation of 4C competences in early education. Its innovative character lies

in the comprehensive treatment of the 4C concept's specificity in early childhood education and in the presentation of pedagogical recommendations grounded in contemporary educational research. Unlike most previous studies, this article bridges theoretical perspectives with specific solutions applicable in practice. It also indicates directions for future empirical research to verify the effectiveness of the suggested recommendations.

SŁOWA KLUCZE ABSTRAKT

edukacja małego
dziecka, edukacja
przedszkolna,
edukacja
wczesnoszkolna,
kompetencje
kluczowe,
kompetencje
4K, innowacyjne
metody nauczania

W artykule przeanalizowano koncepcję kompetencji 4K: krytyczne myślenie, kreatywność, komunikacja, kooperacja, jako istotnego elementu nowoczesnej edukacji dzieci w wieku przedszkolnym i wczesnoszkolnym. Główny cel opracowania stanowiła synteza i uporządkowanie istniejącej wiedzy na temat tych kompetencji oraz zaproponowanie praktycznych wskazań aplikacyjnych dostosowanych do specyfiki edukacji najmłodszych dzieci. Ramę metodologiczną stanowiło podejście analitycznego badania przeglądowego, obejmującego systematyczną identyfikację, selekcję i analizę tematyczną publikacji z naukowych baz danych, z pierwszych dwóch dekad XXI w. Wyniki analizy przedstawiono według głównych obszarów tematycznych: podstaw teoretycznych, wyzwań implementacyjnych, metod dydaktycznych oraz rekomendacji pedagogicznych. Z analizy wynika, że skuteczny rozwój kompetencji 4K wymaga świadomych strategii dydaktycznych, refleksyjnych i odpowiednio przygotowanych oraz doskonalących się nauczycieli, aktywnego zaangażowania rodziców i środowiska lokalnego, co podkreśla społeczny kontekst rozwijania kompetencji przyszłości oraz zdecydowanego wsparcia systemowego. Artykuł wnosi istotny wkład do literatury edukacyjnej, wypełniając zauważalną lukę między teorią a praktycznym wdrożeniem kompetencji 4K w edukacji wczesnodziecięcej. Jego nowatorski charakter polega na kompleksowym ujęciu specyfiki koncepcji kompetencji 4K w edukacji wczesnoszkolnej oraz prezentacji rekomendacji pedagogicznych opartych na współczesnych badaniach edukacyjnych. W odróżnieniu od większości dotychczasowych opracowań artykuł łączy perspektywę teoretyczną z konkretnymi rozwiązaniami możliwymi do bezpośredniego zastosowania w praktyce. Ponadto opracowanie wskazuje kierunki dalszych badań empirycznych, mogących zweryfikować skuteczność przedstawionych rekomendacji pedagogicznych.

Introduction

Dynamic changes taking place in the modern world require a redefinition of the goals of education. The traditional approach, based on imparting knowledge, is no longer sufficient in preparing children for a reality dominated by technology, multiculturalism and dynamic social and economic change. In this context, the concept of 4C competences: critical thinking, creativity, communication, and cooperation, i.e. key elements of modern education, is becoming increasingly important. These competences, also referred to as “21st century competences” (Lamri, 2018/2021; Harari, 2018/2021), are essential for successful functioning in both social and professional contexts. Developing 4C competences from an early age is a part of the concept of lifelong education, aiming to foster attitudes that encourage independence, creativity and cooperation with others. They are particularly relevant in pre-school and early childhood education, as the early childhood period is crucial for the formation of attitudes, habits and basic socio-emotional and intellectual competences. Despite growing awareness of the importance of 4C competences, their effective implementation in educational practice remains a significant challenge for teachers and educational institutions. This is because it requires changes in the preparation of teachers and in the approach to traditional teaching methods, as well as systemic support for educators in developing their own methodological and psychological-pedagogical competences.

The analysis of the literature on the subject made it possible to demonstrate the potential of implementing these competences in elementary education, to indicate practical ways of developing them and to suggest specific recommendations for teachers, enabling them to effectively develop these skills in children from their first years at school. Special attention was paid to modern teaching methods and how they can be adapted to the specific features of working with the youngest learners. Indeed, the introduction of 4C competences into pre-school and early school education is not only a challenge, but, above all, an opportunity to create a more aware, competent and challenge-ready generation of the future. The methodological framework of this scholarly inquiry is based on the approach of an analytical review study, which employed a systematic procedure for the identification and selection of publications from the years 2000–2023. The literature search was conducted using academic databases, including ERIC, Google Scholar and JSTOR. Source selection was guided by carefully formulated keywords including: 4C competences, critical thinking, creativity, communication, cooperation, early childhood education, elementary/primary education, 21st century skills, innovative teaching methods, implementation of key competences, competency-based education. The analysis included publications addressing the development of 4C competences in pre-school and early primary education, with a clear reference to pedagogical practice, and meeting criteria of recency,

scientificity and practical relevance. Sources were excluded if they did not concern the specified competences, focused exclusively on other educational stages, lacked a didactic component, were of a non-scientific nature, or failed to demonstrate practical applicability. This search strategy enabled the selection of highly relevant publications, which were then subjected to thematic analysis according to four key categories: theoretical foundations, implementation challenges, didactic methods, and pedagogical recommendations. The main methodological contribution of this article lies in the integrated synthesis and categorization of fragmented research results into cohesive guidelines for educational practitioners, thereby filling a noticeable gap concerning practical, actionable recommendations tailored explicitly to early childhood educational settings. The novelty of the article lies in its comprehensive examination of 4C competences, taking into account the specific features of early childhood education, and in presenting pedagogical recommendations based on an analysis of contemporary educational research.

Origin and Development of the 4C Competence Concept

The concept of the 4C competencies: critical thinking, creativity, communication and collaboration (P21, 2019), originated from the widely discussed 21st-century competencies that have gained popularity in the context of global economic, technological, and social change (Trilling & Fadel, 2009). These ideas began to emerge at the turn of the 20th century in response to the labour market's needs and the dynamic development of digital technologies (Voogt & Roblin, 2012). Initially, the concept encompassed a broad set of skills, but, over time, these four core skills have been singled out for emphasis. The Partnership for 21st Century Skills (P21) has played a crucial role in popularising and embedding this concept, highlighting that these skills are essential for functioning in the modern world (P21, 2019; OECD, 2018, 2019). Their development is also linked to constructivist and socioconstructivist approaches in education, which assume the active participation of the learner in the learning process and the importance of social interaction for knowledge development (Vygotsky, 1978; Bruner, 1996). In such a context, 4C competences are not just a set of skills, but an integral part of the educational process (Scardamalia & Bereiter, 2006). An important moment in the development of this concept was also the publication of the Future Competences reports, which identified their crucial importance for successful functioning in the information society as a condition for an individual's educational and social success (Schleicher, 2018; UNESCO, 2015). Nowadays, 4C are seen as crucial at all levels of education, with a particular focus on pre-school and early childhood education, where basic attitudes and habits of learning and knowledge selection

are formed (Pianta et al., 2009). Integrating these competences into curricula is now a significant challenge and goal of educational strategies in many countries around the world (Care et al., 2016; Voogt & Roblin, 2012).

Critical thinking is the ability to analyse, evaluate, and synthesise information consciously, which is essential for rational decision-making (Facione, 1990; Ennis, 1985). In early childhood education, it is developed through questioning, analysing perspectives and formulating conclusions (Halpern, 2003). Research indicates that children taught critical thinking are more responsive, perform better and solve problems more efficiently (Abrami et al., 2015). It also underpins citizenship education, fostering a reflective and responsible approach to information (Lipman, 2003; Paul & Elder, 2002; UNESCO, 2015).

Creativity is the ability to produce valuable and original ideas that transcend patterns (Runco & Jaeger, 2012). In education, it also includes the development of thinking, expression, and problem-solving through children's natural curiosity (Chappell et al., 2008; Craft, 2005; Torrance, 1974; Vygotsky, 2004). Research confirms that fostering creativity supports cognitive, social and emotional development (Guilford, 1967; Kim, 2006). Creativity also enhances identity, a sense of agency and inclusiveness (UNESCO, 2015), especially in models such as "creative pedagogy" (Lin, 2011) or "teaching for creativity" (Craft, 2005), where the importance of an educational environment that supports students' creative activities is emphasised through the freedom to express ideas or the absence of fear of making mistakes.

Communication is another key competence of the 21st century supporting learning, collaboration and social development (Mercer, 2000). It involves expressing, listening and interpreting messages, and influences the development of empathy, conflict resolution and self-regulation (Hargie, 2011; Bodrova & Leong, 2007). As language shapes thinking (Vygotsky, 1978), early stimulation of communication by teachers and parents promotes educational success, especially in children from disadvantaged backgrounds (Snow et al., 1998). Modern teaching models are based on dialogue and the co-construction of knowledge (Alexander, 2008; Gillies & Boyle, 2010; Gillies, 2016). What is characteristic of today's world, digital and intercultural communication are becoming equally relevant (Banks, 2015), and in the context of the digitalisation of education and the growing importance of media communication, it is important to build competences for clear, responsible and ethical communication in electronic media also in virtual spaces (Livingstone & Haddon, 2009).

Cooperation is the ability to work together effectively to achieve common goals and it is crucial in the education of children who have been shown to achieve better educational outcomes and a greater sense of belonging to a group when working collaboratively (Roseth et al., 2008). This promotes not only the acquisition of knowledge but also the building of social and emotional competence (Wentzel & Watkins, 2002).

Effective strategies include group projects, cooperative games, peer tutoring (Kutnick et al., 2008; Slavin, 2014), as well as language games, role-playing, guided discussions, storytelling, shared reading, and Socratic dialogue (Fisher, 2007). It is essential not only to provide opportunities for collaboration but also to teach specific social skills, such as active listening, reasoning together, making decisions in a group, and giving constructive feedback (OECD, 2017).

Challenges of Implementing 4C Competences in Educational Practice

At the same time, attention is drawn to the challenges of implementing 4C competences in educational practice. These relate to the pressure to standardise educational achievement, which is often accompanied by insufficient preparation of teaching staff, a shortage of teaching materials, or an unsatisfactory system of support (Fullan, 2007; OECD, 2020). Therefore, developing 4C requires a comprehensive paradigm shift in education, from a transmissive to a constructivist, reflective, and participatory approach, as well as a revised professionalization of teachers.

The implementation of 4C competences in educational practice, despite growing awareness of their importance, faces several significant systemic, institutional, and methodological barriers. One of the main challenges is the lack of explicit guidelines and strategies for implementing 4C competences in pre-school and early childhood curricula, which results in their fragmented or declarative treatment (Voogt & Roblin, 2012). Teachers are often not sufficiently competent in constructivist pedagogy and working with activity-based methods. Research findings indicate that a large proportion of teachers in Europe report a lack of preparation for methods that develop critical thinking, creativity or co-operation. This problem is due to both deficiencies in initial teacher education and a lack of systematic in-service training opportunities (Darling-Hammond et al., 2017; OECD, 2019). The organisational culture of schools and pre-schools also remains a challenge. Traditionally oriented teaching models (transmission-testing-assessment) often fail to foster approaches based on collaboration, dialogue and reflection (Fullan, 2007). The pressures of standardisation and testing, especially in countries with a strong emphasis on educational performance as measured by exam results (e.g. Poland, France, UK, USA, Japan), result in children being taught to reproduce content instead of independent exploration and inference, which limits the development of higher-order thinking competencies (Lucas et al., 2013). This can lead to the marginalisation of soft competencies in favour of cognitive competences measurable by tests (Biesta, 2010). This, in turn, discourages teachers from experimenting and using innovative teaching methods.

The lack of adequate teaching materials and evaluation tools (Redecker, 2017), i.e. diagnostic tools to monitor students' progress in the area of social-cognitive competences, is also significant. Finally, limited systemic institutional support is an important challenge. Many educational reforms focus on structural measures, neglecting the need for systematic and systemic teacher support, networking, mentoring, or collaborative development of pedagogical practice (Hargreaves & Fullan, 2012).

It should be pointed out that, despite the above barriers, there are examples of successful implementations of 4C competence-oriented education. Examples include the Finnish education system, which emphasises integrated cross-curricular teaching, flexible curricula and a high degree of teacher autonomy (Jagiełło-Rusiłowski, 2011; Sahlberg, 2014), and the TeWhāriki model in New Zealand, which is based on the values of collaboration, communication and independent discovery of the world (Carr & May, 2000). In Poland, the Good Behaviour Game programme, implemented in grades 1–2 (also known as Let's Play Together), performs similar functions (Kwaterna & Dzieglewski, 2023).

Therefore, the implementation of 4C competences in education requires not only methodological but also systemic changes, including: reform of teacher training, introduction/extension of institutional support, redefinition of educational goals, and recognition of the importance of social and emotional skills as equally important as cognitive skills (Karbowniczek, et al., 2011).

Innovative Didactic Methods as an Opportunity to Support the Development of 4C Competences

Contemporary education, focused on developing competences for the 21st century, requires the use of modern didactic methods that support students in developing critical thinking, creativity, communication, and cooperation (Kulesza & Michalak, 2018). Traditional transmission models prove to be insufficient in the context of children's social and cognitive needs (Sawyer, 2011).

One of the most effective methods to support CK development is considered to be the Project-Based Learning (PBL) approach in which students work to solve an authentic problem by integrating knowledge from different disciplines, working in teams and learning to build reflection and self-reflection (Thomas, 2000). PBL has been proven to improve academic achievement and develop social competence, especially in groups with diverse learning abilities (Bell, 2010; Holm, 2011). Equally effective is the Inquiry-Based Learning (IBL) method, which promotes questioning, independent inquiry and the formulation of conclusions. IBL fosters the development of critical thinking and communicative competence, especially when implemented

in groups and under the guidance of a teacher-facilitator (Hmelo-Silver et al., 2007; Laevers, 2005; Skafbania, 2020; Wells, 1999) who uses methods such as drama and storytelling that support creativity and communication. Through enactments and narratives children learn to express emotions, take different perspectives, develop imagination as well as empathy and social competence, fostering a climate of trust and acceptance within the peer group (Cremin et al., 2006; Wright, 2007). The Co-operative Learning (CL) approach is considered particularly effective in developing cooperative and communicative competences. This increases engagement, improves educational outcomes and develops conflict resolution skills (Johnson & Johnson, 2009; Slavin, 2014).

Among the innovative methods, it is also worth mentioning gamification, i.e. the use of game procedures in the teaching process. They stimulate creativity, logical thinking, as well as competition and cooperation, supporting children's intrinsic motivation and allowing them to achieve their educational goals in an engaging and attractive manner (Menezes & De Bortolli, 2016). Modern tools, such as digital technologies (IT), are relevant here, as their use enables children to access educational resources, collaborate online, create digital content and share it (Redecker, 2017). They support the personalisation of learning and communication between students and a teacher, while developing the ability to use technology in a responsible way (Beetham & Sharpe, 2013). The successful implementation of modern teaching methods requires adequate teacher preparation and an openness for change, enabling teachers to design practical learning situations (Laurillard, 2012).

Pedagogical Recommendations for the Development of 4C Competences in Pre-School and Early School Age Children

Developing the 4C competences requires well-considered and coherent systemic and didactic actions as well as adequate teacher preparation. The analysis of the literature on the subject allows us to identify the most relevant recommendations that can improve the process of shaping these key skills in the youngest learners:

1. Introduce changes in teacher education programmes that take into account modern pedagogical concepts, such as action learning, constructivism, project pedagogy and reflective teaching, and in their professional development (Darling-Hammond et al., 2017). It is crucial that teachers have theoretical and practical knowledge of developing 4C and other competencies of the future (Kwiatkowski, 2018).

2. Educational environment should be designed to foster the child's autonomy, opportunities for exploration, interaction and collaboration. The educational space needs to be flexible, allowing for arrangements that support group and creative work, be rich in stimuli and learning materials, and be adapted to different learning styles (Laevers, 2005).
3. It is crucial for teachers to use activating teaching strategies and methods (Cohen & Lotan, 2014; Hmelo-Silver et al., 2007), especially problem-solving and interdisciplinary tasks that require students to be critical and creative, and to communicate and interact with others.
4. Supporting children's emotional and social development should be considered as a foundation for 4C competence. Developing empathy, conflict resolution skills, and self-awareness fosters effective communication and cooperation (Denham et al., 2014; van de Pol et al., 2010).
5. Systematic observation and documentation of children's development in the 4C competences should be conducted. Assessment should be formative, supportive and tailored to the child's developmental abilities (Broadfoot et al., 2002). Instead of testing, it is advisable to use portfolios, achievement mind maps, self-evaluation, or personalised pedagogical documentation that allows the child, as well as the teacher and parents, to reflect on the learning process and outcomes (Carr & Lee, 2012).
6. Collaborate with parents who should be informed about the importance of the 4C competences and involved in activities that support children's development, both in the pre-school and home spaces (Sheridan et al., 2009). Joint projects, workshops, open-ended activities and consultations help to build coherence in educational interactions.

Summary and Conclusions

The 4C competences: critical thinking, creativity, communication and cooperation, are the foundation of modern education. In pre-school and early childhood education, their development is crucial for shaping cognitive, emotional and social attitudes that influence a child's future development and life functioning.

Research indicates that the effective promotion of these competences requires a move away from the traditional teaching model to a child-centred, constructivist approach. Here, the teacher acts as a designer of the learning environment, a reflective guide, a scaffolder and a facilitator supporting children's development in a holistic way (Darling-Hammond et al., 2017; Kulesza & Michalak, 2018; van de Pol et al., 2010).

Modern teaching methods, such as projects, drama, storytelling, educational games, and digital technologies, support the development of 4C competences; however, their implementation faces systemic difficulties, a lack of resources, and insufficient teacher preparation (Biesta, 2010; Niemi et al., 2014). The overview analysis shows that:

1. 4C competence should be an overarching goal of education from the earliest stages.
2. Teachers require systematic support and training.
3. A flexible education policy supporting innovation and autonomy is needed.
4. Cooperation with parents and the community is a condition for success.
5. Age-appropriate diagnostic and evaluation tools for children are needed.

In conclusion, the development of 4C competence is not only a question of teaching methods, but also a matter of a broad, systemic approach that takes into account the cooperation of all educational stakeholders. It is an investment in the future of children and a society capable of acting creatively, reflectively and responsibly in the complex reality of the 21st century.

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