



## ***Climate Competence in the Education of Preschool and Early School Teachers Kompetencje klimatyczne w kształceniu nauczycieli przedszkola i edukacji wczesnoszkolnej***

### **ABSTRACT**

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**RESEARCH OBJECTIVE:** The aim of this article is to analyze how preschool and early school education students perceive their own preparation for implementing climate education and to identify areas of study that, according to the respondents, require in-depth study in their academic education.

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**THE RESEARCH PROBLEM AND METHODS:** The research problem concerns declarative assessments of competences, educational experiences and development needs of female students in the field of climate education in working with children. The research is exploratory and contributory in nature and serves to preliminarily recognise the phenomenon and identify key areas requiring further analysis. The method used was an interview in the form of written answers to open-ended questions. The study covered 83 female students in 2024.

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**THE PROCESS OF ARGUMENTATION:** The data analysis process was based on the respondents' answers. The students' statements regarding the importance of climate education, their sense of preparedness for its implementation, as well as their knowledge, educational experiences and development needs in this area were analysed.

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**RESEARCH RESULTS:** The analysis of the responses indicates that female students attach significant importance to climate education and declare their readiness to address this issue in their future professional work, while recognising the limitations of their own substantive and methodological preparation and the need for more structured, practical support during their studies.

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**CONCLUSIONS, RECOMMENDATIONS, AND APPLICABLE VALUE OF RESEARCH:** The results of the study indicate a need for deeper reflection on the inclusion of climate education in the training of future teachers. The findings can serve as a reference point for the design of study programmes and teaching activities that prepare students to address this issue in pre-school and early school education.

→ **KEYWORDS:** **CLIMATE EDUCATION, CLIMATE COMPETENCES, SELF-ASSESSMENT OF PREPARATION FOR CLIMATE EDUCATION, STUDENTS OF PRESCHOOL AND EARLY SCHOOL PEDAGOGY, ACADEMIC EDUCATION**

## STRESZCZENIE

**CEL NAUKOWY:** Celem artykułu jest analiza postrzegania przez studentki pedagogiki przedszkolnej i wczesnoszkolnej własnego przygotowania do realizacji edukacji klimatycznej oraz identyfikacja obszarów kształcenia wymagających – w świetle deklaracji badanych – pogłębienia w procesie akademickim.

**PROBLEM I METODY BADAWCZE:** Problem badawczy dotyczy deklarowanych kompetencji, doświadczeń edukacyjnych oraz potrzeb rozwojowych studentek w zakresie realizacji edukacji klimatycznej w pracy z dziećmi. Badania mają charakter eksploracyjno-przyczynkowy i służą wstępnemu rozpoznaniu zjawiska oraz identyfikacji obszarów wymagających dalszych analiz. Zastosowano metodę pisemnego wywiadu z pytaniami otwartymi. Badaniem objęto 83 studentki w 2024 roku.

**PROCES WYWODU:** Proces analizy danych oparto na odpowiedziach badanych. Analizowano wypowiedzi studentek dotyczące znaczenia edukacji klimatycznej, poczucia przygotowania do jej realizacji oraz wiedzy, doświadczeń edukacyjnych i potrzeb rozwojowych w tym zakresie.

**WYNIKI ANALIZY NAUKOWEJ:** Analiza odpowiedzi wskazuje, że studentki przypisują edukacji klimatycznej istotne znaczenie oraz deklarują gotowość do podejmowania tej tematyki w przyszłej pracy zawodowej, przy jednoczesnym dostrzeganiu ograniczeń własnego przygotowania merytorycznego i metodycznego oraz potrzeby bardziej uporządkowanego, praktycznego wsparcia w toku studiów.

**WNIOSKI, REKOMENDACJE I APLIKACYJNE ZNACZENIE WPŁYWU BADAŃ:** Wyniki badań wskazują na potrzebę pogłębionej refleksji nad uwzględnianiem edukacji klimatycznej w kształceniu przyszłych nauczycieli. Ustalenia mogą stanowić punkt odniesienia przy projektowaniu programów studiów i działań dydaktycznych przygotowujących studentów do podejmowania tej problematyki w edukacji przedszkolnej i wczesnoszkolnej.

→ **SŁOWA KLUCZOWE:** **EDUKACJA KLIMATYCZNA, KOMPETENCJE KLIMATYCZNE, SAMOCENA PRZYGOTOWANIA DO EDUKACJI KLIMATYCZNEJ, STUDENTKI PEDAGOGIKI PRZEDSZKOLNEJ I WCZESNOSZKOLNEJ, KSZTAŁCENIE AKADEMICKIE**

## Introduction

The global economy is experiencing rapid change driven by climate challenges, marked by uneven development, the internationalisation of technology, and the globalisation of institutions and policies. In this context, environmental education is increasingly important for developing competences that support social and economic participation, including knowledge, responsibility, and informed decision-making in response to complex environmental issues. As Monika Michalska notes “understanding what sustainable development is should be particularly important from the point of view of implementing its principles in economic practice and everyday life (e.g., through environmentally friendly consumer choices)” (2016, p. 236). She points out that environmental education at the academic level should not be limited to the transmission of facts, but should lead to a lasting change in attitudes and values that will enable the harmonious coexistence of society, the economy, and nature.

Contemporary environmental change reveals escalating threats such as ecosystem degradation, resource shortages, and greenhouse gas emissions. Climate warming intensifies extreme events and destabilises economic processes, requiring a systemic approach in which ecological education plays a strategic role in preparing society for responsible responses to Anthropocene challenges. Anita Bokwa et al. stress that slowing these changes requires action at international, national, and local levels, combining technological solutions with educational measures. Adverse local climate and environmental changes are increasingly observed and are usually linked to land-use practices that insufficiently account for human environmental impact. This leads to poorer living conditions for the inhabitants of such areas (including poorer air quality) and an increase in the costs of maintaining such areas (Bokwa et al., 2020). The scale of climate challenges demands multi-level action, with education playing a key role in socio-economic transformation. In the context of irreversible environmental change and the transition to a low-carbon model, education for sustainable development supports the development of skills needed to respond to threats. In line with UNESCO guidelines, environmental education should foster awareness, attitudes, and skills related to resource conservation. The literature highlights that its effectiveness depends on the integration of cognitive, axiological, and practical dimensions, underscoring the importance of preparing future teachers during academic education (Ardoin et al., 2020).

## Climate Education as a Response to Global Socio-Economic Challenges

By integrating scientific knowledge with practical action, climate education supports societies in adapting to the climate crisis and stimulates proactive attitudes towards the future (Ibragimow, 2020, pp. 95–105). Its role is to develop the ability to analyse complex environmental relationships and their socio-economic consequences. A systemic

approach that supports the development of critical thinking and individual agency in the context of global change is crucial (Snarska-Nieznańska et al., n.d.).

Responsibility for climate education rests primarily with preschool and early school teachers, who shape pro-environmental foundations. Climate education should be a permanent element of teaching, focused less on knowledge transfer and more on developing responsibility, critical thinking, and ethical sensitivity (Michalska, 2016). In early development, children learn mainly through observation and imitation, underscoring the teacher's role as a pro-environmental model. A teacher engaged in climate protection thus becomes not only a source of knowledge but also a moral role model. Their authenticity in educational activities and everyday choices influences the effectiveness of shaping lasting pro-climate attitudes, such as conserving resources, reducing consumption and waste, and engaging in local environmental initiatives (Niesporek-Szamburska & Przybyła, 2021, pp. 15–20). Everyday educational activities such as working with text, art, nature observation, and maths games can effectively convey environmental content, provided teachers recognise this potential and have the skills to integrate climate issues into the curriculum. Therefore, the training of future teachers should focus not only on imparting knowledge, but also on developing climate, design, and reflective skills, understood as the ability to critically interpret reality, design educational activities responding to local and global challenges, and make decisions in line with sustainable development (Niesporek-Szamburska & Przybyła, 2021, pp. 22–25). Children educated by committed teachers can be inspired to take initiative from everyday choices to social and civic engagement (Niesporek-Szamburska & Przybyła, 2021, pp. 22–25). Foreign studies indicate that teachers' beliefs, their teaching competences and everyday educational practices play a key role in shaping children's environmental attitudes, especially at the stage of pre-school and early school education, where learning is largely based on observation and imitation (Hedefalk et al., 2015).

## The Role of Teachers in Promoting Environmental Awareness in Preschool and Early School Education

In the Anthropocene era, schools should fulfil not only an educational but also a transformative role by shaping social awareness and responsibility. The climate crisis is not only an environmental challenge, but also axiological and cultural, requiring a re-definition of educational goals. Climate education thus becomes a mission supporting the development of reflection, decision-making, and readiness to act, which requires methods based on experience, cooperation, and involvement in local environmental initiatives (UN Global Compact Network Poland, 2021). Teachers play a key role as catalysts for change, guides through a complex world of threats and opportunities, and intermediaries between students and the social world. They shape the classroom climate, the language used to address difficult issues, teach recognition of disinformation, and build agency and empathy towards future generations. As practical guides

emphasise, effective climate education is based not only on scientific facts, but above all on relationships and trust, which makes teachers key allies of children and young people in facing an uncertain future (UN Global Compact Network Poland, 2021). That is why it is important that future teachers are prepared not only to convey curriculum content, but also to act as guides in climate education. During teacher training, they should acquire knowledge about environmental challenges, develop social and communication skills, and learn to design teaching activities in the spirit of environmental justice and intergenerational solidarity. Including these elements in academic programmes increases the likelihood that graduates will be ready to consciously and effectively introduce children to responsible environmental choices and the future of the planet (Michalska, 2016). Future educators, so prepared, can contribute to real social change, starting with their daily work with children.

## Climate Competence in the Education of Preschool and Early School Teachers

Climate competence plays a key role in preparing future teachers to promote environmental awareness among children. In the intensifying climate crisis, teacher education should include both theoretical knowledge and practical teaching skills in the field of environmental protection, sustainable development, and environmental ethics (Kałużyńska & Jackowska-Uwadizu, 2022, pp. 5–8). One of the main challenges is the marginal inclusion of environmental education in teacher training programmes, where environmental issues are often addressed in a fragmented way and without integration into other areas of pedagogy. Meanwhile, teachers of the youngest children play a key role in shaping pro-environmental attitudes, which makes it necessary to develop their climate competence at the university level through compulsory modules such as education for sustainable development or ecology in child education (Kassenberg, 2022). Developing climate competence also requires appropriate teaching methods. Active learning *e.g.*, through projects, simulation games, and case studies allow students to take on the roles of local community leaders and solve real environmental problems faced by children (Kassenberg, 2022). Field activities, outdoor education, ecosystem research, nature observation, and forest workshops are also important parts of teacher training. Classes of this type promote understanding of the practical aspects of environmental protection and prepare future teachers to conduct nature classes with children in an engaging and nature-friendly manner. Good practices include cooperation between universities and external institutions, such as non-governmental organisations, landscape parks, and local government units.

## The Perspective of Students of Preschool and Early School Education – Research Basis

The research was exploratory and contributory in nature and aimed to assess the preparedness of students of preschool and early school education to implement climate education in their future professional work. The topic fits within current discourse on the role of education in counteracting the climate crisis and developing teachers' competences in the spirit of sustainable development. The starting point was the concept of climate competence, understood as an integrated set of knowledge, skills, attitudes, and values enabling understanding of climate processes and responsible environmental action (Michalska, 2016). The study was conducted in 2024 among female students of preschool and early school education, using a diagnostic survey. The study adopted an understanding of climate competence consistent with the theoretical approach presented in the introductory part of the article, covering knowledge, attitudes, and declared readiness for educational activities in the field of climate education. The level of competence and assessment of students' preparedness for climate education refer to their subjective statements regarding their knowledge, educational experiences, and declared methodological readiness. Due to the qualitative and self-reported nature of the data, the term "level of climate competence" is used descriptively and does not refer to a quantitative measurement. Earl Babbie (2015, pp. 240–260) emphasises that survey research can include not only closed questions, but also open questions that provide qualitative material. He points out that data derived from respondents' statements enable analysis of how they perceive social phenomena, their experiences, beliefs and attitudes, rather than their objective measurement. For this reason, Babbie believes that in exploratory and diagnostic research, survey data can be subjected to qualitative analysis if the aim of the research is to interpret meanings rather than to establish quantitative results.

The questionnaire comprised five open and semi-open questions diagnosing climate competence. It addressed knowledge of climate change and sustainable development, prior educational experiences, subjective readiness to conduct climate-related classes with children, motivating attitudes and values, and expectations towards the university in terms of substantive and methodological support. The deliberately selected sample included future preschool and early school teachers, regarded as key actors in early climate education. In total, 83 questionnaires were collected and analysed using qualitative content analysis, with attention to recurring themes, opinions, concerns, needs, and expectations. The findings illustrate levels of environmental awareness and readiness for educational action. Despite its limited scope, the study provides valuable contextual data, enabling an assessment of students' preparedness for climate education and identification of areas requiring further support.

## Climate Competence as an Element of Teacher Education – Analysis of Research Results

In this study, axiological awareness is not analysed as an independent competence but as a dimension embedded in students' declarations within the broader concept of climate competence. The analysis aimed to identify students' understanding of climate competence and their preparedness to implement climate education in future practice. Five thematic areas were examined: knowledge, educational experience, sense of preparedness, attitudes and values, and development needs. Qualitative analysis considered contextual meanings, recurring content and discrepancies, treating students' reflections as indicators of readiness for the role of climate educator. The findings may inform improvements in educational programmes and cooperation between universities and organisations supporting environmental education.

The first analysed area concerned students' knowledge of climate change and sustainable development. Most respondents demonstrated a general but intuitive and simplified understanding of the issue. They identified causes such as CO<sub>2</sub> emissions, industrial activity, transport, deforestation and air pollution, and effects including rising temperatures, melting glaciers, droughts, fires and species extinction. Statements ranged from accurate explanations to expressions of uncertainty or vague formulations, indicating partial understanding and conceptual confusion in some responses.

Only a few responses contained more in-depth reflections, such as: 'Systemic changes are needed, but also education from an early age.' Overall, the analysis shows that students' knowledge is largely based on everyday observations and media messages rather than academic sources. No references were made to concepts such as the greenhouse effect, climate adaptation, carbon footprint or climate neutrality, indicating limited scientific grounding. Moreover, the statements did not address the teacher's role as a transmitter of climate knowledge, suggesting a weak link between personal competence and future professional responsibility. This highlights the need to strengthen structured climate content in teacher education, including scientific, didactic and axiological dimensions.

The second area of analysis concerned students' educational experiences related to climate issues. Responses indicate that contact with this topic was mostly occasional, unsystematic and poorly supported didactically. Climate themes appeared sporadically, for example on Earth Day, during art classes or environmental campaigns in kindergartens. As one respondent noted, "During the internship, children painted posters about nature [...] but no one explained what it meant," while another recalled, "I organised a waste paper collection with the children, but it was my own initiative." Students also expressed critical views of university education, stating that climate education was rarely present in the curriculum. Although some students engaged independently in environmental activities, the findings show that climate education is not systematically embedded in teacher training programmes, which limits the development of coherent pedagogical competences. This highlights the need to integrate climate education more consistently into academic practice, including didactic and axiological dimensions.

The third area concerned students' sense of preparedness to provide climate education when working with children. The analysis shows that most respondents do not feel ready to conduct such classes, despite recognising their importance. They most often pointed to a lack of teaching tools, practical examples and institutional support during their studies. As one respondent stated, "I don't feel prepared. I don't know how to talk to children about it," while another noted, "I am aware of the problem, but I don't have the tools." Insufficient methodological preparation was repeatedly emphasised, along with difficulties in accessing reliable materials. Even students interested in ecology described their engagement as largely based on individual initiative. The sense of unpreparedness appears to result not from low motivation, but from curricular gaps, indicating the need to strengthen the methodological and practical components of teacher training so that climate education can be effectively implemented in everyday teaching.

The fourth area concerned female students' attitudes and values towards climate education and their beliefs about the teacher's role in shaping pro-environmental attitudes. The statements show that respondents perceive climate education as an important and necessary element of work with children, emphasising kindergarten as a key stage in value formation. As one student noted, "If we don't start with children, it will be too late," while another stressed the importance of showing children their agency through simple actions. The teacher was frequently described as a role model: "If the teacher cares about the environment, the children will notice." The responses indicate high axiological readiness and emotional engagement, accompanied by a clear need for methodological support and age-appropriate approaches that inspire rather than frighten children. The findings suggest that future teachers are open to climate education provided they are equipped with suitable pedagogical tools.

The fifth area concerned students' educational needs and expectations towards the university in preparing them for climate education. The statements indicate that, despite increasing awareness of the importance of this issue, climate education is insufficiently represented in teacher training programmes and appears mainly in a sporadic, marginal manner. Students expected more structured support, including dedicated modules and practical classes. As one respondent stated, "I would really like to have classes where someone shows us how to talk to children about climate." A strong need for ready-made tools, scenarios, educational materials and opportunities to practise methods in workshops was repeatedly emphasised. Respondents also pointed to the value of cooperation with experts, non-governmental organisations and environmental institutions, as well as additional voluntary initiatives such as projects, workshops or interest groups, which could enhance engagement and develop practical competences.

## Discussion of Research Results

The study results contribute to a broader pedagogical discourse advocating the inclusion of climate competence in the professional preparation of preschool and early school

teachers. They align with international findings highlighting the key role of teachers in climate education and the persistent lack of systematic support and pedagogical frameworks for developing both knowledge and practical skills among future educators (Spiteri, 2023). The collected statements signal that students of this field recognise the importance of climate education and identify with its values, but do not feel sufficiently prepared for it. Similar gaps between declared environmental values and methodological preparedness of future teachers are reported internationally, indicating the need for systemic support in climate education (UNESCO, 2017; Ardoin et al., 2020). This situation is reflected in the findings contained, among others, in the publication by Izabela Bieńkowska and Małgorzata Kitlińska-Król, who points out that education for sustainable development requires teachers not only to have appropriate curriculum content, but above all a personal commitment, reflectiveness, and the ability to integrate different perspectives of knowledge. The researcher stresses that teachers should act as promoters of ecological values, initiators of social engagement and guides in shaping responsibility for the shared world. The paper also underlines the need to move beyond traditional teaching towards an approach based on partnership, dialogue and participation, which is particularly important in preschool and early school education, where relationships and the teacher's example form the basis of educational practice (Bieńkowska & Kitlińska-Król, 2016, pp. 159–162). A similar view is presented by Olga Jabłonko, who emphasises the importance of environmental education in the context of the integral development of children and points out that effective pro-environmental education cannot be limited to the transfer of knowledge, but must be linked to the development of attitudes, values, and sensitivity to natural and social interdependencies (Jabłonko, 2015). The author emphasises that kindergarten and early school education have particular potential for fostering empathy towards nature, provided that educational activities are grounded in children's everyday experiences, outdoor exploration, observation and empathy. In this perspective, the teacher acts less as an instructor and more as a guide in discovering the world to which children belong. The analysis shows that students demonstrate high readiness to develop climate competence but require systematic and practical support. They expect climate-related content to be integrated into other areas of teacher education, alongside opportunities for creative activities and cross-sector cooperation. The conclusions indicate the need to embed climate education as a permanent, interdisciplinary component of teacher training, as theoretical knowledge alone proves insufficient without practical skills and methodological awareness. This postulate is also formulated by Joanna Madalińska-Michalak, who points out that in times of civilisational change, teachers' competences must include the ability to act in conditions of uncertainty and to translate abstract concepts into language and forms accessible to children (Madalińska-Michalak, 2017, p. 30). Meanwhile, the students surveyed are not yet able to fully transform their knowledge of climate change into educational activities – they lack scenarios, examples, and role models.

The students' statements indicate relatively well-developed attitudes and awareness, but a weak sense of agency and limited access to practical tools, which theory identifies

as crucial for educational effectiveness. Respondents emphasised the value and necessity of climate education, in line with CEO and UNESCO reports highlighting teachers as potential agents of social change, provided they receive adequate resources and institutional support. The study also revealed critical reflections on the insufficient presence of climate-related content in teacher education programmes. This observation is consistent with the results of analyses conducted by Joanna Gilewicz and Anna Batorczak, which indicate that the introduction of environmental topics into teacher education is scattered and incidental. According to these authors, without separate modules, workshops, and cooperation with non-governmental organisations, it is difficult to achieve real change in educational practice (Batorczak & Klimska, 2020). The students' responses also included calls for strengthening the practical aspects of education, such as workshops, projects, and problem-based learning, confirming the relevance of the concepts of engaged pedagogy and educational ecology promoted by authors representing critical pedagogy and environmental education. In particular, the publication edited by Zbigniew Chrobak and Paweł Frejusz shows that contemporary education cannot be limited to the neutral transfer of knowledge, but should be based on moral commitment, responsibility, and actions that respond to real social and environmental problems. The authors stress that engagement pedagogy requires a teacher who is not only a subject specialist but also an active participant in social life and a promoter of civic and pro-ecological attitudes. In this context, workshop-based methods, analysis of local environmental problems and the design of joint activities with students are seen as key elements of preparation for educational work in the era of the Anthropocene (Chrobak & Frejusz, 2018, pp. 16–35). Students indicate a lack of such experiential and cooperative forms of learning, which would allow them to develop climate competencies through practice and action.

## Conclusion

The results indicate that, despite its growing social importance, climate education remains marginal in the training of preschool and early school teachers. Students show high axiological readiness and awareness of the issue, but report a significant lack of teaching tools, systemic support and practical preparation. Their knowledge is often superficial, educational experiences fragmented and sense of preparedness low, although they express strong motivation for self-education and expect climate education to be integrated into study programmes as an interdisciplinary component of teacher training. These findings justify the need to incorporate climate-related content into teacher education curricula and to undertake further research on effective implementation strategies, methodological support and graduates' professional practice, which could inform the development of a modern model of teacher education grounded in responsibility, environmental awareness and action for future generations.

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