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Formation of conscious citizenship in the context of rural education development

Formación de ciudadanía consciente en el contexto del desarrollo de la educación rural

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Abstract


The main purpose of the study is to analyze the prospects and threats of forming a system of the formation of a conscious citizen in the context of rural education development. The object of the study is the system of training future specialists in the context of rural education development. The scientific task of the study is to analyze the key threats to the formation of a system for the formation of conscious citizenship in the context of rural education development and forming the leveling of these threats. The research methodology includes methods of expert analysis, pairwise comparison and hierarchical ordering. As a result of the application of these research methods, the key threats to the formation of a system for training specialists for the development of conscious citizenship in the context of rural education development were streamlined. Based on a certain hierarchy, measures to counter these threats were proposed.


Resumen


El objetivo principal del estudio es analizar las perspectivas y amenazas de formar un sistema de formación de un ciudadano consciente en el contexto del desarrollo de la educación rural. El objeto del estudio es el sistema de formación de futuros especialistas en el contexto del desarrollo de la educación rural. La tarea científica del estudio es analizar las amenazas clave para la formación de un sistema para la formación de una ciudadanía consciente en el contexto del desarrollo de la educación rural y la nivelación de estas amenazas. La metodología de investigación incluye métodos de análisis de expertos, comparación por pares y ordenamiento jerárquico. Como resultado de la aplicación de estos métodos de investigación, se racionalizaron las amenazas clave para la formación de un sistema de formación de especialistas para el desarrollo de una ciudadanía consciente en el contexto del desarrollo de la educación rural. Sobre la base de una cierta

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The study is limited in that it involves analysis of a limited number of threats. It is planned to expand this list of threats in the future.

Keywords: rural education development, ecological values, conscious citizenship, sustainability of education.

Introduction

The development of modern society is impossible without the formation of civic consciousness. In the context of environmental challenges and global climate problems, as well as limited natural resources, the development of a new concept for the development of rural infrastructure with a proactive position of the public is a decisive factor in well-being and development. The formation of this concept requires, first of all, a change in the paradigm of education, its adaptation to train future specialists who are capable of not only fulfilling the responsibilities assigned to them, but also predicting and neutralizing possible environmental threats. The basis of the new concept of education should be the formation of a conscious citizenship and understanding of the importance of environmental and sustainable development of the agricultural complex.

The modern paradigm of sustainability includes maintaining an optimal balance between environmental, economic and social aspects of society's development. Compliance with these development principles guarantees the satisfaction of the needs of the current generation and socio-economic development, preserving the environment and natural resources for future generations. The implementation of this approach requires the involvement of highly qualified specialists, which once again raises the issue of improving the concept of the educational process.

The issue of improving education in the field of development of the agricultural complex and rural infrastructure implies that the student must acquire skills not only in the field of his immediate activity, but also gain in-depth knowledge in the field of environmental problems and their solutions, as well as in issues of social justice and economic efficiency. The knowledge gained will become the basis for further professional activities and decision-making aimed at modern paradigms of sustainable development of agricultural

jerarquía, se propusieron medidas para contrarrestar estas amenazas. El estudio tiene las limitaciones de que implica el análisis de un número limitado de amenazas. Está previsto ampliar esta lista de amenazas en el futuro.

Palabras clave: desarrollo de la educación rural, valores ecológicos, ciudadanía consciente, sostenibilidad de la educación.

infraestructure. Modern educational concepts actively use an interdisciplinary approach. In the context of which the advantage is the acquisition of knowledge from different fields of science. In the context of sustainable development, this approach makes it possible to combine the fundamentals of social, economic and environmental development of rural infrastructure. At the same time, an important element of the modern education system is the use of interactive teaching methods, among which methods such as project-based learning, case studies, modeling and others have already proven their effectiveness. The use of these methods allows not only to present large volumes of materials in a simplified and understandable form, but also to develop teamwork skills in students and lay the foundations for logical and creative thinking. Along with modern methods and approaches to education, an important element in the issue being studied is the development of moral guidelines and social responsibility. A high level of these character parameters will have a significant positive impact on making rational professional and personal decisions. Thus, the modern education system should encourage students about their role in society and their own contribution to the development of rural infrastructure.

Practical application of knowledge through internships, participation in community projects and volunteer programs focused on rural education development provides not only real-world experience, but also the opportunity to contribute to positive change. Self-education and professional development in the field of rural education development should become an integral part of every specialist. In a world where knowledge and technology are rapidly changing, the ability to constantly learn and adapt is critical. Effective formation of a conscious citizen ready to contribute to rural education development is only possible through close cooperation between universities, government agencies, business and public organizations. Such interaction will create

conditions for the implementation of comprehensive educational programs focused on the comprehensive development of students and their preparation for an active role in achieving rural education development goals.

In the modern world, rural education development is turning from an abstract idea into a concrete course of action for every person. Education focused on rural education development becomes the foundation for the formation of a new generation of conscious citizens ready to face the challenges of the future and ensure the rural education development of our planet. The main goal of the study is to analyze the prospects and threats of forming a system of training future specialists for the formation of a conscious citizen in the context of rural education development. The object of the study is the system of training future preschool education specialists in the context of rural education development.

The structure of the article consists of a literature review, a description of the methodology, coverage of the results, their comparison and conclusions.

Literature review

The literature review plays a key role in our research, as it provides a solid basis for analyzing and understanding the topic of forming a system for training future preschool education specialists as an important part of rural education development. Studying contemporary literature is important because it allows us to identify and analyze new trends, theoretical approaches and practical examples related to a given topic. Such a review contributes to understanding the current state of the problem under study, identifies gaps in existing knowledge, and draws attention to key aspects requiring further research. Studying modern scientific works, articles, analytical reports and other types of literature allows us to lay a solid foundation for our research and ensure its relevance and scientific validity.

Thus, in a study by Melnychuk et al. (2022) explored the importance of protecting children's rights in armed conflict and the role of public administration in this process. The authors highlight the critical need for educational initiatives aimed at raising awareness of children's rights among all sectors of society, including future professionals. This work highlights the need to integrate principles of rural education development and civic responsibility into educational curricula to develop responsible

citizenship in response to global challenges such as armed conflict. At the same time, in the study by Yuryk et al. (2021) examines the balance between the right to medical confidentiality and the employer's right to obtain information about the employee's health status, focusing on the moral and legal aspects of this issue. The authors explore how this interaction affects the provision of human rights and freedoms in the work environment, which is directly related to the formation of a conscious citizenship in the context of personal data protection. This source emphasizes the importance of developing critical thinking skills and moral understanding among future professionals, which are necessary to balance confidentiality and the need for information in a professional context.

In turn, Boshoff et al. (2020) resorted to analyzing child development programs using the DIR/Floortime method. This can provide valuable information about the outcomes and effectiveness of early childhood education approaches, which is important for understanding which programs and practices to invest in. An interesting study by Yetik et al. (2020) where the authors consider the criteria for lifelong learning in the context of open and distance education. This research may be important in understanding how to effectively use the region's resources to support such modern learning formats. Mousena et al. (2022) presents a study focusing on curriculum development that promotes citizenship and sustainability. The authors argue that modern education should include a comprehensive approach to developing students' understanding of their rights and responsibilities as citizens, as well as the knowledge and skills necessary to support the rural education development of society. This work highlights the importance of an integrated approach to education, combining theoretical knowledge with practical skills aimed at solving real-life social and environmental problems. At the same time, Barenthien et al. (2020) focus on learning opportunities for early childhood teachers and their impact on professional knowledge and motivation. This is important for understanding the effectiveness of investments in teacher training and their impact on the overall quality of early childhood education, which are important rural education development policy agendas.

In the study by Jandri et al. (2018) discusses the concept of post-digital science and education in the system of rural education development, which is important for understanding modern approaches in educational technologies and their

impact on preschool education. This source makes an important contribution to understanding how digitalization can affect educational processes and its further impact on the success of rural education development. At the same time, the study by Alazzam et al. (2023), focuses on public environmental management in the context of commercial bioeconomy development and rural education development. This provides important context for understanding the sustainability aspect of education and its potential impact on the financing of educational programs. The issue of formative learning is actively discussed in the study by Blömeke et al. (2017) This article examines the relationship between education and knowledge of preschool teachers. This source is important for assessing the impact of funding on

the quality of teacher training and, accordingly, on the quality of education. Johansson & Sandberg (2012) focus on training and knowledge development in teacher education for early childhood teachers. This helps to understand how resources can be directed to improve educational programs and teacher training. Similar to the study by Krasovska et al.(2020). The article is devoted to the training of future preschool teachers in the field of artistic and aesthetic education using contextual learning technologies. This is important for understanding how funding can influence innovative practices in early childhood education.

However, there are a number of gaps in the literature according to the issues of the article (Figure 1).

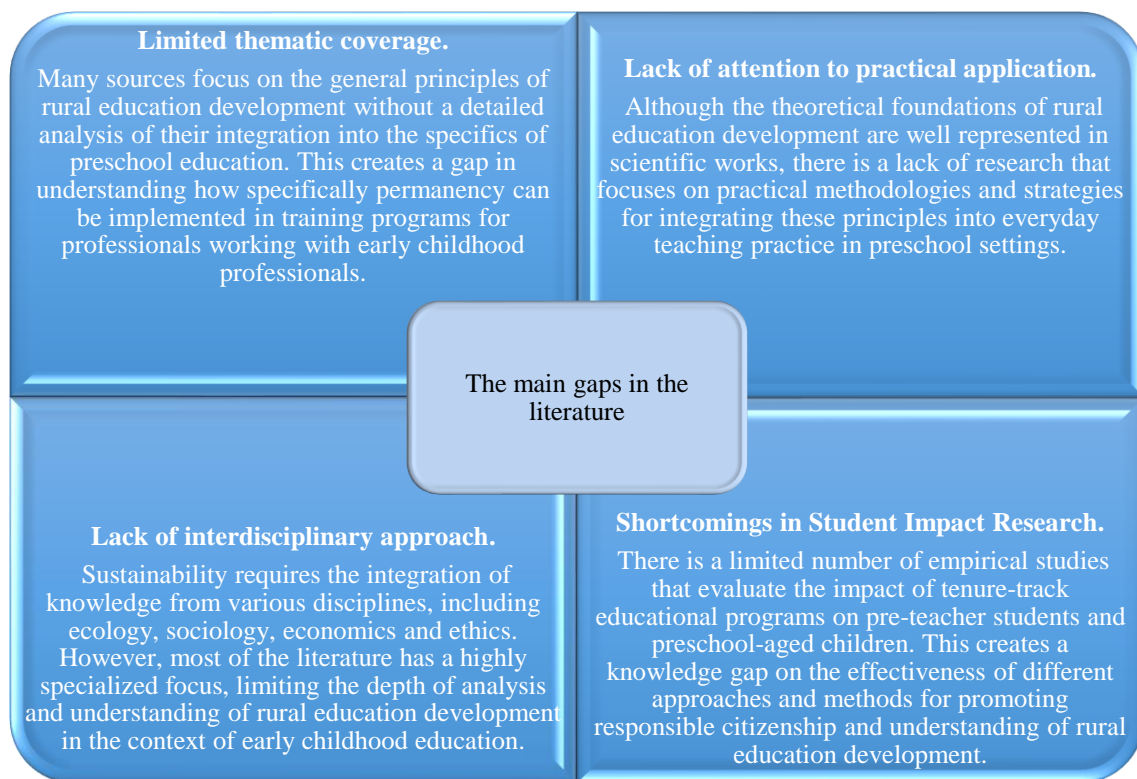


Figure 1. The main gaps in the literature according to the issues of the article (formed by authors)

To summarize, it should be noted that, despite significant research in the field of formation the system of training future preschool education specialists for the formation of a conscious citizen in the context of rural education development, this topic still remains insufficiently studied, especially in the context of identifying and analyzing potential threats. A review of the literature showed that there are many works focused on general issues of education formation, but specific aspects related

to the identification of threats and risks for the system of training specialists for the formation of a conscious citizen in the context of rural education development in preschool education remain insufficiently studied. This indicates that there are gaps in the scientific discourse and the importance of further detailed analysis in this area, which will not only allow for a deeper understanding of the problem, but also the creation of effective strategies for solving it.

The scientific task of the study is to analyze the key threats to the formation of a system for training future preschool education specialists for the formation of conscious citizenship in the context of rural education development and forming the leveling of these threats.

Methodology

To achieve our goals, we will use a number of methods, each of which meets the objectives and goals of the article. The first method that was used in the research process is the method of expert analysis. The essence of this method is the use of expert opinions and assessments in the process for research purposes. In the context of our research, experts provided their opinions on the key threats to the formation of a system for training future preschool education specialists. The key advantage of this method is the ability to obtain data from subject matter experts from the field under study. At the same time, this also implies a key drawback of this method - the subjectivity of judgment, since we by default accept the opinion of experts as truthful. In addition, there is a risk of receiving diametrically different assessments from experts, which will complicate the compilation of a final list of threats and further research.

The next method used in the study is the paired comparison method. This method is based on conducting a systematic comparison of a certain list of factors (in our case, the key threats to the formation of a system for training future preschool education specialists) with determining the level of their importance. In the context of our research, this method will allow us to determine the impact of which threat is decisive, which will become a vector for the formation of further management strategies and policies in the field of education. The advantage of this method is the detailed structuring of problems and the possibility of specifying the assessment. At the same time, the disadvantages of this method are the limited number of factors for the list and the difficulty of determining all the relationships between a given factor. The third method is the threat hierarchy, which allows you to systematize and rank potential risks and threats. In the context of education formation, this method can be used to identify and prioritize the most significant threats. This method has the advantage of providing a clear framework for risk analysis, but the disadvantage is that it may be difficult to identify and assess all potential threats.

In addition to these methods, data analysis is also used. The essence of this method is the collection, processing and analysis of large volumes of information, including statistical data, financial reports, survey results, etc. In our study, it allows us to assess the real state of formation and identify trends and anomalies. The advantage is the objectivity and accuracy of the data obtained, but at the same time, a large volume of data can complicate their analysis and interpretation. The threat hierarchy method may be limited in its ability to accurately identify and evaluate all potential threats. In some cases, important risks may be overlooked because the ranking process is based on current understanding and available information, which may be incomplete.

Data analysis, although objective, can suffer from limitations related to data quality. Incomplete, inaccurate or outdated data may lead to incorrect conclusions. Also, analyzing large volumes of data requires large resources and specialized skills.

Experts in the field of preschool education and rural educational development are carefully chosen based on their academic contributions, practical experiences, and policy knowledge. A diverse range of perspectives is sought, considering experts from different geographical and professional backgrounds, which helps in reducing the bias inherent in expert analysis. The recruitment process often taps into academic networks and professional associations, followed by a rigorous vetting of each expert's credentials and relevance to the research questions. In the pairwise comparison process, threats to the formation of a training system for preschool educators are evaluated. Each threat is compared against others using a structured matrix where experts assess the significance of one threat over another and determine the level of importance through a scoring system. This methodical approach allows for the quantification of each threat's impact, helping to prioritize them. The process might involve several rounds of evaluation to achieve consensus among the experts, ensuring a balanced and comprehensive assessment. For the data analysis part of your study, large volumes of data including educational statistics, survey results from educators, and financial reports are collected and processed. Analytical techniques such as regression analysis are applied to identify significant trends and anomalies (Fig.2).

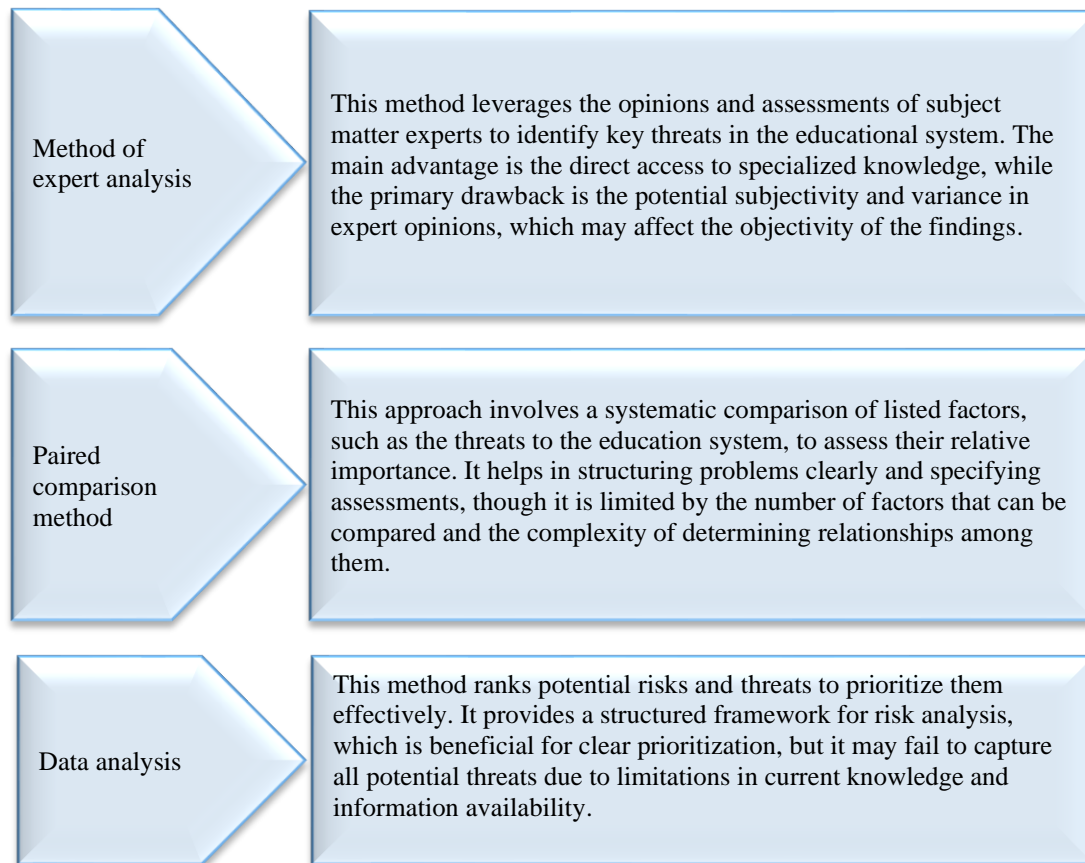


Figure 2. The flowchart that represents the research methodology (formed by authors)

In general, the use of these methods allows us to obtain a multifaceted view of the problems of formation preschool education, which is necessary for the development of effective strategies and solutions in this area.

Results and discussion

In the course of our research, using the method of expert analysis, we focused on identifying key threats affecting the formation of the system for training future preschool education specialists. Particular attention was paid to the development of conscious citizenship and economic and environmental values. The use of expert analysis allowed us to collect important data and assessments of leading experts in the field of education, which ensured the scientific depth and objectivity of our conclusions. The six key threats identified in this study are critical to understanding the current state of funding and guide future policy interventions.

In the process of research and interviewing experts, we strictly adhered to ethical standards and requirements of expert research. All stages of

the study were planned and conducted with respect for confidentiality of information, objectivity of assessments and independence of experts. This approach ensured a high degree of validity and reliability of the data obtained, which is critical to ensuring the quality and responsibility of scientific research in this important area. Thus, we have identified the following threats:

FT1. Professional burnout and staff attrition. Insufficient funding can lead to low wages and lack of opportunities for professional development for teachers, which, in turn, contributes to professional burnout and the outflow of qualified personnel from the industry.

FT2. Changes in sustainable political priorities. Political instability and changing priorities may lead to reduced funding for educational programs, especially those that develop environmental awareness and civic competencies.

FT3. Dependence on external sources of formation. Over-dependence of educational

institutions on private investment or international grants can create uncertainty and insecurity in funding, especially in the long term.

FT4. Limited resources for innovation and technology development. Insufficient resources to integrate new technologies into the educational process threaten the quality of education and the ability of preschool institutions to adapt to modern challenges.

FT5. Underestimating the importance of sustainability education is a serious threat because it results in environmental education being ignored or underemphasized in preschool curricula. This situation may undermine efforts to develop economic-environmental values and consciousness among the younger generation. Lack of adequate emphasis on environmental aspects of educational programs can lead to misunderstandings and lack of understanding of the importance of balancing human needs and environmental conservation. Children who do not receive sufficient sustainability education may not understand the impact of their actions on nature and society as a whole.

FT6. Insufficient government funding. One of the most important threats is the limited state budgeting, which cannot cover all the needs of preschool education. This leads to underfunding of programs and initiatives aimed at developing civic consciousness and environmental values.

At the next stage of our research, the method of paired comparison and hierarchical analysis will be used to rank the identified threats to the formation of the system of training future preschool education specialists. This approach will allow us to systematically evaluate the importance of each of the identified threats by comparing them with each other. Such ranking will help to understand which of these threats have the greatest impact on the system and require primary focus in developing counter strategies.

Table 1.
Pairwise Comparison Matrix

FT	FT ₁	FT ₂	FT ₃	FT ₄	FT ₅	FT ₆
FT ₁	1	0,5	4	0,33	3	0,2
FT ₂	2	1	7	0,5	5	0,333
FT ₃	0,25	0,143	1	0,2	0,5	0,143
FT ₄	3	2	5	1	4	0,5
FT ₅	0,333	0,2	2	0,25	1	0,2
FT ₆	5	3	7	2	5	1

(formed by authors)

The use of these methods will not only provide quantitative and qualitative assessments, but will also help prioritize threats. This is especially important because it allows us to optimize the allocation of resources and efforts aimed at minimizing the negative impact of these threats on the quality and stability of the preschool education formation system.

The first stage is the formation of an even comparison matrix. This step involves determining the relative importance of various alternatives or criteria in the decision-making process. The essence of this method is to compare pairs of elements to assess their relative importance or priority.

The creation of the Pairwise Comparison Matrix occurs according to the following algorithm: each element is compared with each other according to a certain criterion. The results of these comparisons are placed in a matrix, where the diagonal elements are always equal to 1 (meaning the element is being compared to itself) and the off-diagonal elements show the relative importance of the two elements.

In this case:

- 1 means the two factors are equally important;
- 9 indicates very high importance of one factor over another.

The remaining values from 1 to 9 are used to indicate intermediate weight levels.

Additionally, Diagonal Elements (a_{ii}) are always equal to 1 because each factor is compared to itself. For non-diagonal elements if a_{ij}=x then a_{ji}= 1/x

The formed matrix is shown in Table 1.

The next step is to standardize the even comparison matrix in the Analysis of Hierarchies (AHP) method by normalizing the matrix to calculate the relative importance of each element. This process turns raw comparison scores into standardized values that can be used for further analysis.

The essence of this stage is that each element of the even comparison matrix is divided by the sum of the elements in the corresponding column. This allows the matrix to be "normalized" so that each column sums to 1. This normalization is necessary to determine the weights for each element that are used to evaluate their relative importance.

Table 2.
Standardized Matrix

FT	FT ₁	FT ₂	FT ₃	FT ₄	FT ₅	FT ₆
FT ₁	0.086	0.073	0.154	0.078	0.162	0.084
FT ₂	0.173	0.146	0.269	0.117	0.270	0.140
FT ₃	0.022	0.021	0.038	0.047	0.027	0.060
FT ₄	0.259	0.292	0.192	0.233	0.216	0.210
FT ₅	0.029	0.029	0.077	0.058	0.054	0.084
FT ₆	0.432	0.438	0.269	0.467	0.270	0.421

(formed by authors)

After standardizing the even comparison matrix, the main task is to calculate a priority vector that reflects the relative importance of each threat. This process involves determining average values for each row of a standardized matrix representing the average importance of each threat, taking into account all comparisons. These averages are then normalized to sum to one, turning them into a vector of priorities. The priority vector is used to evaluate and rank threats, determining which ones are most significant and require the most attention in the context of the study.

This process turns subjective assessments from experts into quantitative indicators that can be used for objective analysis and informed decision making.

To calculate the priority vector, the average values for each row of the standardized matrix were first determined. This is the average value of each row of a standardized matrix representing the average importance of each hazard in relative terms. Formula for calculating the arithmetic mean of the *i*-th row (2):

The matrix will be normalized using the following formula (1):

$$n_{ij} = \frac{a_{ij}}{\sum_{k=1}^n a_{kj}} \quad (1)$$

n_{ij} is a normalized element value,
 n – number of elements (rows or columns) in the matrix.

a_{ij} is the original value of the element in the matrix.

In accordance with this formula, we have formed a standardized matrix (Table 2).

$$P_i = \frac{1}{n} \sum_{j=1}^n s_{ij} \quad (2)$$

Where

P_i – average value of the *i*-th row.
 s_{ij} element of a standardized matrix.
 n – number of elements.

These averages were then normalized to sum to one, turning them into weights for each threat.

Normalization formula (3):

$$W_i = \frac{P_i}{\sum_{k=1}^n P_k} \quad (3)$$

where W_i is the normalized weight coefficient of *i*-th element

P_i – average value of the *i*-th row
 $\sum_{k=1}^n P_k$ – the sum of all average values.

Table 3 contains the results of calculating the weight coefficient.

Table 3.
The results of calculating the weight coefficient

Weighting coefficients	
FT ₁	0,106
FT ₂	0,186
FT ₃	0,036
FT ₄	0,234
FT ₅	0,056
FT ₆	0,383

(formed by authors)

These weights reflect the relative importance of each threat, with a higher value indicating greater importance of the threat in the context of the study. For example, FT₆ «Insufficient government funding» and FT₄ «Limited resources for innovation and technology development» have the highest weight, meaning it is of higher importance compared to other threats.

The next step is to check consistency. In the hierarchy analysis method, it is important to ensure the reliability and validity of the results. This step ensures that the scores presented in the even comparison process are consistent and logical.

First of all, the maximum eigenvalue (λ_{max}) is determined. This value is used to assess the degree of consistency of the experts' answers. It is defined as the average value of the ratio of the sums of the rows of the even comparison matrix to the corresponding elements of the priority vector. If the matrix is completely consistent, λ_{max} is equal to the number of elements in the matrix. Formula to determine the maximum eigenvalue for our matrix (4).

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \frac{(A \times \text{Priority vector})}{\text{Priority vector}_i} \quad (4)$$

As a result of calculations, we determined that the maximum eigenvalue (λ_{max}) is 6.27. Which is a sign that the constructed matrices are consistent.

The next step is to determine the consistency index. The consistency index allows you to determine how significant the deviation from consistency is. The lower the CI value, the higher the consistency of the matrix. Formula for determining the consistency index (5):

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (5)$$

In our case, the CI is approximately 0.053. This value means a high degree of matrix consistency.

The final metric in the consistency check phase is the determination of the consistency relationship. This index is used to assess the acceptability of CI and is calculated as the ratio of CI to the random index (RI), which is a standard value for matrices of a certain size. For a matrix of size 6, RI is 1.24. Formula for calculating CR (6):

$$CR = \frac{CI}{RI} \quad (6)$$

Having made calculations, we determined that the CR value for our matrix is approximately 0.043. Since the CR is less than 0.1, the matrix is considered consistent, which means that the experts' assessments are consistent and reliable, and the determination of the ranking values can be considered correct.

After identifying key threats to the formation of the system of training future preschool education specialists, especially with an emphasis on the development of a conscious citizenship and economic and environmental values, the next step is to develop and implement a system of measures to counter these threats. This includes not only developing strategies that address specific problems, but also implementing an integrated approach that covers various aspects of financial management, including attracting additional sources of funding, optimizing costs and strengthening internal resources (Table 4).

An effective system of measures should be based on a deep analysis of the needs and capabilities of the educational sector, and be flexible and adaptive to changing conditions and challenges that the industry may face in the future.

Table 4.
Measures to counter the most influential threats

Measures to counter the most influential threats	
<p>Insufficient government funding</p> <p>Attracting private investment Increased collaboration with the private sector can help attract additional financial resources. This could be through partnerships, sponsorships or corporate social responsibility.</p> <p>Grant Programs and Funds The use of international and national grant programs can help provide additional funding for educational projects, especially those aimed at innovation and rural education development.</p> <p>Improving efficiency of using existing resources Optimizing budgetary expenditures and improving financial management mechanisms can help make better use of existing resources.</p> <p>Increasing Community Engagement Organizing charitable events and soliciting contributions from parents and local communities can provide an additional source of funding for educational programs.</p>	<p>Limited resources for innovation and technology development</p> <p>Partnerships with technology companies Collaborations with IT companies and startups can provide access to the latest technologies and innovative solutions for the educational process.</p> <p>Attracting Technology Grants Actively seeking and utilizing grants focused on technology development and innovation in education can help improve technology infrastructure.</p> <p>Development of own innovative rural education development programs Creation and development of own innovative educational programs and educational materials can reduce dependence on external resources and contribute to the development of internal potentials.</p> <p>Cooperation with Scientific and Educational Institutions Building a network of cooperation with universities, research centers and other educational institutions can facilitate the exchange of knowledge and experience in the field of innovation and technology.</p>

(formed by authors)

After conducting a survey of experts, using paired comparison methods and hierarchical analysis, we successfully identified the most significant threats to the formation of the system for training future preschool education specialists. This process not only made it possible to identify key problem areas, but also to formulate targeted and effective measures to counter these threats. As a result, a set of strategies was developed covering various aspects of financial and resource management, and also involving the active involvement of various stakeholders. This approach not only helps to minimize potential risks, but is also aimed at improving the quality and efficiency of formation the education system as a whole.

Once the results are available, it is important to conduct a comparative analysis of our own results with those of previous studies to determine the novelty, uniqueness, and significance of our results in the context of the existing scientific literature. Comparison with other studies helps highlight our contributions to the field, highlight similarities and differences in findings, and identify potential future research opportunities in this area. Such an analysis helps to confirm the reliability and significance of the results obtained and open new horizons for further scientific activity.

In the study by Volchik (2019), the author examines institutional traps in the fields of education and science in the context of optimization. This research is useful for understanding institutional challenges in shaping education, and our study complements it by focusing on sustainable threats and counter strategies in early childhood education.

Boni & Calabuig's (2016) study focuses on the potential of formal and informal educational spaces of universities to develop global citizenship and cosmopolitanism among students. The authors explore how university programs can foster students' understanding and responsibility for global challenges by cultivating global awareness and intercultural competence both through academic courses and beyond the classroom. Our research differs from this work in that it focuses on identifying and organizing threats to the system of training future preschool education specialists with an emphasis on the development of conscious citizenship in the context of rural education development, using methods of expert analysis, paired comparison and hierarchical ordering. This approach allows specific challenges to be examined in detail and targeted response strategies to be developed, while the authors focus on the broader aspect of global citizenship without specifying methods for identifying and countering challenges. Our

study provides specific analytical tools for evaluating and developing interventions in a highly specialized field, making its contribution unique in the context of early childhood education professional development.

Bączek et al. (2021) explore student perceptions of online learning during the COVID-19 pandemic. Our study extends this by using these findings to understand the impact of the pandemic on educational programs from rural education development perspective.

Our research uses expert analysis, paired comparison, and hierarchical ordering techniques to identify and develop strategies to counter threats in the system of preparing future preschool education specialists, focusing on the development of conscious citizenship in the context of rural education development. In contrast, the study by Hira et al. (2023) presents a broad systematic review of the literature on education for rural education development and global citizenship education, highlighting the importance of integrating these concepts into educational programs. Our approach is characterized by detailed analysis and development of specific interventions, making it particularly valuable for practical implementation in the field of early childhood education, ensuring that it meets specific challenges and needs.

A study by Zuurmond et al. (2023) focused on the importance of teaching critical thinking, civic education, and Bildung in vocational education. The authors argue that these elements are key to preparing students to question the status quo, which is necessary to form conscientious and responsible citizens. Our research is

distinguished by its use of specific analytical methods to address specific problems in early childhood education, making it particularly practical and focused.

Zohar, Weinberger and Tamir (1994) analyze the impact of a critical thinking project on the development of critical thinking in the context of biology. Their work focuses on specific disciplines and the effectiveness of educational interventions. In contrast, your research is more general in nature and focuses on systemic issues in early childhood education.

Fellenz (2016) views Bildung and professional development from an ontological perspective, emphasizing personal growth. Our work differs from this study in its emphasis on methodological tools for solving pedagogical challenges rather than on the philosophical aspect of education.

Colás-Bravo et al. (2018) explore teachers' sustainability consciousness using e-portfolios. Our research is distinguished by its focus on early childhood education and the specific threats in this area, providing tools for identifying and countering them.

At the same time, Vasylyk (2019) is engaged in the formation of the ethnic consciousness of future teachers, which differs from your research in its cultural and ethnic aspect. While our research provides a broader analysis of systemic challenges in education and proposes specific methods for solving them.

To summarize, Fig. 3 depicts the key differences between our study and others in the context of this topic.

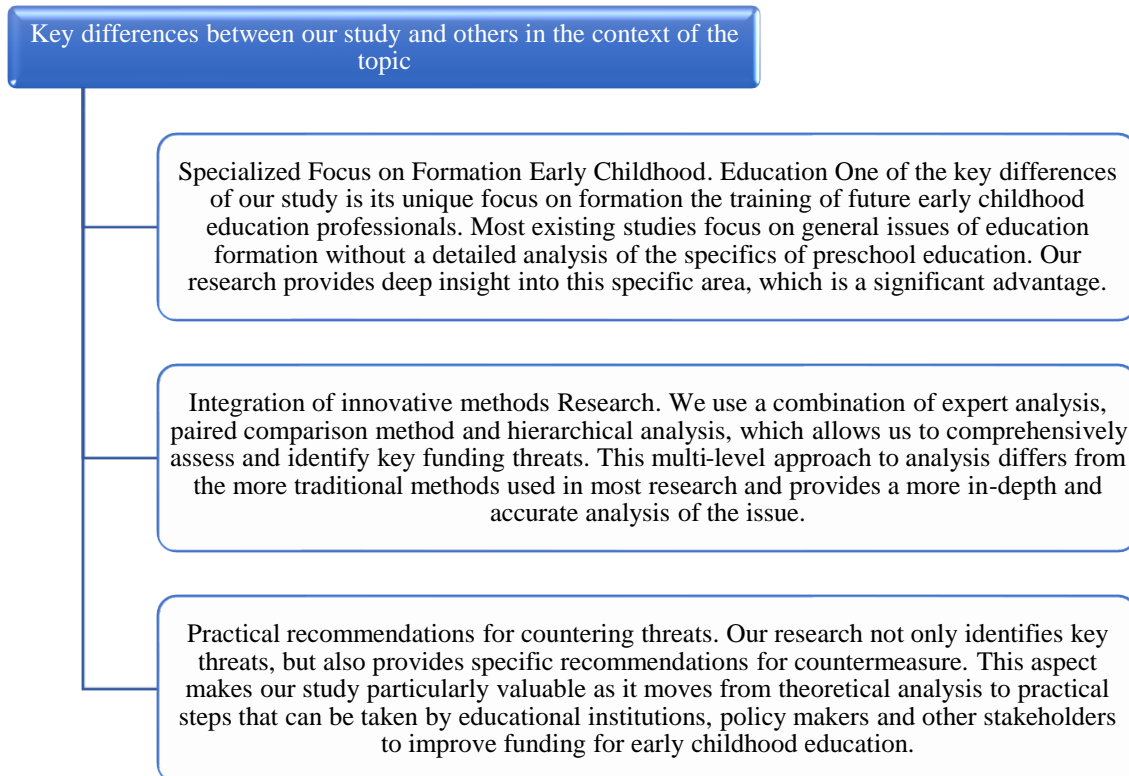


Figure 3. The key differences between our study and others in the context of this topic (formed by authors)

Considering the comparison of the results of our research with existing scientific works in this area, we can affirm its relevance and scientific novelty. Thus, the key priority of our research is that it is aimed at conducting a detailed analysis of the influence of the environment and the relevance of measures to form a conscious position of citizens in preschool education. As a result, we have expanded our understanding of the problems of this issue and formed key theoretical and practical ideas that will be useful in the creation and implementation of appropriate operating strategies and management policies in this area. Our research is relevant because it corresponds to modern development trends and problems in the social spheres under study. The use of the results obtained will not only solve current problems, but can also serve as the basis for further research in the field of environmental education.

The study focuses on rural education development, which might not capture the nuances or the broader spectrum of educational challenges found in urban or suburban contexts. This geographical focus limits the applicability of the findings to other educational settings. The study might be constrained by time and resources, which can limit the depth and breadth

of the research. For example, conducting a thorough expert analysis can be time-consuming and resource-intensive, and limited resources may have restricted the number of experts consulted or the extent of data analysis.

Conclusions

In the final part of the study, which analyzes the system of training future preschool education specialists in the context of rural education development, we come to identify the key conclusions identified during the analytical work. The study emphasized the importance of integrating the principles of rural education development into the educational process, which forms the basis for the formation of conscious citizenship in future generations.

First of all, it has been established that consistency in preschool education not only contributes to the environmental education of children from an early age, but also lays the foundation for the development of a socially responsible personality. This creates the preconditions for the formation of a harmonious society capable of adapting and responding to modern challenges of rural education development. The analysis showed that the

specialist training system faces a number of threats that can slow down or even block the process of integrating rural education development into the educational space. However, focusing on the opportunities offered by the adoption of rural education development as a core doctrine in education allows for an optimistic view of the future. An important aspect is the awareness of the need for deep and systemic changes in approaches to education. This requires all educational stakeholders, from policymakers to educators, to rethink their roles and contribute to shaping a future of sustainability. During the study, it was noted that the successful implementation of the principles of rural education development requires an integrated approach, including scientifically based methods, innovative technologies in training and education, as well as active participation and support from society.

The study highlighted the importance of continuing education and professional development for teachers as a means of improving the quality of the educational process. Teachers and educators equipped with knowledge and skills in rural education development are key to helping children understand the importance of environmental conservation, social justice, and economic stability.

In conclusion, this study opens the door for further developments in education for rural education development, pointing to the need for greater dialogue among educators, researchers, policy makers and the public. By working together, significant progress can be made in preparing conscientious citizens who can make significant contributions to the rural education development of society. As a result of the application of these research methods, the key threats to the formation of a system for training future preschool education specialists for the development of conscious citizenship in the context of rural education development were streamlined. Based on a certain hierarchy, measures to counter these threats were proposed. The study is limited in that it involves analysis of a limited number of threats. It is planned to expand this list of threats in the future.

The use of hierarchical ordering and pairwise comparisons may not fully capture the complexity of interactions between various threats. These methods often assume that factors are independent of each other, which may not be the case in complex educational ecosystems. Future studies could include a broader range of

educational settings, incorporating urban and suburban contexts to compare and contrast with rural education systems. This could help in understanding the unique and shared challenges across different educational landscapes.

Bibliographic references

- Alazzam, F.A.F., Aldrou, K.K.A.R., Berezivskyy, Z., Zaverbnyj, A., & Borutska, Y. (2023). State management of the system of rational environmental use in the context of commercial development of the bioeconomy: Ecological aspect. *International Journal of Environmental Impacts*, 6(4), 155-163. <https://doi.org/10.18280/ije.060401>
- Bączek, M., Zagańczyk-Bączek, M., Szpringer, M., Jaroszyński, A., & Woźakowska-Kapłon, B. (2021). Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students. *Medicine*, 100(7), e24821. <https://doi.org/10.21203/rs.3.rs-41178/v1>
- Barenthien, J., Oppermann, E., Anders, Y., & Steffensky, M. (2020). Preschool teachers' learning opportunities in their initial teacher education and in-service professional development – do they have an influence on preschool teachers' science-specific professional knowledge and motivation? *International Journal of Science Education*, 42(5), 744-763. <https://doi.org/10.1080/09500693.2020.1727586>
- Blömeke, S., Jenßen, L., Grassmann, M., Dunekacke, S., & Wedekind, H. (2017). Process mediates structure: The relation between preschool teacher education and preschool teachers' knowledge. *Journal of Educational Psychology*, 109(3), 338-354. <https://doi.org/10.1037/edu0000147>
- Boni, A., & Calabuig, C. (2016). Education for global citizenship at universities: Potentialities of formal and informal learning spaces to foster cosmopolitanism. *J. Stud. Int. Educ.*, 21(1), 22-38. <https://doi.org/10.1177/1028315315602926>
- Boshoff, K., Bowen, H., Paton, H., Cameron-Smith, S., Graetz, S., Young, A., & Lane, K. (2020). Child development outcomes of DIR/Floortime-based programs: A systematic review. *Canadian Journal of Occupational Therapy*, 87(2), 153-164. <https://doi.org/10.1177/0008417419899224>
- Colás-Bravo, P., Magnoler, P., Conde-Jiménez, J. (2018). Identification of Levels of Sustainable Consciousness of Teachers in



- Training through an E-Portfolio. *Sustainability*, 10(10), 3700. <https://doi.org/10.3390/su10103700>
- Fellenz, M.R. (2016) Forming the Professional Self: Bildung and the ontological perspective on professional education and development, *Educational Philosophy and Theory*, 48(3), 267-283. <https://doi.org/10.1080/00131857.2015.1006161>
- Hira, A., Zaman, A., & Tok, E. (2023). Education for rural education development and global citizenship education in the GCC: a systematic literature review. *Globalisation, Societies and Education*, 1-6. <https://doi.org/10.1080/14767724.2023.2265846>
- Jandri, P., Knox, J., Besley, T., Ryberg, T., Suoranta, J., & Hayes, S. (2018). Postdigital science and education. *Educational Philosophy and Theory*, 50(10), 893-899. <https://doi.org/10.1080/00131857.2018.1454000>
- Johansson, I., & Sandberg, A. (2012). Learning and knowledge development in preschool teacher education and practicum. *Early Child Development and Care*, 182(7), 907-920. <https://doi.org/10.1080/03004430.2011.592188>
- Krasovska, O., Miskova, N., & Veremchuk, A. (2020). Professional Training of Future Preschool Teachers in the Field of Artistic and Aesthetic Education by Means of Contextual Learning Technologies. *Behavioral Sciences*, 10(2), 50. <https://doi.org/10.3390/bs10020050>
- Melnychuk, O., Yaremenko, O., Kronivets, T., Opolska, N., & Overkovska, T. (2022). Protecting the rights of children in the armed conflict: the tasks before the state government. *Amazonia Investiga*, 11(60), 32-38. <https://doi.org/10.34069/AI/2022.60.12.3>
- Mousena, E., Sidiropoulou, T., & Sidiropoulou, M. (2022). Curriculum for Citizenship and Sustainability. *IntechOpen*. <https://doi.org/10.5772/intechopen.103981>
- Vasylyk, M. (2019). Formation of ethnic consciousness of the future pedagogue in the conditions of the european educational space. *Journal of Vasyl Stefanyk Precarpathian National University*, 6(1), 155-160. <https://doi.org/10.15330/jpnu.6.1.155-160>
- Volchik, V. (2019). Institutional Traps in the Education and Science Sector under the Conditions of Optimisation. *Terra Economicus*, 16(4), 783-795. <https://doi.org/10.31063/2073-6517/2019.16-4.14>
- Yetik, E., Ozdamar, N., & Bozkurt, A. (2020). Seamless learning design criteria in the context of open and distance learning, *Managing and Designing Online Courses in Ubiquitous Learning Environments*, 106-127. <https://doi.org/10.4018/978-1-5225-9779-7.ch006>
- Yuryk, O., Stashkevich, A., Chorny, R., Chorna Zh., Kronivets, T., & Valakh, V. (2021). The correlation between the right to medical secrecy and the employer's right to receive information on the employee's health state. *International journal of computer science and network security*, 21(7), 103-107. <https://doi.org/10.22937/IJCSNS.2021.21.7.13>
- Zuurmond, A., Guérin, L., van der Ploeg, P., & van Riet, D. (2023). Learning to question the status quo. Critical thinking, citizenship education and Bildung in vocational education, *Journal of Vocational Education & Training*, 1-20. <https://doi.org/10.1080/13636820.2023.2166573>
- Zohar, A., Weinberger, Y., & Tamir, P. (1994). The effect of the biology critical thinking project on the development of critical thinking. *Journal of Research in Science Teaching*, 31, 183-196. <https://doi.org/10.1002/tea.3660310208>