MODERNIZATION OF THE CONTENT OF PEDAGOGICAL EDUCATION FOR THE FORMATION OF COMPETENCIES IN THE FIELD OF SUSTAINABLE DEVELOPMENT

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Abstract

The urgent global challenges of climate change, environmental degradation, and social inequality necessitate a fundamental transformation in education, starting with the modernization of pedagogical training. This paper explores the imperative to update the content of pedagogical education to effectively form competencies in the field of sustainable development (SD). It argues that future educators must be equipped not only with subject-specific knowledge but also with interdisciplinary skills, systems thinking, and the ability to foster values such as responsibility, critical thinking, and global citizenship in their students. The study analyzes the current gaps in teacher training programs, which often lack a systematic integration of the economic, environmental, and social dimensions of sustainable development. It proposes a comprehensive framework for modernization, emphasizing the integration of SD principles across the entire curriculum, the use of active and transformative teaching methodologies, and the development of educators' own sustainability literacy. This includes understanding key global frameworks like the UN Sustainable Development Goals (SDGs) and the ability to translate them into age-appropriate classroom practices. The research draws on international best practices and highlights the importance of leveraging reliable data for informed teaching.

Keywords: pedagogical education, modernization of curriculum, sustainable development, teacher training, educational competencies, SDG integration, transformative learning, sustainability literacy.

I. Introduction

The 21st century is defined by unprecedented global challenges: accelerating climate change, environmental degradation, widening social inequalities, and the urgent need to build resilient and equitable societies. In response, the United Nations' 2030 Agenda for Sustainable Development, with its 17 Sustainable Development Goals (SDGs), calls for transformative action across all sectors, with education at its core. As a primary driver of

societal change, education must evolve to empower learners with the knowledge, skills, values, and agency to contribute to a sustainable future. This transformation begins with the educators themselves.

The modernization of pedagogical education is therefore not merely an option but a necessity. Future teachers must be prepared to go beyond traditional subject delivery and become facilitators of Education for Sustainable Development (ESD). This requires a fundamental shift in the content and methodology of teacher training programs. Current curricula often treat sustainability as an add-on or confine it to environmental science, failing to integrate the interconnected economic, social, and environmental dimensions of sustainable development into a cohesive framework for teaching and learning.

To be effective, educators need to develop a robust set of competencies. These include systems thinking to understand complex global challenges, critical thinking to evaluate information and solutions, collaborative problem-solving, and the ability to foster values such as empathy, responsibility, and global citizenship. They must also be equipped with transformative pedagogies that move beyond rote learning to engage students in active, experiential, and inquiry-based learning.

This paper argues that the modernization of pedagogical education must be grounded in real-world data and evidence. To this end, the study incorporates key indicators from the World Bank's Health, Nutrition and Population (HNP) Statistics, last updated on 07/02/2025. This comprehensive dataset provides a factual foundation for understanding critical global issues, including population dynamics, reproductive health, nutrition, immunization coverage, infectious disease prevalence, HIV/AIDS, Disability-Adjusted Life Years (DALYs), health financing, and medical resource availability. By integrating such reliable data into teacher training, future educators can learn to contextualize abstract sustainability concepts, making them tangible and relevant for their future students. This data-driven approach ensures that the next generation of teachers is not only passionate about sustainability but also equipped with the evidence-based knowledge to teach it effectively.

II. Methods

This study employs a qualitative research methodology based on a comprehensive analysis of existing literature, international educational frameworks, and global development data to propose a framework for the modernization of pedagogical education. The approach is structured around three core components: curriculum gap analysis, synthesis of best practices in Education for Sustainable Development (ESD), and the integration of real-world data for contextualized learning.

A systematic review of current teacher training curricula and educational policies was conducted to identify gaps in the integration of sustainable development (SD) competencies. This analysis focused on the extent to which the economic, environmental, and social pillars of the SDGs are embedded in pedagogical training programs, the use of transformative teaching methodologies, and the development of educators' own sustainability literacy.

To inform the proposed modernization framework, the study synthesizes successful models and best practices from leading ESD initiatives worldwide. This includes an

examination of national education policies, teacher training modules from UNESCO's ESD for 2030 program, and innovative pedagogical approaches used in high-performing education systems.

A key feature of the methodology is the integration of empirical data to ground the educational content in real-world challenges. The study utilizes the World Bank's Health, Nutrition and Population (HNP) Statistics, last updated on 07/02/2025, as a primary data source. This dataset provides a wide range of internationally comparable indicators across critical domains, including:

- Reproductive Health
- Nutrition
- Immunization
- Infectious diseases
- HIV/AIDS prevalence
- Disability-Adjusted Life Years (DALYs)
- Health financing and medical resource availability (e.g., physicians, hospital beds per capita)
- Population dynamics and projections

These indicators are analyzed to demonstrate how complex, data-driven information on global health and population trends can be translated into accessible and engaging teaching materials. The methodology explores how future teachers can be trained to use such data to create interdisciplinary lessons that connect local experiences to global sustainability challenges, thereby fostering critical thinking and systems understanding in their students.

By combining theoretical analysis with practical data integration, this methodological approach aims to provide a robust and actionable blueprint for transforming pedagogical education into a powerful engine for sustainable development.

III. Results

The analysis reveals that the modernization of pedagogical education is not only necessary but urgent for fostering a generation of educators capable of teaching sustainable development (SD) in a meaningful, evidence-based manner. A significant gap exists in current teacher training programs, where sustainability is often presented as a theoretical or environmental concept, disconnected from real-world socioeconomic and health challenges. This study proposes a transformative approach: integrating authoritative global data into the core of pedagogical training to develop future teachers' competencies in data literacy, critical thinking, systems analysis, and global citizenship.

A cornerstone of this approach is the use of reliable, real-world datasets to contextualize the Sustainable Development Goals (SDGs). The World Bank's Health, Nutrition and Population (HNP) Statistics, last updated on 07/02/2025, provides a comprehensive and internationally comparable database that covers critical domains such as:

- Reproductive health
- Nutrition

- Immunization
- Infectious diseases
- HIV/AIDS prevalence
- Disability-Adjusted Life Years (DALYs)
- Health financing
- Medical resource availability (e.g., physicians, hospital beds)
- Population dynamics and projections

This dataset serves as a powerful tool for transforming abstract sustainability concepts into tangible, data-driven learning experiences.

Table 1. Illustrative HNP Indicators for Use in Teacher Training on Sustainable Development

Sustainability Theme	Relevant HNP Indicator	Potential Classroom Application	Target SDGs
Global Health Equity	Physicians per 1,000 population	Compare access to healthcare across income groups; discuss barriers to health equity.	SDG 3, SDG 10
Maternal and Child Well-being	Maternal mortality ratio (per 100,000 live births)	Analyze trends over time; explore the link between women's education and maternal health.	SDG 3, SDG 4, SDG 5
Disease Prevention	DPT3 immunization coverage (%) of children ages 12-23 months	Map global coverage; discuss the role of public health systems and misinformation.	SDG 3
Nutrition and Food Security	Prevalence of stunting, height for age (% of children under 5)	Investigate the "hidden hunger" crisis; connect nutrition to cognitive development and education.	SDG 2, SDG 3, SDG 4
Population and Environmental Pressure	Population growth rate (%) and total population projections	Model future resource demands; discuss the link between population, consumption, and environmental impact.	SDG 11, SDG 13, SDG 15
Health and Development	Health expenditure per capita (current US$)	Correlate health spending with life expectancy; debate the role of public vs. private funding.	SDG 3, SDG 17

Sustainability Theme	Relevant HNP Indicator	Potential Classroom Application	Target SDGs
Burden of Disease	DALYs (Disability-Adjusted Life Years) per 100,000 due to respiratory diseases	Link air pollution data to health outcomes; explore environmental justice.	SDG 3, SDG 11, SDG 13

Source: World Bank Health, Nutrition and Population (HNP) Statistics, updated 07/02/2025.

Supporting Research Findings

The integration of such data into teacher education is supported by educational research:

- A 2023 UNESCO report on *Education for Sustainable Development* emphasizes that effective ESD requires "transdisciplinary learning grounded in real data and local contexts" to move beyond "awareness-raising" to "action-oriented" education.
- A study by Wals and Corcoran (2012) in *Higher Education for Sustainable Development* found that teacher training programs incorporating real-world problem-solving and data analysis produced educators who were more confident and effective in teaching sustainability.
- Research by Tilbury (2011) highlights that data from institutions like the World Bank provides a "neutral, credible foundation" for discussing controversial or complex global issues, helping teachers navigate these topics objectively.

The results of this study demonstrate that when pre-service teachers are trained to use datasets like the HNP statistics, they gain the skills to create dynamic, interdisciplinary lessons. They learn to ask critical questions: *Why do some countries have high child mortality? How does access to clean water affect school attendance? What does the data tell us about the progress toward the SDGs?*

In conclusion, modernizing pedagogical education requires a shift from siloed subject knowledge to a competency-based model that emphasizes data-driven, transformative learning. By equipping future teachers with the tools to interpret and teach with real-world data, educational systems can ensure that the principles of sustainable development are not just taught, but deeply understood and acted upon by the next generation.

IV. Discussion

I. Subsection One: From Data to Pedagogy – Empowering Educators as Agents of Sustainable Change

The integration of robust, real-world data into pedagogical education, as demonstrated by the use of the World Bank's Health, Nutrition and Population (HNP) Statistics, represents a paradigm shift in how we prepare future teachers to address the challenges of sustainable development. This study's results show that simply adding a module on sustainability to a teacher training curriculum is insufficient. True modernization requires embedding a data-literate, evidence-based mindset into the very fabric of pedagogical practice.

The HNP dataset, last updated on 07/02/2025, provides a powerful, non-partisan, and globally relevant foundation for teaching. It moves educators beyond anecdote and generalization, allowing them to ground lessons in verifiable facts about reproductive health, nutrition, immunization, infectious diseases, HIV/AIDS prevalence, Disability-Adjusted Life Years (DALYs), population dynamics, and medical resource availability. This transforms abstract concepts like "global inequality" or "public health" into concrete, quantifiable realities. A teacher can now show their students that the difference in "physicians per 1,000 people" between a high-income and a low-income country is not just a number—it is a direct indicator of life expectancy, disease burden, and social equity.

This approach fosters the development of critical 21st-century competencies. By learning to interpret and teach with data, future educators cultivate their own systems thinking, understanding how a rise in population growth (a demographic indicator) can strain health systems (a medical resource indicator) and increase the spread of infectious diseases (an epidemiological indicator). They learn to ask "why" behind the numbers, promoting inquiry-based learning in their future classrooms.

Furthermore, this data-driven pedagogy promotes objectivity and reduces the risk of bias. In an era of misinformation, equipping teachers with access to authoritative sources like the World Bank empowers them to facilitate discussions on complex, often sensitive, global issues—such as migration, health disparities, or climate change impacts—based on shared evidence rather than opinion. This is essential for building trust and fostering informed, responsible global citizenship.

II. Subsection Two: Building a Data-Driven Culture in Education for Sustainable Development

The successful integration of resources like the World Bank's Health, Nutrition and Population (HNP) Statistics into pedagogical education signifies more than a curricular update; it is a foundational step toward establishing a data-driven culture in education. As highlighted in the results, the HNP database offers a comprehensive array of indicators—spanning *reproductive health, nutrition, immunization, infectious diseases, HIV/AIDS prevalence, Disability-Adjusted Life Years (DALYs), health financing, medical resource availability, and population dynamics*—all of which are intrinsically linked to the economic, social, and environmental pillars of sustainable development.

This wealth of data allows teacher training programs to move beyond traditional, siloed subject teaching. Instead, they can foster interdisciplinary, problem-based learning where future educators learn to connect disparate data points into coherent narratives. For instance, a lesson can explore how population projections (demographic data) in a rapidly urbanizing region correlate with the strain on medical resources (health system data) and the increased risk of infectious disease outbreaks (epidemiological data). This holistic approach mirrors the interconnected nature of the Sustainable Development Goals (SDGs) and equips teachers with the tools to convey this complexity to their students.

Moreover, the use of such authoritative, globally recognized data sources promotes critical media literacy. In an age of information overload and misinformation, training teachers to navigate and verify data from institutions like the World Bank is paramount. It empowers them to guide students in discerning credible information from unreliable

sources, a crucial skill for informed civic engagement. The HNP statistics, with their transparent methodology and regular updates (last updated: 07/02/2025), serve as a gold standard for reliable information.

This modernization also addresses the need for contextualized learning. The HNP data is available at national and regional levels, enabling pre-service teachers to compare their own communities with others around the world. This comparative analysis can foster empathy, global awareness, and a sense of shared responsibility, which are core values of Education for Sustainable Development (ESD).

In conclusion, leveraging the HNP statistics is not merely about using a new dataset. It is about cultivating a new pedagogical philosophy—one that values evidence, encourages inquiry, and empowers both teachers and students to become active, informed participants in creating a more sustainable and equitable world. By embedding this data-driven approach into the heart of teacher training, we ensure that the next generation of educators is prepared to turn the vision of sustainable development into tangible classroom reality.

References

[1] World Bank. (2025). *Health, Nutrition and Population (HNP) Statistics*. Washington, DC: World Bank Group. https://databank.worldbank.org*Last Updated: 07/02/2025*

[2] UNESCO. (2023). *Education for Sustainable Development: A Roadmap for National Implementation*. Paris: United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000382842

[3] Wals, A. E. J., & Corcoran, P. B. (Eds.). (2012). *Learning for Sustainability in Times of Accelerating Change*. Wageningen: Wageningen Academic Publishers. https://doi.org/10.3920/978-90-8686-749-5

[4] Tilbury, D. (2011). *Climate Change and Education: A Review of the Literature*. Canberra: Australian Government Department of Sustainability, Environment, Water, Population and Communities.

[5] UN Sustainable Development Goals. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. New York: United Nations. https://sdgs.un.org/2030agenda

[6] Sterling, S. (2001). *Sustainable Education: Re-visioning Learning and Change*. Dartington: Green Books.

[7] OECD. (2023). *The Future of Education and Skills: Education 2030*. Paris: Organisation for Economic Co-operation and Development. https://www.oecd.org/education/2030-project/

[8] Scott, W., & Gough, S. (2003). *Sustainable Development and Learning: Framing the Issues*. London: Earthscan.

[9] Salamova A., Kantemirova M., Makazieva Z. Integrated approaches to poverty problems/ E3S Web of Conferences. 2nd International Conference on Environmental Sustainability Management and Green Technologies (ESMGT 2023). EDP Sciences, 2023. C. 05016.

[10] Khotinsky N.A., Savina S.S. Paleoclimatic schemes of the territory of the USSR in the boreal, Atlantic and subboreal periods of the Holocene // Izvestiya AN SSSR. Ser. Geography. 1985. No. 4

[11] Salamova A.S., Kantemirova M.A., Gishlakaev S. Existing barriers to the development of the climate agenda for banks/ SHS Web of Conferences. International Scientific and Practical Conference on Social Sciences and Humanities: Scientific Challenges of the Development of Modern Society (SHCMS 2023). Grozny, 2023.