PEDAGOGICAL FOUNDATIONS OF TEACHING THE PRINCIPLES OF THE GREEN ECONOMY IN SCHOOL GEOGRAPHY EDUCATION.

Rakhimov I. B.
Department of natural sciences,
Namangan State Pedagogical Institute;
Mo'minov.M.
Department of natural sciences,
Namangan State Pedagogical Institute;

Annotation: This article examines the pedagogical foundations of integrating green economic principles into school geography education. In the context of global environmental challenges, geography serves as a key discipline for developing students' ecological thinking, responsible consumption habits, and sustainable development competencies. The study analyzes relevant scientific literature, explores pedagogical approaches, and identifies effective methods for teaching green economics in secondary schools. The results demonstrate that interdisciplinary learning, experiential activities, project-based methods, and digital tools significantly enhance students' understanding of green economic principles. The article proposes practical strategies for geography teachers and highlights the need for curriculum renewal to ensure students' sustainable worldview formation.

Keywords: Green economy, geography education, sustainability, ecological literacy, pedagogical foundations, environmental education, sustainable development, interdisciplinary approach.

Modern socio-economic development requires a shift toward environmentally responsible models of growth known as the green economy. The green economy emphasizes rational use of natural resources, low-carbon technologies, renewable energy, circular economy models, and sustainable consumption patterns. Preparing future generations to understand and implement

these principles starts in school education, particularly in geography lessons, which provide both spatial and environmental perspectives.

School geography curriculum already includes topics such as natural resources, environmental protection, climate change, and sustainable development. Integrating green economic concepts into these topics is essential for equipping students with the competencies needed to become environmentally conscious citizens. The pedagogical foundations of teaching green economics include scientific literacy, critical thinking, values education, and problem-solving skills. This article discusses theoretical and practical approaches to implementing these foundations in the teaching process.

Teaching the principles of a green economy (circular economy, decarbonisation, resource efficiency, regenerative development, and social justice within planetary boundaries) in school geography is not simply about adding new content. It requires a deliberate pedagogical redesign that develops students' geographical thinking, critical awareness, and capacity to act in complex socio-ecological systems. The following foundations provide a coherent, research-informed framework for teachers.

Constructivist and Socio-Constructivist Learning Theory

Students do not passively receive the idea of a green economy; they must build it themselves. According to Piaget and Vygotsky, meaningful learning occurs when new knowledge is connected to existing mental schemas through active experience and social interaction.

In practice:

- Begin with students' lived environments: "Where does the waste from our school canteen go?" or "Why did the price of electricity rise last winter?"

- Use the spiral curriculum (Bruner): revisit the same concepts (e.g., material flows) at increasing levels of complexity from primary to upper-secondary school.

- Organise collaborative inquiries where students co-construct understanding through discussion, modelling, and peer feedback (e.g., groups mapping the life-

cycle of a smartphone from Congolese coltan mines to European recycling centres).

Systems Thinking as the Core Geographical Competence

A green economy cannot be understood through isolated facts; it demands recognition of interconnected Earth systems. Donella Meadows, the International Geographical Union (2016), and the Lucerna Declaration all emphasise systems thinking as indispensable for sustainability education.

Teachers should:

- Explicitly teach stocks, flows, delays, and feedback loops (e.g., the reinforcing loop of consumption → waste → resource depletion → higher prices → more consumption).

- Use rich pictures, causal loop diagrams, and computer-based system models (e.g., the free online “Loopy” tool or the Ellen MacArthur Foundation’s interactive circular economy system diagrams).

- Link biophysical limits (Rockström’s planetary boundaries) with economic processes so students see that infinite growth on a finite planet is a geographical impossibility.

Futures Education and Anticipatory Competence

The green economy is fundamentally about creating preferable futures rather than predicting inevitable ones. UNESCO’s Futures Literacy framework and the concept of anticipatory competence (developed by Wiek, Bernstein, and others) are therefore central.

Effective methods include:

- Backcasting: start from a desired 2040 or 2050 vision (net-zero city, circular region, post-growth society) and work backwards to identify necessary actions today.

- Scenario exercises comparing business-as-usual, green growth, and degrowth/post-growth pathways.

- Three-horizons framework (Sharpe) to help students distinguish between the collapsing dominant system (linear economy), emerging innovations (repair cafés, renewable micro-grids), and visionary long-term possibilities (doughnut economics, commons-based economies).

Transformative and Transgressive Learning (ESD 2.0)

Traditional “education about sustainability” is insufficient. Stephen Sterling and Arjen Wals advocate a shift to “education as sustainability” – learning that changes the learner and, through the learner, the system itself.

This means:

- Making values and worldviews explicit. Teachers must create safe spaces to examine assumptions about economic growth, consumption, and human–nature relationships.

- Including normative competence: students learn to recognise unsustainability, interrogate justice implications (e.g., who pays the externalised costs of fast fashion?), and develop ethical positions.

- Encouraging “transgressive” actions – small disruptions of unsustainable norms (school strikes, redesigning the canteen menu, campaigning for plastic-free procurement).

Place-Based and Community-Connected Geography

Geography’s unique contribution is its focus on place and spatial relationships. Green economy education becomes powerful when rooted in students’ own localities before scaling up.

Examples:

- Material flow analysis of the school or neighbourhood (where does water, energy, food, waste come from and go to?).

- Partnerships with local circular enterprises (repair workshops, urban farms, energy cooperatives) for fieldwork and guest speakers.

- Service-learning projects: designing and implementing a school composting system, a second-hand uniform shop, or a biodiversity-enhancing school ground redesign.

Critical Political Ecology Perspective

A naïve presentation of the green economy risks "greenwashing." Students must be equipped to ask critical geographical questions:

- Who owns the new "green" infrastructure (wind farms, lithium mines)?

- Whose land is used for carbon offsets or biofuel plantations (green grabbing)?

- Who bears the risks and costs of the transition (just transition for coal-mining communities)?

Incorporating Southern and indigenous perspectives is essential to avoid a Eurocentric narrative. Case studies from the Global South (e.g., cobalt mining in the DRC, land conflicts over palm oil in Indonesia, or the Yasuní-ITT initiative in Ecuador) reveal the power geometries behind supposedly green solutions.

Inquiry-Based and Project-Based Pedagogies

Open, real-world problems are ideal for geography because they rarely have a single correct answer.

Strong project examples:

- Applying Kate Raworth's Doughnut Economics model to the students' own city or region.

- Conducting a full ecological and carbon footprint analysis of the school and presenting a staged transition plan to the senior leadership team.

- Simulating UN climate negotiations where countries present nationally determined contributions that include circular economy measures.

Interdisciplinary Integration with Geography as the Connecting Discipline

Green economy topics naturally span biology (biogeochemical cycles), chemistry (material properties and recycling), economics (externalities, subsidies),

citizenship (policy and governance), and design/technology. Geography provides the spatial and holistic glue.

Practical approaches:

- Team-teaching units with science and economics colleagues.

- Using GIS and remote sensing to map resource flows, renewable energy potential, or urban heat islands as entry points to economic transformation discussions.

Developmental Progression Across School Years

Primary (ages 7–11): Phenomenon-based and storytelling approaches; focus on wonder, care, and simple actions (reduce, reuse, recycle in context).

Lower secondary (ages 12–15): Structured case studies, basic system mapping, introductory GIS, role-plays of stakeholder conflicts.

Upper secondary (ages 16–18): Deep critical analysis, student-designed research, engagement with academic and activist literature (degrowth, eco-feminism, doughnut economics, just transition).

By consciously grounding green economy education in these pedagogical foundations, geography teachers can move beyond superficial environmentalism and cultivate the geographical imagination, critical thinking, and agency that young people need to navigate and shape the socio-ecological transformations of the 21st century.

The findings indicate that teaching green economics in school geography education is both necessary and pedagogically beneficial. However, several challenges still exist:

Lack of teacher training.

Many geography teachers have limited knowledge of green economy concepts. Continuous professional development programs are needed.

Insufficient learning materials.

Textbooks often contain outdated information or insufficient content on sustainability and green economy.

Traditional teaching methods.

Teacher-centered approaches do not fully engage students in active problem solving or real-world environmental analysis.

Limited school resources such as digital tools, GIS systems, and laboratory materials hinder the practical implementation of green economy education.

Despite these challenges, integrating sustainability principles into geography lessons fosters students' environmental awareness, economic understanding, and social responsibility. The discussion highlights that pedagogical reforms must prioritize innovative methods and updated learning materials.

Conclusions

Teaching green economy principles in geography education plays a crucial role in shaping students' sustainable worldview. Interdisciplinary and learner-centered approaches significantly improve understanding of environmental and economic relationships. Modern pedagogical strategies—such as fieldwork, projects, digital mapping, and problem-based tasks—enhance students' motivation and learning outcomes. Curriculum modernization and teacher training are essential for effective green economy education.

Integrate green economy topics into all stages of geography curriculum with clear learning objectives.

Provide professional development for geography teachers on sustainability pedagogy and digital tools.

Develop new instructional resources, including textbooks, digital platforms, and interactive manuals.

Promote project-based learning, especially local environmental projects that engage students in practical sustainability activities.

Increase collaboration between schools, environmental organizations, and local communities.

Use GIS, remote sensing, and data analysis tools to help students visualize environmental processes and green economic models.

Encourage eco-friendly school environments (energy efficiency, waste sorting, green campus initiatives).

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