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Integrating Green Education in Universities: A Case Study of Youth-Led Sustainability Initiatives at Baku State University

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Abstract

The demands of a rapidly changing global environment require adaptive and mitigative strategies across all sectors, including higher education. In addition to theoretical instruction in environmental science, the integration of green education through practical, interdisciplinary, and innovative approaches is now essential for fostering sustainability literacy. This study investigates the effectiveness and challenges of such integration by conducting a qualitative case study of youth-led sustainability initiatives at Baku State University (BSU) in Azerbaijan. The research analyzes the dynamics, enabling factors, and measurable impacts of student-driven projects on the university's sustainability culture. While the methodological scope is not exhaustive, the data include cross-faculty engagement and thematic analysis of activities implemented during the study period. Initial findings indicate that youth-led initiatives are a significant catalyst for experiential, student-centered learning by connecting theoretical knowledge with practical application. Notable outcomes are observed in waste management, awareness campaigns, specialized training programs, seasonal schools, and academic simulations. The study concludes that sustained efforts at BSU have significantly enhanced its green education ecosystem and contributed to the development of a green campus model aligned with evolving international accreditation standards. This progression suggests that BSU's experience may serve as a flexible and resilient framework for green education in similar institutional contexts.

Keywords

Green Education, Youth-led Initiatives, Sustainable Development, Campus Governance, Experiential Learning

Introduction

The world's future hinges on humanity's capacity to successfully meet the Sustainable Development Goals (SDGs). Lately, cleaner manufacturing, nature-based instruction, the environment, and ecological schooling have surfaced as some aspects meriting consideration to attain SDGs. There's a broad agreement that ecological learning plays a crucial part in breaking the cycle of poverty across generations, enhancing health outcomes, and safeguarding the natural world so it keeps supporting current and future populations. The idea and breadth of ecological education have amplified since its inception, particularly following the Earth Summit in Brazil in 1992, where Agenda 21 [1] acknowledged Education for Sustainable Development (ESD) with the aim of balancing economic and human welfare through educational methods. ESD's original aim was to integrate environmental, economic, and ecological facets into humankind's lifelong learning. ESD surpasses simply gaining and creating understanding by including diverse elements in advancement and progress. Therefore, ESD is vital for cultivating the aptitudes, competencies, values, and proficiencies required for tackling future sustainability challenges and guaranteeing dedication to creating lasting societies. The United Nations Educational, Scientific and Cultural Organization (UNESCO) regards Education for Sustainable Development as instruction that "equips learners to make knowledgeable choices and responsible deeds for ecological wholeness, economic feasibility, and a fair community

1. Agenda 21 is a comprehensive, non-binding action plan for sustainable development adopted by over 178 countries at the 1992 Earth Summit in Rio de Janeiro, focusing on integrating environment, social, and economic issues for the 21st century https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf
2. QS World University Rankings: Sustainability 2026 https://www.topuniversities.com/sustainability-rankings
3. https://www.topuniversities.com/universities/baku-state-university
4. https://www.timeshighereducation.com/world-university-rankings/baku-state-university
5. https://greenmetric.ui.ac.id/rankings/overall-rankings-2025/bsu.edu.az

for present and future generations while respecting cultural variety." ESD has three main components: learning results, learning materials, and teaching methods. Clearly, ecological teaching is essential for environmental durability, societal and economic progress, and other facets of existence, which is a fresh aspect of this study.

The theoretical aspects of green education are well developed across various higher education institutions, according to the well-known higher education analytics company Quacquarelli Symonds (QS World University Rankings: Sustainability 2026) [2]. Universities in the USA, Canada, Sweden, the UK, Australia, and Switzerland lead the initial positions, namely Lund University, University of Toronto, UCL, and others. Baku State University (BSU) ranked 688th globally in the latest QS World University Rankings, becoming the leading university in the South Caucasus region. In addition, BSU was placed within the 1031–1040 range in the QS Sustainability Rankings [3]. According to the Times Higher Education (THE) Impact Rankings, the University achieved national leadership status, ranking in the 401–600 bracket, and was further distinguished by securing a position among the top 100 universities worldwide in four Sustainable Development Goals (SDGs) [4]. The released results in the first week of 2025 December showed that Baku State University (BSU) was ranked 493rd in the UI GreenMetric World University Rankings, emerging as the regional leader, and was featured under the theme "Advancing Sustainable Development Goals in Higher Education: Stories from Our Institutions and Communities" [5].

The selection of Baku State University (BSU) as the case study in this article not only highlights the distinctive characteristics of its internal institutional environment but also contributes to addressing existing theoretical–practical gaps in the academic discourse on green education and sustainability in higher education. In particular, the commendable steps the University has taken in recent years in the field of sustainability, along with the publication of sustainability-related reports, position BSU as a relevant subject of analysis. Like studies conducted in the context of China, where Tsinghua University is recognized as a pioneer of green universities in China [6], has been employed as a case study, Baku State University has the potential to serve as a comparable model at the national level. Accordingly, this research examines the ways in which green education is manifested within higher education institutions, its underlying theoretical foundations, and the theoretical and practical initiatives implemented by Baku State University for students and youth.

Methodology

This investigation principally depends on a literary survey of research carried out from 2022 until now. The investigations were meticulously vetted to confirm they are peer-marked and address the following main research inquiries: What green instruction constitutes. What is the function of green instruction in realizing sustainable development goals? The youth-driven efforts by Baku State University in advancing sustainable objectives, confirming they were peer-evaluated, were vital to ensure that the outcomes are compiled from trustworthy and genuine research. The narrative/conventional literary survey has been favoured as the primary survey method for this paper. This method proved advantageous for determining whether green instruction benefits SDG attainment due to its dependence on a summary of numerous proof sources. By merging existing literature on green instruction in meeting the Sustainable Development Goals, this study intends to accentuate the diverse means through which green instruction assists in achieving SDGs. This research acknowledges that Sustainable Development Goals represent a particularly broad field of study, it chose to utilize diverse platforms during the search: Google Scholar, JSTOR, Emerald Group Publishing, Research-Gate, Web of Science, and Emerald Insight, along with yearly accounts from University bodies such as Quality Assurance Center, BSU SDG reports by each objective, undertakings and reports by University Youth Groups, and curricula from pertinent departments. These platforms were chosen because the exploration of SDGs was from a specialized domain: among all tiers and the interaction between green instruction literature and SDGs. An explicit search was also conducted on Google Scholar to boost the search's thoroughness since these platforms have also aided scientists who performed reviews on green instruction. The research was also narrowed for China and Türkiye. The research permitted the search to include journal articles that were peer reviewed, inquiry reports, as well as texts, which were utilized specifically for definitions and conceptual underpinnings.

Analysis

According to the Law of the Republic of Azerbaijan "On Youth Policy", young people are defined as individuals between the ages of 14 and 29 [7]. This age group constitutes the core of the University's human capital. As of September 2025, the total number of undergraduate students alone reached 22,347, indicating the significant demographic weight of youth within the university community. Within the university campus, a unique environment exists that enables both the theoretical and practical application of knowledge, while also fostering youth self-expression and active participation. Of this student population, 6,996 are male and 15,351 are female, a distribution that reflects notably positive progress toward Sustainable Development Goal 5 (Gender Equality) [8].

There are faculties, specialties and subjects taught in university regarding to sustainable development including faculty of Ecology and soil sciences, international relations and economics faculty, faculty of Geography itself with its bachelor's and master's degrees. Sustainable development, geography, hydrometeorology degrees and green and blue transformation policy in sustainable development, climate studies, adaptation to climate change, management of water sources and other specialities [9]. Being the oldest and largest higher education institution in the country, Baku State University comprises two research institutes, more than six research centers, and one branch, alongside one college, one lyceum, five museums, one teaching and practical training base, and one teaching, training, and recreation center. In addition, the University hosts a wide range of student-led and representative bodies, including the Student Youth Organization, the Student Trade Union, the BSU Volunteers Organization, the

6. International Journal of Sustainability in Higher Education (2015) 16 (4): 491–506.
7. https://doi.org/10.1108/IJSHE-02-2014-0021
8. https://e-qanun.az/framework/1619#_edn2
9. http://bsu.edu.az/az/news/bduda_yeni_tdris_ili_balayb14092025102629
10. https://geography.bdu.info.az/tehsil/fakulte-uzre-ixtisaslasmalar
11. http://bsu.edu.az/az/news/bduda_keyfiyyt_tminat_mrkzi_yaradlb_
12. https://sdg.bsu.edu.az/uploads/files/Report%20on%20SDG%201.pdf

Student Scientific Society, and numerous student clubs. Together with its 16 faculties and institutional units- most notably the Quality Assurance Unit-Centre established by decision of the Academic Council in 2023 [10]- These structures collectively contribute to the University's efforts toward sustainable development.

In total, more than 75% of university students study for free, more than 1300 students receive financial aid, while more than 200 students get aid from the Students' Trade Union. In accordance with the Accommodation Policy, some students can count a place on university dormitory, when considering application financial need is one of the main criteria [11].

Sustainability efforts on BSU's campus have 4 canteens and one coffee shop offering eco-friendly menu options, such as vegetarian and vegan meals, while ensuring high food safety standards. The university's broader agricultural sustainability strategy combines academic expertise and student engagement: faculty and researchers develop innovative farming methods and students apply them through laboratory activities and practical training. After the catastrophic Türkiye earthquakes, BSU volunteers and members participated in the process of sending aid and providing direct help in the disaster zone. The Faculty of Biology offers six undergraduate specializations—Biology, Biology Education, Aquatic Bioresources and Aquaculture, Biotechnology, Plant Protection, and Food Engineering—preparing graduates for careers in research institutes, industry laboratories, educational institutions, environmental agencies, and food safety organizations. Beginning in the 2024/2025 academic year, the Department of Analytical Chemistry at Baku State University's Faculty of Chemistry has launched a new master's program in "Food Product Expertise and Marketing [12].

In addition, Baku State University actively promotes health and well-being within both its campus and the surrounding community through a range of institutional and student-led initiatives. Notably, the University's Law Clinic provides free legal assistance to socially vulnerable groups, while the "BSU Volunteers" program engages approximately 2,000 students in diverse forms of community service. BSU further prioritizes the physical and mental well-being of its students and staff by offering comprehensive sexual and reproductive health services, continuous psychological counseling, and full access to healthcare through the University Polyclinic. The University maintains a strict smoke-free policy across all facilities, including student dormitories, to ensure a safe and healthy learning environment. Complementing these measures, BSU regularly organizes training sessions and awareness meetings on civil defense, substance abuse prevention, non-communicable diseases such as diabetes, and healthy lifestyles. Additional initiatives include free on-campus eye examinations, ongoing psychological support programs, health-focused camps outside Baku, and the expansion of bicycle parking infrastructure at the university entrance, collectively reinforcing a holistic approach to campus well-being [13].

Additionally, the university actively participates in volunteer work and community outreach. However, there is a need for executive education programs. BSU implements anti-discrimination policies and promotes equality, ensuring accessibility for all. Overall, BSU plays a key role in advancing Sustainable Development Goal 4 in Azerbaijan. Besides the traditional lectures, non-traditional teaching methods including interactive sessions, COP, UN, OIC, WUF and Parliament model simulation conferences dedicated to sustainable development and solidarity for green world year (2024), study visits to state and private facilities to get first-hand experience, student clubs have created an environment for art, music, robotics and theatre-oriented youth [14]. Another important aspect is that the university is committed to preventing discrimination and harassment, with policies in place to protect those reporting such incidents. Overall, Baku State University is dedicated to advancing gender equality and fostering an inclusive environment for all members of its community [15].

Figure 1: Representation in Leadership Roles

At Baku State University (BSU), campus-wide water consumption is systematically measured and monitored through the Baku City Water Network. Monthly usage reports provided by the State Water Agency are regularly reviewed by the University's Department of Utilities and Maintenance to identify irregularities and guide preventive maintenance planning. As a result of targeted leak detection, infrastructure repairs, and efficiency measures, BSU has achieved an estimated 8–10% reduction in total water consumption since 2022. Within the framework of the "Green University" initiative, BSU also implements awareness-raising campaigns aimed at reducing unnecessary water use among students and staff. Informational posters and educa-

13. https://sdg.bsu.edu.az/uploads/files/SDG%202.pdf
14. https://sdg.bsu.edu.az/uploads/files/SDG%203.pdf
15. https://sdg.bsu.edu.az/report-on-sdg-4-quality-education
16. REPORT ON SDG 5: GENDER EQUALITY https://sdg.bsu.edu.az/report-on-sdg-5-gender-equality
17. https://sdg.bsu.edu.az/uploads/files/SDG%206.pdf
18. https://sdg.bsu.edu.az/uploads/files/SDG%207.pdf
19. https://sdg.bsu.edu.az/uploads/files/Report%20on%20SDG%209.pdf

tional materials have been installed in restrooms and laboratory facilities to encourage responsible water-related behavior. These operational and educational measures ensure that water use is accurately recorded, efficiently managed, and aligned with national sustainability priorities as well as United Nations Sustainable Development Goal 6 (Clean Water and Sanitation).

Complementing infrastructure-based efforts, the University regularly organizes training sessions and workshops on water resource protection, the impacts of climate change on water systems, and the importance of sustainable water management. Student- and staff-led projects in this area have received national and international recognition and awards. In addition, fourth-year students from the Faculty of Biology, specializing in Biology, Water Bioresources, and Aquaculture, participated in comprehensive field studies conducted in the Guba and Lankaran regions, strengthening the link between academic instruction and applied environmental research.

During the pre-COP period, Baku Climate Week, co-organized by BSU, placed a particular focus on water-related challenges arising from global warming. To give a sample, during COP29, Baku State University showcased the IRRIGO smart agricultural system at the Green Pavilion, demonstrating innovative, technology-driven approaches to water efficiency and climate resilience [16].

To achieve high energy efficiency, Baku State University's Sustainable Procurement Policy on this issue was also included. The heating system in BSU buildings was switched to clean and sustainable heating. Daylight-saving bulbs are lighting systems used in buildings. Several solar panels and a charge point for electric cars were installed in BSU. It is planning to install more solar panels on the campus for sustainability [17].

Baku State University (BSU) is firmly committed to the development and maintenance of sustainable infrastructure that enhances both educational quality and community engagement. In recent years, the University has undertaken extensive reconstruction and modernization initiatives across its campus. Notably, Building No. 2 has been fully reconstructed, and reconstruction of No.1 building is ongoing, while several of the University's museums, including the Heydar Aliyev Museum and the Museum of Useful Minerals, at the same time, the Museum of History of Baku State University and the Scientific Library for students have been comprehensively renovated.

In parallel, key academic and public spaces such as the Heydar Aliyev Lectorium and the Round Hall have been modernized to support inclusive learning environments and large-scale academic events. To further strengthen student-centered development, BSU has established dedicated facilities including the Student Space (Tələbə Məkanı) and the Student Development Center, designed to foster innovation, leadership, and extracurricular engagement. With the support of bp-Azerbaijan, the University's publishing house has also been upgraded to meet contemporary academic and sustainability standards. Additionally, the creation of an eco-space (eko-məkan) on campus reflects BSU's commitment to environmentally responsible design and the integration of sustainability principles into daily university life [18].

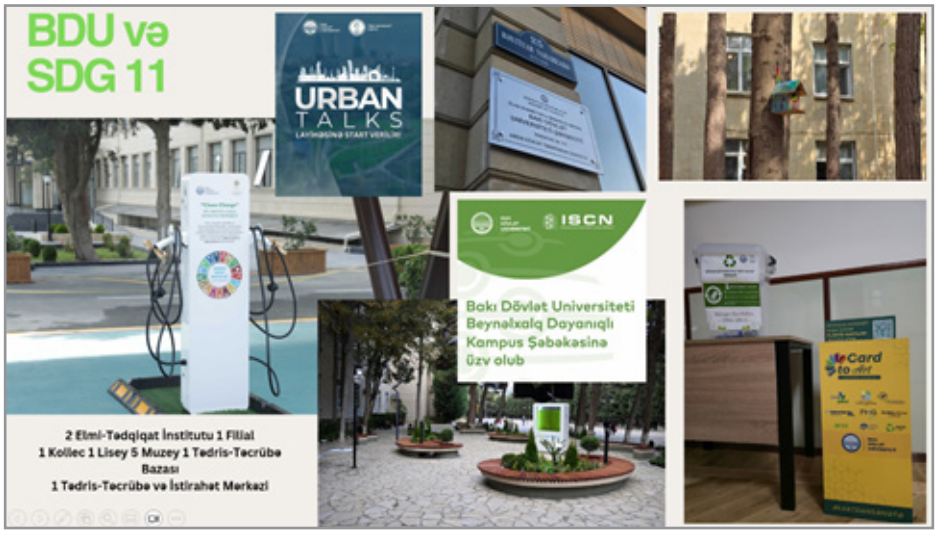

Figure 2

In 2024, the year of "Solidarity for Green World", BSU launched its flagship project, "Eco Space," a 1,000-square-meter innovative facility designed to integrate ecological education, research, and public awareness. The project features modern technologies, including an Aquaponics system for sustainable agriculture, bioreactors for oxygen production and biofuel generation, photovoltaic solar panels for renewable energy, and digital monitoring systems for air quality and weather data. "Eco Space" provides students, researchers, and the broader public with hands-on training in green technologies, environmental monitoring, and

20. https://sdg.bsu.edu.az/uploads/files/SDG%2011.pdf
21. http://bsu.edu.az/az/news/bdu_knlllrinin_yal_tbbs_khn_batareyaya_yeni_hyat_bx_et
22. https://azertag.az/xeber/bdu_da_berk_meiset_tullantilarinin_idare_edilmesinde_muasir_yanasmalar_movzusunda_telim-3878811
23. http://bsu.edu.az/az/news/bduda_wuf13_yolunda_urbanizasiya_v_innovasiya_adl_ilk_gr_keirilib
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26. http://bsu.edu.az/az/news/bdunun_tlblri_t_modeli2025_layihsi_rivsind_tkil_olunan_simulyasiyada

sustainable practices, while fostering interactive workshops, seminars, and ecological competitions. Developed through a public-private partnership [19]. As well as battery recycling and used cards recycling projects were initiated by the BSU volunteers [20]. Waste management is developed, and the sorting of waste is enhanced to contribute to recycling [21].

Since December 2025, Baku State University has launched a volunteer-driven initiative entitled "Urban Talks," dedicated to addressing contemporary challenges and emerging trends in urbanization [22]. Within the framework of this project, three lectures have already been delivered by university specialists and the Rector's advisor, fostering interdisciplinary dialogue on sustainable urban development. In alignment with global sustainability agendas and in pursuit of enhancing the institutional effectiveness of higher education in contributing to international development efforts, 2026 was declared the "Year of Urban Planning and Architecture" by a Presidential Decree of the President of the Republic of Azerbaijan [23]. In response, the University adopted a comprehensive activity plan to structure its academic, scientific, and public engagement initiatives throughout the thematic year [24].

During the second academic term, the University also hosted the "OIC Model International Relations Academy 2025," a capacity-building program comprising non-formal lectures and training sessions delivered by ambassadors, statesmen, and subject-matter experts. The program culminated in a simulation conference and contributed to the professional development of more than 150 young participants [25].

From a scientific perspective, 2025 concluded with the organization of an international conference entitled "Sustainable Future: Integrated Development of Earth Sciences and Ecology," which provided an interdisciplinary platform for advancing research collaboration in environmental and earth sciences [26]. To promote meaningful youth engagement and deepen understanding of real policy processes, a WUF13 Model Simulation Conference was conducted for the first time in collaboration with local and international institutions, with the involvement of a senior representative of UN-Habitat [27, 28]. The initiative significantly contributed to capacity-building, multilevel dialogue, and practical exposure to global urban governance mechanisms. On February 14, 2026, the University, in cooperation with local executive authorities, implemented a voluntary community outreach initiative involving the donation of books to local communities, with the objective of promoting educational development and supporting knowledge accessibility at the grassroots level [29].

Conclusion

This study examined the role of green education and youth-led sustainability initiatives in higher education, using a case study of Baku State University (BSU). Drawing on the framework of Education for Sustainable Development, the findings demonstrate that BSU integrates sustainability principles not only through academic curricula but also through student engagement, institutional policies, and campus-based practices.

The analysis indicates that youth participation plays a key role in translating theoretical sustainability concepts into practical action. Student-led initiatives, volunteer programs, applied research activities, and non-traditional learning formats have contributed to progress across several Sustainable Development Goals, particularly SDGs related to quality education, gender equality, clean water, clean energy, and sustainable communities. Infrastructure investments and eco-oriented facilities further support experiential learning and reinforce a campus-wide culture of sustainability.

BSU is committed to further expanding its partnership activities and strengthening its contribution to the SDGs. The University's strategic priorities include enhancing scientific research, broadening international cooperation, ensuring the continuity of ecological and social initiatives, and increasing student and young researchers' participation in global platforms. Through these efforts, BSU aims to consolidate its position as a leading academic institution and a national model for green education.

Although limited to a single case study, the findings suggest that BSU's experience offers an adaptable framework for other higher education institutions seeking to integrate green education into their sustainability strategies.

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