

Transformative Higher Education: A Catalyst to Achieving Sustainable Development Goals

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Abstract

This subject delves into transformative education as a potent instrument for propelling sustainable development. It delves into how institutions of higher education can assume a central role in equipping students and communities with the essential knowledge, proficiency, and principles requisite for steering constructive transformations, confronting global adversities, and forging a future that is both sustainable and just. The composition is structured into six subsections, each dedicated to an in-depth exploration of distinct facets. The framework encompasses a spectrum of elements within transformative education, encompassing the overhaul of curricula, involvement with communities, advancement of faculty, and the evaluation of learning outcomes, thereby presenting a comprehensive scrutiny of the subject matter. Educators and policymakers alike can refer to this composition to gain insights into the pivotal function of higher education institutions in melding prospective trailblazers, catalysts of change, and pioneers who will proactively contribute to a world characterized by sustainability.

Section 1: The introduction provides a comprehensive overview of higher education and its significance.

Section 2: Emphasizes the link between Education and Sustainable Development Goals. It also reviews relevant literature and previous studies on the issues of sustainability in education.

Section 3: Addresses the scope of exploring transformative learning in higher education towards the attainment of SDGs.

Section 4: Presents a detailed discussion on the role of higher education and initiatives undertaken by Indian policymakers.

Section 5: Concluding remarks summarize the Indian perspective by discussing the challenges and opportunities.

Section 6: Explores the future scope of the study.

INTRODUCTION

Transformative education aims to inspire and equip joyful, healthy students to make wise decisions and contribute to their communities and the world in positive ways. Acquiring rational and emotional skills is the main objective

of transformative education so that the learners are enabled to make critical decisions in the changing landscape of the world. Transformative education takes on heightened importance within higher education institutions, addressing not only sustainability but also encompassing crucial aspects such as human rights, value systems, diversity, equity, holistic education, and community-based learning. This broader perspective underscores the multifaceted role of higher education in shaping individuals who are not only academically proficient but also socially responsible and ethically aware.

As a core tenet of transformative education, sustainability solidifies its significance in the educational offerings of higher education institutions. Transformative education actively advocates sustainable development, emphasizing the harmonious integration of social equity, well-being, economic advancement, environmental respect, and protection. This educational approach actively promotes and supports the practice of sustainable development, fostering a holistic understanding of interconnected global challenges among students. Higher education plays a pivotal role in shaping individuals into seasoned, knowledgeable, and critical thinkers. It goes beyond the acquisition of specialized knowledge and serves as a transformative experience that equips students with the skills necessary for success in a rapidly evolving global landscape. Through higher education, individuals gain not only expertise in their chosen fields but also develop essential skills such as critical thinking, problem-solving, communication, and collaboration. Moreover, it fosters a sense of intellectual curiosity and a lifelong commitment to learning. Higher education institutions also serve as hubs for research and innovation, contributing to the advancement of knowledge and the development of groundbreaking technologies. Additionally, higher education provides a platform for cultural exchange and diversity, exposing students to a variety of perspectives and preparing them for a sustainable world. As societies continue to face complex challenges, the role of higher education becomes increasingly crucial in preparing individuals to navigate and contribute meaningfully to the ever-changing global landscape.

A limitation of this study is that while sustainable issues in higher education are thoroughly examined, the role of sustainable issues in primary education remains an area for future investigation.

Link between Education and Sustainable Development Goals

Sustainable Development Goals (SDGs) are a set of 17 global objectives established by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development. These goals are designed to address a wide range of social, economic, and environmental challenges, aiming to create a more equitable, just, and sustainable world. The SDGs cover diverse areas, including poverty, hunger, health, education, gender equality, clean water, affordable and clean energy, decent work and economic growth, industry innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice, and strong institutions, and partnerships for the goals.

The SDGs represent a shared commitment by countries around the world to work collaboratively to tackle pressing global issues. They provide a comprehensive framework that encourages cooperation between governments, businesses, civil society, and individuals to achieve common objectives. The goals are interconnected, recognizing that progress in one area often depends on advancements in others. Monitoring and reporting on the progress toward these goals are crucial components of the 2030 Agenda, promoting transparency and accountability on a global scale. Achieving the SDGs requires concerted efforts, innovative solutions, and a commitment to leaving no one behind in the pursuit of a more sustainable and inclusive future.

Numerous Sustainable Development Goals (SDGs), such as gender equality and economic growth, explicitly recognize the pivotal role of education as a facilitator.

Conversely, progress in various fields can influence education in diverse ways, a phenomenon extensively researched since the adoption of the Millennium Development Goals (MDGs) in 2000.



The responsibility for implementing Education for Sustainable Development (ESD) for 2030 rests with UNESCO, the primary UN institution for ESD. ESD empowers students of all ages to address interconnected global challenges like climate change, biodiversity loss, unsustainable resource use, and inequality. It equips individuals to make informed choices and take both personal and collective action to enhance society and safeguard the environment, thereby contributing to high-quality education and lifelong learning. The Pacific Education for Sustainable Development Framework has identified priority areas in formal education and teacher preparation to enhance knowledge, understanding, and the adoption of sustainable practices.

Globally, there is substantial attention on Education for Sustainable Development, and in India, the National Education Policy (NEP) reflects a revised framework aligning with many sustainable development goals. While the recent adoption of NEP is a positive step, effective implementation remains a work in progress. Until full implementation, the focus should be on integrating best practices and ensuring widespread adoption of NEP and ESD components across all educational institutions in India.

Bibliometric Review of available literature has been done using the database of Scopus and Web of Science. A total of 1781 papers were collected from 382 sources and 4258 authors. A detailed review was

conducted using bibliophily software.

Some important tables are reported as below:

The most relevant sources in which studies regarding sustainable higher education are reported are listed in the Table 1.

As reported above, the International Journal of Sustainability in Higher Education has the highest number of relevant studies, which is 954. This journal is followed by Sustainability with 91 studies on the topic and Further Journal of Cleaner Production is the third top journal with 53 studies reported on the theme.

This review is followed by studying the work of authors with the maximum reported studies. The top ten authors in the area of sustainability in higher education are mentioned in the Table 2.

As shown above, Leal W is the topmost author with 30 published studies on sustainable higher education. He is followed by Hermansyah H and Thomas I with 23 studies. Next in line are Haddock-Fraser J, Rands P, and Scoffh S with 19 studies each. Santosa S, Brandli L, Wright T, and Guerra J are the other prominent authors with 15, 14, and 13 studies respectively.

The most relevant affiliations in which the research on the area of sustainable higher education has been conducted are as Table 3.

As clear from the above data University of Indonesia is the leading university, identifying and researching the issue of sustainable higher education, Institute of Technology Bandung, Royal

Table 1: Most Relevant Sources

Sources	Articles
International Journal Of Sustainability In Higher Education	954
Sustainability	91
Journal Of Cleaner Production	53
2018 5th International Conference On Electric Vehicular Technology (Icevt)	28
Sustainability In Higher Education: Stories And Strategies For Transformation	27
Leadership For Sustainability In Higher Education	19
Contemplative Approaches To Sustainability In Higher Education: Theory And Practice	18
Implementing Sustainability In Higher Education: Learning In An Age Of Transformation	18
Environmental Education Research	16
Higher Education And The Challenge Of Sustainability	10

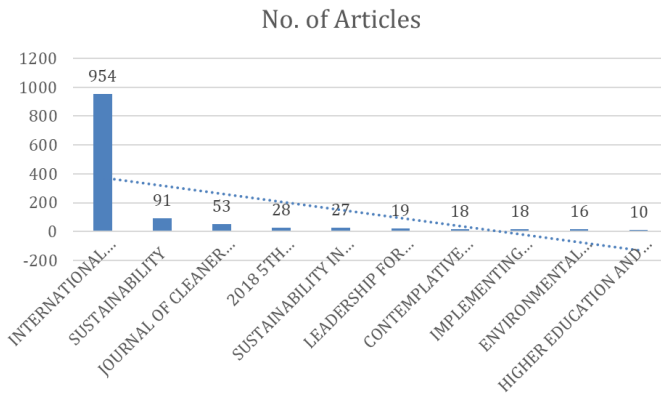


Chart 1: Most relevant sources

Table 2: Most relevant authors

Authors	Articles
LEAL W	30
HERMANSYAH H	23
THOMAS I	23
HADDOCK-FRASER J	19
RANDS P	19
SCOFFH S	19
SANTOSA S	15
BRANDLI L	14
WRIGHT T	14
GUERRA J	13

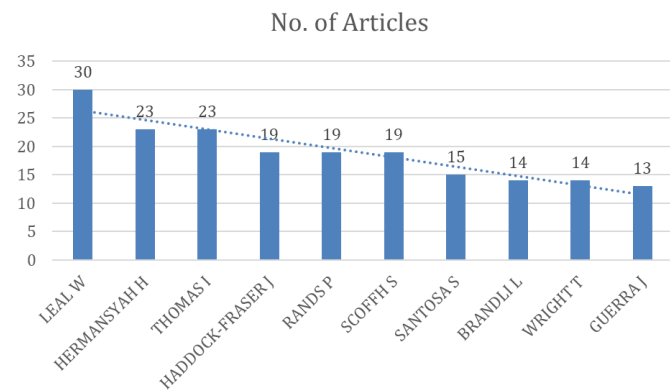


Chart 2: Most relevant authors

Table 3: Most relevant affiliations

Affiliation	Articles
University Of Indonesia	93
Institute Technology Of Bandung	75
Royal Melbourne Institute Of Technology (Rmit)	35
Universitas Padjadjaran	31
Bogor Agricultural University	29
Arizona State University-Tempe	26
Sebelas Maret University	26
Leuphana University Luneburg	25
Hochschule Angewandte Wissenschaft Hamburg	23
Universidade De Aveiro	21



Chart 3: Most relevant affiliations

Table 4: Total citations

Country	Total citation
Usa	4406
United Kingdom	2514
Canada	1877
Australia	1631
Indonesia	1464
Spain	1249
Germany	1225
Brazil	1069
Netherlands	811
Portugal	768



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PORTUGAL	768

A word cloud visualization of the abstract 'Sustainable Development Framework for Higher Education'. The words are arranged in a circular pattern, with 'higher education' and 'university' being the largest and most central. Other prominent words include 'sustainable development', 'framework', 'education', 'management', 'competences', 'science', 'knowledge', 'challenges', 'behavior', 'institutions', 'universities', 'model', 'campus', 'perceptions', 'design', 'development', 'people', 'policy', 'environmental', 'sustainability', 'indicators', 'attitudes', 'students', 'primary', 'secondary', 'tertiary', 'vocational', 'higher', 'learning', 'teaching', 'research', 'innovation', 'barriers', 'science', 'change', 'systems', 'impact', 'consumption', 'green', 'performance', 'integration', 'campus', 'sustainability', 'implementation', 'curriculum', 'figure', 'emerging', 'campus', 'sustainability', 'implementation', 'curriculum', 'figure', 'emerging'.

higher education, education, sustainability and management (Figure 1).

Melbourne Institute of Technology, Universitas Padjadjaran, and other international universities. This data clearly shows that from an Indian perspective, there is huge scope for sustainable higher education and policy framework.

Considering the above review literature the scope of exploring transformative learning in higher education towards the attainment of SDGs can be as mentioned as below:

- The USA has topped as per the citations data with 4406 total citations, followed by the UK and Canada with total citations of 2514 and 1877. Here also, this is clear that in India this topic is at a nascent stage and needs a lot of recognition.

The above scope areas are explained in the next sections. The next section covers the sustainable issues to be attained through various ongoing and proposed practices being followed at higher education institutions. The practices mentioned below are based on the experience and observations of the authors.

The word cloud of the considered data also highlights the top five words as university,

The Role of Higher Education in Shaping Sustainable Mindsets

Cultivating sustainability as a fundamental principle within academic institutions through the formulation of innovative policies.

Casarejos, F., Frota, M.N. and Gustavson, L.M. (2017) discussed various strategic innovations for sustainable higher education. Further, India's inaugural 21st-century education policy, the National Education Policy (NEP), was introduced in 2020. Geared towards delivering inclusive and comprehensive education, the NEP aims to propel India towards achieving Goal 4: Quality Education. Infused with a perspective on Education for Sustainable Development, the NEP recognizes the imperative to reshape the entire national educational framework by revisiting existing policies for timely attainment of established goals. NEP 2020 places significant emphasis on comprehensive and integrated environmental education, encompassing subjects such as sustainable living, waste management, environmental preservation, biodiversity, natural resource protection, sanitation, and climate change. Beyond the outlined agenda, higher education institutions are encouraged to incorporate critical thinking and system-oriented approaches into their program educational objectives. Prioritizing the development of learners' critical thinking abilities enables future leaders to identify current and impending sustainability challenges and propose strategies for achieving Sustainable Development Goals (SDGs). Furthermore, integrating ethics and values into the curriculum is deemed an integral part of an institution's vision and mission, fostering responsible decision-making among students. Reisch, O.C et al (2023), recommends developing sustainable strategic performance map by higher education institutions.

Transformation of the curriculum to promote Sustainability

Taking clues from the study of (Shephard K. 2008), new strategies, methods and techniques for curriculum design can be adopted. However,

as per the study of Velazquez, L., Munguia, N. and Sanchez, M. (2005), successful implementation of sustainability initiatives, in accordance to the vision is subject to many obstacles and hiccups in higher education institution.

Reimagining conventional academic disciplines to seamlessly incorporate sustainability is imperative for higher education institutions. This involves a thorough review and revision of the curriculum, ensuring the introduction of courses aligned with this vision. As an illustration, environmental education is now a mandatory component, to be instructed by trainers specializing in environmental development. The National Education Policy (NEP) aims to impart education in a manner that not only sustains livelihoods but also fortifies the national economy. Additionally, the curriculum can embrace inclusive education, addressing both social and environmental justice issues for a more comprehensive approach to sustainability. Integrating service-learning programs into the curriculum benefits both students and communities, fostering a sense of civic responsibility. To gauge the transformative impact of education, it is essential to develop indicators and frameworks for assessing sustainable development learning, utilizing progressive assessment tools. Both qualitative and quantitative methodologies should be employed to evaluate the transformative impact of education on sustainable development. Annabi, C.A. and Wilkins, S. (2016) studied the impact of online MOOCs in curriculum, as an initiative towards sustainable higher education initiative.

Educators serving as agents for transformative change

The National Education Policy (NEP) places particular importance on the education and preparation of teacher educators and trainers. The integration of faculty development programs focused on teaching sustainability and transformative learning will become a routine part of higher education institutions' annual academic activities. Promoting interdisciplinary collaboration and fostering cross-faculty partnerships at both national and international levels will enhance comprehension of the broader paradigm within the realm of sustainability. Additionally, acknowledging and



incentivizing research and teaching efforts centered on sustainability will serve as a motivational factor for teachers and educators to actively engage in Education for Sustainable Development.

Fostering student leadership to drive sustainable initiatives

Incorporating experiential and project-based learning into all domains of pedagogy is essential for real-world problem-solving. Students should actively engage in conducting surveys involving stakeholders to address various issues related to sustainable development goals. Poon, J. (2012) studied the student's learning experience through MOOCs. Subsequently, they can present their solutions and recommendations to local authorities for implementation. Additionally, integrating various certificate courses into subjects is crucial. Student participation in sustainability initiatives and campus projects is encouraged, and institutes should establish incubation cells to support student-led sustainable entrepreneurship and innovations. Financial aid and support can be facilitated through institute funds, cloud funds, government aid, and donations. This approach enables students to learn and contribute to self-sustainable business activities for the benefit of society. Regulatory bodies such as AICTE and UGC can organize national and international competitions centered around the SDGs, fostering the development of future leaders dedicated to sustainable practices. Furthermore, international collaborations for sharing best practices in sustainability education will enhance the skills of future managers in sustainable development. Gallifa, J. and Batallé, P. (2010) studied students' perception towards transformative sustainable education. Wilkins, S. and Stephens Balakrishnan, M. (2013) studied student satisfaction after implementing sustainable practices in higher education and concluded that students of UAE branch campus were more satisfied with the policies and emerged as better leaders.

Active involvement with communities through service-based learning

In India, numerous companies are currently dedicated to producing environmentally friendly

products and establishing sustainable brands to contribute to environmental conservation. The experiences of these entrepreneurs can serve as valuable case studies, providing insights into potential partnerships between academia and local communities. These successful entrepreneurs can act as a connecting bridge, facilitating collaboration and knowledge exchange.

The students can participate in various community engagement programs such as tree plantation, cleanliness missions, pollution control, education for the underprivileged, awareness campaigns related to social issues, care for the elderly, and many more.

Besides collaborating with industry and following successful sustainable businesses, long-term impact can be ensured through visible alumni contributions to sustainable development.

Collaborations and Partnerships

UGC has guidelines on Sustainable and Vibrant University Industrial Linkage Systems for Indian universities. The objective is to promote research and development through University-Industry (UI) collaboration in the universities to address practical problems of research and development which are high on social relevance and include engaging the faculty and students from degree (UG) level upwards.

This aims at establishing linkages and developing sustainable relationships between industry and academia to create training opportunities in the industries, research and development labs, research organizations, including social systems across the country.

Further, every educational institution or university may create an Industry Relation Cell (IRC) for collaboration and every industry including MSME can create a University Relation Cell (URC) to enable the collaboration.

Siemens Initiative for Driving Sustainability in HEIs through Industry-Academia Collaboration

In the words of Jan Quint, Senior Sales Enablement Specialist, Higher Education at Siemens, higher education institutions face triple challenges of

achieving sustainable goals, evolving modern educational demands, and addressing budget constraints. These challenges require bold innovative approaches. For many institutions partnerships with industry are key to bridging the gap between aspiration and action addressing complexities. As a technology company with strong ties to higher education and a leader in sustainability and technology innovation, Siemens supports higher education institutions worldwide on their journey towards smart net-zero campuses and creates impact-full academic environments that transform the every day in education and research.

Siemens supports HEIs through three Central initiatives

- Curriculum development: collaborating on courses and degree programs to ensure sustainability and technology innovation, Siemens experts also teach at partner institutions equipping students with specialized knowledge in sustainability technology.
- Hands-on experience: Access to state-of-the-art tools and facilities allows students to gain practical experience that enhances their employability. Siemens initiatives such as EMPOWER+, connected curriculum, Siemens research and innovation ecosystem, sponsor internships, mentorships, and on-campus placements help in bridging the gap between theoretical knowledge and real-world application.
- Living Labs: Siemens collaborates with HEIs worldwide to create living labs where students, researchers, and faculty can interact with the latest sustainability technology and use real-world data.

According to Siemens, the benefits are mutual as they gain a pipeline of skilled talent and opportunities for co-innovation while HEIs can better support applied research and prepare students for careers in the fast-growing green economy.

CONCLUSION

After reviewing the available literature, observations of sustainable education practices at the higher education level, and critically analyzing the role

of various stakeholders, mentioned points can be highlighted:

Need of Envisioning the Future Role of Higher Education in Sustainable Development

The initial stride involves heightening awareness of Education for Sustainable Development (ESD). It is imperative to address the fundamental understanding of sustainability and education, intertwining the two concepts. Higher education institutions are mandated to embed the essence of transformative learning for sustainable development directly into their vision statements. Subsequently, an action plan should be meticulously drafted to realize this vision.

Policy Recommendations for Integrating Sustainability into Educational Systems via an Effective Curriculum

An effective ESD curriculum should concentrate on imparting proper attitudes, skills, and behaviors concerning sustainability issues to students and stakeholders. The curriculum ought to stimulate behavioral change and must be accessible, concise, and easily implementable. Incorporating sustainability-related activities into the ESD curriculum is paramount.

Advocacy for Community Involvement

Ensuring local context and relevance is integral in curriculum design, and the curriculum review committee should involve local representatives, industry stakeholders, and policymakers in its meetings and planning sessions. Special emphasis should be placed on engaging each stakeholder in educating and supporting sustainability. Organizing sustainability forums within institutions, creating or reorganizing committees, and leveraging existing forums will foster community engagement. Training and incubation centers should actively organize seminars, conferences, exhibitions, and visits to rural and underprivileged segments of society to ensure their contribution to sustainable education. Involving all relevant stakeholders, including students, teachers, parents, and community members, in such activities will enhance participation.



Networking, Partnerships, and Collaborations

Effective implementation of ESD requires robust collaboration between the government, private sector, civil society organizations, institutions, and other key players. This collaborative effort will enhance capabilities and help overcome resource and budget constraints.

Implications and Future Research

Undoubtedly, education is a cornerstone in achieving sustainable development and serves as a powerful tool. Higher education institutions can instigate the necessary shifts in attitudes, behaviors, and skills essential for problem-solving and decision-making in the future. The substantial contribution to ESD would materialize if educational institutions integrate sustainability as a key component of instruction in a practical and realistic manner. This paper articulates the requisite actions and stages toward sustainability, demonstrating how transformative education can catalyze sustainable development and contribute to achieving the Sustainable Development Goals (SDGs) by 2030.

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