

Research Article

# A Study on Education 5.0 Towards Sustainable Development Goals

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## Abstract

Education 5.0 envisions a future in which curricula are customized not just for academic achievement but also for the development of emotional intelligence and social competencies. Education 5.0 isn't just another curriculum update it's a whole shift in how we tackle big global problems like poverty, inequality, and climate change through the Sustainable Development Goals (SDGs), and you can see that in the way teaching and learning start to work together. Research suggests that when learning is personalized, students tend to be more motivated and perform better. Plus, when learners join forces through technology to discuss ideas, it naturally builds a sense of community and shared purpose. At the same time, teachers find themselves in a different role now. They aren't just there to dump facts on students but are expected to act as mentors and even tech guides. This shift means schools need to back robust training programs that mix traditional teaching with new digital skills, critical thinking, and a touch of emotional understanding. This study dives into how Education 5.0 and the Sustainable Development Goals (SDGs) can mix together, probing the tough issue of how schools and universities might tweak their practices to boost sustainable actions and overall community well-being even as the world changes at a dizzying pace. As classrooms begin to prioritize people and their needs, it becomes increasingly natural to integrate these values into everyday learning. By throwing light on practical approaches and real stakeholder input, the research deepens our grasp on how to reshape education to fit better with sustainability goals, arming future leaders with the kinds of tools needed for a fairer, greener world. This article explores the foundational pillars of Education 5.0 and its potential as a catalyst for achieving a more equitable, inclusive, and sustainable future.

## Keywords

Sustainable Development Goals (SDGs), Education 5.0, Five Pillars of Education, Quality Education

## 1. Introduction

The 21st century demands more than just imparting knowledge in education. It requires a nurturing mind capable of empathy, innovation, critical thinking, and sustainable action. Against this backdrop, Education 5.0 represents a visionary model that extends beyond previous paradigms, shifting from industrial-age education (Education 1.0) to a human-centred, value-driven framework. At the same time,

UNESCO has proposed 17 interlinked goals for Sustainable Development that will be achieved under the Education 2030 initiative. It aims to ensure inclusive and equitable quality education, as well as achieve many other goals under different goal frameworks. Education is not only a stand-alone goal (SDG 4: Quality Education) but also a strong enabler for achieving the other 16 Sustainable Development Goals. Ed-

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ucation 5.0 and the SDGs are thus interdependent tools in shaping the future we want to build.

School systems are undergoing significant changes, not just minor ones. We no longer feed students' facts; nowadays, education is showing signs of a profound shift as it try to keep up with a world buzzing with technology. Traditional methods, which often falter in the face of rapid technological changes, are being outpaced by a new idea: Education 5.0. Instead of treating learners as static recipients, this new approach invites them to take charge of their learning journeys. It leans into hands-on skills like critical thought, creative problem solving, and teamwork, all powered by tools such as artificial intelligence (AI) and machine learning (ML) that tailor lessons to each person's needs [4]. Advanced AI generative models, such as ChatGPT, can produce text responses that appear to have been written by a person, and can also be utilized to generate code and identify and correct errors in code [2]. Teachers play a crucial role in preparing the next generation for learning AI. Therefore, teachers' desire and ability to support AI are crucial for its effective use in schools and for preparing students for a future where humans and AI collaborate [3].

Education 5.0 popped up as a new idea, one that isn't just about pushing technology ahead but also about interweaving ethical and sustainable practices similar to those outlined in the UN's SDGs. Rather than following a rigid blueprint, this approach brings together diverse ideas, engages communities, and employs innovative teaching methods that cater to what students truly need. It's pretty flexible, adapting to ever-changing societal demands while maintaining fair and accessible education, qualities that many consider essential for achieving SDG targets in diverse cultural and economic settings. Some even believe that future schooling must break free from traditional academic boundaries by forming partnerships among governments, industries, community groups, and institutions to enhance learning outcomes [5]. Turning learners into active problem solvers sits right at the heart of this vision, blending academic growth with sustainability and social responsibility.

In most cases, the Education 5.0 curriculum leans toward value-based learning, encouraging students to dive into research and project work that tackles both local and global challenges [6]. Project-based learning, a central element of the approach, fosters critical thinking and encourages students to put ideas into practice a necessity for meeting those high-reaching SDG goals [7]. Additionally, incorporating digital innovations such as the Internet of Things (IoT) and AI not only refreshes the classroom atmosphere but also enhances collaborative efforts toward sustainable education [13]. Evaluating education through an SDG lens is crucial; schools are now encouraged to assess how well they nurture responsible citizens who can face challenges such as climate change, inequality, and health crises. Recent studies generally indicate that institutions that integrate sustainability into both their curricula and everyday operations tend to experience in-

creased student engagement and stronger community support. With Education 5.0, there's a genuine push to ensure that everyone receives quality learning opportunities, regardless of their background or financial means [8]. Efforts to bring marginalized communities into the fold often play a pivotal role, enriching the classroom with diverse perspectives and experiences. Additionally, technology is introduced as a valuable tool for distance learning and more effective resource distribution, opening up more opportunities than before [1]. As these new ideas take hold, it's crucial to monitor their effectiveness.

The idea is to nurture the whole person, with lifelong learning and flexibility at its core, ensuring that students grow into informed citizens who give back to their communities [9]. As our economy gradually shifts toward jobs that require knowledge and service, the school's role becomes increasingly critical in preparing learners for an unpredictable future [10]. Taking a step back, a closer look at Education 5.0 suggests it could be a real game-changer, pushing innovation, fairness, and community engagement into the spotlight. It's less about just transferring knowledge and more about building environments where future leaders and creative thinkers can truly shine [11].

## 2. Background and Context of Education 5.0

Education 5.0 signifies a shift in perspective rather than merely academic development. Education 5.0 focuses on human values, social demands, and sustainable living, whereas past stages concentrated on knowledge delivery (1.0), personal computing (2.0), digital integration (3.0), and AI-driven, individualized learning (4.0).

It focuses an emphasis on:

- 1) Empowerment rather than employment,
- 2) Focus on purpose rather than performance,
- 3) Community rather than competition,
- 4) Transformation rather than transaction.

Education is shifting in unexpected ways, and the classic ideas now have fresh meaning. In Education 5.0, pillars aren't just about concrete supports or neat organizational boxes. They capture the core values that drive every learning experience. Each of these supports ends up doing double duty: not only do they help pass on knowledge, but they also nurture an entire environment where student engagement, social responsibility, and a commitment to lifelong learning all intersect. Consider pillars inspired by concepts such as constructivism and experiential learning. These approaches encourage students to engage in and take charge of their learning journey actively. Technology, for example, plays a significant role these days. The pillars now stretch past traditional subjects to include digital literacy as a must-have skill in the 21st century.

The blend of tech-savvy, a genuine commitment to fairness, and an emphasis on collaboration points to an education sys-

tem that's not merely about knowledge transfer but about sparking social change and fostering human development. Looking through the lens of Education 5.0, it's evident these pillars will play a significant role in shaping future paths, equipping learners with the practical tools needed to navigate and even thrive in our fast-changing, unpredictable world.

Technology continues to reshape how we learn, and Education 5.0 has become a prime example of this change. At its core, this effort is about determining whether modern teaching methods, backed by new technology, cannot only improve how we teach but also align with today's rapidly changing world. The study, for instance, examines whether digital strategies enhance critical thinking, spark creativity, and facilitate learners working together, traits that become increasingly crucial as things become more complex. [9] noted that the pandemic has exposed some deep inequalities and made it clear that our education system needs to be more rigorous and fairer for every student, regardless of their background. In other words, embracing the ideas behind Education 5.0 can enhance the quality of education and help during challenging times. Another essential part of this shift is the push for teamwork on other fronts. Governments, schools, businesses, and community groups must come together to rethink what learning means today. In many cases, aligning education with the real needs of society and the economy requires a shared effort that can sometimes lead to surprising innovations [11]. Making room for new experiments in our schools, even if it means making some mistakes along the way, maybe precisely what is needed to implement these new ideas. Ultimately, Education 5.0 is not just a trendy term. It provides a comprehensive response to a rapidly evolving landscape driven by both advanced technology and societal shifts.

Ultimately, the goal is to equip future generations with the essential skills to confront global challenges head-on and make a tangible impact on sustainable development. The paper advances research in this area by addressing key questions that have been previously unanswered.

- 1) What is the importance of Education 5.0 towards sustainable development goals?
- 2) How can this importance be addressed based on the relevance of Education 5.0 to sustainable development goals?

To achieve these objectives, this study proposes a mixed-methods approach that examines the significance of Education 5.0 about the Sustainable Development Goals. Education 5.0 encompasses various domains, including the utilization of ICT, an emphasis on personalized learning, collaborative learning, adaptive learning, technology integration, safeguarding the privacy of students and educators, low-latency applications, and data analysis to enhance the educational system and promote sustainable development. Education 5.0 seeks to enhance customized learning, collaboration, and well-being while cultivating 21st-century competencies, including critical thinking, creativity, and problem-solving, through the application of contemporary infor-

mation and communication technologies (ICT) and associated innovations such as blockchain, Internet of Things (IoT), artificial intelligence (AI), machine learning (ML), and augmented/virtual reality (AR/VR) inside the Metaverse. The evolution of this chapter has led to the identification of essential needs for an Education 5.0 system, which is detailed in the next section.

## 2.1. Machine Learning (ML)

A sub-discipline of artificial intelligence (AI), machine learning (ML) focuses on enabling computers to learn from data autonomously without explicit programming. It involves developing algorithms proficient in data processing, pattern identification, and predictive or decision-making capabilities. Machine learning (ML) allows systems to learn from experience and accumulate data over time, therefore enhancing their performance.

## 2.2. Artificial Intelligence (AI)

It refers to the emulation of human intelligence in machines engineered to think and act like humans. It encompasses a diverse array of technologies that enable computers to perform tasks such as learning, problem-solving, perception, and decision-making, which often require human intelligence.

## 2.3. The Phrase “Internet of Things” (IoT)

It refers to an extensive network of interconnected devices capable of exchanging and collecting data since they are equipped with sensors, software, and network connectivity. These “things” may encompass a range of objects, from ordinary household goods to sophisticated industrial machinery, all interconnected through the internet. The IoT enables these devices to interact and communicate with both humans and each other autonomously, without requiring direct human intervention.

The 17 interrelated Sustainable Development Goals (SDGs), often referred to as the Global Goals, serve as a framework for achieving a more equitable and sustainable future for all. The Sustainable Development Goals (SDGs), endorsed by all UN member states in 2015, are intended to be achieved by 2030. Poverty, inequality, climate change, environmental degradation, prosperity, peace, and justice are among the global challenges they address.

## 3. The Five Pillars of Education 5.0

The UNESCO's original “Four Pillars of Learning” has been updated for modern relevance; the architecture of Education 5.0 rests on five transforming pillars.

### 3.1. Learning to Know

This pillar emphasizes the importance of lifelong education, digital literacy, curiosity, and the development of cognitive and critical thinking skills. Arming students to grasp complex systems and adapt to a knowledge-driven environment supports quality education i.e. SDG-4 and Innovation and Infrastructure i.e. SDG-9. It demonstrates that Education 5.0 is contributing to sustainable development among learners by creating awareness about the importance of quality education and innovative infrastructure (SDG-4 & 9), which guides our society in the right direction.

### 3.2. Learning to Do

Beyond theory, this pillar fosters entrepreneurship, problem-solving, and practical skills. Concurrent with Decent Work and Economic Growth under SDG-8 and Sustainable Cities and Communities i.e. SDG-11, project-based and experiential learning equips students for real-world challenges. It means that without techno-education, modern learners cannot understand the economic aspects necessary for growth and development. It also helps in creating sustainable cities and communities near society.

### 3.3. Learning to Be

It primarily addresses personal development, emotional intelligence, ethics, and well-being. It directly supports Good Health and Well-being comes under SDG-3 and Peace, Justice, and Strong Institutions comes under SDG-16, thus promoting overall human development. Education 5.0 also focused on raising awareness and promoting hands-on practice in health and well-being, as well as promoting peace, justice, and strong institutional bonds. It shows that all these things are possible with quality education and integrated with technology, i.e., Education 5.0.

### 3.4. Learning to Live Together

Encouraging respect for diversity, global citizenship, and social cohesion, this pillar fosters tolerance, harmony, and peace through cooperation. It corresponds with Partnerships for the Goals comes under SDG-17 and Reduced Inequalities under SDG-10. Education 5.0 also enhances awareness and respect for diversity, global citizenship, and social cohesiveness, which is made possible through tolerance, harmony, and a peaceful mindset among learners.

### 3.5. Learning to Transform

The most unusual pillar of Education 5.0 exhorts students to be change agents. It fosters social responsibility and environmental stewardship, as well as skills and attitudes that help address inequality and climate change, promoting positive innovation. It closely corresponds with Climate Action comes

under SDG-13, Responsible Consumption and Production under SDG-12, and the general ethos of all 17 SDGs.

At the core of Education 5.0 is the notion that our traditional methods don't adequately prepare students for the numerous challenges of the 21st century. This insight has sparked a fresh look at teaching methods, advocating for a blend of hands-on learning and interdisciplinary approaches that better align with the needs of industries and communities [13]. With innovative tools like AI and the IoT emerging, classrooms are receiving a boost, equipping learners with practical skills for our increasingly interconnected world [14]. Increasingly, colleges are exploring nonlinear learning routes, sometimes unpredictable in structure, to tailor education to each student's unique journey. In most cases, this shift moves us toward a more student-centred model, which many believe is crucial to sparking genuine innovation. Linking Education 5.0 with the SDGs is another vital piece of the puzzle. When schools start incorporating sustainability into their daily routines, they do more than share knowledge; they actively help tackle global challenges.

## 4. Importance of Education with Sustainable Development Goals (SDGs)

Aligning education with the SDGs is a vital step toward building a more equitable, inclusive, and resilient world. Education plays a foundational role in shaping individuals' understanding of global issues, and when guided by the SDGs, it becomes a powerful force for driving long-term societal change. Among the 17 SDGs, Goal 4 refers to ensuring inclusive and equitable quality education, which serves as a cornerstone and supports the achievement of all other goals. By embedding sustainability into the curriculum, schools can transform their teaching methods from rote learning to critical thinking, ethical reasoning, and collaborative skills necessary to address pressing global challenges, such as poverty, climate change, and inequality. Considering AI from the perspectives of both economic and social sustainability reveals how AI can contribute to both social responsibility and long-term success, meeting customer needs while minimizing ethical issues and concerns from the economic sustainability perspective [12].

In other words, aligning educational goals with SDG targets isn't just a lofty ideal; it's a practical necessity for progress both locally and globally. Education 5.0 is still on the rise, with an apparent reliance on team efforts that span various fields, underscoring that education remains a crucial pillar for a sustainable future. Changing the foundations of educational practice isn't just an academic exercise. It's a recalibration aimed at boosting learning while nurturing broader societal shifts. This review, then, helps pave the way for future research into how these ideas can be translated into real-world strategies, ultimately fostering resilient communities ready to tackle the numerous challenges of our rapidly evolving world.



Education is shifting in unexpected ways as classrooms begin to mix everyday lessons with global sustainability goals. In many cases, schools are now rethinking their approach, tying daily learning directly to the Sustainable Development Goals (SDGs) without relying on the usual formal frameworks. This change isn't just about adding new topics; it's about equipping students with practical skills and fostering a genuine sense of global responsibility. The UN even suggests that education can spark fundamental societal shifts by creating citizens who not only possess knowledge but also care deeply about their communities. Education 5.0, for example, advocates for a style where sustainability is integrated into lessons, prompting learners to ask challenging questions and act with responsibility. Blending sustainability with regular lessons isn't always a straightforward process; it often becomes a blend of ideas from various fields. When students become immersed in learning modules that address topics such as climate change, social injustice, and health issues simultaneously, they begin to see the broader picture of the world around them. The shift to renewable energy, for instance, isn't just an engineering problem; it also calls for considering social impacts. Schools can become fundamental catalysts by partnering with industries, government bodies, and local groups, which in turn provides students with hands-on challenges they wouldn't encounter in a textbook. These real-life encounters, repeated in various ways, help build practical problem-solving skills and a stronger sense of duty. Project-based courses have aligned with the SDGs enable learners to engage directly with their communities, reinforcing that what they study matters in real time. Sometimes, it's not enough to just know facts. There's a growing need to integrate values and ethical principles directly into the curriculum. Value-based education, generally speaking, cultivates traits such as empathy, moral judgment, and cultural awareness. Checking progress in this new educational landscape means that quality assurance can't just rely on traditional metrics. Evaluating how well schools foster sustainable development requires standards that assess the effectiveness of teaching methods and community engagement in real-world applications. Institutions may need to develop new assessment systems that give equal weight to sustainability outcomes and academic scores, encouraging educators to adopt innovative strategies [14]. Additionally, digital tools are becoming increasingly important in this context. These technologies expand access and engagement for a diverse student body, all while supporting the promise of inclusive, quality education that SDG 4 advocates for. Linking education with sustainable goals is more than a trendy idea. It's a practical, moral duty. Educators, policymakers and other stakeholders need to work together, ensuring that schools don't just pass along information but also spark real action aimed at global challenges. This shift gears up students for today's workforce while also building a lasting commitment to the well-being of future communities and our planet. By putting sustainability at the heart of learning, schools can help

alleviate worldwide problems while fostering a spirit of innovation that's as resilient as it's inspiring [16]. In our complex 21st-century world, the collaboration between learning environments and sustainable principles stands out as a cornerstone for creating a future where societies can thrive.

## 5. Conclusion

Education has always faced evolving challenges, but the emergence of Education 5.0 marks a significant shift in the field of education. As we navigate the intersection of technology, pedagogy, and societal change, this new phase demands a reimagined approach centred on human development rather than mere knowledge transmission. Education 5.0 and the Sustainable Development Goals converge to present a compelling vision for how people will learn and live in the future. To create inclusive, resilient, and uncertainty-navigating systems, we are pushed to transition from transactional education models to transformative learning ecosystems. Today, without education 5.0, students' performance was different in many ways, such as not knowing enough about science and how to use that knowledge to learn, teachers not knowing how to look at things scientifically, and the continued use of traditional learning methods that focus on theory rather than hands-on experiments and data analysis [15].

The message is clear for institutions, educators, and policymakers: we need to embrace this change for the sake of our planet's sustainability and survival, not just for academic reform. According to this new paradigm, education is life itself rather than a means of preparing for it. All in all, Education 5.0 paints a picture of an education system that's more blended, inclusive, and flexible. This shift isn't just about keeping up with technology or meeting job market demands. It's also about preparing students to be engaged global citizens. As educators and institutions continue to adapt, they're embracing innovative practices and nurturing environments where academic growth goes hand in hand with personal development, ensuring the educational landscape keeps pace with our ever-changing world.

As discussions about Education 5.0 continue, it's clear that this model addresses everyday needs while also preparing learners for the challenges ahead. This two-pronged focus enhances the relevance of what is taught and translates theory into practical know-how [17]. Flexibility in course design provides teachers and students with the opportunity to adjust programs for various contexts and goals [18]. It seems evident that incorporating these education tweaks into broader policy debates is crucial for achieving sustainability targets at both national and global levels. In short, linking Education 5.0 with the SDGs is a forward-thinking move that could reshape the educational landscape. Policy plans that incorporate Education 5.0's ideas while advancing SDG goals are likely to spark significant changes not only in schools but also across entire communities. As our society navigates a range of complex issues, building a generation of informed, engaged, and re-

sponsible citizens relies on applying education in smart, sometimes imperfect ways that align with broader sustainability goals. Ultimately, pushing this conversation forward will be vital in bringing diverse groups together to innovate, ensuring that education truly prepares individuals and communities for the twists and turns of the 21st century.

## Abbreviations

SDG	Sustainable Development Goals
M.L	Machine Learning
AI	Artificial Intelligence
IoT	Internet of Things
Education 5.0	Education Integration with ICT

## Author Contributions

**Priyank Kumar Shivam:** Supervision, Validation, Visualization, Writing – review & editing

**Arnab Chowdhury:** Conceptualization, Data curation, Formal Analysis, Investigation

## Conflicts of Interest

The authors declare no conflicts of interest.

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