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Education to Enable Sustainable Economic Development

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ABSTRACT

Sustainable development has been widely discussed in the economic and political debate for the past 20 years, but practical, sustainable measures are still lacking. This fact poses a serious challenge to governments as they strive to balance the demand for natural and social resources while ensuring economic progress and risking severe environmental degradation. The urgent need for an economically sustainable development model raises essential questions, such as integrating education into business models and government policies. Education plays a vital role in sustainable development, as recognised by the United Nations. Technological solutions alone are insufficient; our society requires a shift in thinking and behaviour towards sustainable lifestyles and consumption patterns, which can only be achieved through education. However, we face a significant dilemma as current educational models seem to prioritise the interests of the political and business elite over socio-economic and environmental needs. In this paper, we critically assess the role of education in fostering economic sustainability and inclusive development. We conclude that education can play a critical role in achieving the United Nations 2030 Agenda and the Sustainable Development Goals. We argue that our education system should prioritise the well-being of humanity, challenging the prevailing focus on profit maximisation and economic growth as currently understood. Therefore, we need to reevaluate the meaning of growth and reconsider how economic elements should be approached.

Keywords: Education, Inequality, Sustainability, Poverty, Inclusion, Development

Education to Enable Sustainable Economic Development

Introduction

The world economies face significant challenges as they seek to comply and align their policies with the ambitious UN SDGs (United Nations, 2015). Specifically, developing economies worldwide must reassess their economic models, capabilities, and available resources to effectively promote and implement sustainable strategies for economic growth and development (Sachs et al., 2016; Spaiser et al., 2017 and Bali Swain & Yang-Wallentin, 2020). The introduction of Sustainable Development Goals (SDGs) has sparked discussions on the sustainability of current economic models. Developing countries, in particular, demand special consideration as they heavily rely on securing adequate financial support to bridge the resource gap and effectively meet the requirements of the UN 2030 Agenda (UN, 2015). Inadequate infrastructure, investment, skilled workforce, weak institutions, and conflicts are crucial challenges that economies must tackle. The UN 2030 Agenda has heightened the importance of comprehending development effectiveness more deeply. According to recent research studies, the ideal economic models should now encompass economic growth, social inclusion, and environmental sustainability, which is quite a difficult task as the cost associated with the transition need to be considered, as also the social and political will to engage on required changes and transformation process (Rahman & Farin, 2019; Smith & Archer, 2020; Lincoln Lenderking et al., 2021).

Education has become a vital component of business models and a commodity primarily accessible to those with financial means, creating a dual impact. On the one hand, education can serve as a pathway to employment opportunities and economic advancement. Conversely, the absence of education can perpetuate poverty and inequality (Nash, 1990). However, in general terms, education holds significant importance in fostering inclusivity and enhancing social cohesion. Conversely, individuals with limited educational attainment are likely to experience adverse effects on their socio-economic standing, as analysed by de Paula Arruda Filho (2017), Kraus et al. (2019), and Vaio et al. (2020). Access to higher education can lead to better job prospects, but it also has a broader social impact. Education can improve economic activity, health, and the environment. It can also shape the future of generations and their way of thinking. However, existing educational models can also exacerbate inequality and exclusion. They can lead to elitism, exclusion, and discrimination (Watermeyer & Olssen, 2016; Carrington, 2017;

Preece, 2018; Hansen et al., 2020). Therefore, it is important to critically assess the role of education as a tool for economic sustainability and development. Education can be a liberating mechanism for individuals as it can help to reduce inequality. However, there is a paradox associated with economic and political interests, which can undermine the potential of education to achieve these goals, as Nelson Mandela highlighted in his speech at the launch of the Nelson Mandela Institute for Education and Rural Development in 2007:

"There can be no contentment for any of us when there are children, millions of children, who do not receive an education that gives them dignity and honor and allows them to live their lives to the full." (Mandela Institute, 2022)

This research paper delves into the complexities of sustainable economic development. It examines how the educational system can contribute to formulating strategies that address economic and social inequalities while staying within the limits of our planet. The remainder of the paper is structured as follows: Section 2 addresses education and inequality. Section 3 explores education for sustainability, with section 4 examining energy models and business activity. Section 5 discusses the need to educate governments, businesses, and the population for economic sustainability. Finally, section 6 concludes the paper.

Education and Inequality

Despite a series of goals identified by the international community to assess the sustainability of the development process, countries differ in their priorities for economic and human development. The United Nations' Sustainable Development Goals (SDGs) were inspired by the Millennium Development Goals (MDGs) launched in 2001. The MDGs were an attempt to reduce inequalities and mitigate the adverse effects of globalisation. However, the benefits of globalisation have been distributed in an unfair way, and the most vulnerable societies had to bear most of the costs (Doyle & Stiglitz, 2014; Kelegama, 2014; Carant, 2017). Moreover, the latest research suggests that eliminating this great inequality, ceteris paribus would double GHG emissions, propelling the Earth system beyond dangerous tipping points (Rammelt et al., 2022). The Millennium Development Goals (MDGs) were initially met with great optimism, but this soon gave way to criticism that the goals were not ambitious enough and did not adequately address inequality. In response, the United Nations issued its proposal for the Sustainable Development Goals (SDGs) in June 2014. The SDGs build on the MDGs but are more ambitious and focus more on sustainability (Saiz & Donald, 2017; Winkler & Williams, 2018; Kaltenborn et al., 2020). According to their particularities

and different realities, the implementation of adequate responses to environmental pressures is hampered and marked by political priorities and critical unmet social needs in many parts of the world (United Nations, 2021). This reality can be seen by observing and examining data on economic growth and social well-being. The data shows that income disparities and economic differentiation between developed and less developed economies are much more significant today than they were a century ago (UNRISD, 2017; Alvaredo et al., 2018; Piketty et al., 2019; OECD, 2021b). The World Inequality Report (2022) provides global indicators of inequality, revealing a growing trend since 1820¹, reaching an all-time high in the early 2000s before dropping to 38 in 2020. Especially after the 2008 Global Economic and Financial Crisis (GEFC), inequality between countries declined and remained stable, due to the poor post-2008 growth performance of rich countries, especially in Europe, compared to developing and emerging countries (Boyce, 2019; Chancel, 2020; Chancel & Piketty, 2021).

Despite the decline in inequality between countries, in 1980, the average income of the top 10% of the world's major economies was 53 times greater than the average income of the bottom 50%. On the other hand, in 2020, the average income of the top 10% globally was 38 times higher than the average income of the bottom 50%, revealing the significant gap between the rich and the poorest countries (Chancel & Piketty, 2021). The data suggests a potential correlation between the impact of income inequality and economic growth. Furthermore, considering that environmental pollution can reinforce the level of global inequality between countries, the effects of climate change seem to be associated with more pronounced effects in low-income countries (Pata & Caglar, 2021; Kang, 2022; Wan et al., 2022). In 2012, the role of education in supporting sustainable development was finally recognised. This was after several global consultations organised by the United Nations, which addressed specific topics related to the implementation of the Millennium Development Goals. These consultations laid the foundation for what would become the heart of the SDGs (Leicht et al., 2018; Rieckmann, 2018; Glavič, 2020). In its couplet, education was identified as SDG 4: "*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*" (United Nations, 2015, p.14). According to the conclusion reached by the 2012 United Nations Conference on Sustainable Development (United Nations, 2012), sustainable development cannot be achieved solely through technological solutions, political regulation, or financial instruments. The progress of the discussion on the role of education in sustainable economic growth since 2012 is evident in the development of national and international education policy initiatives and activities in subsequent years. These reaffirm the influential role of education in national education systems. The importance of investing in

¹ Time when the series began to be reported.

education in the global context and the need to enable its critical role as a catalyst for change towards sustainable development is unquestionable (UNESCO, 2017; Cebrián et al., 2020; Marouli, 2021). Sustainable development requires changing how we think and act and transitioning to sustainable lifestyles, consumption, and production patterns. This change can only be achieved through learning across all levels and social contexts.

Education is essential for sustainable development because it can help people understand sustainability challenges and develop the values and attitudes they need to live sustainably (UNESCO, 2018). The transition of our economies and societies from an industrial to a knowledge-based model has made education a fundamental element for individual and social progress. Today's education systems must provide high-quality education and skills to meet the demands of increasingly specialised jobs (OECD, 2017; Boston Consulting Group, 2021; McKinsey & Company, 2021). In addition, education emerges as a key player in enabling change and ensuring that economic and business practices are reviewed and reconsidered in the context of the UN SDGs (Shulla et al., 2020; UN Global Compact, 2022). The general notion, given theoretically and empirically by recent studies, is that the development of human capital leads to an increase in innovative entrepreneurs, productivity and production, which ultimately leads to economic growth in the long-run (Diebolt & Hippe, 2019; Deloitte, 2020; Tiruneh et al., 2021). In other words, it has long been believed that the human capital factor is positively associated with quality and sustainable economic growth, as this, human capital, is capable of creating efficiency, influence, creativity, innovation, and enhanced productivity (Prasetyo & Kistanti, 2020). Studies such as the one by Rahman & Alam (2021), who explored the engines of economic growth in some of the 20 largest economies in the world,² confirm the role of human capital and labour as critical factors in enabling economic growth. Knowledge is considered the main production factor, so investment in human capital is essential for competitiveness and economic growth (Becker, 1964; Barro, 2001; Singh Malik, 2018; Hanushek, 2021). Thus, employability in a knowledge-based economy is particularly highlighted by the growing demand for highly skilled workers, which also impacts existing business models and demand for change (Son-Turan, 2022). There is a growing concern that educational models are becoming increasingly aligned with the objectives of businesses. This is evident in the rapid growth of technical programs designed to train students for specific jobs. There are also concerns that the educational system is becoming too focused on the professional career and that the mission of higher education is shifting from education to

² Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Netherland, Russian Federation, Saudi Arabia, Spain, Switzerland, Turkey, United Kingdom and the United States.

human capital development and regional economic growth (Son-Turan, 2020; Sanches et al., 2021; Zepeda Quintana et al., 2022).

According to Bereiter (2002), Moore, (2007), Barnett & Bengtson (2017) and OECD (2017), in the knowledge society, the main challenge for a country's education system is to make learning adherent and aligned with an economic model based on a knowledge-based workforce and driven by the information technology revolution. However, despite the enormous potential of the SDGs, their viability requires arduous implementation, which implies radical changes to the status quo. The achievement of these ambitious goals will bring positive rewards reflected in impacts on well-being for all (Schleicher, Schaafsma, & Vira, 2018; Schleicher, Schaafsma, Burgess, et al., 2018; Helne, 2021). However, the path to a successful implementation of the SDGs necessarily involves incorporating sustainable development concepts into business models, seeking to implement new practices that bring intended social impact. One of the most fundamental flaws in this logic is the absence of a common accountability framework that allows companies to assess, measure, and report their contribution to the SDGs (Angeli & Jaiswal, 2016; Dembek et al., 2018; Ghosh & Rajan, 2019). The extant literature offers significant evidence of the association between low educational attainment and negative implications regarding future socio-economic status (Knapp et al., 2011; Boss et al., 2016; Golberstein et al., 2016; Sosu & Schmidt, 2017; Agasisti et al., 2018; OECD, 2018). Moreover, higher education can lead individuals to better integrate into the labour market, but its role is more than that. It has a higher and more altruistic purpose. We need to explore and consider broader social aspects, such as the direct impact on economic activity, health, the environment, and ultimately, the future of generations and their way of thinking. This can help nurture and promote inclusion and strengthen social cohesion (Hajisoteriou & Neophytou, 2022). Therefore, education emerges as a critical variable to drive the UN 2030 Agenda focus on sustainability. A critical question that emerges at this point is, to what extent is and can education be used to support sustainable economic development? Given recent regress from the SDGs, particularly the economic goals (Sachs et al., 2022), this aspect is examined in the section that follows.

Education for Sustainable Development – The Challenge of Our Days and the Road to the Future

Education, as one of the most influential and proven vehicles for sustainable development, requires more holistic and urgent pedagogies. Since pedagogy is the science whose object of study is education (Murphy, 2003; Feinstein & Kirchgasser, 2015; Yanez et al., 2019), the teaching

and learning process (and as such, it is the necessary instrument for the construction of sustainable development models) - to face the challenges and goals expressed by the United Nations, and postulated by SDG4 (Quality Education) (UN, 2015; Marouli, 2021; Cebrián et al., 2020). Education can be seen both as an end and a means, capable of promoting lifelong learning and thereby providing opportunities for all in an inclusive and equitable manner (Selby & Kagawa, 2014; UN, 2015; Lange, 2019; Walsh et al., 2020; Wamsler, 2020). Based on these principles and objectives, the concepts of Education for Sustainable Development (ESD) and Education for Sustainable Development Goals (ESDG) were established to address the education system's growing challenges. ESD was confirmed in 2002 at the World Conference on Sustainable Development in South Africa, and later, with the advent of the SDGs in 2015, the broader concept of ESDG was incorporated (United Nations, 2015; Koprina, 2020a; Koprina, 2020b).

However, most of the challenges outlined by the SDGs can only be resolved through inclusive and sustainable economic development. This is because inequalities, growing pressures on natural resources, climate change, and social tensions are all the products of economic development models that need to be urgently revised (Adelman, 2018; Barrable, 2019; Smith, 2019; Koprina, 2020). Moreover, this inclusivity must be achieved within planetary boundaries to ensure that natural resource replenishment rates are allowed (Raworth, 2017).

Undoubtedly, the great differentiator of ESD is its dynamism and the incorporation of a new vision of education that is more responsible and committed to building a sustainable future. This enables citizens to assume the transformative role that reality requires (Koprina, 2018; Sinakou et al., 2018; Sinakou et al., 2019; Nousheen et al., 2020). In other words, ESD provides access to the knowledge and skills necessary to shape a sustainable future. It provides each individual with information about the state of the planet, the risks and causes of environmental issues, and the need for attitudes that promote environmental preservation, sustainable economic growth, and social justice for present and future generations (OECD, 2018b; United Nations, 2020; Priyadarshini & Abhilash, 2022). Consequently, ESD can be seen as a transformative mechanism capable of leveraging critical thinking and designing scenarios for a better future at local and global scales since regional decision-making has international effects and consequences (Rieckmann, 2017).

Energy Models and Business Activity

According to the IEA (International Energy Agency, 2021), currently, fossil fuels supply more than 80% of total primary energy demand at global levels. In comparison, more than 90% of energy-

related carbon dioxide emissions come from burning fossil fuels. This is intrinsically linked to population growth and its effects on energy demand. Some countries have a greater dependency on coal, as it is the world's cheapest, most polluting, and most available resource (Ucal & Xydis, 2020). As the world's largest energy consumer, China's economic development has been heavily reliant on fossil fuels. However, supply risks and shortages of fossil fuels are major challenges to sustainable development. Therefore, it is important for China to diversify its energy mix and reduce its reliance on fossil fuels. As suggested by Wang et al. (2019); Tian et al. (2019); Wang et al. (2020); Wen et al. (2021) highlight China's dependence on energy sources based on fossil fuels as a bottleneck for the perpetuation of its economic growth model, even with the country's efforts to reduce such dependence, promoting a shift in its energy matrix.

Extending the analysis to distinguish carbon emission levels between rich and poor economies, we can see that inequality is extreme globally and present in most countries (Institute for European Environmental Policy & Oxfam, 2021). Evidence of a marginal effect of income inequality on carbon emissions per capita supports the hypothesis that there is a trade-off between carbon emissions per capita and income inequality (Rojas-Vallejos & Lastuka, 2020). Recent research studies show that annual global carbon emissions grew by about 60% in the 25-year period from 1990 to 2015. This represents approximately twice the total accumulated global emissions. This unprecedented growth has brought the world dangerously close to over 2°C of warming and is now on the verge of exceeding 1.5°C (Karthi et al., 2020; United Nations, 2021). The current situation is dire, and we have reached this point primarily because of the lack of commitment across countries to mitigate greenhouse gas emissions. A clear example of this stance can be seen in the failure of the 2015 Paris Agreement, which is still the current climate policy benchmark for limiting global warming to below 2°C followed by the disappointing outcomes of COP 26 and COP 27 that show a global lack of commitment towards climate action. In addition, it can be noticed that in recent years, the trend has been the intention of some big polluters to withdraw from the Paris Agreement (Nisbet et al., 2019; Estrada & Botzen, 2021). The Paris Agreement is voluntary and does not explicitly penalise countries for failing to meet their commitments. However, the United States, the world's second-largest emitter of carbon dioxide, withdrew from the agreement in 2017 under President Donald Trump. China is the world's largest emitter, and both countries have high per capita carbon consumption. Therefore, a reversal of global climate change will depend on the willingness of the United States and China to take action to reduce their emissions. The successful mitigation of climate change hinges upon the cooperative commitment of both the United States and China; however, this endeavour also poses intricate

challenges for the global economic landscape. This is not just a problem for these two countries but for the world's largest and most developed economies. The symbiotic relationship between the proactive engagement of the USA and China in addressing climate change and the intricate fabric of global economic interdependencies underscores the imperative of a unified, concerted effort (Parker & Karlsson, 2018; Mildenerger, 2019; Tingley & Tomz, 2020). More recently, the war in Ukraine has significantly impacted the global energy market. The conflict has disrupted supply chains and led to rising energy prices. This has caused a setback in the European-led movement towards the use of cleaner energy sources. Countries are once again turning to fossil fuels to meet their immediate energy needs (Ozili, 2022; Umar et al., 2022; Zhou et al., 2023). Furthermore, the COP 26 meeting in 2021 is another example of countries' lack of commitment to the planet's environmental needs that have been neglected as a result of the Russia and Ukraine war. Moreover, COP 26 and COP 27, while emblematic of international deliberations, have been critiqued for their limited substantive breakthroughs, wherein the pursuit of binding commitments and decisive actions to curb climate change has been hindered by discordant agendas and insufficient consensus among participating nations (Prys-Hansen & Klenke, 2021; Arasaradnam & Hillman, 2022; Fairchild, 2022). Notably, the world's largest carbon-emitting countries failed to articulate concrete targets for reducing emissions from their food and agricultural systems (Tobin & Barrit, 2021; Arasaradnam & Hillman, 2022; Clément, 2022).

The extreme inequality in carbon emissions between 1990 and 2015 has been discussed by Han et al. (2020), Kartha et al. (2020) and Kazemzadeh et al. (2022). With a share of 93% of total global emissions under the responsibility of the highest income groups (the richest 1%, the richest 5% and the richest 10%). The reviewed literature reveals a clear emissions-income trade-off, highlighting striking evidence of significant imbalances and inequalities between poorer and wealthier economies and challenges in diversifying economic models due to high emissions. In summary, we can see that the wealthiest strata of society account for 93% of carbon emissions, while the poorer portion for only 7% of emissions. Pollution, a by-product of economic activity, harms health and overall well-being. The poorest segment of the population suffers the most, facing increased premature mortality rates due to heightened exposure to harmful agents. Additionally, pollution causes substantial economic damage, equivalent to around 5% of a country's Gross Domestic Product. (World Bank, 2017). However, achieving a cleaner world comes with high costs, requiring a profound overhaul of production methods and social organisation as we know it. This is potentially a price that big polluters refuse to pay, which justifies the failures of initiatives like the 2015 Paris Agreement. Evidence of this unwillingness to reconsider and embrace a new production model is apparent in the outcome of the 26th Convention

of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2021. Described as an apparent failure by private sector actors, civil society organisations, and activists, COP 26 aimed to bridge the gap between current climate commitments and the urgent need for transformation by both state and non-state actors. During discussions, the lack of attention given to the significant impact of food systems on climate change contributed to much of COP 26's failure.

We must delve into our past to comprehend the challenges posed by climate change. The Industrial Revolution, which began in the mid-1700s, marked the starting point of significant CO₂ emissions into the atmosphere. Before industrialisation, emissions averaged around 280 ppm. However, in 2015, global emissions surpassed 400 ppm for the first time in history. This remarkable increase implies that emissions escalated from approximately 5 billion tonnes per year in the mid-20th Century to an astounding 35 billion tonnes per year by the Century's end (Lindsey, 2021). The Industrial Revolution began in late 18th Century England and extended throughout the 19th Century, reaching Belgium, Germany, northern France, the United States, and Japan. These countries greatly benefited from this extraordinary event in human history. England, in particular, emerged as a dominant force, both economically and politically, during the Industrial Revolution. The rapid economic growth facilitated the establishment of the British Empire, which involved colonising various regions across the globe. This expansion was made possible by the availability of affordable coal as a fuel source, which played a crucial role in solidifying the new industrial model. The accessibility of inexpensive energy contributed to a decline in capital costs relative to wages, incentivising the substitution of labour with capital (Allen, 2011; Carvalho et al., 2018; Gholami et al., 2021). The evidence reveals that GHG emissions have increased along with human emissions since the beginning of the Industrial Revolution in 1750, reinforcing what was previously described. At this point, it is essential to reflect on the gains achieved by the world's most developed economies, their historical contributions to climate change, and the need to bring new perspectives to the role played by the world's less developed economies.

The link between the Industrial Revolution, rising emissions, and the subsequent buildup of CO₂ in the atmosphere transcended academic discussions. It gained significant attention in the political sphere, particularly during the 1980s when concerns regarding global warming became prominent. One notable instance was UK Prime Minister Margaret Thatcher's renowned address to world leaders at the United Nations Assembly on November 8, 1989. In her speech, she stated the following:

"What we are now doing to the world, by degrading the land surfaces, by polluting the waters and by adding greenhouse gases to the air at an unprecedented rate—all this is new in the experience of the Earth. It is mankind and his activities which are changing the environment of our planet in damaging and dangerous ways (...) We are seeing a vast increase in the amount of carbon dioxide reaching the atmosphere. The annual increase is three billion tonnes: and half the carbon emitted since the Industrial Revolution still remains in the atmosphere." (Margaret Thatcher Foundation, 2022)

Climate change and water scarcity stand out as significant challenges in our era when it comes to aligning with a sustainable development framework. However, the scope extends beyond these issues, as a sustainable development model entails attaining various markers of social welfare. These include education, healthcare, security, equality, economic growth, and the eradication of hunger (Gödecke et al., 2018; Omer et al., 2020; Lenaerts & Demont, 2021). According to Zhang et al. (2020), the world is currently confronting a distressing scenario, with the potential for a tumultuous future marred by environmental imbalances and intense pressures on natural resources, posing a threat to human survival. Economic and business activities have already begun generating adverse consequences that impact the delicate cycle of life. Society is increasingly mobilising, urging governments and civil society institutions to go beyond rhetoric and take practical actions towards sustainability goals. A collective effort is underway to halt or at least slow down the ongoing changes. In this context, the role of education emerges as crucial, as a shift in direction becomes imperative. Urgent reevaluation and proactive measures are needed to transform our current production systems. Global leaders in economics and politics must redirect their focus towards sustainable lifestyles, recognizing the gravity and urgency of environmental issues, climate change, biodiversity loss, and other challenges of the Anthropocene caused by profit-driven choices and outdated fossil fuel-intensive processes. Climate change stands as perhaps the most significant and far-reaching market failure ever witnessed. To mitigate its effects and even reverse its course, countries must reassess their investments in human potential through educational systems, necessitating radical changes to existing educational models (Nordhaus, 2019; Palmer & Stevens, 2019; Rocklöv & Dubrow, 2020). For education to fulfil its transformative role in society, it must focus on equipping students and future generations with the necessary knowledge, skills, values, and attitudes to actively contribute to sustainable development. However, it is equally vital for governments and civil society to embrace and advocate for the teachings of sustainability. This collaborative effort ensures a harmonious promotion of sustainable development, intertwining the concepts of sustainable development and education as

inseparable components (UNESCO, 2018). And here, this new vision of education is in line with the vision and mission of institutions such as EUt+ (European University of Technology). According to EUt+ website, *“EUt+ represents a consortium of eight universities funded by the ERASMUS+ programme call seeking to bring Europe, Universities and Technology together. Here is our shared vision on each of these principles, as articulated around our central pillar “Think Human First – European values empowering technology”* (European University of Technology, 2021). We argue on the need of an educational paradigm shift towards engaging in building an inclusive and sustainable future in the face of unprecedented challenges such as climate change, excessive use of resources, the growing inequality and social impacts of the digital age faced by humanity today. The contemporary paradigm of education transcends its traditional boundaries, evolving into a dynamic instrument for constructing an inclusive and sustainable future amidst the formidable challenges of our era. Recognising the imperatives of climate change mitigation, judicious resource stewardship, and redressing widening social disparities, this new vision of education embodies a pivotal role in nurturing environmentally conscious citizens, fostering innovative solutions, and instilling values of equity and social responsibility, thereby empowering generations to navigate the intricate terrain of the digital age while forging a resilient and harmonious global society. According to this analogy, the answers to these challenges must take into account the needs and aspirations of people and our environment. At the same time, we need to respect freedom and diversity by reaching, through training, the responsible entities so that we can achieve the concept of *“Thinking Human First”* as a basic assumption for the development of our society. Therefore, Education for Sustainable Development (ESD) is pivotal in the imperative transformative agenda we currently require. It represents the convergence of two fundamental concepts that can guide us towards a fairer and more sustainable society. The significance of ESD is explicitly acknowledged in Goal 4.7 of the Sustainable Development Goals (SDGs), where it is recognised as a crucial instrument for attaining the remaining 16 SDGs (United Nations, 2015). As the search for new alternatives in our mode of production and consumption is crucial and constitutes tasks for all of us, the next section will analyse the importance of the education process in this context.

Educating the Government, Businesses and the Population about Economic Sustainability

Globalisation and increased international trade have led to economic liberalisation on a global scale. This has intensified competition among countries, resulting in a differentiation between economically prosperous nations with competitive and comparative advantages. The degree of specialisation within each country plays a critical role in determining its position in this landscape. Developed economies typically exhibit specialisation across multiple sectors, leveraging various competitive advantages in the global market. The level of education and training of a country's workforce significantly influences its economic performance. A developed economy relies on a specialised workforce capable of operating complex production systems, fostering innovation, and sustaining competitive advantages. While other factors, such as resource availability, also contribute to a country's competitive edge, the qualification of the workforce plays a vital role in distinguishing between developed and developing nations. Moreover, it serves as a critical driver for generating positive externalities within the economy (Delgado et al., 2014; Hanushek, 2016; Singh Malik, 2018; Hanushek & Woessmann, 2021; Maneejuk & Yamaka, 2021).

The adoption of the 2030 Agenda for sustainable development brought about a significant shift in priorities regarding education. It highlighted the crucial role of education, no longer confining it solely within the realm of schools but placing it at the heart of strategies to foster sustainable development. It is essential to recognise that educators, governments, and business leaders possess the power to shape the mindset and actions of future leaders. This creates an opportunity for a virtuous cycle, where education, guided by the Sustainable Development Goals (SDGs), plays a pivotal role in nurturing a collective journey towards sustainability (Rao & Ye, 2016; Bento Ambrosio Avelar et al., 2019; Das et al., 2020; Fabbri & Dari-Mattiacci, 2021; UNESCO, 2021). Given that a society's educational standards are a fundamental element in defining its degree of success in dealing with complex issues to promote development, we can infer that the educational level of its leaders directly influences the achievement of the SDGs, which is why the process of educating is also of vital importance for governments (Kolb et al., 2017; Avelar et al., 2022; Frizon & Eugénio, 2022; Greenland et al., 2022).

The attainment of Goal 4 holds strategic significance, as it directly influences the progress of other goals, triggering a cascade of benefits across the Sustainable Development Goals (SDGs). SDG 4 is important in its own right and plays a fundamental role in achieving the other sixteen SDGs, many of which have specific education-related targets. Hence, describing SDG 4 as a universal and transformative goal is fitting. Its principles address global challenges related to education, encompassing access, inclusion, equity, and the quality of life derived from learning outcomes at all levels. We argue that the education system should offer improved social and employment

opportunities while adopting a broader approach to individual development, fostering global citizenship and embracing sustainability principles (Ferguson & Roofe, 2020; Elmassah et al., 2022; Kohl et al., 2022). For example, the eradication of poverty is directly influenced by SDG 4 as it can help break the perverse vicious cycle of poverty. Education, as a potent catalyst for socio-economic transformation, can rupture the cycle of poverty by cultivating critical skills, empowerment, knowledge generation and sharing that can lead towards creating opportunities for all. By equipping individuals with a holistic toolkit of knowledge and abilities, education engenders the capacity to secure gainful employment, innovate, and navigate complex economic landscapes, thereby fostering upward mobility and breaking the shackles of intergenerational poverty.

Conclusions

The role of education as an indispensable and predominant tool for achieving sustainable development for a more just and egalitarian society is indisputable. We are no longer restricted to the idea that education is a variable that does not impact economic development. Robert Lucas, an American economist who was a Nobel laureate in 1995 and one of the most influential macroeconomists of the 20th Century, showed us the opposite. Through the progress of science and building upon the knowledge of our predecessors, we are presented with a remarkable opportunity for evolution. This evolution reveals that one of the primary determinants of a nation's prosperity is the accumulation of human capital through education. Education acts as a catalyst, creating a virtuous cycle that fosters the creation of more equitable conditions, enabling people of all ages to acquire the skills necessary for better employment and improved lives. Consequently, it is imperative for governments to prioritise investments in education to combat sources of potential inequality.

While investment in education is crucial, it is equally important to implement rigorous evaluation and control measures to ensure that resources are allocated and utilised effectively, thereby achieving the desired outcomes. The pursuit of economic development has long been a driving force in our society, occupying a prominent position in the priorities of economists, policymakers, and governments. The significance of economic development and its status as the "holy grail" of economic science cannot be underestimated, as it is through development that we attain well-

being and accommodate population growth, providing future generations with the necessary conditions for survival. This foundation justifies the continuous quest for growth. We cannot forego economic growth, as the consequences would be unimaginable, potentially leading us towards regression and chaos. Hence, reevaluating the concept of economic growth is crucial, with the primary aim being sustainable and inclusive growth that fosters progress, creates decent jobs, and enhances living standards. The underlying logic is that growth enables us to share the wealth we generate. Looking ahead, our greatest asset is the intellectual wealth accumulated through human capital, with education playing a central role in its accumulation. This intangible wealth will collectively empower us to construct a better world through more altruistic endeavours.

This research paper concludes with Paulo Freire's quote, a Brazilian Educator (1921-1997) that communicates to which extent education should be cherished and nurtured, *"Education does not change the world. Education changes people. People change the world."* Our discussions bring us to the concept of *"Thinking Human First"* as a fundamental element for reviewing our mode of production and consumption based on an exacerbated vision of the search for profit maximisation and economic growth. As such, we might reconsider what growth means and how economic elements might need to be revisited. The current catastrophe scenario to which we are already subjected is proof that our modes of economic growth and development have failed, as it has promoted social exclusion and environmental degradation, compromising life as we know it on our planet. It is no exaggeration, therefore, to infer that our future as a species and the continuity of life depend on a sudden, abrupt and rapid change in our attitude towards sustainability and our understanding of economic growth and progress.

References

- Agasisti, T., Avvisati, F., Longobardi, S., & Borgonovi, F. (2018). Academic resilience: What schools and countries do to help the disadvantaged succeed in Pisa. OECD, 167. [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP\(2018\)3&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2018)3&docLanguage=En)
- Allen, C., Metternicht, G., & Wiedmann, T. (2018). Initial progress in implementing the Sustainable Development Goals (SDGs): A review of evidence from countries. *Sustainability Science*, 13(5), 1453–1467.
- Allen, C., Metternicht, G., & Wiedmann, T. (2021). Priorities for science to support national implementation of the sustainable development goals: A review of progress and gaps. *Sustainable Development*, 29(4), 635–652.
- Allen, R. C. (2011). Why the industrial revolution was British: Commerce, induced invention, and the scientific revolution1. *The Economic History Review*, 64(2), 357–384. <https://doi.org/10.1111/j.1468-0289.2010.00532.x>
- Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2018). The elephant curve of global inequality and growth. *AEA Papers and Proceedings*, 108, 103–108.
- Angeli, F., & Jaiswal, A. K. (2016). Business model innovation for inclusive health care delivery at the bottom of the pyramid. *Organization & Environment*, 29(4), 486–507.
- Arasaradnam, R. P., & Hillman, T. (2022). Climate change and health research—lessons from COP26. *Clinical Medicine*, 22(2), 172.
- Avelar, A. B. A., Farina, M. C., & Pereira, R. da S. (2022). Principles for responsible management education—PRME: Collaboration among researchers. *The International Journal of Management Education*, 20(2), 100642. <https://doi.org/10.1016/j.ijme.2022.100642>
- Bali Swain, R., & Yang-Wallentin, F. (2020). Achieving sustainable development goals: Predicaments and strategies. *International Journal of Sustainable Development & World Ecology*, 27:2, 96–106. <https://doi.org/10.1080/13504509.2019.1692316>
- Barnett, R., & Bengtson, S. (2017). Universities and epistemology: From a dissolution of knowledge to the emergence of a new thinking. *Education Sciences*, 7(1), 38.
- Barrable, A. (2019). Refocusing Environmental Education in the Early Years: A Brief Introduction to a Pedagogy for Connection. *Education Sciences*, 9(1). <https://doi.org/10.3390/educsci9010061>
- Beardsley, K., Cunningham, D. E., & White, P. B. (2019). Mediation, peacekeeping, and the severity of civil war. *Journal of Conflict Resolution*, 63(7), 1682–1709.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. National Bureau of Economic Research.
- Bento Ambrosio Avelar, A., Dayane da Silva-Oliveira, K., & da Silva Pereira, R. (2019). Education for advancing the implementation of the Sustainable Development Goals: A systematic approach. *The International Journal of Management Education*. <https://doi.org/10.1016/j.ijme.2019.100322>
- Bereiter, C. (2002). Education in a knowledge society. *Liberal Education in a Knowledge Society*, 11–34.

- Blind, P. K. & others. (2020). *How Relevant is Governance to Financing for Development and Partnerships? Interlinking SDG16 and SDG17 at the Target Level*.
- Boss, P., Bryant, C. M., & Mancini, J. A. (2016). *Family stress management: A contextual approach*. Sage Publications.
- Boston Consulting Group. (2021). *Lessons in Corporate Learning for Education Technology Companies*.
- Boyce, J. (2019). *Economics for people and the planet: Inequality in the era of climate change*. Anthem Press.
- Briant Carant, J. (2017). Unheard voices: A critical discourse analysis of the Millennium Development Goals' evolution into the Sustainable Development Goals. *Third World Quarterly*, 38(1), 16–41. <https://doi.org/10.1080/01436597.2016.1166944>
- Brown, P., & James, D. (2020). Educational expansion, poverty reduction and social mobility: Reframing the debate. *International Journal of Educational Research*, 100, 101537. <https://doi.org/10.1016/j.ijer.2020.101537>
- Carrington, S. (2017). Inclusive education. In *Inclusive Education* (pp. 233–248). Springer.
- Carvalho, N., Chaim, O., Cazarini, E., & Gerolamo, M. (2018). Manufacturing in the fourth industrial revolution: A positive prospect in sustainable manufacturing. *Procedia Manufacturing*, 21, 671–678.
- Cebrián, G., Junyent, M., & Mulà, I. (2020). Competencies in Education for Sustainable Development: Emerging Teaching and Research Developments. *Sustainability*, 12(2). <https://doi.org/10.3390/su12020579>
- Ch, R., Shapiro, J., Steele, A., & Vargas, J. F. (2018). Endogenous taxation in ongoing internal conflict: The case of Colombia. *American Political Science Review*, 112(4), 996–1015.
- Chancel, L. (2020). *Unsustainable inequalities: Social justice and the environment*. Harvard University Press.
- Chancel, L., & Piketty, T. (2021). Global Income Inequality, 1820-2020: The Persistence and Mutation of Extreme Inequality. *World Inequality Lab*.
- Clayton, G., & Dorussen, H. (2022). The effectiveness of mediation and peacekeeping for ending conflict. *Journal of Peace Research*, 59(2), 150–165.
- Clément, C. W.-Y. (2022). Copping Out on Food Systems: How COP26 Failed to Address Food and Climate and How COP27 Can Solve It. *Journal of Agricultural and Environmental Ethics*, 35(4), 20. <https://doi.org/10.1007/s10806-022-09893-4>
- Cremin, H., Echavarría, J., & Kester, K. (2018). Transrational peacebuilding education to reduce epistemic violence. *Peace Review*, 30, 295–302.
- Das, I., Klug, T., Krishnapriya, P., Plutshack, V., Sapparapa, R., Scott, S., & Pattanayak, S. (2020). A virtuous cycle. *Reviewing the Evidence on Women's Empowerment and Energy Access, Frameworks, Metrics and Methods*. Available Online: <https://Energyaccess.duke.edu/Wp-Content/Uploads/2020/11/White-Paper-on-Gender-and-Energy-Access-Oct-2020.Pdf> (Accessed on 23 November 2021).
- Dasandi, N., & Mikhaylov, S. J. (2019). AI for SDG 16 on Peace, Justice, and Strong Institutions: Tracking Progress and Assessing Impact. *Position Paper for the IJCAI Workshop on Artificial Intelligence and United Nations Sustainable Development Goals*.

Dashwood, H. S. (2012). *The rise of global corporate social responsibility: Mining and the spread of global norms*. Cambridge University Press.

Dawes, J. H. (2020). Are the Sustainable Development Goals self-consistent and mutually achievable? *Sustainable Development*, 28(1), 101–117.

de Paula Arruda Filho, N. (2017). The agenda 2030 for responsible management education: An applied methodology. *The International Journal of Management Education*, 15(2), 183–191.

Delgado, M. S., Henderson, D. J., & Parmeter, C. F. (2014). Does education matter for economic growth? *Oxford Bulletin of Economics and Statistics*, 76(3), 334–359.

Deloitte. (2020). *An innovative approach to recruiting and admissions in higher education*.

Diebolt, C., & Hippe, R. (2019). The long-run impact of human capital on innovation and economic development in the regions of Europe. *Applied Economics*, 51(5), 542–563. <https://doi.org/10.1080/00036846.2018.1495820>

Doyle, M. W., & Stiglitz, J. E. (2014). Eliminating extreme inequality: A sustainable development goal, 2015–2030. *Ethics & International Affairs*, 28(1), 5–13.

Elmassah, S., Biltagy, M., & Gamal, D. (2022). Framing the role of higher education in sustainable development: A case study analysis. *International Journal of Sustainability in Higher Education*, 23(2), 320–355. <https://doi.org/10.1108/IJSHE-05-2020-0164>

Estrada, F., & Botzen, W. J. W. (2021). Economic impacts and risks of climate change under failure and success of the Paris Agreement. *Annals of the New York Academy of Sciences*, 1504(1), 95–115. <https://doi.org/10.1111/nyas.14652>

European University of Technology. (2021). <https://www.univ-tech.eu/mission-statement>. Retrieved August 14, 2023, from <https://www.univ-tech.eu/mission-statement>

Fabbri, M., & Dari-Mattiacci, G. (2021). The virtuous cycle of property. *Review of Economics and Statistics*, 103(3), 413–427.

Fairchild, R. J. (2022). How Successful Will Be the Cop26 Agreement on De-Forestation?: A Game Theoretic Analysis. *A Game Theoretic Analysis (February 23, 2022)*.

Feinstein, N. W., & Kirchgasser, K. L. (2015). Sustainability in science education? How the Next Generation Science Standards approach sustainability, and why it matters. *Science Education*, 99(1), 121–144.

Ferguson, T., & Roofe, C. G. (2020). SDG 4 in higher education: Challenges and opportunities. *International Journal of Sustainability in Higher Education*, 21(5), 959–975. <https://doi.org/10.1108/IJSHE-12-2019-0353>

Forrer, J. J., & Katsos, J. E. (2015). Business and Peace in the Buffer Condition. *Academy of Management Perspectives*, 29(4), 438–450. <https://doi.org/10.5465/amp.2013.0130>

Frizon, J. A., & Eugénio, T. (2022). Recent developments on research in sustainability in higher education management and accounting areas. *The International Journal of Management Education*, 20(3), 100709. <https://doi.org/10.1016/j.ijme.2022.100709>

Ganson, B. (2019). Business and peace: A need for new questions and systems perspectives. *Business and Peacebuilding: Beyond the Sustainable Development Goals*.

Gholami, H., Abu, F., Lee, J. K. Y., Karganroudi, S. S., & Sharif, S. (2021). Sustainable Manufacturing 4.0—Pathways and Practices. *Sustainability*, 13(24), 13956.

- Ghosh, S., & Rajan, J. (2019). The business case for SDGs: An analysis of inclusive business models in emerging economies. *International Journal of Sustainable Development & World Ecology*, 26(4), 344–353. <https://doi.org/10.1080/13504509.2019.1591539>
- Ghoshal, S. (2005) 'Bad Management Theories are Destroying Good Management Practices', *Academy of Management Learning and Education*, Vol. 4, No. 1, pp. 75 - 91.
- Glavič, P. (2020). Identifying key issues of education for sustainable development. *Sustainability*, 12(16), 6500.
- Gödecke, T., Stein, A. J., & Qaim, M. (2018). The global burden of chronic and hidden hunger: Trends and determinants. *Global Food Security*, 17, 21–29.
- Golberstein, E., Gonzales, G., & Meara, E. (2016). *Economic conditions and children's mental health*. National Bureau of Economic Research.
- Gore, T., Alestig, M., & Ratcliff, A. (2020). *Confronting Carbon Inequality*. Oxfam.
- Greenland, S., Saleem, M., Misra, R., & Mason, J. (2022). Sustainable management education and an empirical five-pillar model of sustainability. *The International Journal of Management Education*, 20(3), 100658. <https://doi.org/10.1016/j.ijme.2022.100658>
- Hajisoteriou, C., & Neophytou, L. (2022). The role of the OECD in the development of global policies for migrant education. *Education Inquiry*, 13(2), 127–150. <https://doi.org/10.1080/20004508.2020.1863632>
- Han, M., Lao, J., Yao, Q., Zhang, B., & Meng, J. (2020). Carbon inequality and economic development across the Belt and Road regions. *Journal of Environmental Management*, 262, 110250.
- Hansen, J. H., Carrington, S., Jensen, C. R., Molbæk, M., & Secher Schmidt, M. C. (2020). The collaborative practice of inclusion and exclusion. *Nordic Journal of Studies in Educational Policy*, 6(1), 47–57. <https://doi.org/10.1080/20020317.2020.1730112>
- Hantzopoulos, M., & Bajaj, M. (2021). *Educating for peace and human rights: An introduction*. Bloomsbury Publishing.
- Hanushek, E. A. (2016). Will more higher education improve economic growth? *Oxford Review of Economic Policy*, 32(4), 538–552.
- Hanushek, E. A. (2021). Education and Economic Growth. *Hoover Institution*. <https://doi.org/10.1093/acrefore/9780190625979.013.651>
- Helne, T. (2021). Well-being for a better world: The contribution of a radically relational and nature-inclusive conception of well-being to the sustainability transformation. *Sustainability: Science, Practice and Policy*, 17(1), 220–230.
- Huan, Y., Liang, T., Li, H., & Zhang, C. (2021). A systematic method for assessing progress of achieving sustainable development goals: A case study of 15 countries. *Science of the Total Environment*, 752, 141875.
- Institute for European Environmental Policy, & Oxfam. (2021). *Carbon Inequality in 2030: Per capita consumption emissions and the 1.5°C goal*.
- International Energy Agency. (2021). *Net Zero by 2050 A Roadmap for the Global Energy Sector*.
- Išoraite, M. (2019). The Importance of Education in Peace Marketing. *Munich Personal RePEc Archive*, 91262. <https://mpra.ub.uni-muenchen.de/91262/>

- Kaltenborn, M., Krajewski, M., & Kuhn, H. (2020). *Sustainable development goals and human rights*. Springer Nature.
- Kang, H. (2022). Impacts of Income Inequality and Economic Growth on CO2 Emissions: Comparing the Gini Coefficient and the Top Income Share in OECD Countries. *Energies*, 15(19). <https://doi.org/10.3390/en15196954>
- Kartha, S., Kemp-Benedict, E., Ghosh, E., Nazareth, A., & Gore, T. (2020). The Carbon Inequality Era. *Stockholm Environment Institute*.
- Katsos, J. E., & AlKafaji, Y. (2019). Business in war zones: How companies promote peace in Iraq. *Journal of Business Ethics*, 155(1), 41–56.
- Kazemzadeh, E., Fuinhas, J. A., & Koengkan, M. (2022). The impact of income inequality and economic complexity on ecological footprint: An analysis covering a long-time span. *Journal of Environmental Economics and Policy*, 11(2), 133–153.
- Kelegama, S. (2014). *Redefining the global partnership for development*. Southern Voice on Post-MDG International Development Goals, 2014.
- Kohl, K., Hopkins, C., Barth, M., Michelsen, G., Dlouhá, J., Razak, D. A., Abidin Bin Sanusi, Z., & Toman, I. (2022). A whole-institution approach towards sustainability: A crucial aspect of higher education's individual and collective engagement with the SDGs and beyond. *International Journal of Sustainability in Higher Education*, 23(2), 218–236. <https://doi.org/10.1108/IJSHE-10-2020-0398>
- Kolb, M., Fröhlich, L., & Schmidpeter, R. (2017). Implementing sustainability as the new normal: Responsible management education – From a private business school's perspective. *The International Journal of Management Education*, 15(2), 280–292. <https://doi.org/10.1016/j.ijme.2017.03.009>
- Kolk, A., Kourula, A., Pisani, N., Westermann-Behaylo, M., & Worring, M. (2018). Embracing the Un Sustainable Development Goals? Big Data Analysis of Changes in the Corporate Sustainability Agenda. *Academy of Management Global Proceedings*, 2018, 51.
- Kopnina, H. (2020a). Education for Sustainable Development Goals (ESDG): What Is Wrong with ESDGs, and What Can We Do Better? *Education Sciences*, 10(10). <https://doi.org/10.3390/educsci10100261>
- Kopnina, H. (2020b). Education for the future? Critical evaluation of education for sustainable development goals. *The Journal of Environmental Education*, 51(4), 280–291. <https://doi.org/10.1080/00958964.2019.1710444>
- Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2019). Digital entrepreneurship. *International Journal of Entrepreneurial Behavior & Research*, 25(2), 353–375. <https://doi.org/10.1108/IJEER-06-2018-0425>
- Lange, E. A. (2019). Transformative Learning for Sustainability. In W. Leal Filho (Ed.), *Encyclopedia of Sustainability in Higher Education* (pp. 1954–1966). Springer International Publishing. https://doi.org/10.1007/978-3-030-11352-0_104
- Lazarus, L. (2020). Securitizing sustainable development? The coercive sting in SDG 16. In *Sustainable Development Goals and Human Rights* (pp. 155–169). Springer, Cham.
- Leicht, A., Combes, B., Byun, W. J., & Agbedahin, A. V. (2018). From Agenda 21 to Target 4.7: The development of education for sustainable development. *Issues and Trends in Education for Sustainable Development*, 25.

- Leininger, J., Lührmann, A., & Sigman, R. (2019). *The relevance of social policies for democracy: Preventing autocratisation through synergies between SDG 10 and SDG 16*. Discussion Paper.
- Lenaerts, B., & Demont, M. (2021). The global burden of chronic and hidden hunger revisited: New panel data evidence spanning 1990–2017. *Global Food Security*, 28, 100480.
- Lincoln Lenderking, H., Robinson, S., & Carlson, G. (2021). Climate change and food security in Caribbean small island developing states: Challenges and strategies. *International Journal of Sustainable Development & World Ecology*, 28(3), 238–245. <https://doi.org/10.1080/13504509.2020.1804477>
- Lindsey, R. (2021). Climate Change: Atmospheric Carbon Dioxide. *Climate.Gov*. <https://www.climate.gov/news-features/understanding-climate/>
- MacDonald, S. (2018). Peacebuilding and the private sector. In *Integrated Peacebuilding* (pp. 127–150). Routledge.
- Marouli, C. (2021). Sustainability Education for the Future? Challenges and Implications for Education and Pedagogy in the 21st Century. *Sustainability*, 13(5). <https://doi.org/10.3390/su13052901>
- McKinsey & Company. (2021). *How to transform higher education institutions for the long term*.
- Melin, M. M. (2021). The business of peace: Understanding corporate contributions to conflict management. *International Interactions*, 47(1), 107–134. <https://doi.org/10.1080/03050629.2020.1723581>
- Miklian, J. (2019). The role of business in sustainable development and peacebuilding: Observing interaction effects. *Business and Politics*, 21, 1–33. <https://doi.org/10.1017/bap.2019.28>
- Mildenberger, M. (2019). Support for climate unilateralism. *Nature Climate Change*, 9(3), 187–188.
- Milton, S. (2021). Higher education and sustainable development goal 16 in fragile and conflict-affected contexts. *Higher Education*, 81(1), 89–108.
- Moore, R. (2007). *Sociology of knowledge and education*. A&C Black.
- Murphy, P. (2003). Defining pedagogy. In *Equity in the classroom* (pp. 17–30). Routledge.
- Nash, R. (1990). Bourdieu on education and social and cultural reproduction. *British journal of sociology of education*, 11(4), 431–447.
- Nisbet, E. G., Manning, M. R., Dlugokencky, E. J., Fisher, R. E., Lowry, D., Michel, S. E., Myhre, C. L., Platt, S. M., Allen, G., Bousquet, P., Brownlow, R., Cain, M., France, J. L., Hermansen, O., Hossaini, R., Jones, A. E., Levin, I., Manning, A. C., Myhre, G., ... White, J. W. C. (2019). Very Strong Atmospheric Methane Growth in the 4 Years 2014–2017: Implications for the Paris Agreement. *Global Biogeochemical Cycles*, 33(3), 318–342. <https://doi.org/10.1029/2018GB006009>
- Nordhaus, W. (2019). Climate Change: The Ultimate Challenge for Economics. *American Economic Review*, 109(6), 1991–2014. <https://doi.org/10.1257/aer.109.6.1991>
- Nousheen, A., Zai, S. A. Y., Waseem, M., & Khan, S. A. (2020). Education for sustainable development (ESD): Effects of sustainability education on pre-service teachers' attitude towards sustainable development (SD). *Journal of Cleaner Production*, 250, 119537.
- OECD. (2017). *Education Policy Implementation: A Literature Review and Proposed Framework*.

- OECD. (2018a). *Equity in Education*. <https://www.oecd-ilibrary.org/content/publication/9789264073234-en>
- OECD. (2018b). *The future of education and skills Education 2030*. [https://www.oecd.org/education/2030-project/contact/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030-project/contact/E2030%20Position%20Paper%20(05.04.2018).pdf)
- OECD. (2021). *OECD Economic Outlook* (No. 2021).
- Omer, A., Ahmed Elagib, N., Zhuguo, M., Saleem, F., & Mohammed, A. (2020). Water scarcity in the Yellow River Basin under future climate change and human activities. *Science of The Total Environment*, 749. <https://doi.org/10.1016/j.scitotenv.2020.141446>
- Ozili, P. K. (2022). *Global Economic Consequence of Russian Invasion of Ukraine*. <http://dx.doi.org/10.2139/ssrn.4064770>
- Palmer, T., & Stevens, B. (2019). The scientific challenge of understanding and estimating climate change. *Proceedings of the National Academy of Sciences*, 116(49), 24390–24395. <https://doi.org/10.1073/pnas.1906691116>
- Parker, C. F., & Karlsson, C. (2018). The UN climate change negotiations and the role of the United States: Assessing American leadership from Copenhagen to Paris. *Environmental Politics*, 27(3), 519–540.
- Pata, U. K., & Caglar, A. E. (2021). Investigating the EKC hypothesis with renewable energy consumption, human capital, globalization and trade openness for China: Evidence from augmented ARDL approach with a structural break. *Energy*, 216, 119220.
- Pham-Truffert, M., Metz, F., Fischer, M., Rueff, H., & Messerli, P. (2020). Interactions among Sustainable Development Goals: Knowledge for identifying multipliers and virtuous cycles. *Sustainable Development*, 28(5), 1236–1250. <https://doi.org/10.1002/sd.2073>
- Prasetyo, P. E., & Kistanti, N. R. (2020). Human Capital, Institutional Economics and Entrepreneurship as a Driver for Quality & Sustainable Economic Growth. *Entrepreneurship and Sustainability Issues*, 7(4). [https://doi.org/10.9770/jesi.2020.7.4\(1\)](https://doi.org/10.9770/jesi.2020.7.4(1))
- Preece, J. (2018). *Combating social exclusion in university adult education*. Routledge.
- Priyadarshini, P., & Abhilash, P. C. (2022). Rethinking of higher education institutions as complex adaptive systems for enabling sustainability governance. *Journal of Cleaner Production*, 359, 132083. <https://doi.org/10.1016/j.jclepro.2022.132083>
- Prys-Hansen, M., & Klenke, J. (2021). *Requirements for a Successful COP 26: Commitment, Responsibilities, Trust*.
- Rahman, M., & Farin, S. M. (2019). Rethinking Development Effectiveness: Insights from Literature Review. *Southern Voice*.
- Rahman, M. M., & Alam, K. (2021). Exploring the driving factors of economic growth in the world's largest economies. *Elsevier*. <https://doi.org/10.1016/j.heliyon.2021.e07109>
- Rammelt, C.F., Gupta, J., Liverman, D., Scholtens, J., Ciobanu, D., Abrams, J.F., Bai, X., Gifford, L., Gordon, C., Hurlbert, M. & Inoue, C.Y., (2022). Impacts of Meeting Minimum Access on Critical Earth Systems amidst the Great Inequality.
- Rao, J., & Ye, J. (2016). From a virtuous cycle of rural-urban education to urban-oriented rural basic education in China: An explanation of the failure of China's Rural School Mapping Adjustment policy. *Journal of Rural Studies*, 47, 601–611.

- Raworth, K. (2017). *Doughnut economics: seven ways to think like a 21st-century economist*. Chelsea Green Publishing.
- Rieckmann, M. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO Publishing.
- Rieckmann, M. (2018). Learning to transform the world: Key competencies in Education for Sustainable Development. *Issues and Trends in Education for Sustainable Development*, 39, 39–59.
- Rocklöv, J., & Dubrow, R. (2020). Climate change: An enduring challenge for vector-borne disease prevention and control. *Nature Immunology*, 21(5), 479–483. <https://doi.org/10.1038/s41590-020-0648-y>
- Rojas-Vallejos, J., & Lastuka, A. (2020). The income inequality and carbon emissions trade-off revisited. *Energy Policy*, 139, 111302. <https://doi.org/10.1016/j.enpol.2020.111302>
- Sachs, J., Schmidt-Traub, G., Kroll, C., Durand-Delacre, D., & Teksoz, K. (2016). *SDG index & dashboards: A global report*.
- Sachs, J., Kroll, C., Lafortune, G., Fuller, G. and Woelm, F., 2022. *Sustainable development report 2022*. Cambridge University Press.
- Saiz, I., & Donald, K. (2017). Tackling inequality through the Sustainable Development Goals: Human rights in practice. *The International Journal of Human Rights*, 21(8), 1029–1049. <https://doi.org/10.1080/13642987.2017.1348696>
- Sanches, F. E. F., Campos, M. L., Gaio, L. E., & Belli, M. M. (2021). Proposal for sustainability action archetypes for higher education institutions. *International Journal of Sustainability in Higher Education*.
- Schleicher, J., Schaafsma, M., Burgess, N. D., Sandbrook, C., Danks, F., Cowie, C., & Vira, B. (2018). Poorer without it? The neglected role of the natural environment in poverty and well-being. *Sustainable Development*, 26(1), 83–98.
- Schleicher, J., Schaafsma, M., & Vira, B. (2018). Will the Sustainable Development Goals address the links between poverty and the natural environment? *Elsevier*, 34, 43–47. <https://doi.org/10.1016/j.cosust.2018.09.004>
- Schouten, P., & Miklian, J. (2018). The business-peace nexus: 'business for peace' and the reconfiguration of the public/private divide in global governance. *Journal of International Relations and Development*, 23. <https://doi.org/10.1057/s41268-018-0144-2>
- Selby, D., & Kagawa, F. (2014). *Sustainability frontiers: Critical and transformative voices from the borderlands of sustainability education*. Verlag Barbara Budrich.
- Shulla, K., Filho, W. L., Lardjane, S., Sommer, J. H., & Borgemeister, C. (2020). Sustainable development education in the context of the 2030 Agenda for sustainable development. *International Journal of Sustainable Development & World Ecology*, 27(5), 458–468. <https://doi.org/10.1080/13504509.2020.1721378>
- Sinakou, E., Boeve-de Pauw, J., & Van Petegem, P. (2019). Exploring the concept of sustainable development within education for sustainable development: Implications for ESD research and practice. *Environment, Development and Sustainability*, 21(1), 1–10. <https://doi.org/10.1007/s10668-017-0032-8>
- Sinakou, E., Pauw, J. B., Goossens, M., & Petegem, P. V. (2018). Academics in the field of Education for Sustainable Development: Their conceptions of sustainable development. *Journal of Cleaner Production*, 184, 321–332. <https://doi.org/10.1016/j.jclepro.2018.02.279>

- Singh Malik, R. (2018). Educational Challenges in 21st Century and Sustainable Development. *Journal of Sustainable Development Education and Research*, 2(1), 9–20.
- Smith, G., & Archer, R. (2020). Climate, population, food security: Adapting and evolving in times of global change. *International Journal of Sustainable Development & World Ecology*, 27(5), 419–423.
- Smith, T. S. (2019). *Sustainability, well-being and the posthuman turn*. Springer.
- Son-Turan, S. (2020). The HESFS for higher education funding, employment and sustainability. *International Journal of Sustainability in Higher Education*, 22(1), 100–119.
- Son-Turan, S. (2022). Fostering Equality in Education: The Blockchain Business Model for Higher Education (BBM-HE). *Sustainability*, 14(2955). <https://doi.org/10.3390/su14052955>
- Sosu, E. M., & Schmidt, P. (2017). Economic Deprivation and Its Effects on Childhood Conduct Problems: The Mediating Role of Family Stress and Investment Factors. *Frontiers in Psychology*, 8. <https://www.frontiersin.org/article/10.3389/fpsyg.2017.01580>
- Spaiser, V., Ranganathan, S., Swain, R. B., & Sumpter, D. J. (2017). The sustainable development oxymoron: Quantifying and modelling the incompatibility of sustainable development goals. *International Journal of Sustainable Development & World Ecology*, 24(6), 457–470.
- Tian, X., Chen, B., Geng, Y., Zhong, S., Gao, C., Wilson, J., Cui, X., & Dou, Y. (2019). Energy footprint pathways of China. *Energy*, 180, 330–340. <https://doi.org/10.1016/j.energy.2019.05.103>
- Tingley, D., & Tomz, M. (2020). International commitments and domestic opinion: The effect of the Paris Agreement on public support for policies to address climate change. *Environmental Politics*, 29(7), 1135–1156. <https://doi.org/10.1080/09644016.2019.1705056>
- Tiruneh, E. A., Sacchetti, S., & Tortia, E. C. (2021). The effect on economic development of creative class versus human capital: Panel evidence from German regions. *European Planning Studies*, 29(1), 75–93. <https://doi.org/10.1080/09654313.2020.1821611>
- Tobin, P., & Barrit. (2021). Glasgow's COP26: The Need for Urgency at 'The Next Paris.' *Political Insight*, 12, 4–7. <https://doi.org/10.1177/20419058211044997>
- Ucal, M., & Xydis, G. (2020). Multidirectional Relationship between Energy Resources, Climate Changes and Sustainable Development: Technoeconomic Analysis. *Sustainable Cities and Society - Elsevier*, 60. <https://doi.org/10.1016/j.scs.2020.102210>
- Umar, M., Riaz, Y., & Yousaf, I. (2022). Impact of Russian-Ukraine war on clean energy, conventional energy, and metal markets: Evidence from event study approach. *Resources Policy*, 79, 102966. <https://doi.org/10.1016/j.resourpol.2022.102966>
- UNESCO. (2017). *A Decade of Progress on Education for Sustainable Development Reflections from the UNESCO Chairs Programme*.
- UNESCO. (2018). *Issues and trends in Education for Sustainable Development*. UNESCO Publishing.
- United Nations. (2012). *Resolution adopted by the General Assembly on 27 July 2012*. https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E
- United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development* [Technical Report]. UN. sustainabledevelopment.un.org
- United Nations. (2020). *Education for Sustainable Development A roadmap*. <https://www.gcedclearinghouse.org/sites/default/files/resources/200782eng.pdf>

- United Nations. (2021). *The Sustainable Development Goals Report*. United Nations Publications. <https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf>
- United Nations Global Compact. (2015). *Advancing the Sustainable Development Goals by Supporting Peace: How Business Can Contribute*.
- United Nations Research Institute for Social Development. (2017). *Global Trends: Challenges and Opportunities in the Implementation of the Sustainable Development Goal*. United Nations Development Programme.
- Vaio, A. D., Palladino, R., Hassan, R., & Escobar, O. (2020). Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *Journal of Business Research*, 121, 283–314. <https://doi.org/10.1016/j.jbusres.2020.08.019>
- Walsh, Z., Böhme, J., Lavelle, B. D., & Wamsler, C. (2020). Transformative education: Towards a relational, justice-oriented approach to sustainability. *International Journal of Sustainability in Higher Education*, 21(7), 1587–1606. <https://doi.org/10.1108/IJSHE-05-2020-0176>
- Wamsler, C. (2020). Education for sustainability. *International Journal of Sustainability in Higher Education*, 21(1), 112–130. <https://doi.org/10.1108/IJSHE-04-2019-0152>
- Wan, G., Wang, C., Wang, J., & Zhang, X. (2022). The income inequality-CO2 emissions nexus: Transmission mechanisms. *Ecological Economics*, 195, 107360.
- Wang, H., Wang, G., Qi, J., Schandl, H., Li, Y., Feng, C., Yang, X., Wang, Y., Wang, X., & Liang, S. (2020). Scarcity-weighted fossil fuel footprint of China at the provincial level. *Applied Energy*, 258, 114081. <https://doi.org/10.1016/j.apenergy.2019.114081>
- Wang, K., Wu, M., Sun, Y., Shi, X., Sun, A., & Zhang, P. (2019). Resource abundance, industrial structure, and regional carbon emissions efficiency in China. *Resources Policy*, 60, 203–214. <https://doi.org/10.1016/j.resourpol.2019.01.001>
- Watermeyer, R., & Olssen, M. (2016). 'Excellence' and Exclusion: The Individual Costs of Institutional Competitiveness. *Minerva*, 54(2), 201–218. <https://doi.org/10.1007/s11024-016-9298-5>
- Wen, W., Feng, C., Zhou, H., Zhang, L., Wu, X., Qi, J., Yang, X., & Liang, Y. (2021). Critical provincial transmission sectors for carbon dioxide emissions in China. *Renewable and Sustainable Energy Reviews*, 149, 111415. <https://doi.org/10.1016/j.rser.2021.111415>
- Williams, O. F., & Park, S. Y.-S. (2019). "Business for Peace" (B4P): Can this new global governance paradigm of the United Nations Global Compact bring some peace and stability to the Korean peninsula? *Asian Journal of Business Ethics*, 8(2), 173–193. <https://doi.org/10.1007/s13520-019-00093-4>
- Winkler, I., & Williams, C. (2018). *The sustainable development goals and human rights: A critical early review*. Routledge.
- World Bank. (2017). *Toward a Clean World for All*. World Bank. <https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/pollutionmanagement.pdf>
- Yanez, G. A., Thumlert, K., De Castell, S., & Jenson, J. (2019). Pathways to sustainable futures: A "production pedagogy" model for STEM education. *Futures*, 108, 27–36.
- Zepeda Quintana, D. S., Esquer, J., & Munguía, N. (2022). Factors that Hinder the Implementation of Sustainability Initiatives in Higher Education Institutions. *The Wiley Handbook of Sustainability in Higher Education Learning and Teaching*, 79–98.

Zhou, X.-Y., Lu, G., Xu, Z., Yan, X., Khu, S.-T., Yang, J., & Zhao, J. (2023). Influence of Russia-Ukraine War on the Global Energy and Food Security. *Resources, Conservation and Recycling*, 188, 106657. <https://doi.org/10.1016/j.resconrec.2022.106657>