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Percorsi di geografie letterarie, percettive, educative e dello sviluppo locale

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Zero Waste for geographical education on sustainability

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Abstract

Environmental education is vital for raising awareness of sustainable development. Zero Waste is a holistic model that goes beyond waste reduction and recycling, and calls for a reshaping of contemporary modes of production and consumption while also promoting active citizenship awareness. Exploring Zero Waste principles, this article situates and demonstrates its alignment with key international documents, such as the United Nations' *2030 Agenda for Sustainable Development*. Already used in some educational contexts, the Zero Waste model has the potential to encourage a new perspective to fundamentally reconsider and redesign our relationship to what it means to be actively more sustainable, through a systemic and circular approach. We outline how educational geography and sustainability practices can both benefit from, and support, a dialogue with Zero Waste principles.

Keywords: waste; sustainability; Zero Waste; educational processes; geographical education.

1. Introduction

Waste is a complex pressing issue that requires urgent solutions, generating new research in the field of geography. A growing number of articles are dedicated to waste-related topics, such as waste fluxes (Davies 2012), the challenges of waste management in cities (Zaman 2015), waste as a generator of conflicts (De Rosa 2018), and the difference in research approaches between the Global North and South (Millington and Lawhon 2019). Despite these recent additions to the literature, the

role of education for sustainability has long been emphasised (Huckle and Sterling 1996), as well as the links between education, environmental attitudes and behaviour (Grodzinska-Jurczak *et al.* 2003).

Zero Waste is a holistic concept that has received increasing interest (Zaman 2015), yet how this approach can contribute from an educational perspective remains to be fully explored (Venturini 2021). The aim of this article is to show that Zero Waste is a concept that offers dialogue and practical implementation between the disciplines of education, sustainability and geography, both theoretically and in practice via examples of external education programmes.

This paper locates Zero Waste within the United Nations' *Transforming Our World: The 2030 Agenda for Sustainable Development* (2015), especially Sustainable Development Goal (SDG) 4 on ensuring inclusive and quality education for all. Additionally, the *International Charter on Geographical Education* (IGU-UGI 2016) also provides scope for addressing waste education. The paper first outlines the importance of sustainability and waste from an education perspective, highlighting that education has a vital role in promoting wider awareness and actions towards sustainability. Next, the Zero Waste approach is explained in more detail, followed by an exploration of where it sits against the key documents mentioned above, with a focus on sustainability as it relates to waste management and educational curricula. We then provide examples of some current Zero Waste educational programmes, noting that they are generally managed by external organizations and yet to be officially incorporated into school curricula, with the majority focused on recycling. This paper concludes by situating Zero Waste as a strong example of an interdisciplinary approach that combines geography, education and sustainability, with the potential to educate citizens and encourage them to fundamentally reconsider their actions and perspectives on sustainability.

2. A waste approach in environmental sustainability education

The *Earth Charter*[1], in relation to ecological integrity and patterns of production and consumption, urges the need for choices and measures where people can "reduce, reuse, and recycle the materials used in pro-

[1] The *Earth Charter* (2000) was drafted and developed by an independent commission in order to relaunch certain fundamental principles and themes that emerged from the Earth Summit of Rio de Janeiro (1992).

duction and consumption systems, and ensure that residual waste can be assimilated by ecological systems" (Earth Charter 2000, 2). The idea that production, with its concomitant output of waste, closely depends on traditional models of production and consumption is clearly stated. Moreover, it underlines how the theme of waste is not independent from a careful evaluation of Earth's natural systems and its capacity for absorption and regeneration. The considerations proposed by the *Earth Charter* have been deeply influenced by debates on sustainable development on the one hand, and by those regarding the planet as a common home on the other, as promoted by the Brundtland Commission (1987). Thus, our contribution lies within a new international path of theorising the main parameters of economic culture and social organisation, especially as it views the earth's systems in a holistic manner.

In 2015, the SDGs outlined the focus of a new international agenda. However, the goals remain far from being fully achieved. Lack of progress is not ascribable to any single economic, political, scientific, technologic or cultural cause. However, educational messaging is low and under-utilised, especially on the knowledge, values and behaviours able to motivate and activate people and communities relating to the care of Earth as a common home (Pope Francesco 2015).

Education has a central role in promoting wider awareness and actions in relation to sustainability. It can refer both to formal and institutionalized education, which has a clear contextualization, and to educational suggestions made by many non-formal agencies that are born and developed in everyday informality (Kolbe 2019). This is not a recent belief regarding environmental education; the *Tbilisi Declaration*, for example, was developed by UNESCO and the United Nations Environment Programme (UNEP) in 1977. On the key function of education and harmonious interaction with the natural environment, the declaration states:

> For this purpose, environmental education should provide the necessary knowledge for interpretation of the complex phenomena that shape the environment, encourage those ethical, economic, and aesthetic values which will further the development of conduct compatible with the preservation and improvement of the environment. (UNESCO and UNEP 1977, 2)

Encouraging and promoting the values of sustainable conduct aligns the Zero Waste approach with UN policy goals in an appropriate way to meet these environmental declarations, and we believe that the educational dimension represents the only effective and achievable option that humanity has available.

3. The Zero Waste approach

The novel term "Zero Waste" seeks to contribute to the quest for a sustainable future. Paul Palmer first introduced the term in the early 1970s but, looking back, it can be considered problematic "because it implies a condition applied to waste" (2009, n.p.). Over the years, the term has evolved to encompass a wider meaning, particularly since the beginning of the 1990s. The Zero Waste International Alliance (2018, n.p.) defines Zero Waste as:

> the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health.

This definition stresses the importance of rethinking not only today's supply chain, but our entire economic system in order to build a sustainable future. While working on what was considered waste, Palmer developed "the notion of functional reuse as opposed to materials reuse" (2009, n.p.). The latter is the classic recycling approach where waste is considered something to be processed to recover raw material. The former aims to reuse the object while maintaining the original function or fulfilling a new one, and at the same time minimising energy consumption and material degradation. Different names have been used for this approach, all stressing slightly different features, like upcycling, reusing unwanted or waste material/products, remanufacturing and assembling used products into new ones, or adopting green supply-chain management, while applying measures across all phases of the supply chain to ensure sustainability.

However, on closer inspection, Zero Waste is more comprehensive, and not limited to the whole product chain or to a singular "magic" action-word. First, it critiques the contemporary linear mode of production where energy is dissipated and resources end as waste, while proposing a shift to a *circular* approach, with an increased focus on keeping resources in the circuit (Giorgi *et al.* 2017). Second, the richness of the Zero Waste approach is well-illustrated by the waste hierarchy, recently formulated by Zero Waste Europe (Simon 2019). This is a clear call that goes beyond recycling and towards a circular mode of production.

The hierarchy is divided into three main parts, from the top, where the best actions towards a Zero Waste future are represented, moving downwards, where we find actions that degrade objects or materials. These are less preferable as they require an increase in energy consump-

tion. At the top of the image with the widest dimensions are the values of reconsideration – how each one of us relates to resources and goods, aiming to revalue and radically remodel the production and consumption processes, proposing to rethink and redesign the manufacture and supply chain and to reinforce the value of reduction. Next come the reuse policies, and even further down are the techniques and behaviours that are based on recycling value, including also composting, anaerobic digestion and material recovery. At the bottom of the hierarchy lies the unacceptable actions, such as landfilling unstable waste, littering and any sort of combustion or co-combustion of mixed waste.

While Murray (2002) suggests that Zero Waste focuses on reorganising waste management and all phases of production, this recently-developed hierarchy adds an important meaning to Zero Waste: it questions the production itself, calling for a deeper change in our social customs and economy. The important message of the Zero Waste approach is the need to change our society to build a more ecological civilization. Using waste as an analytical lens can provide important insights into the inherent pollution of our linear mode of production (Murray 2002).

A circular mode of production, embraced by the Zero Waste approach, would have obvious limitations, especially in the acceptance and effective application phase, if not accompanied and supported by radical and widespread education (Kirchherr and Piscicelli 2019). In particular, the need to rework the prevailing economic system cannot be translated into successful intervention policies while the educational sphere is not fully involved. The feasibility – both technical and economical – of the steps from linear to circular logic remain insufficient in the absence of widespread, careful meditation and awareness-raising of the value of this epochal transition.

Ultimately, what appears as irreplaceable and essential becomes a cultural revolution grounded in education. We emphasise that this is not just an issue to be simply inserted into school curricula, centered on the learning unit and delivered via environmental education proposals. What is really called for is something far deeper, a radical change in how people consider citizenship and their relationship with the actions of purchasing and consuming goods – a reconsideration of how environmental resources are used on the one hand, and of the organisational dynamics within which society and the economy must be conducted on the other. This transformation constitutes a decisive educational act that not only assumes the principles of care standing at the basis of the relationship between humans and nature, but also between human beings (Jickling 2005).

4. A sustainable approach to waste and education: International goals and Zero Waste

With respect to educational perspectives on waste, the key aspect is to increase awareness of the need to question the typical way production and waste management are systematically handled (Wing Mui So *et al.* 2019). However, rather than focus on the concept of sustainability and related scientific production processes (Maletic *et al.* 2014; Capra and Henderson 2017), or simply the educational dimension (Jones, Selby and Sterling 2010), we revisit some of the most prominent international documents that focus on the theme of sustainability as it relates to waste management.

Introducing Zero Waste to the field of education can contribute towards the SDGs for building a sustainable future. The 2030 Agenda for Sustainable Development aims to provide continuity and substance to what was defined in the Conference on Sustainable Development in Rio de Janeiro in 2012 (Rio+20). The 2030 Agenda identifies a fundamental function for educational institutions in Target 4.7.

> By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. (United Nations 2015, 17)

The substantial and essential function of this target is also confirmed in the European Council's policy in relation to basic skills for permanent learning. Besides inserting Target 4.7 of the SDGs among the essential introductory aspects, it underlines the urgent commitment for:

> incorporating the ambitions of the targets of sustainable development of the United Nations in education, formation and learning [...] even by promoting the acquisition of knowledge [...] about the sustainable utilisation of natural resources. (European Union Council 2018, 5)

In considering SDG 4, UNESCO highlights how educational programmes should be outlining paths of education and learning, as well as modalities of work that can promote in learners the acquisition of "knowledge, values, abilities and behaviours which are necessary for the promotion of sustainable development" (UNESCO 2017, 19). It sup-

ports the progressive building of behaviours in active citizenship, where an articulated and integrated composition of skills is desirable [2].

Important in the discussion of sustainability, expressed through a new approach to the theme of waste, are the goals in the 2030 Agenda, particularly SDG 11 for sustainable cities and communities, and SDG 12 on responsible consumption and production. New generations should learn the importance of the correct management of the waste cycle, to ensure that human settlements are sustainable. Focus should be placed on policies and choices, both collective and individual, that help to prevent the production of waste, with a general lesson on the economic system, which includes notions of production and consumption before any valuation of waste disposal and its destination. The term "prevention" represents an approach, both ideal and pragmatic, that supports the Zero Waste message. Again, to develop awareness about sustainable models in productive contexts and consumption praxis, UNESCO identifies the fundamental value of the circular economy, which is synthesized in the expression "from cot to cot" (2017, 35).

The Zero Waste approach has started to appear in educational projects, but curricula are currently limited and lack a deeper perspective and coordination. Virtuous examples of planning do exist on a local scale, of a single teacher, of a single educational institution, or of a wider associative context, bringing together several groups belonging to different schools [3]. However, these endeavours are hard to locate and analyse for research purposes. Some educational projects that we have encountered, which aim to employ the Zero Waste approach, are listed in the following table (*Tab. 1*).

All of these projects share striking similarities. First, they are all managed by a third sector, external to the schools, as Zero Waste seems not yet incorporated into official school curricula. For this reason, *ad hoc* projects are necessary to fill this gap.

[2] Fundamental skills for sustainability are essential for improving comprehension of the complexity of the contemporary world system. These are related to the ability of analysing systematic complexity, forecasting, and exercising critical thought, supported by self-awareness of how to think about value and regulatory components. It is important to have a strategic approach to different issues and express collaborative behaviour, even by applying various problem-solving approaches to complex issues that consider sustainability (UNESCO 2017, 10).

[3] This list does not aim to be comprehensive but represents a sample of online resources that can offer the basics for future research.

Table 1. – Zero Waste educational projects.

PROGRAMME	LEAD ORGANISATION	LOCATION	NO. OF STUDENTS REACHED	SCHOOL GRADE	YEARS ACTIVE	AVAILABLE AT
Zero Waste in my School School Separation and Recycling Programme	Organización de Educación Ambiental AC	Mexico	Between 2015 and 2016, 6,583 students in 10 different schools	1-6	2015-2017	https://www.globalgiving.org/pfil/28305/REPORTE_PRAXAIR_2017_BAJA.pdf
Boulder County School Recycling and Environmental Education Programme	Eco-Cycle	Colorado (USA)	21,000 students in 50 elementary / middle schools	1-8	Since 2005	https://www.recyclecolorado.org/assets/docs/.pdfhttps://www.recyclecolorado.org/assets/docs/.pdf
Zero Waste Education	Waste Education	New Zealand	536 elementary schools, 250 preschools	pre-school, 1-8	Since 1993	https://www.zerowasteeducation.co.nz
Seven Generations Ahead	Zero Waste Schools	Illinois (USA)	18 elementary schools and kindergartens, 4 middle schools and 1 high school, and 14 Chicago Public Schools	kindergarten-12	Since 2017	http://sevengenerationsahead.org/zero-waste/zero-waste-schools/
Zero Waste Programme	One Cool Earth	California (USA)	18 elementary schools	1-8	Since 2013	http://www.onecoolearth.org/zero-waste.html

Source: compilation by the authors.

Across the programmes, the age groups also appear similar, mainly grade 1-8 students. It is difficult to find dedicated programmes for older students. Early age is key to learning good habits to minimise waste. Moreover, such programmes are often designed around recycling, rarely deal with the core Zero Waste objectives and often lack engagement with the more innovative production and consumption aspects of the model.

5. Educational paths on waste: a geographical declination

Geography, due to its cross-disciplinary nature, and its ability to establish further relationships with many other fields, can play an important role in promoting the cognitive, educational and operational approach represented by the Zero Waste model. The principles that underpin the sustainability paradigm find a point of synthesis in territorial and landscape values (Dematteis and Giorda 2012). In its multidimensional articulation, this involves political and ethical considerations, in addition to the constituent dimensions. It also involves environmental, economic and sociocultural themes and practices, and those that give meaning to and strengthen practices of citizenship. These are precisely the values that nourish geographical education and which can be safeguarded and adequately promoted by reflecting on the conceptual nodes that Zero Waste proposes, and finding appropriate and effective applications of these values from early childhood onwards (Bulut 2020).

During the 1992 Washington congress, the international geographical community identified waste as being among the thorniest and worthiest issues in education. Specifically, it referred to waste that is considered the most problematic in terms of toxicity and risk, especially nuclear waste (Haubrich 1994). In 2016 the International Geographical Union renewed the *International Charter on Geographical Education* (IGU-UGI 2016), which makes a commitment to favour, through educational programmes, the concrete application of sustainability principles to guarantee a harmonious co-evolution between humans and other natural biotic and abiotic components. In this latest declaration, the sustainability principles constitute two matrices – value and procedure – which should inform geographical literacy (IGU-UGI 2016).

Although the theme of waste is not clearly expressed in this document, it is nonetheless as fundamental as awareness, sense of respect and propensity to care about different ecosystem contexts, all of which are

strongly interconnected (Van Der Schee 2017). The human–earth vision of the ecosystem considers the interaction between three systems: the earthly and the human, which in turn is articulated in two further systemic variants, the social and the personal (IGU-UGI 2007). Waste is produced by the human system, but strongly influences the earth, which should, in theory, "offer the natural disposal" of waste (IGU-UGI 2007, 2).

The conceptual and methodological frames that structure official declarations of the most authoritative international consent of geographers are respectively centred on the paradigm of sustainability and on a new active and participatory role of the learner as protagonist of the education process, and a related and renewed awareness of the function and responsibility of the geography teacher. These theoretical and methodological assumptions represent opportunities for educational programmes to be built, especially using principles based on the circular economy and Zero Waste models. Currently, there is separation of the framing of waste from reference to the wider ecosystem. The value of the Zero Waste model lies in part in the actions represented in the inverted pyramid, where reconsideration of the very foundations of the economic and social system offers not only new concepts, but also a different methodological approach to analysis.

The importance of recycling and the meritorious involvement of children and adolescents in the diffusion of this practice seem to absorb a great part of the commitment of the educational/didactic action around the issue of waste. Ultimately, though, the reasons why ever-increasing quantities of waste material are produced reflect the low interest and attention from teachers, and so consequently from students, as well as unawareness of the potential actions and modalities that might guarantee an appropriate and functional differentiation in phases of elimination, collection, conferment and treatment. To sum up, education programmes traditionally graft and develop the inferior stages of the pyramid, most of the time neglecting potential moments of profound reflection and revaluation.

6. Conclusion

Education is an essential component to achieving the aims and goals of key international declarations on sustainability. The discipline of geography can play a crucial role in this effort, given its interdisciplinary nature and

links to other fields. The Zero Waste approach offers a pathway where the economic model of circularity can become an effective reality, as a counter to the dominant and linear model of production and consumption. Zero Waste can also help educators move beyond the traditional divide between formal and informal education (Mohan 2009), and develop well-rounded citizens, more able to face current and future sustainability challenges.

The challenges of this quest are multiple. The nascent educational projects that employ the Zero Waste approach represent a solid starting point for future development. But to be effective and lead to principles that characterise the higher, more ambitious and decisive portion of the inverted pyramid, educational activities should not limit themselves to action, information and education, but should aim to promote reflection, reconsideration and a redesigning of the current production and consumption paradigm. Only then can sustainable development be truly considered actively in progress, with a growth in (self-) awareness of actions and behaviours that benefit the various environments that comprise people's lives, whether family, work, organisational or social, and including all private and public spaces.

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