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Sustainability Through a Digital Lens

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Abstract

In today's rapidly evolving international education landscape, the European Union's Erasmus+ programme has been playing a pivotal role in learners' mobility and cross-cultural exchange. As environmental concerns take centre stage, the intersection of digitalisation and 'green' mobility is revealing a paradigm shift that is prominently featured in the programme and through two of the four main priorities. This paper explores the integration of sustainability and digitalisation in the Erasmus+ programme, focusing on the programme's recent alignment with EU policies such as the Digital Education Action Plan and the European Green Deal. It examines the various ways in which sustainable practices can be seamlessly integrated into student exchanges, ranging from green travel to the introduction and establishment of new mobility formats and paperless administration aimed at mitigating the environmental impact of the Erasmus+ programme. The paper concludes by reflecting on the future implications of integrating sustainability and digitalisation into the Erasmus+ programme. It emphasises the need for a balanced approach in addressing the challenges of digital pollution and e-waste, advocating for comprehensive strategies that ensure sustainability in digital education and underscoring the programme's role as a leader in fostering a sustainable and digitally inclusive future in international education.





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A Dual Approach in the Erasmus+ Programme

The Erasmus+ programme, as outlined in the Erasmus+ Programme Guide (2023), has the general objective “to support, through lifelong learning, the educational, professional and personal development of people in education, training, youth and sport, in Europe and beyond, thereby contributing to sustainable growth, quality jobs and social cohesion, to driving innovation, and to strengthening European identity and active citizenship.”¹ The programme provides opportunities for mobility and cooperation in all education sectors, including higher education, vocational education and training, school education, early childhood education and care and adult education. Reflecting its evolving nature, the current priorities of the Erasmus+ programme include inclusion and diversity, digital transformation, environmental protection and promoting participation in democratic life. These priorities underline the programmes’ comprehensive approach to addressing today’s multifaceted challenges, ensuring that it remains a vital and relevant force in the future of international education. This paper will focus on the intersection of two of these priorities, namely sustainability and digitalisation as cross-cutting themes that are key policy priorities at EU level.

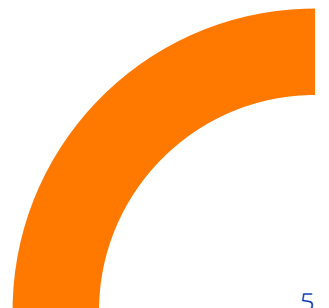
The European Union, recognising the importance of education in Member States, has introduced several initiatives to guide the integration of digital and green principles in education. The EU’s policy framework is characterised by several key documents and strategies, including the Digital Education Action Plan (2021-2027)² and the European Green Deal³. These policies provide a strategic direction for EU Member States and aim to harmonise educational practices with the overarching goals of digital transformation and environmental sustainability.

The Digital Education Action Plan sets out a vision for inclusive, high-quality, and accessible digital education in EU Member States. It outlines strategic priorities to develop a robust digital education ecosystem and to enhance digital skills, which are essential for the digital transformation. Adopted on 30 September 2020, the Digital Education Action Plan sets out two strategic priorities: fostering the development of a high-performing digital education ecosystem and enhancing digital skills and competences for the digital transformation. The plan will help guide educational institutions in adapting to the digital age, with a focus on capacity building and skills development. At the same time, the EU’s response to the green transition, the European Green Deal, serves as a roadmap to make Europe the first climate-neutral continent by 2050, with a sustainable economy that leaves no one behind. In this framework, educational institutions can be seen as key actors for the green transition and for a more sustainable world. They are encouraged to engage in research, innovation, and sustainable practices that address environmental and climate challenges, and to set an example for environmental sustainability through their infrastructure and operations.

¹ European Commission (2023). The Erasmus+ Programme Guide. Available online: https://erasmus-plus.ec.europa.eu/sites/default/files/2023-11/2024-Erasmus%2BProgramme-Guide_EN.pdf.

² More information on the Digital Education Action Plan (2021-2027) is available at: <https://education.ec.europa.eu/focus-topics/digital-education/action-plan>.

³ More information on the European Green Deal is available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en.





In response to these policy developments, the Erasmus+ programme has aligned its objectives with the principles of digitalisation and sustainability. This alignment is evident in the programme's emphasis on green mobility, digital administration, and the promotion of sustainable practices among its participants.⁴ The programme encourages environmentally responsible behaviour and the use of digital technologies in educational settings which can minimise the environmental impact of physical mobility. Through the integration of these policy-driven agendas, the Erasmus+ programme demonstrates a commitment to fostering an educational environment that is not only culturally enriching but also environmentally conscious and digitally forward-thinking.

In the following sections, this paper will focus on discussing two critical aspects of the Erasmus+ programme: green exchanges and the transition from paper to digital. These components are a crucial part of the programme's commitment to sustainability and digitalisation in the context of international education. Both aspects are central to addressing today's challenges in international education. They represent a concerted effort to balance the imperatives of educational exchange with environmental responsibility and technological advancement. Incorporating sustainable practices into student exchanges and Erasmus+ administration is crucial for environmental responsibility, resource efficiency, increased accessibility, long-term programme viability and positive impact.

⁴ European Commission, Directorate-General for Education, Youth, Sport and Culture, (2022a). Erasmus+, what's in it for me? New opportunities start here: adult education. Publications Office of the European Union. Available online: <https://op.europa.eu/publication-detail/-/publication/f6040443-39b7-11ed-9c68-01aa75ed71a1>; European Commission, Directorate-General for Education, Youth, Sport and Culture, (2022b). Erasmus+, what's in it for me? The school for life starts here: school education. Publications Office of the European Union. Available online: <https://op.europa.eu/publication-detail/-/publication/6ac1c50d-39b9-11ed-9c68-01aa75ed71a1>; European Commission, Directorate-General for Education, Youth, Sport and Culture, (2022c). Erasmus+, what's in it for me? Your professional journey starts here. Publications Office of the European Union. Available online: <https://op.europa.eu/en/publication-detail/-/publication/4f38e3b2-39b7-11ed-9c68-01aa75ed71a1>.





The Green Strand of the Erasmus+ Programme

The concept of green exchanges within the Erasmus+ programme represents a significant shift towards environmentally friendly transport and communication methods in the context of international student exchanges. The programme incorporates a significant “green strand” to support the green transition, emphasising the importance of environmental sustainability in all its aspects. This commitment is reflected not only in the programme’s objectives, as outlines above, but also in its operational approach.

But first, let’s look at the environmental impact of the Erasmus+ programme. “Air travel is responsible for a significant percentage of academic mobility. As a result, academia is a very significant source of the carbon footprint generated by air traffic.”⁵ With this in mind, the [Erasmus Goes Green project](#) conducted a comprehensive review of methodologies used for assessing the carbon footprint, with an insight into the European Green Deal. Bases on the data collected, they estimated the carbon footprint generated by the mobility of individuals in the last Erasmus+ programme (2014-2020), across the three key actions: mobility of individuals (KA1), cooperation for innovation and exchange of good practices (KA2) and support for policy reform (KA3), while also developing projections for the carbon footprint of the new Erasmus+ programme (2021-2027), based on three different scenarios. The graph below specifically illustrates the carbon footprint associated with the Erasmus+ programme in the higher education sector. While this serves as a concrete example for this sector, it implicitly suggests that similar mobility patterns in other education sectors could also have a significant environmental impact, despite the lack of clear data for these areas.

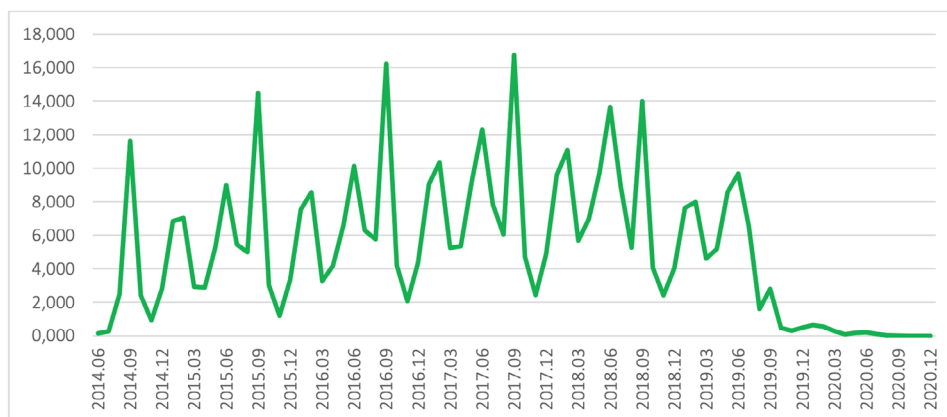
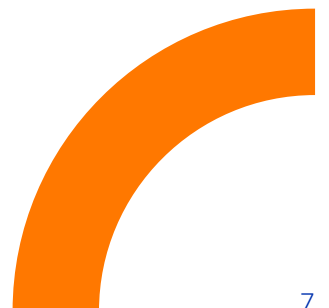


Figure 1: Carbon footprint emission of the Erasmus+ programme, 2014–2020, CO2eq. tonnes;
Source: Erasmus Goes Green Report: Assessment of the transport-related carbon footprint of the Erasmus+ programme.

⁵ Erasmus Goes Green (2021). Assessment of the transport-related carbon footprint of the Erasmus+ programme. Available online: <https://www.egg-project-eu.uvsq.fr/erasmus-what-carbon-footprint>.





Between 2014 and 2020, more than 1.5 million student mobilities were achieved under the Erasmus+ programme, a significant proportion of the total of almost 1.9 million mobilities including higher education staff.⁶ Typically, student mobility lasted 155 days (equivalent to one semester) and covered an average distance of 1.374 kilometres. In contrast, staff mobility typically lasted five days (one working week) and involved travelling 1.754 kilometres. The transport-related carbon footprint of these mobilities is estimated at approximately 500.000 tonnes, with projections indicating a significant increase in these figures for the period 2021-2027.⁷

Unfortunately, in the previous programme, academic mobility was largely ignored in sustainability policies, as “academic mobility is an integral and growing aspect of the academic career.”⁸ The “[Green Erasmus Project Report](#)”, which focuses on investigating the travel behaviour of Erasmus students, reveals that the vast majority of the Erasmus+ programme participants choose to travel by air. Air travel emerges as the dominant mode of transport for these students, with a high percentage opting for flights both to (73.1%) and from (69.8%) their mobility destination. This preference for air travel significantly outweighs the use of other modes of transport such as coach/bus, train, ship/boat, or other means of transport. This trend is clearly highlighted in the report, emphasising the overwhelming preference for air travel by Erasmus students during their participation in the programme.⁹

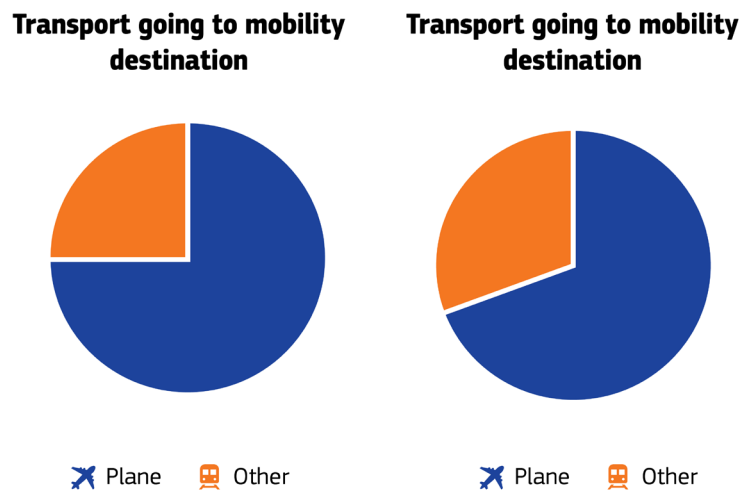


Figure 2: Use of plane for going to and coming back from a mobility destination.
Source: European Union

⁶ Gabrielczak, P., & Sokołowicz, M. (2021). Assessment of the transport-related carbon footprint of the Erasmus+ programme: The carbon footprint of the Erasmus+ programme 2014–2020.

⁷ Erasmus Goes Green (2021). Assessment of the transport-related carbon footprint of the Erasmus+ programme.

⁸ Glover, A., Strengers, Y., & Lewis, T. (2018). Sustainability and academic air travel in Australian universities.

International Journal of Sustainability in Higher Education, 19(4), 756–772.

⁹ Green Erasmus Partnership (2022). Research on the habits of Erasmus students: Consumer, daily life, and travel habits of Erasmus students from the perspective of their environmental attitudes and belief. Available online: <https://project.greenerasmus.org/documents/GE-report.pdf>.





The new Erasmus+ programme sets out to achieve carbon neutrality by encouraging sustainable transport and environmentally responsible behaviour across all education sectors. It does this by introducing green travel top-ups, which incentivise students to choose low-emission options such as trains and buses. This approach challenges traditional travel practices, requiring a reassessment to meet modern environmental standards and reduce the overall carbon footprint of the Erasmus+ programme.

Green mobility also includes the use of digital tools for communication and collaboration that reduce the need for physical travel and align student exchanges with broader environmental objectives. The new programme thus places greater emphasis on so-called new mobility formats, including virtual exchanges and blended mobilities. This encompasses the promotion of virtual mobility options such as online courses and digital exchanges. These forms of mobility mitigate the need for physical travel, thereby reducing environmental impact and widening access to education.





New Mobility Formats

However, international learning experiences with online elements are not new developments per se. Blended or hybrid formats (international mobility combined with an online learning component either before or after physical mobility), virtual exchanges, or more integrated formats such as Collaborative Online International Learning (COIL) existed long before the COVID-19 pandemic. Yet lockdowns accelerated the need for new, digitally enhanced international experiences, and multiplied the models and arrangements applied, expanding them beyond previous ideas and practices.¹⁰

Virtual exchanges and blended mobilities are pivotal in promoting sustainability within the Erasmus+ framework. Virtual exchanges refer to numerous online learning initiatives and methodologies that engage learners in sustained online collaborative learning and interaction with partners from different countries and cultural backgrounds.¹¹ This allows participants in virtual exchanges to engage in cross-border educational experiences without the need for physical travel. This method can thus significantly reduce the carbon footprint associated with student mobility. Blended mobility, on the other hand, refers to the strategic combination of periods of online learning with short periods of physical mobility, which can strike a balance between the traditional benefits of exchange and environmental considerations.¹² These approaches not only contribute to sustainability but also offer flexibility and accessibility, making international education experiences available to a wider range of learners.

Within the Erasmus+ programme, the implementation of virtual and blended mobility models is a testament to the adaptation of international education to modern challenges, ensuring that it remains sustainable and inclusive in an increasingly digital world. Under Key 1, the programme currently offers all education sectors the opportunity to have their mobility activities blended with the incorporation of virtual activities or be delivered entirely in a virtual format in the case of higher education and the youth sector, while in the higher education sector it also offers the opportunity to fund Blended Intensive Programmes, i.e., short intensive programmes using innovative ways of learning and teaching, including the use of online cooperation¹³. Of course, these mobility formats are not to be considered as a substitute for the benefits of physical mobility, but they can offer participants the opportunity to reap some of the benefits of international educational experiences without further increasing the emissions of the programme.

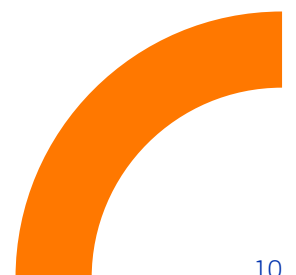
Nevertheless, the costs associated with virtual mobility should not be overlooked. The environmental costs, although often perceived as negligible, are noteworthy due to the digital exchange of data. Pedagogically, virtual mobility can also lead to learning difficulties, with professors noting a lack of interaction with and

¹⁰ Psychogiou, A. (2022). Students' motivations for blended and virtual international exchanges during COVID-19: Snapshot survey report. Academic Cooperation Association.

¹¹ O'Dowd, R. (2023). Issues of equity and inclusion in Virtual Exchange. *Language Teaching*, 1-13.

¹² Helm, F., & O'Dowd, R. (2020). Virtual exchange and its role in blended mobility initiatives. UNICollaboration Position Paper.

¹³ More information on the funding mechanisms for new forms of mobility within the Erasmus+ programme is available at: <https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-1/key-action-1-learning-mobility-of-individuals>.





between students. Further to this, scientifically, it can hamper the establishment of lasting scientific collaborations, particularly affecting young researchers who need physical networking, and interculturally, as the lack of interaction between students from different countries can impede the acquisition of intercultural skills.¹⁴ Choosing clean physical mobility or blended approaches can offer a middle ground. The environmental impact is less severe than air mobility, but more substantial than virtual mobility and the pedagogical, scientific, and cultural issues can be mitigated.

The implementation of the green strand within the Erasmus+ programme, which includes both sustainable travel methods and new mobility formats, reflects a comprehensive approach to aligning international student exchanges with environmental sustainability goals. These sustainable practices go beyond the immediate environmental benefits; they foster a culture of sustainability among students in all education sectors, who carry these values forward into their future endeavours. The programme's commitment to these practices not only addresses the immediate need for eco-friendly options but also encourages a broader philosophy of sustainability among participants, paving the way for a more conscious and responsible approach to international education. For international cooperation, guidelines such as those of the Erasmus Goes Green project are essential. These recommend promoting alternatives to travel, such as prioritising video-conferencing facilities, disseminating guidelines for successful online partnerships, and ensuring regular contact and convenient use of communication tools between partners. Educational institutions are encouraged to revise internal communications to emphasise sustainable travel and articulate the importance of reducing the carbon footprint of travel.



¹⁴ ENGAGE.EU (2023). Guidelines on Green Mobility. Available online: https://www.engageuniversity.eu/wp-content/uploads/2022/09/green_mobility-2021.pdf.



Transition from Paper to Digital

The [European Student Card Initiative](#) (ESCI), which aims to enhance student mobility across the EU by promoting the digitalisation of administrative processes and the exchange of information between higher education institutions, is seeking to simplify and streamline the management of student mobility, making it more efficient and user-friendly. The initiative has three building blocks, including the transformation of the current student cards into a European Student Card (ESC), the development of the Erasmus+ App to help Erasmus students with all their practical administrative needs, and the Erasmus Without Paper (EWP) initiative, a digital solution connecting the systems used by higher education institutions to allow them to manage their Erasmus+ mobilities online¹⁵.

The European Commission highlights that institutions and students can benefit in many ways by adopting any of the three building blocks of the ESCI¹⁶. For example, using EWP to manage student mobility allows institutions to move from traditional paper-based methods to a modern digital workflow. This shift is essential as many administrative tasks in the Erasmus+ programme are still heavily reliant on paper. In this way, EWP significantly eases the administrative burden for both students and staff involved in setting up student exchanges, while also reducing administrative costs.

Another benefit showcased is how the Erasmus+ App provides a platform for students to share experiences and tips, while higher education institutions can use it to disseminate information. Further to this, integrating current student cards with the ESC leads to eliminating the need for issuing new cards for mobility students, allowing for streamlined access to on- and off-campus services. However, one of the lacking benefits highlighted by the European Commission is how the ESCI can also contribute significantly to sustainability efforts, a crucial consideration in today's environmentally conscious world.



¹⁵ More information on the ESC initiative is available at: <https://education.ec.europa.eu/education-levels/higher-education/european-student-card-initiative>.

¹⁶ For detailed benefits, see: <https://erasmus-plus.ec.europa.eu/european-student-card-initiative>.

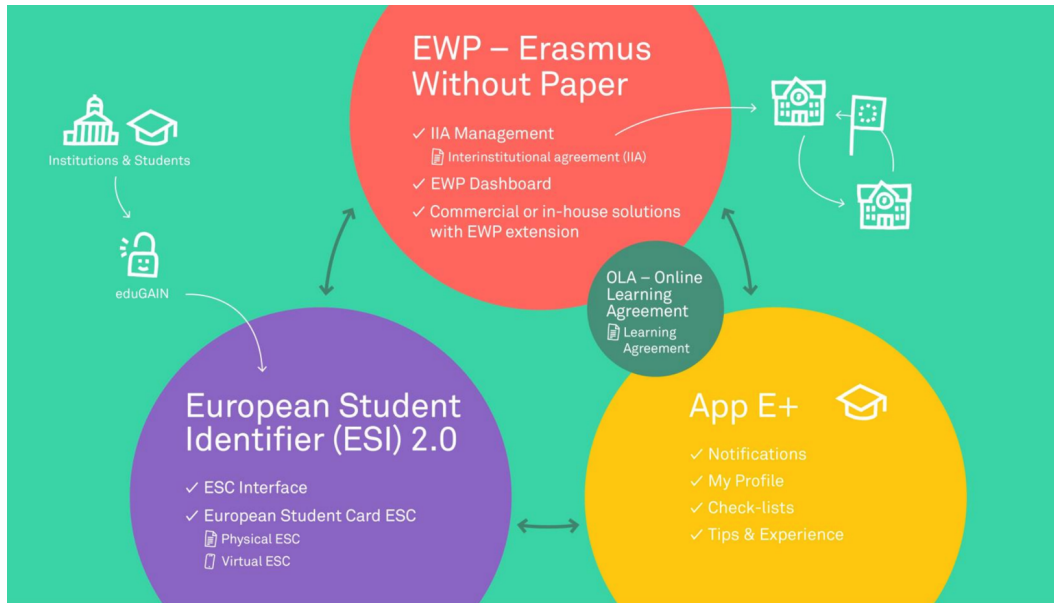


Figure 3: Overview of the European Student Card Initiative

Source: Movetia (2021). Digitalisation of the Erasmus+ programme factsheet. Available online: https://www.movetia.ch/fileadmin/user_upload/Dokumente/Bereich_3/SEMP/HE_European_Student_Card_Initiative_EN_.pdf.

In terms of sustainability, the most immediate benefit of going paperless is the drastic reduction in paper consumption and waste. Traditional paper-based systems in educational exchange programmes often involve extensive documentation, from application forms to progress reports and the issuing of new cards at each university. By digitising or centralising these processes, the Erasmus+ programme significantly reduces its carbon footprint, contributing to a more sustainable planet. In addition, digital documentation eliminates the need to physical transport documents, reducing the carbon emissions associated with postal and courier services. For example, students reported difficulties in sending their Erasmus contracts by post. Documents were repeatedly lost by the postal service and had to be resent several times.

Moreover, energy-efficient digital storage and cloud computing can further minimise the environmental impact, proving that technology can be harnessed for ecological benefit. Central to the ESCI is the implementation of the “once-only principle” in student mobility administration. This means that “students only need to enter their mobility information once and that it will be shared in a safe and secure way directly between relevant services in the mobility administration.”¹⁷ This method is not just about streamlining processes; it also plays a vital role in reducing environmental impact.

¹⁷ Leys, P. (2022). Digitalisation in international higher education: How digital Erasmus administration can contribute to more and better mobilities. Academic Cooperation Association Think Pieces.

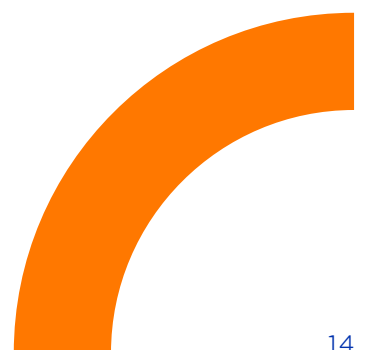
¹⁸ Council Recommendation of 16 June 2022 on learning for the green transition and sustainable development. Available online: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(01)).

¹⁹ European Commission (2023). The Erasmus+ Programme Guide.



Paperless systems enable more efficient resource management. Digital documents are easier to organise, track, and retrieve, saving time and resource. This efficiency not only benefits the administrative staff and students, but also contributes to a broader culture of sustainability within the education sector. As environmental concerns take centre stage globally, initiatives such as this demonstrate a commitment to sustainable practices that will have long-term benefits for the planet.

While these particular initiatives concern higher education, it is imperative to consider how the transition from paper to digital could also be helpful in the case of other education sectors, such as school, adult and vocational education. In these sectors, the focus of the Erasmus+ programme so far seems to be on learning for the green transition and sustainable development – in line with the 2022 Council Recommendation on learning for the green transition and sustainable development¹⁸ – and on supporting projects that foster behavioural change in individual preferences, cultural values and awareness towards sustainable consumption habits and lifestyles. Finally, the programme itself supports that “sustainability should become a part of the entire spectrum of education and training, including curricula, professional development for educators as well as buildings, infrastructure, and operations.”¹⁹





Reflections for the Future

As the 21st century progresses, the role of digital education in promoting sustainability continues to evolve. The Erasmus+ programme, operating at the intersection of digitalisation and sustainability, has embarked on a transformative journey that aligns with the twin transition themes central to the EU's agenda. This paper has explored how the Erasmus+ programme is bringing together the green and digital agendas by incorporating sustainable practices such as the green strand in mobility, the use of digital tools for a paperless Erasmus+ administration and the overall transition from paper to digital.

The green strand of the Erasmus+ programme represents a significant shift towards environmental sustainability in international student exchanges. Acknowledging the substantial carbon footprint of academic mobility, mainly due to air travel, the Erasmus+ programme has introduced initiatives such as the green travel top-ups to encourage sustainable travel choices. With a focus on carbon neutrality, the Erasmus+ programme promotes low-emission transport and the use of digital platforms for collaboration, reducing the need for physical travel. This shift also includes virtual exchanges and blended mobility models that balance environmental considerations with the benefits of traditional exchanges. Additionally, the Erasmus+ programme's move towards digitalisation, exemplified by the ESCI, further reduces its environmental impact by streamlining administrative processes and reducing paper consumption. These efforts reflect a comprehensive approach to aligning educational exchanges with sustainability goals, fostering a culture of environmental awareness among institutions and students, but also contributing to a more sustainable future for international education.

It is important to recognise that the Erasmus+ programme's initiatives in green mobility and digital administration have significant implications for the future of international education and these two agendas. By promoting virtual exchanges and blended mobility, the Erasmus+ programme is addressing the environmental impact of physical student travel and widening access to education. However, it is crucial to recognise that while these digital solutions offer greener alternatives, they also contribute to the generation of e-waste. As the Erasmus+ programme continues to evolve, addressing the challenges of digital pollution and e-waste will be essential, as will acknowledging the environmental implications of these digital solutions themselves. In order to tackle this challenge, a balanced approach is needed that recognises the benefits of digitalisation in education, while also being aware of its ecological footprint. This awareness is key to achieving a sustainable approach to education that embraces technological advances while remaining





conscious of its environmental responsibilities. This balance at the programme level could be achieved by implementing measures to monitor and reduce the ecological impact of digital technologies.

The challenge of e-waste and digital pollution, however, requires attention at both the policy and implementation levels. At the latter level, it relies heavily on leadership within educational institutions, emphasising the need for organisational conditions that can foster an active engagement in developing strategies to minimise the environmental impact of digitalisation. This can include bottom-up approaches, such as promoting best practices in digital tool usage, turning off video during online classes to reduce carbon emissions, and top-down approaches, including implementing comprehensive strategies for a sustainable digital infrastructure.

The Erasmus+ programme's journey towards integrating sustainability and digitalisation reflects a forward-thinking approach to international education. As the Erasmus+ programme continues to navigate the challenges and opportunities of this twin transition, its role in shaping the future of sustainable digital education will become increasingly important. The success of the Erasmus+ programme in this endeavour will not only enhance the educational experience of its participants and contribute significantly to the broader goals of creating a more sustainable and digitally inclusive future in education, but it will also ensure that the programme remains a leader in these fields and sets an example for educational institutions across the EU and beyond.



