



THE ENVIRONMENTAL FOOTPRINT OF TRANSPORT CONSUMPTION – AN EDUCATIONAL CHALLENGE FOR GENERATION Z

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Abstract *This paper brings together two very topical and important themes. The first is the issue of the environmental footprint of transport consumption and the second is the current educational challenges of Generation Z representatives. The paper focuses on a combination of both topics, respectively addressing the education of Generation Z on the environmental footprint of transport consumption. The paper is prepared using a primary representative survey method based on an online questionnaire survey of representatives of Generation Z (secondary school students in the Czech Republic). The aim of the paper is to identify the educational challenges of the generation Z (studying at secondary schools in the Czech Republic) in the thematic area of the environmental footprint of transport consumption. The results clearly show the necessity of using audio-visual educational content and linking theory and practice, for example in the form of case studies. Generation Z wants quick, concise, up-to-date, interesting, and interactive information. Generation Z representatives clearly confirm the need to address human environmental impacts in education, adding that not enough time is devoted to them. They also confirm that there is a lack of study materials in this subject area and that they are not developed in a user-friendly way. Representatives of Generation Z are interested in further education on the environmental footprint of transport consumption. The findings of this paper can help both secondary school teachers, as well as school and curriculum developers and educational policy and strategy makers.*

Keywords *sustainable development, sustainability, transportation, mobility, environment, sustainable consumption, sustainable behaviour*

1 INTRODUCTION

Currently, all countries in the world, or rather the inhabitants of all countries, are facing a range of environmental challenges that require not only technological innovations but also (and primarily) fundamental changes in individual behaviour. One of the main environmental challenges is particularly the issue of the environmental footprint of transport consumption, due to the transportation sector being among those with a significant (negative) impact on the environment. The mentioned changes in individual behaviour require a conceptual approach that will include, among other things, the process of education. Education plays a significant role in informing and subsequently shaping the current generation of young people who will significantly influence, among other things, the mentioned environmental footprint of transport consumption through their behaviour.

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Young people who are currently studying in secondary or higher education can be identified as representatives of Generation Z (people born between 1995 and 2010). It is typical for this generation that they grew up in an era of rapid technological development, the internet, and social media, are accustomed to quick access to information, interactive, and visually attractive content, which shapes their learning preferences and the way they receive and process new information.

The importance of education in the environmental footprint of transport consumption cannot be underestimated, especially due to the continuously increasing impact of transportation on climate change and environmental degradation. Several authors who have researched the area of environmental footprint of consumption agree that effective educational strategies can lead to significant changes in personal and collective behaviour.

The aim of the paper is to identify the educational challenges of the generation Z (studying secondary schools in the Czech Republic) in the thematic area of the environmental footprint of transport consumption. The contribution of the article is seen particularly from the perspective that it can serve as a foundational document for individuals who are responsible for the education of students at secondary schools, specifically in making strategic decisions in educating the current generation of secondary school students on the issue of the environmental footprint of transport consumption.

Chapter 2 of this paper describes the literature review. Chapter 3 focuses on the materials and methods used. Chapter 4 presents the results and Chapter 5 elaborates the discussion.

2 LITERATURE REVIEW

The literature review is divided according to the thematic areas of the paper. Subsection 2.1 is dedicated to the environmental footprint of transport and subsection 2.2 is dedicated to the educational challenges of Generation Z.

2.1 Environmental footprint of transport

Peters, Andrew and Karstensen (2016) state that the environmental footprint is used to estimate the total environmental flows related to consumption. The environmental footprint measures, according to Almeida, Maertens and Verbist (2011), the pressure that an individual, organization, human activity or event exerts on an ecosystem. This conception is in line with Muñiz, Calatayudb and Dobaño (2013). These authors add that assessment using environmental footprinting can also be applied to cities or regions. According to these authors, it is an indicator that puts the consumers in position to be responsible for the impact of their activities. And from the perspective of researchers, decision makers and the public, it becomes an important metric (Klemeš, 2015). It is considered as a summary indicator (Browne, O'Regan and Moles, 2008; Muñiz, Calatayudb and Dobaño, 2013) that includes the evaluation of sub-components. The sub-components, according to Holmatov and Hoekstra (2020), include carbon footprint, land footprint and water footprint.

In the context of transport, the characterization of the environmental footprint focuses on understanding the direct and indirect effects of transport, transport infrastructure and transport-supported activities (Muñiz, Calatayudb and Dobaño, 2013; Chen et al., 2023). Thus, transport is not an individually assessed activity, but is also assessed as part of other inputs (Biekša, Zonienė and Valiulė, 2021) and the whole life cycle of services and products (Castellani et al., 2017).

The primary focus in the transport sector has been on assessing a sub-component of the environmental footprint – the carbon footprint (Zhao et al., 2020). Transport is considered as one of the main carbon emissions emitting activities along with food production or housing (Osorio, Tobarra and Tomás, 2024; Li et al., 2024). The transport sector contributes to approximately 25 % of total anthropogenic emissions

according to the UN (2021) and further increases can be expected (EEA, 2023). Mainly road transport has long been a significant contributor to these emissions (Saner et al., 2013; Fan et al., 2022).

Considering the share and projected growth of the consumption footprint from transport, there is an ambition to find strategic solutions. Holden and Høyer (2005) mention three basic options – an efficiency strategy (the strategy is associated with the development of new technologies), a substitution strategy (the strategy is associated with modal split changes and is also appropriate according to Ercan, Onat and Tatari, 2016; Satrovic et al., 2024) and a reduction strategy (to reduce the use of unnecessary transport, which is also recommended by Deveci et al., 2024; Satrovic et al., 2024). Substitution and reduction strategies require some level of user education and the setting up of an appropriate environmental education system.

2.2 Educational challenges for Generation Z

Generation Z students possess a unique mix of attitudes, beliefs, social norms, and behaviors (Chicca and Shellenbarger, 2018). These characteristics will impact education for years to come and educators must be ready to develop and deliver appropriate interventions and approaches. To that end, they need to be aware of the specifics of Generation Z: how this generation feels, thinks, what are their concerns and hopes, and how they prefer to learn and interact.

One of the changes that Generation Z are bringing to educational environment is their preference for media-rich learning environments (Dollinger, 2023). Traditional books do not engage Generation Z any longer as they prefer to learn through image/video/audio and prefer to use electronic study materials (Hernandez-de-Menendez, Escobar Díaz and Morales-Menendez, 2020). Effective and engaging learning materials should therefore include graphics, animations or video clips and educators should search for creative ways of incorporating other sources, such as podcasts, websites, simulations, interactive tutorials and Internet-based educational games into their teaching (Hernandez-de-Menendez, Escobar Díaz and Morales-Menendez, 2020).

Generation Z students prefer independent, self-directed and self-paced learning and regular assessment and feedback (Moore, Jones and Frazier, 2017). For this reason, learning materials should be available instantaneously so that students can access them at any time and from anywhere – thanks to the portability of most modern devices, learning does not have to take place in the classroom only.

Educators should also consider adapting their instructional approach so that it delivers concepts in smaller chunks of information due to the attention span of Generation Z students which is only 8 seconds long (Mosca and Curtis, 2019). Another challenge lies in the fact that students now have access to more resources than ever before. Due to this overwhelming amount of information, they are unable to analyse it's the validity and critically use the information they receive. Educators need to assist them in learning how to process information (Moore, Jones and Frazier, 2017).

In terms of social aspects, Generation Z students can have underdeveloped social and relationship skills. This may lead to isolation, insecurity, and mental health issues, such as anxiety and depression (Chicca and Shellenbarger, 2018). A possible solution to this challenge could be the use of cooperative learning strategies, which bring many benefits to students' academic achievement, their interpersonal relationships, and individual well-being (Johnson and Johnson, 2009). Even if Generation Z students like independent learning, they are open to collaboration (Moore, Jones and Frazier, 2017). Engaging students in active, constructive and cooperative learning could help them make meaningful connections with others in a safe and respecting environment.

Apart from learning strategies that are visual, interactive and collaborative, Generation Z students value hands-on experience and prefer educational approaches that are more practically and financially-oriented and include a career focus (Dollinger, 2023).

To conclude, an ideal educational environment should offer individualized, visually engaging, technologically based learning with opportunities for hands-on experience and collaborative learning. Chicca and Shellenbarger (2018) offer a comprehensive overview of teaching-learning design strategies and approaches that can help educators design suitable approaches to Generation Z students.

3 MATERIALS AND METHODS

The paper is prepared using a questionnaire survey method, specifically the CAWI (Computer Assisted Web Interviewing) method. The questionnaire survey was created in Google Forms. Subsequently, pilot testing was conducted with four respondents. Then the questionnaire survey was modified. The questionnaire survey was made available to respondents from 14 to 25 November 2022. Subsequently, the responses were analysed using basic statistical methods and conclusions were drawn.

Hague (2023) describes that for populations of 100 000 or more, a minimum of 384 respondents is sufficient. This ensures a maximum of 5% margin of error and 95% confidence in the claim (Hague, 2023). According to the ČSÚ (2024), there are 10.9 million inhabitants in the Czech Republic. Based on the Česko v datech (2024), it was determined that Generation Z makes up 19.62% of the population of the Czech Republic, which is 2,138,580 inhabitants. This makes the survey sample a large population (population of 100 000 or more), so a minimum of 384 respondents is sufficient to ensure that the sample is representative in terms of the number of respondents.

The questionnaire survey involved secondary schools associated in the Association of Secondary Schools of Information Technology, Telecommunications, Finance, Postal and Logistics. The location of the participating schools is presented in Fig. 1. These secondary schools also cover most of the regions of the Czech Republic. Classes of students were randomly selected from each of the participating secondary schools to whom the questionnaire was made available. A total of 725 respondents participated in the questionnaire survey, which meets Hague (2023) defined minimum number of respondents. The return rate of the survey is therefore 80.92%. 345 men (47.59%), 312 women (43.03%) and 68 representatives of other genders (9.38%) participated in the survey.

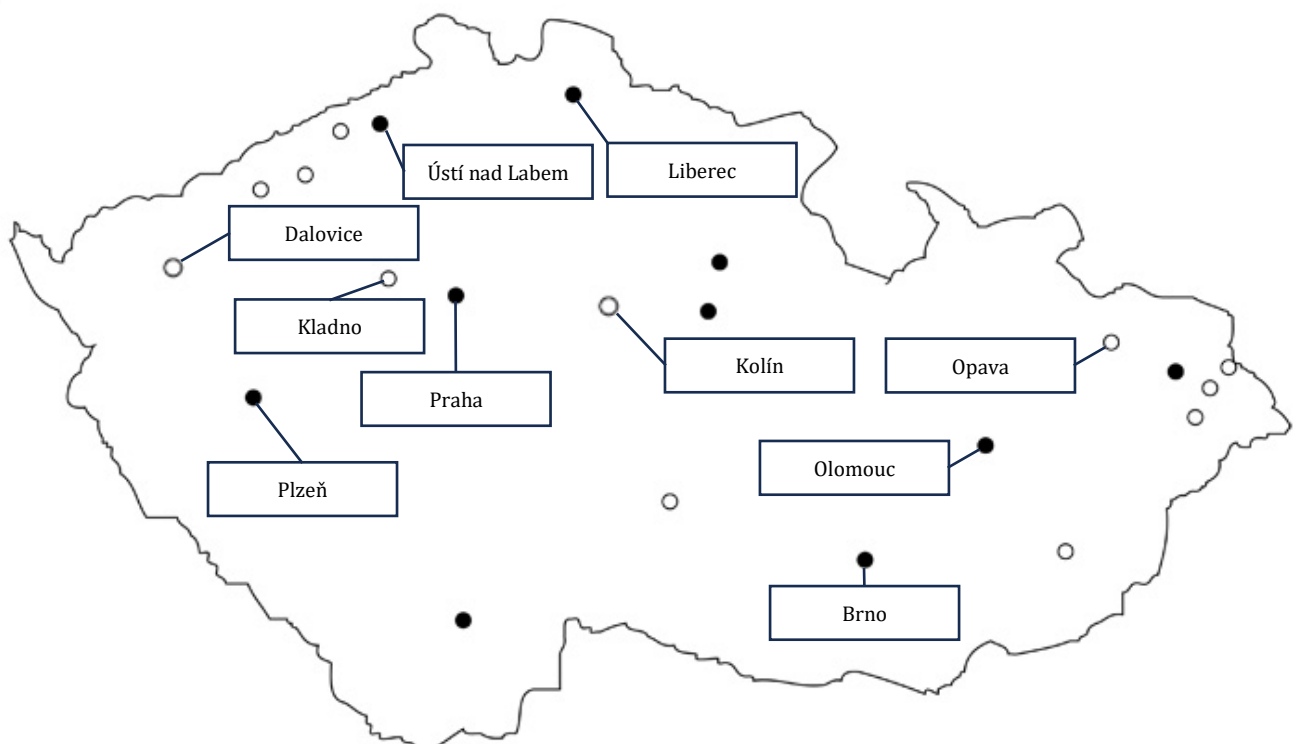


Fig. 1 Overview of participating secondary schools; source: authors

Respondents were asked to evaluate individual forms of study materials in terms of their user-friendliness, specifically:

- Interactive quizzes (e.g., Kahoot!),
- Educational videos,
- Power-Point presentations,
- Infographics (picture with brief information),
- Practical case studies,
- Short educational videos on Instagram,
- Educational posts on Instagram,
- Printed study materials (textbooks, worksheets, etc.),
- Electronic version of the textbook (.docx, .pdf format, etc.),
- Educational software,
- Short educational videos on TikTok.

For this question, respondents used a scale of 1-4. Grade 1 represented the response “definitely user-friendly”, grade 2 represented the response “rather user-friendly”, grade 3 represented the response “rather not user-friendly”, and grade 4 represented the response “definitely not user-friendly”.

The questionnaire survey included the following questions:

- Do you think that education needs to address the negative impact of humans on the environment? (4 answer options).
- Do you think that enough time is dedicated to addressing the issues of negative human impacts on the environment in the classroom? (4 answer options).
- Do you think that there are enough learning materials that would deal with the negative human impact on the environment? (4 answer options).
- Do you think that the existing learning materials that deal with negative human impact on the environment have a user-friendly format? (5 answer options).
- Have you heard of the term "environmental footprint of consumption"? (4 answer options).
- Do you think that the frequency of use of transport and the type of transport can influence the share of a person's "environmental footprint of consumption"? (5 answer options).
- Would you like to know more about the impact of the means of transport used on the "environmental footprint of consumption" of humans? (4 answer options).

All questions were constructed as closed questions. Most of them had 4 answer options (Definitely YES, Rather YES, Rather NO, Definitely NO). In addition, selected questions had a fifth answer option (Don't know). In terms of identification questions, only the gender of the respondents was collected. The results of the questionnaire survey are presented in Chapter 4.

4 RESULTS

The results chapter is structured according to the questions in the questionnaire survey. The first question evaluated the different forms of study materials in terms of their user-friendliness. The results were obtained using the arithmetic mean method, with a value of 1 corresponding to the answer "definitely user-friendly" and a value of 4 corresponding to the answer "definitely not user-friendly". The results are presented in Fig. 2.

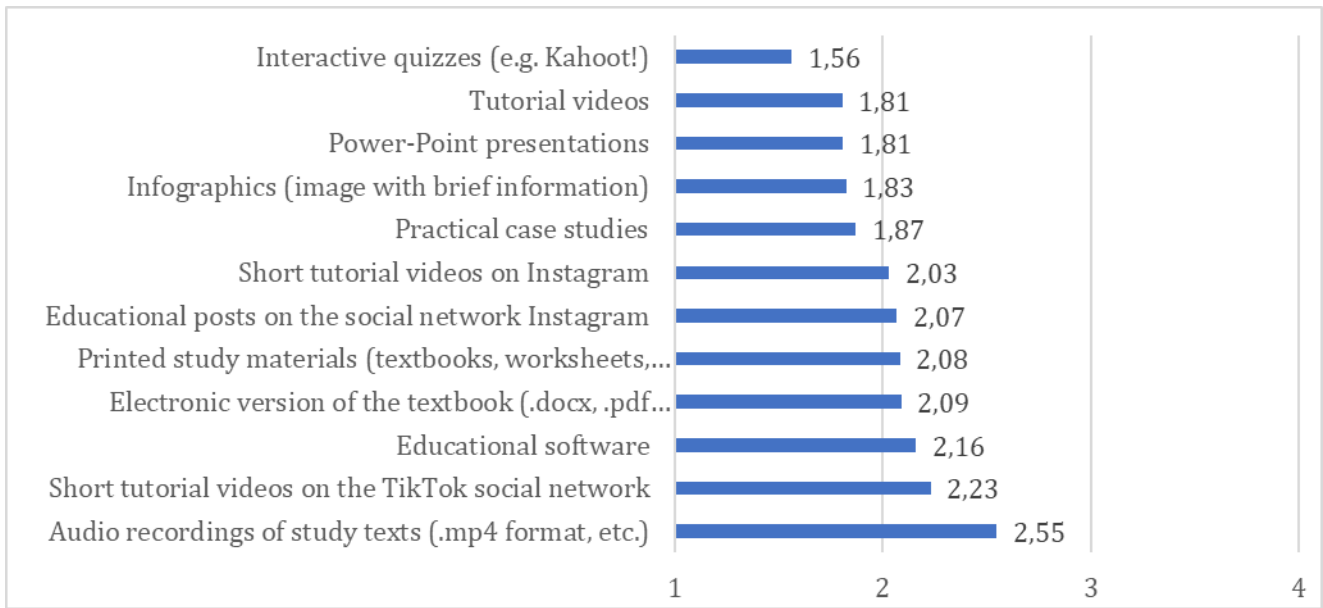


Fig. 2 Study materials in terms of user-friendliness (grade 1 – definitely user-friendly, grade 4 – definitely not user-friendly); source: authors

The results show that interactive quizzes (such as Kahoot!), tutorial videos, Power-Point presentations, infographics and practical case studies are the most user-friendly for students (representatives of Generation Z). These types of study materials received an average rating of less than 2.00. These results clearly indicate that Generation Z prefer information quickly and clearly, using audio-visual content where possible. Furthermore, Generation Z learners place a strong emphasis on linking theory and practice, for example through case studies.

Another question addressed whether students believe that it is necessary to address the negative impacts of humans on the environment in education. The exact wording of the question was “Do you think that education needs to address the negative impact of humans on the environment?”. The results are presented in Fig. 3.

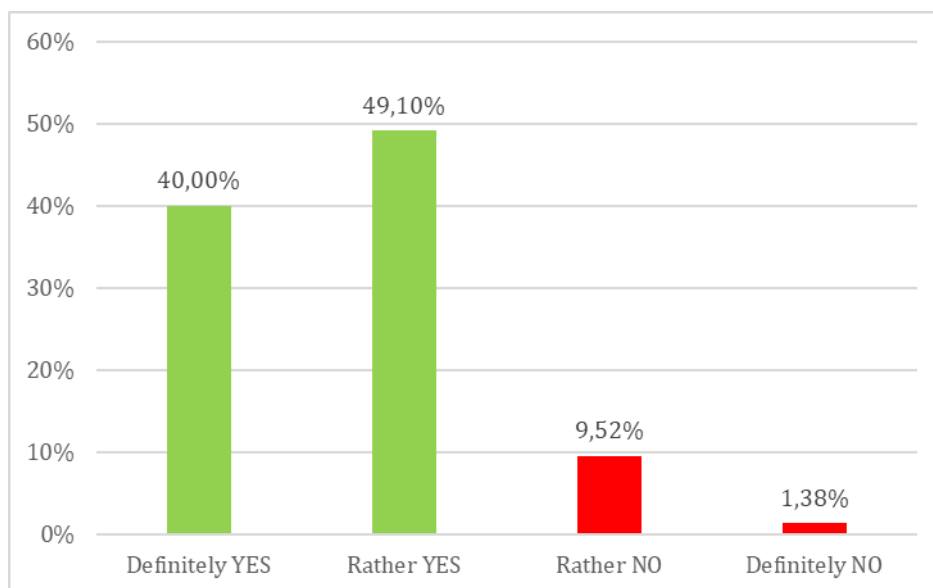


Fig. 3 The need to address the negative impacts of humans on the environment in education; source: authors

The results (Fig. 3) show that students generally agree, with a combined total of 89.1% of respondents saying "Definitely YES" (40%) and "Rather YES" (49.1%). This indicates a strong consensus among the respondents on the importance of environmental issues being addressed in education. On the other side

of the spectrum, only a minority of respondents are less convinced, with 9.52% saying "Rather NO" and a small 1.38% stating "Definitely NO". These figures suggest that there is a small degree of scepticism or perhaps a lower priority given to environmental education among these students. Overall, the data underscores a pronounced acknowledgment among the surveyed students of the necessity to integrate discussions on human impacts on the environment into educational curricula, reflecting a generational concern for environmental issues.

Next question asked whether students believe that sufficient time is dedicated to negative human impacts on the environment in the classroom. The exact wording of the question was "Do you think that enough time is dedicated to addressing the issues of negative human impacts on the environment in the classroom?". The results are presented in Fig. 4.

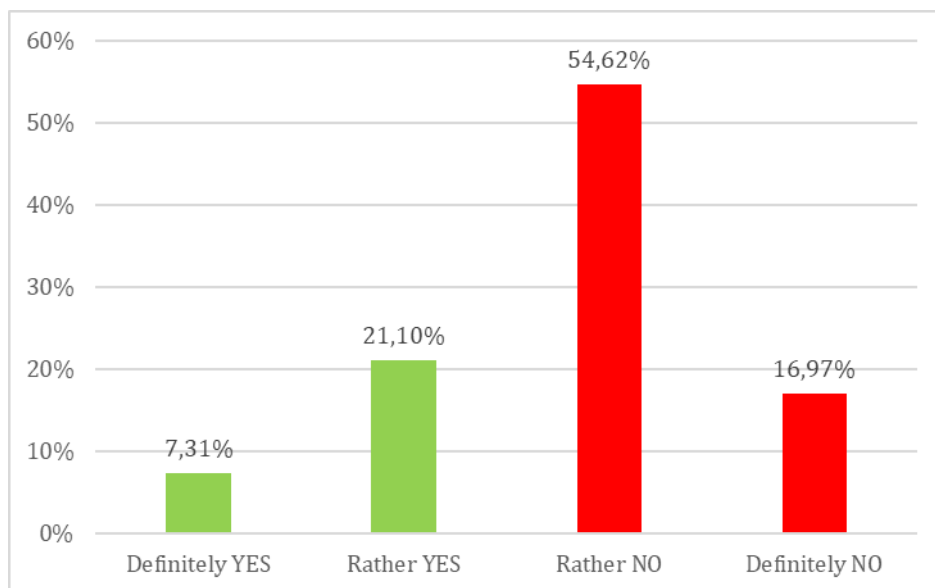


Fig. 4 Sufficient time for the topic of negative human impacts on the environment in education; source: authors

Most of the respondents, 54.62%, believe that "Rather NO," not enough time is devoted to this topic in their education (Fig. 4). Additionally, 16.97% strongly believe that "Definitely NO," adequate time is not given to environmental issues in their curriculum. In contrast, only a small proportion of students feel that sufficient time is being allocated to the topic, with 7.31% answering "Definitely YES" and 21.10% saying "Rather YES." These results reflect a clear discrepancy between the recognition of the issue's importance, as indicated by the earlier graph, and the perceived lack of emphasis on it within their educational experience. It suggests that while students acknowledge the significance of the subject, many feel that their education does not adequately cover it. This could point to an opportunity for curriculum developers and educators to increase the focus on environmental issues in the school syllabus to align with students' concerns.

Next question asked whether students believe that there are enough learning materials on the topic of negative human impacts on the environment. The exact wording of the question was "Do you think that there are enough learning materials that would deal with the negative human impact on the environment?". The results are presented in Fig. 5.

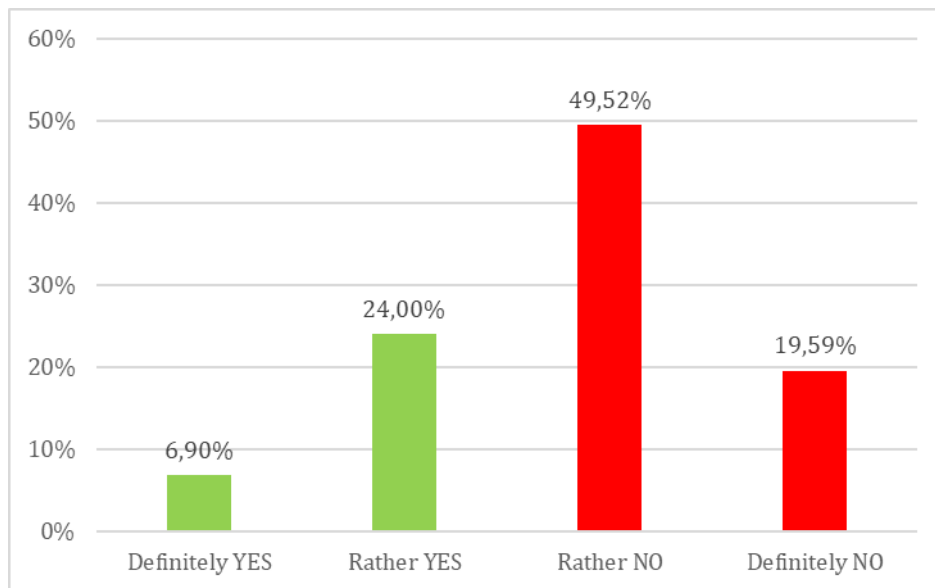


Fig. 5 Sufficient study material on the topic of negative human impacts on the environment in education; source: authors

The results (Fig. 5) suggest a critical view of the current resources available for this topic. A substantial majority of respondents feel that there is a lack of study material, with 49.52% answering "Rather NO" and 19.59% firmly stating "Definitely NO". This combined total of 69.11% indicates that more than two-thirds of the students surveyed perceive a deficiency in the educational resources dedicated to this issue. Conversely, a minority of students consider the available material to be adequate, with 24% indicating "Rather YES" and only 6.9% feeling "Definitely YES". These figures align with the previous results suggesting that while students acknowledge the importance of environmental issues, they find the current time that is dedicated to it, and the materials provided in their education to be insufficient. It highlights a gap between the educational system's offerings and the expectations or desires of the students for more comprehensive coverage of environmental topics.

Next question asked whether students believe that the study materials on the topic of negative human impacts on the environment used in the training have a user-friendly format. The exact wording of the question was "Do you think that the existing learning materials that deal with negative human impact on the environment have a user-friendly format?". The results are presented in Fig. 6.

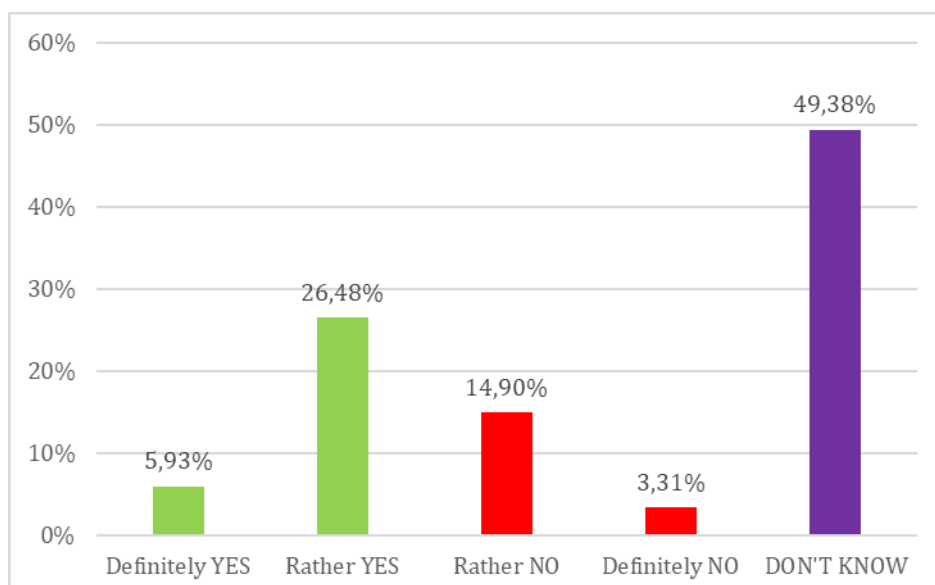


Fig. 6 User-friendliness of study materials; source: authors

The most notable data point is that a large plurality, 49.38%, selected "DON'T KNOW", indicating a significant level of uncertainty or lack of familiarity with the materials in question (Fig. 6). This suggests that nearly half of the respondents may not have had enough engagement with the materials to judge their user-friendliness, or that the materials have not been memorable or distinctive enough in their format to make an impression. On the affirmative side, 5.93% of students responded "Definitely YES" and 26.48% said "Rather YES," totalling 32.41% who find the materials to be user-friendly. In contrast, 14.9% responded "Rather NO" and a smaller segment of 3.31% stated "Definitely NO," summing up to 18.21% who believe the materials are not presented in a user-friendly way.

The significant percentage of students unable to assess the user-friendliness of the materials is a critical insight. It may imply a divide between the materials' design and student engagement or accessibility. For educators and curriculum designers, these results could point to a need for reassessment of how environmental study materials are presented to ensure they are engaging, memorable, and accessible to all students.

Next question addressed whether students know the term "environmental footprint of consumption". The exact wording of the question was "Have you heard of the term "environmental footprint of consumption"?". The results are presented in Fig. 7.

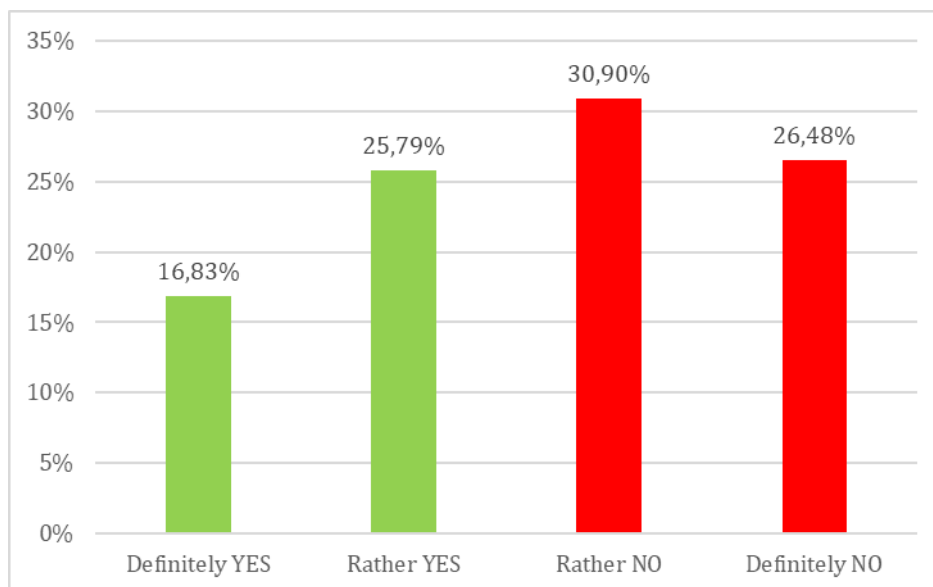


Fig. 7 Knowledge of the concept "environmental footprint of consumption"; source: authors

The results (Fig. 7) indicate a nearly even split in familiarity with the term. A total of 42.62% of respondents have heard of it, with 16.83% saying "Definitely YES" and a further 25.79% saying "Rather YES". This suggests that nearly a half of the students are aware of the term and possibly have some understanding of its meaning. However, a slightly larger percentage of respondents are not familiar with the term, with 30.90% answering "Rather NO" and 26.48% indicating "Definitely NO". This combined total of 57.38% points to a majority who have not heard of the environmental footprint of consumption or do not recall it.

The data reflects a gap in awareness among these students about a key concept related to environmental impact, which is essential for understanding individual and collective roles in sustainability. It highlights the potential need for educational programs to place greater emphasis on ecological literacy, particularly on concepts that are crucial to understanding human impacts on the environment.

Next question asked whether students know that the frequency of use of transport and the type of transport can influence the share of a person's "environmental footprint of consumption". The exact wording of the question was "Do you think that the frequency of use of transport and the type of transport

can influence the share of a person's "environmental footprint of consumption?". The results are presented in Fig. 8.

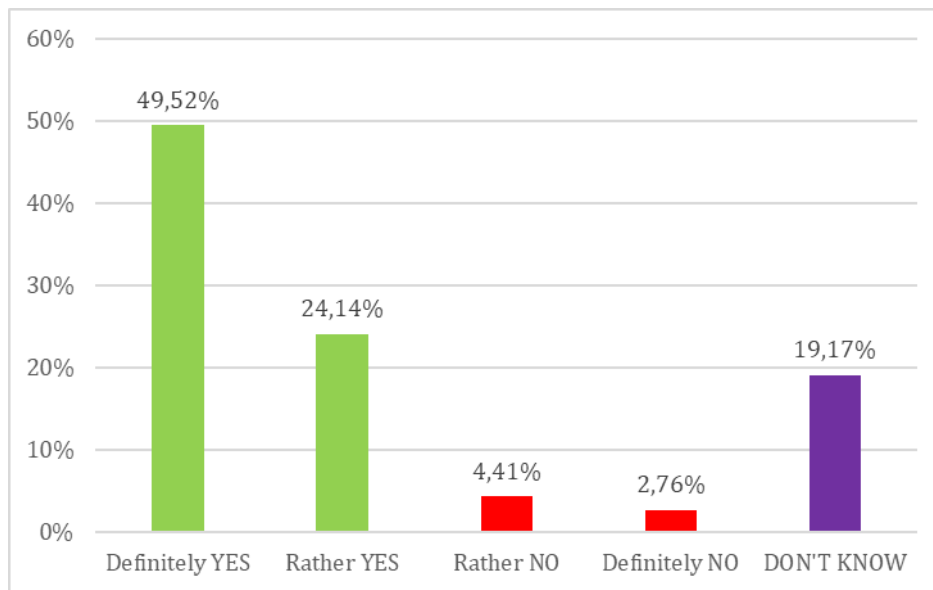


Fig. 8 Relating the frequency of transport use to the size of the personal environmental footprint of consumption; source: authors

A significant majority of the respondents (Fig. 8) recognize the correlation, with 49.52% expressing "Definitely YES" and 24.14% leaning towards "Rather YES," making a combined affirmative response of 73.66%. This indicates a strong awareness among these students that how often they use transport and the type of transport they choose can significantly affect one's environmental footprint. A small minority express scepticism or disagreement, with 4.41% choosing "Rather NO" and an even smaller 2.76% opting for "Definitely NO." These responses suggest that there is a minor level of doubt or dissent about the relationship between transportation choices and environmental impact among the respondents. Lastly, the graph shows that 19.17% of the students are uncertain, as they have chosen "DON'T KNOW." This substantial percentage points to a lack of confidence or knowledge on the issue, indicating an area where further educational focus could be beneficial.

Overall, the responses suggest that the concept of an environmental footprint, particularly in relation to transportation choices, is generally acknowledged among most of these students, although there is still a noteworthy portion that could benefit from additional information and education on the subject.

The last question asked whether students want to know more about the impact of the means of transport used on the "environmental footprint of consumption" of humans. The exact wording of the question was "Would you like to know more about the impact of the means of transport used on the "environmental footprint of consumption" of humans? The results are presented in Fig. 9.

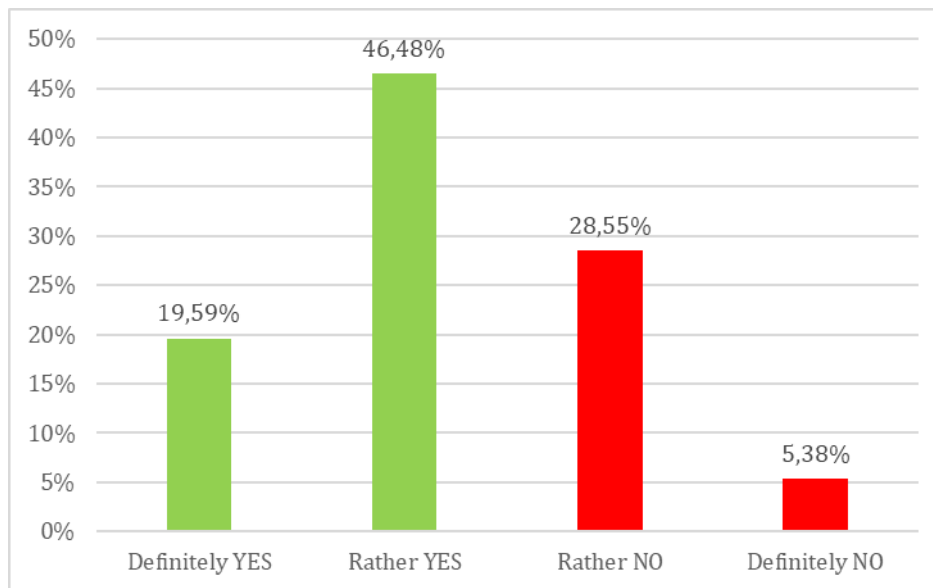


Fig. 9 Interest in further information in the context of the environmental footprint of transport consumption; source: authors

Most of the students show (Fig. 9) a positive inclination towards expanding their knowledge, with 19.59% indicating "Definitely YES" and a significant 46.48% choosing "Rather YES," totalling 66.07% who are interested in the subject. On the other hand, a smaller proportion of students appear to be less interested, with 28.55% selecting "Rather NO" and 5.38% choosing "Definitely NO." This group may already feel informed enough or perhaps have less interest in the environmental aspects of transportation.

Overall, the data suggests a clear interest among most of the surveyed students in understanding the environmental implications of transport choices. This demonstrates a potential demand for educational content that addresses this specific aspect of environmental impact, which could be seen as an opportunity to further integrate such topics into the educational curriculum.

5 DISCUSSION

Based on the results presented in Chapter 4, the discussion focuses on the implications of these findings and what they could potentially mean for educational strategies targeted at Generation Z, specifically in the context of environmental education and the environmental footprint of consumption.

The insights garnered from the survey of Generation Z students on their perceptions of educational materials and content concerning the environmental footprint of consumption raise several intriguing points for discussion. Firstly, the strong preference for interactive, audio-visual study materials such as interactive quizzes, educational videos, and practical case studies suggests a shift in educational engagement strategies. Modern students are digital natives; therefore, their preference for these mediums over traditional methods (e.g., printed materials) underscores the need for educational content creators to innovate and adapt to these changing preferences to maintain engagement and effectiveness.

Moreover, the overwhelming consensus among students on the importance of addressing environmental issues within the educational context cannot be overstated. This pronounced acknowledgment highlights a generational concern for environmental issues and reflects a conscious, ethical stance that is increasingly prevalent among young people today. It suggests that environmental education is not only valued but is deemed essential by the youth, warranting its integration into educational curricula as a core subject rather than a peripheral topic.

However, despite recognizing the importance of environmental education, a significant portion of students feel that neither enough time is devoted to these issues nor are there sufficient study materials on this

topic. This disparity suggests a critical gap between student expectations and current educational provisions, calling for a comprehensive reassessment of curricular content. Educational policymakers and curriculum developers might need to consider these findings seriously, potentially increasing the allocation of time and resources to environmental education.

The noted uncertainty regarding the user-friendliness of study materials – evident from the large proportion of students who chose "DON'T KNOW" when assessing the materials – points to a possible divide between the way educational materials are presented and the students' understanding or interaction with them. This ambiguity may reflect a lack of clear communication about the purpose and use of the materials or could indicate that the materials are not effectively engaging the students.

Furthermore, the results revealed a gap in awareness regarding the term "environmental footprint of consumption." While this term is pivotal to understanding one's impact on the planet, most students were not familiar with it, suggesting an opportunity for educators to deepen the discourse around environmental terminology and its practical implications. Enhancing students' ecological literacy could be achieved through the incorporation of the terms and concepts into relatable and interactive educational experiences.

Students' recognition of the link between transportation choices and environmental impact represents a critical awareness that could be leveraged to promote sustainable practices. Nevertheless, the substantial percentage of students who indicated uncertainty ("DON'T KNOW") in relation to the user-friendliness of materials and the environmental footprint concept signals a potential for more targeted and clear educational interventions.

To conclude, the expressed interest in learning more about the impact of transportation on the environmental footprint of consumption among most students is an optimistic indicator for the future of environmental education. It underscores a readiness to engage with and understand complex environmental issues and suggests a willingness to explore sustainable alternatives. This eagerness provides an impetus for educational institutions to develop and implement comprehensive programs that not only educate but also empower students to make informed choices that contribute to a sustainable future.

Educators and curriculum designers are thus tasked with a critical challenge: to harness this evident enthusiasm and concern for environmental issues in a way that translates into practical knowledge and proactive behaviour. This necessitates a re-evaluation of both the content and delivery of environmental education, ensuring it is not only informative and user-friendly but also directly applicable to the students' lives and future endeavours.

This discussion synthesizes the survey results into actionable insights for educators and policy makers, suggesting a realignment of educational content to better address the needs and preferences of Generation Z students.

6 CONCLUSIONS

The aim of the paper was to identify the educational challenges of the generation Z (studying secondary schools in the Czech Republic) in the thematic area of the environmental footprint of transport consumption.

This article provides valuable insights into the perceptions and preferences in the field of education regarding the environmental footprint of transport consumption from the perspective of the current generation of students (representatives of Generation Z) from selected secondary schools. Based on the results of the conducted research, it can be confirmed that students are interested in effective and interactive forms of education that reflect the rapidly changing technological environment in which they have grown up. At the same time, it was revealed that the current state of education in this area is

considered insufficient, pointing to an urgent need for innovation, both in educational methods and especially in the content itself.

Based on the findings, it must be emphasized that the success of any educational initiative in this area will depend on its ability to engage students through relevant and practical content that not only allows students to understand the impacts of their transportation habits on the environment but also inspires them to actively participate in reducing these impacts. Educational strategies should include the use of interactive technologies, social media, and practical projects that enable students to apply theoretical knowledge about the environmental footprint of consumption in the real world. Ultimately, if students are to be effectively educated in reducing the environmental footprint of transport consumption, it is essential that educational systems reflect the dynamic and interactive nature of the information environment in which Generation Z has grown up and continues to grow. This requires courage to innovate, openness to new ideas and approaches, and most importantly, the engagement of the students themselves in the process of creating and implementing educational programs.

Acknowledgements

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