Generation Z's Perspectives and Responses to Climate Change: The Role of Education and Social Media

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Abstract - This study aims to analyze Generation Z's perspectives on climate change and to describe their patterns of understanding and response to this issue, including how they acquire information, interpret the impacts of climate change, and take action in their daily lives. Additionally, this study evaluates the role of educational institutions and social media in shaping awareness and provides recommendations to enhance their engagement in environmental issues. A quantitative descriptive approach was employed, utilizing online surveys, interviews, and focus group discussions to collect data from respondents across various regions. The findings indicate that Generation Z has a high level of awareness regarding climate change and recognizes human activities as the primary cause. They actively seek information through social media, particularly Instagram, and gain further understanding from educational institutions. Visual educational content and support from educators contribute to shaping their attitudes and concrete actions, such as reducing plastic and energy consumption, to promote environmental sustainability.

Keywords: Climate Change Awareness; Environmental Engagement; Generation Z; Social Media; Education.

Introduction

Climate change is a global issue that has become the world's attention in recent decades. Awareness of its impacts is increasing as extreme phenomena become more frequent, such as the rising global temperatures, changes in rainfall patterns, and the increase in natural disasters and their impact on social and economic life. The long journey of global awareness towards climate change hasbeen marked by some important momentum (Ballew et al., 2019).

One of the forerunners in overcoming climate change occurred in 1992 through the United Nations Conference on Environment and Development held in Rio de Janeiro (Earth Summit). At this conference, the United Nations Framework Convention on Climate Change (UNFCCC) was established which became the basis for global efforts to overcome climate change (United Nation, 2024). Five years later, in 1997, the Kyoto Protocol was signed, the first international treaty specifically targeted the reduction of greenhouse gas emissions by industrialized countries. This agreement shows the increase in World awareness of the importance of action in overcoming climate change (United Nation-Climate Change, 2024).

Furthermore, in 1988, the Intergovernmental Panel on Climate Change (IPCC) was created by the United Nations to provide a scientific study of climate change, its risks, and its impacts on the environment and human life. The reports issued by the IPCC regularly play a role in developing a global understanding of this problem and influencing the policies taken by many countries (IPCC Secretariat, 2024). One of the most important agreements in overcoming climate change was the Paris Agreement in 2015, which became a global commitment to keep the rise of Earth's temperature from exceeding 2 degrees Celsius above pre-industrial levels. This agreement also affirms the importance of adaptation and mitigation of climate change through cooperation between countries (United Nation-Climate Change, 2024).

In recent decades, the role of the younger generation in understanding and advocating climate change issues has become increasingly noticeable. Generation Z (Gen Z), born between 1997 and 2012 as classified by the Central Agency of Statistics (BPS, 2020) and William H. Frey in a United States population analysis (June 25, 2020), played an important role in the discussions related to climate change. Gen Z has unique characteristics that distinguish them from previous generations, especially in terms of the way they communicate and seek information. They grow up in an environment that is highly connected to digital technology, tend to have a short and dense communication style and show high concern for diversity and social issues (Anderson & Jingjing, 2018).

There are several factors make Gen Z different from previous generations. First, Gen Z is a smaller generation than the previous generation, but it is strongly influenced by the rapid development of technology and connectivity. Second, they are more diverse in terms of behavior and culture, considering that they grew up in a digital era with wide access to various perspectives and information. Third, Gen Z has a more global mindset than previous generations, as a result of their connectedness to various digital platforms that enable cross-country communication faster and easier. Lastly, they have the potential to influence the behavior of other generations because they tend to integrate transparency and sustainability values into daily life (Patil & Gokhale, 2023).

The role of Gen Z in climate change activism is highly noticeable in different parts of the world, especially through the use of social media. Gen Z frequently watches and interacts with climate change-related content that appears on their digital platforms. According to Tyson et al. (2021), each individual of this generation applies a variety of emotional reactions to climate change, from a sense of motivation to act to anxiety and anger at the slow response of the authorities. Naidoo (2019), in research cited by Amnesty International, also mentioned that Gen Z facing the issue of climate change as a reflection of how power is often used for short-term personal matters without considering the long-term impact on the environment. A survey by the Indonesian Institute of Political Indicators also shows that in Indonesia, Gen Z and millennial generation consider the environment as one of the worrying issues, equivalent to corruption as the main problem that needs to get more serious attention (Intan, 2021).

In the academic research context, understanding the perspectives and patterns of seeking information from Gen Z on climate change is critical for several reasons. This research can help in raising the awareness and knowledge of Gen Z about the impact of climate change. With good information, they can understand better how climate change impacts their daily lives and how they can contribute to mitigation and adaptation. Second, this research can help Gen Z in making better decisions regarding a sustainable lifestyle, education, and career. As a generation that will face the long-term impacts of climate change, Gen Z has the potential to be a leader in creating positive change through the decisions they make.

In addition, this research is also important in encouraging Gen Z's active participation in environmental movements and sustainable policies. With a good understanding of climate change, they can be more active in advocating eco-friendly policies as well as get involved in social movements that focus on social movements. Furthermore, the impact of climate change can also affect Gen Z's mental health and emotions, especially with more and more news about natural disasters and other negative impacts. The research could help in identifying strategies for managing stress and anxiety related to climate change and also promoting the mental wellness of the younger generation.

From an innovation and problem-solving perspective, Gen Z also has great potential to create more effective and sustainable solutions to face climate change. With a strong background in digital

capabilities, they can use technology and media to develop and disseminate information that can increase public awareness and participation in environmental efforts. In addition, the study can also help in designing more effective educational programs to improve climate literacy among Gen Z so that they are better prepared for the challenges in the future By understanding how Gen Z seeking and access information about climate change, they can design more effective communication strategies and educational campaigns. With an approach that is more in line with Gen Z's communication preferences, it is hoped that the awareness and behavioral changes related to climate change can be more successful.

Therefore, research on Gen Z's perspectives and patterns of information seeking on climate change is very relevant, not only to understand this generation's mindset but also to help create a foundation of knowledge and skills that can be used in facing future environmental challenges. Therefore, the research on Gen Z's perspectives and patterns of information seeking on climate change is very relevant, not only to understand this generation's mindset but also to help in creating a knowledge foundation and skills that can be used in facing environmental challenges in the future.

In this context, it is important to understand how Gen Z understands and responds to climate change in general. This study aims to explore the various aspects that influence their perspective, including the differences that may exist between individuals from different geographical, economic, and social backgrounds. In addition, the use of social media as a source of information and a channel of expression is also a major focus, as the platform is important in developing Gen Z opinions and knowledge on environmental issues. Considering the educational background, this study will explore the patterns of information seeking that are common among Gen Z and how the knowledge they acquire affects their attitudes toward facing climate change.

Several previous studies provide a theoretical foundation for understanding the dynamics of communication-related to climate change, especially in the context of the development of digital media. Painter et al. (2018) showed that climate change is often perceived as a complex issue and of less interest to the general public, with the main source of information coming from the media. Their study compared coverage of climate change by digital media such as Huffington Post, Vice, and BuzzFeed with traditional media in the context of the COP21 summit in Paris in 2015. The results show that although the thematic spectrum is similar, there are differences in News volume and issue emphasis among different types of media.

Another study by Ruiz et al. (2020) highlighted the factors that influence people's perception of climate change. The study revealed that social, political, geographic, economic, and educational factors play a role in developing perceptions of climate change, with the same principles in the community and direct experience of weather changes as a major factor. This study also emphasizes the importance of understanding the interaction among the driving factors in designing effective climate change mitigation and adaptation strategies.

Furthermore, research by Swim et al. (2022) discusses the differences of the generations in responding to climate change. Using data from a decade (2010-2019) of more than 22,000 respondents in the United States, the study found that younger generations, particularly Generation Z and Millennials, showed a more serious concern about climate change than previous generations. In addition, there are differences in the emotions shown by each generation, which affects their tendency to discuss and act on climate change issues.

Another study by Agrawal et al. (2023) highlights how government initiatives, the influence of social media, as well as the level of environmental awareness, affect the eco-friendly practices of Generation Z. The study found that social media has a significant influence on the environmental behavior of Generation Z, while government policies did not have a significant impact. This study confirms the role of social media in developing environmental awareness and pro-environmental behavior among the younger generation.

The purpose of this study is to analyze Generation Z's perspective on climate change and describe their patterns of understanding and response to the issue, including how they obtain information, interpret the impact of climate change, and take action in their daily lives and assess the role of educational institutions in developing perceptions and actions related to climate change. With this comprehensive approach, it is hoped that the research can provide deeper insights into how Gen Z interacts with climate change issues, as well as provide recommendations for improving environmental education and awareness among the younger generation.

Unlike previous studies that focused on media coverage, socio-political factors, or generational differences, this research specifically explores Generation Z's understanding, response, and daily actions related to climate change, while also examining the role of educational institutions—offering a more integrated perspective and practical insights for environmental education.

In this study, the positivist paradigm is the main foundation for understanding how Generation Z perceives and seeks information about climate change. A scientific and objective approach is applied by using quantitative data, such as surveys or statistical analysis, to identify patterns of behavior and their opinions. This paradigm allows empirical measurement of the factors that influence perceptions as well as the way Generation Z responds and seeks information related to environmental issues.

Theoretical Framework

In understanding communication patterns related to climate change issues, the concept of environmental communication becomes relevant. Meisner (2015) defines environmental communication as interactions in various forms—interpersonal, group, organizational, and media that develop social discussions regarding environmental issues and human relationships with nature. Flor (2004) added that environmental communication cannot be separated from the cultural context, including in local wisdom that is passed down between generations.

Pezzullo and Cox (2018) suggest that environmental communication has two main functions, they are pragmatic and constitutive functions. Pragmatic functions include the delivery of information, education, persuasion, and advocacy, while constitutive functions involve the establishment of meaning, values, and social relationships in environmental issues. In this context, the Naturalizing Culture theory of Carbaugh (Littlejohn et al., 2017) affirms that communication is not just delivering messages, but also part of the system that carries a collective understanding of the environment.

To spread information about climate change, various communication strategies need to be implemented, including environmental campaigns. Pezzullo and Cox (2018) describe three main elements in environmental communication, they are alert (providing warnings about environmental issues), amplify (expanding the reach of messages through social media), and engage (encouraging public participation in real action). Milstein (2011) also highlighted the importance of the role of digital media in shaping environmental discourse through labeling and emphasizing specific issues. The concept of environmental literacy is also an important aspect of understanding the pattern of seeking information about climate change. Jurin et al. (2010) explained that environmental literacy encompasses an individual's ability to discover, understand, and act on information about the environment. People who have good environmental literacy will understand the science behind climate change as well as how individual policies and actions can affect the environment.

In the context of spreading information about climate change among Generation Z, Rogers ' (2003) Diffusion of Innovation Theory can be used to explain how information about environmental innovations and solutions spreads in society. Generation Z, as a group familiar with technology and social media, often acts as innovators or early adopters in spreading information related to environmental issues.

In addition, the theory of Uses and Gratifications of Katz, Blumer, and Gurevitch in Littlejohn et al. (2017) can also be applied to understanding how Generation Z uses the media to obtain information related to climate change. Gen Z uses the media for various purposes, such as obtaining scientific information, building an identity as an individual who cares about the environment, and getting involved in social movements, and entertainment. Social Media allows them to share information, mobilize support, and build communities that care about environmental issues. This theory also highlights the role of leaders' opinions in developing Generation Z's attitudes and behavior toward environmental issues. They are more likely to follow the opinions of figures that they consider credible on social media, which ultimately influences their communication patterns about climate change. Involvement in environmental issues not only serves

By understanding existing theories and research, the study will find deeper into how Generation Z perceives and seeks information about climate change, as well as how many factors such as social media, environmental literacy, and environmental communication affect their information-seeking patterns.

Material and Methodology

This research uses quantitative descriptive research type to understand the perspective and seek information patterns about climate change in Generation Z. This approach allows us to describe systematically the quantitative data that reflects the attitudes, knowledge, and behavior of Generation Z related to environmental issues. Through a questionnaire-based survey, the study measured their level of awareness of climate change, information sources that are frequently used, as well as their level of concern and involvement in facing the issue.

The population of this study was Generation Z, which according to the Central Agency of Statistics (BPS) born between 1997 and 2012 (BPS, 2020). The research sample consisted of students from various regions in Indonesia, including representatives from Sumatra, Java, Kalimantan (Borneo), Sulawesi, Nusa Tenggara, Maluku, and Papua. The sampling technique was convenience sampling, with the main criteria being the age appropriate to the category of Generation Z of 512 respondents.

Data sources in this study were obtained from various methods. Online surveys become the main instrument in collecting quantitative data, which allows for identifying patterns of preferences, attitudes, and behaviors of Generation Z in seeking information related to climate change. In addition, to gain more about the data, in-depth interviews and focus group discussions were used to gain a deeper qualitative understanding of the factors that influence their perspective. In addition, the data from social media platforms can also be used as an additional reference to analyze discussion patterns, the most widely accessed sources, as well as emotional responses to climate change issues. The combination of various data sources is expected to provide a comprehensive description of Generation Z's seeking information pattern related to climate change.

Result and Discussion

Research Context

Generation Z in Indonesia, born between 1997 and 2012, will experience the impact of climate change more than previous generations. Climate change caused by human activities, such as fossil fuel burning and deforestation, has led to increased global temperatures, extreme weather, as well as ecosystem degradation that threatens biodiversity (Clayton, 2020; IPCC Secretariat, 2024). The impact also extends to social, economic, and health aspects, including the clean water crisis, disrupted food security, and rising sea levels that threaten Indonesia's coastal areas. Developing countries such as Indonesia face major challenges in climate change adaptation due to limited resources (Leiserowitz et al., 2020).

As a generation that grew up with wide access to digital technology, Generation Z in Indonesia has an important role in understanding and responding to climate change issues. Social Media and the internet became their main sources of information on this issue, which included news, educational videos, as well as infographics (Clayton & Karazsia, 2020). However, the big challenge is the amount of misinformation that can affect their understanding of climate change (Leiserowitz et al., 2020). Therefore, improving Generation Z's digital literacy is crucial so that they can filter valid information and contribute to climate change mitigation efforts (Parker & Igielnik, 2020; Torelli et al., 2020).

This study involved Generation Z respondents from various provinces in Indonesia, including Banten, Bangka Belitung, Jakarta, West Java, Central Java, South Kalimantan, Lampung, Maluku, West Nusa Tenggara, East Nusa Tenggara, Riau, South Sumatra, North Sumatra, and Yogyakarta. Indonesia as an archipelagic country is the most vulnerable to the effects of climate change, such as floods, forest fires, and sea level rise. Generation Z's perspective on climate change is influenced by their local experiences. For example, in South Sumatra and Riau, forest fires are a major issue, while in Maluku and East Nusa Tenggara, climate change happens in the form of threats to coastal communities.

Understanding how Generation Z accesses and processes information related to climate change is critical to designing effective communication strategies. With these insights, education campaigns and environmental policies can be adjusted to their needs and information consumption patterns. Generation Z in Indonesia is not only a recipient of the impacts of climate change but also has great potential as a change agent that can increase public awareness and encourage concrete action in mitigating climate change for the sake of a sustainable future.

Gen Z Perspectives on Climate Change

Findings from this study, as illustrated in Table 1, show that the majority of Generation Z (68.3%) have Good Understanding and Complete Understanding understanding (9.5%) of climate change issues, reflecting a high level of climate literacy among them. This signifies that exposure to information through a variety of media, including digital, formal education, and activism campaigns, is effective in raising awareness. This awareness is in line with their concern for individual actions, such as their efforts in reducing plastic use and using public transport. However, 21.7% of respondents have Limited Understanding, while 0.5% did not understand at all, indicating a gap in climate literacy among some Generation Z. Although the percentage is small, it can be an important signal for governments, environmental organizations, and educational institutions to improve information access and more relevant and effective educational approaches.

Table 1. Understanding Level of Climate Change Issues

Understanding Level	Percentage
Complete Understanding	9,5%
Good Understanding	68,3%
Limited Understanding	21,7%
No Understanding	0,5%

Source: Researcher's Processed Data, 2024

Table 1 illustrates that although the majority of Gen Z already understand the climate issues, sustainable education is still needed, especially for those who lack understanding. Interactive and practical experience-based campaigns, such as environmental workshops or eco-volunteering activities, can be a solution to improve their understanding. This is important so that the awareness that already exists is not only superficial but also followed by consistent and sustainable changes in behavior.

Table 2. Knowledge of the main causes of climate change

Knowledge	Percentage
Extraterrestrial factors such as solar activity	2,7%
Earth's Natural changes	14,6%
Human activities such as fossil fuel use and deforestation	81,5%
No Idea	1,2%

Source: Researcher's Processed Data, 2024

Table 2 shows that the majority of Generation Z (81.5%) realized that human activities, such as greenhouse gas emissions, deforestation, and fossil energy consumption, are the main causes of climate change, reflecting a high level of environmental literacy. However, 14.6% still consider that climate change occurs naturally, while 2.7% link it to extraterrestrial factors such as solar activity. Although these views are a minority, it is still important to ensure that their understanding is based on accurate science. In addition, the 1.2% of respondents who did not know the causes of climate change showed that there an information gaps that need to be addressed.

Table 3. Actions in reducing the impact of climate change

Actions	Percentage
Cut meat consumption	1,5%
Reduce the use of single-use plastics	64,8%
Using eco-friendly transportation	22,7%
No Action	11,0%

Source: Researcher's Processed Data, 2024

The data in Table 3 shows that 64.8% of Generation Z in this study have reduced the use of single-use plastics, indicating their preference for simple action, easy to do, and having a direct impact on the environment. The popularity of anti-plastic campaigns, such as the zero-waste movement and policies banning plastic bags in some areas, is likely to be the main factor in this behavior. However, only 22.7% chose to use public transportation, and 1.5% cut meat consumption, although both of these actions highly contribute to reducing carbon emissions. This low indicator is probably due to limited access to proper public transport as well as a lack of awareness of the impact of meat consumption on climate change. In addition, there are still 11% of respondents who have not taken any action, indicating obstacles or lack of encouragement to participate in environmental mitigation.

A common Pattern of Information Seeking among Gen Z Towards Climate Change
The data in Table 4 shows that the majority of Generation Z (75.1%) obtain information about climate change through social media, it showed that digital platforms brought a big impact in developing their awareness. Content such as infographics and educational videos allow the spread of information faster but also risks generating misinformation. More credible sources, such as online news (16.9%) and formal education (5.9%), are less likely to be primary references, it's probably due to a less attractive approach. Therefore, a strategy is needed that combines the credibility of formal sources with a more engaging digital format so that Gen Z's understanding of climate change is more accurate and in-depth.

Table 4. The sources of information used the most in studying climate change

Sources	Percentage
Discussion among friends or family	2,2%
Formal education in school/college	5,9%
Online news and articles	16,9%
Social Media	75,1%

Source: Researcher's Processed Data, 2024

Table 5. Social media platforms used the most to follow Climate Change issues

Social media platforms	Percentage
Instagram	51,0%
TikTok	27,7%
X/Twitter	19,1%
Facebook	2,2%

Source: Researcher's Processed Data, 2024

Table 5 shows that the majority of Generation Z (51%) rely on Instagram as the main platform to follow Climate Change issues, it's indicates that their preference for visual and narrative content is easy to understand. Instagram shares information through infographics, short videos, and interactive stories, it makes complex issues more interesting for the younger generation. On the other hand, TikTok was chosen by 27.7% of respondents and also contributes an important role with faster and more accessible content, supported by algorithms that facilitate the virality of environmental messages. However, the short content has the risk of causing oversimplification of information.

Meanwhile, X/Twitter (19.1%) serves more as a platform for real-time discussion and news updates, although it is not as popular as visual-based platforms. Facebook, which is used by only 2.2% of respondents, appears to be less relevant to Gen Z in the context of climate change issues, it seems due to the dominance of older users. These findings showed the importance of adjusting environmental campaign strategies to Gen Z's media preferences, with a primary focus on Instagram and TikTok for a wide reach, as well as X/Twitter for more in-depth discussion.

The finding that 29.1% (Table 6) of Gen Z access information about climate change every day and 45.2% in couple of times a week showed that this issue has become their regular information consumption. This reflects Gen Z's high interest and involvement in environmental issues, along with their high exposure to content on social media such as Instagram, TikTok, or X/Twitter. This intense

level of Access also strengthens the potential of social media as an effective environmental education and advocacy platform.

Table 6. The level of social media use to get information about climate change

Social Media Usage Percentage

The Use of Social Media	Percentage
Everyday	29,1%
Couple of week	45,2%
Couple of Month	20,0%
rarely or never	5,6%

Source: Researcher's Processed Data, 2024

On the other hand, there are 20% of respondents only access information about climate change a couple of times a month, while 5.6% rarely or never, reflecting the engagement variation among Gen Z. Other factors such as individual preferences or the perception that the issue is less relevant in everyday life can affect their participation. Therefore, more engaging and personalized communication strategies are needed, such as community-based campaigns, collaboration with influencers, or gamification of information. This approach can increase long-term engagement and ensure that environmental messages are not only temporary but also encourage sustainable behavior change.

Table 7. The way to express the idea about climate change on Social Media

Type of Expression	Percentage
Uploading Photo/ Videos / Stories	13,0%
Share content from other sources	34,5%
Participate in discussions or comments	23,0%
No action	29,6%

Source: Researcher's Processed Data, 2024

The table above shows that 34.5% of Gen Z prefer sharing climate change content from other sources rather than creating their own, it showed that their role was as curators of information that promote an existing message. Meanwhile, 29.6% had no action / never expressed their ideas, which showed the presence of a passive segment who may feel less confident or did not find the relevance of this issue in their identity. Only 23% who participated in discussions and 13% frequently posted or made stories, showed their preference for reactive interaction over personal initiative. These findings indicate that effective environmental campaigns need engagement through interactive discussions and provide quality content that can be easily shared, to reach more audiences and raise collective awareness.

The Role of Social Media in Developing Gen Z Opinions and Knowledge about Climate Change.

A total of 56.2% of Gen Z consider that the information from social media is quite influential in supporting their actions related to climate change, it showed its role as a motivation and inspiration. Accessible and relatable content, such as eco-friendly lifestyle tips, makes it easier for them to adopt sustainable habits. In addition, 23.2% of Gen Z even experiencing a high influence, indicating that social media not only provides information but also triggers behavioral changes through viral content and public figures. These findings confirm that social media has great potential as an educational and advocacy tool, especially if it is packaged creatively and relevantly.

Table 8. The impact of information from social media on action in addressing climate change

Impact of Social Media Information	Percentage
High	23,2%
Medium	56,2%
Low	18,6%

No Impact	2,0%

It is important to ensure the credibility of information on social media to reach more people and maximize its impact in encouraging concrete actions related to climate change as described in Table 9.

Table 9. The level of credibility of information about climate change from social media

Credibility Level	Percentage
Very Accurate	14,7%
Medium	81,2%
Less Accurate	3,9%

81.2% of Gen Z assess the information about climate change on social media as Accurate, reflecting high trust in platforms such as Instagram, TikTok, and Twitter, despite there being skepticism and a desire to recheck the facts. Meanwhile, 14.7% consider the information was Very Accurate, indicating that they tended to follow credible sources, such as accounts of activists or environmental organizations. However, 3.9% consider that the information from social media is Less Accurate, reflecting awareness of the risks of disinformation. The findings showed the need for education about verifying information so that Gen Z can sort out accurate and fact-based content in understanding climate change. The type of Content affects Gen Z in studying climate change issues, as described in Table 10 below:

Table 10. Type of interesting content related to climate change

Type of Contents	Percentage
Personal stories and experiences	9,0%
Articles and news	13,0%
Infographics and images	20,5%
Educational videos and documentaries	57,5%

The majority of Gen Z (57.5%) are more interested in educational videos and documentaries, which showed that visual and narrative content is effective in conveying the issue of climate change emotionally and understandably. On the other hand, 20.5% of Gen Z prefer infographics and images, which allow for conveying information concisely and attractively, especially on platforms such as Instagram. Meanwhile, 13% of Gen Z are interested in articles and news then 9% in personal stories, signaling that despite being less popular, the format is still important for providing a deep understanding and emotional connection. These findings highlighted the need for a variety of content formats in environmental campaigns to reach Gen Z optimally according to their preferences.

Table 11. Knowledge of climate change affects daily decisions

Influence of Decisions	Percentage
High	21,0%
Medium	62,3%
Low	14,4%
No Impact	2,2%

Table 11 shows that 62.3% of Gen Z consider that their understanding of climate change sufficiently influences everyday decisions, reflecting the awareness that impacts small eco-friendly actions. Meanwhile, 21% considered that their understanding is very influential, indicating the existence of a group that is more committed to living a sustainable lifestyle. However, 14.4% were only slightly affected, indicating there is a challenge in applying understanding to concrete action.

The findings highlighted there is a need a campaigns that not only provide information but also offer practical solutions to drive a more consistent behavior change.

Table 12. The main motivation for finding information about climate change

The Main Motivation	Percentage
Follow current trends and discussions	5,1%
Personal concerns about environmental impact	67,2%
Academic or work needs	8,1%
For general information only with no specific motivation	19,6%

Source: Researcher's Processed Data, 2024

Table 12 shows 67.2% of Gen Z looking for information about climate change because of personal concerns about environmental impacts, indicating a high awareness of the issue. Meanwhile, 19.6% of Gen Z only want to gain general knowledge, while 8.1% are motivated by academic needs, and the rest 5.1% follow the trend. These findings indicate that Gen Z's motivations for seeking information are very diverse, so communication approaches about climate change need to be linked to relevant aspects of their lives to increase engagement and action on environmental issues.

Table 13. The most frequent actions to reduce the effects of climate change based on knowledge

Actions	Percentage
Buying eco-friendly products	18,6%
Reduce energy use	61,4%
Recycling and reducing waste	14,9%
No specific action	5,1%

Source: Researcher's Processed Data, 2024

Related to the motivation Table 13 showed that 61.4% of Gen Z reduce energy use, it showed a high awareness of energy efficiency as a climate change mitigation measure. Meanwhile, 18.6% of they chose eco-friendly products, reflecting efforts to consume sustainably despite probably there being price and availability constraints. A total of 14.9% recycle and reduce waste, indicating a concern about waste management, while 5.1% do not take any action. The findings showed that although the majority of Gen Z have contributed in various forms, there is still space to increase their involvement in broader sustainability practices.

The Role of Educational Institutions in Developing Gen Z Perceptions and Actions Regarding Climate Change

Table 14 describes that 59.2% of Gen Z showed that education and climate change campaigns are quite influential, indicating the success of the educational field in raising awareness and encouraging action. Meanwhile, 24.4% consider it's influenced them so much, that interactive experiences such as workshops and environmental projects can strengthen their motivation to contribute more actively. These findings showed the importance of engaging and participatory educational approaches to strengthen Gen Z engagement in Sustainability Action.

Table 14. The role of education and campaigns on climate change for motivation

The Role of Education	Percentage
High	24,4%
Medium	59,2%
Low	15,6%
No Impact	0,7%

Source: Researcher's Processed Data, 2024

A total of 59.2% of Gen Z experienced that education and climate change campaigns were quite influential, while 24.4% had a very big impact, showing the effectiveness of education in increasing their awareness and motivation. However, 15.6% considered those programs to a little impact, and 0.7% had no impact at all, indicating a less engaged group. Some factors such as limited access to information or less relevant educational approaches can be the cause. The findings showed the importance of inclusive campaigns so all Gen Z segments would experience the benefit of climate change education.

Table. 15. Quality of educational materials on climate change in schools/campuses

Material Quality	Percentage
Excellent	15,6%
Good	48,2%
Poor	20,8%
Bad	15,4%

Source: Researcher's Processed Data, 2024

In Table 15, 48.2% of Gen Z rated the quality of educational material about climate change in schools or campuses as good, while 20.8% considered it was poor, indicating that the existing program needs improvement. A total of 15.6% rated the material as excellent, while 15.4% rated it as bad, reflecting there is a gap in the learning experience. These findings emphasize the importance of evaluation and renewal curriculum to make climate change materials more relevant, interesting, and able to equip Gen Z with a knowledge that drives them into some action on the environmental issues.

Table 16. How influential are educators in improving understanding of climate change

Influence of Educators	Percentage
High	19,1%
Medium	49,6%
Low	26,9%
No Impact	4,4%

Source: Researcher's Processed Data, 2024

A total of 49.6% of Gen Z rated the influence of their teachers or lecturers as considerable in improving understanding of climate change, it showed that educators have an important role in developing environmental awareness. However, 26.9% rated it as only having a slight influence, and 4.4% showed no influence at all, indicating there is a challenge in teaching methods or the integration of this issue in the curriculum. Meanwhile, 19.1% rated it as very large, indicating that effective teaching can have a significant impact. These findings emphasize the importance of improving the quality of teaching and training for educators to be able to convey climate change issues in a more interesting and inspiring way for Gen Z.

Tables 1 - 16 showed that Generation Z (Gen Z) has a good understanding of climate change, majority of them recognizing that human activity is the main culprit. This awareness is reflected in concrete actions, such as the reduction in the use of single-use plastics done by 64.8% of respondents. In addition, they considered individual actions as an important step in facing climate change and showed a desire to contribute to the mitigation of environmental problems.

In terms of seeking Information, social media is the main source for Gen Z to understand the issue of climate change. 75.1% of respondents rely on social media with Instagram being the most used platform. They not only access information, but also actively share them, it shows the role of social media in disseminating environmental awareness. Gen Z's preference for educational video and documentary content also rated that visual and narrative formats are more effective for their attention to these issues.

In addition, educational institutions also play a role in developing Gen Z's perspective and awareness of climate change. A total of 59.2% of respondents rated that education and campaigns have a big influence, although there is still space to improve the quality of the material taught. Teachers and lecturers are considered to have an important role, with 49.6% of Gen Z rated that

educators help improve their understanding. Overall, the combination of social media and formal education is a major factor in developing Gen Z's attitudes and actions toward climate change.

Discussion

This study can be analyzed using several relevant environmental communication theories. Based on the Environmental Communication Theory of Meisner (2015), environmental communication includes social debate about environmental issues and human relationships with nature. The findings showed that Gen Z actively seeks information about climate change through social media and educational institutions, reflecting intensive environmental communication among them. Climate change has become part of the social conversation that encourages them to understand the impact of human activities on the environment and take more proactive action. These findings theoretically verify Meisner's (2015) Environmental Communication Theory, which posits that environmental communication encompasses social debate on environmental issues and human relationships with nature. The active information-seeking behavior of Generation Z regarding climate change—particularly through social media and educational institutions—demonstrates that environmental issues have become embedded in their social discourse, prompting greater awareness and proactive engagement in addressing environmental challenges.

In addition, Flor (2004) emphasizes that environmental communication also includes a cultural dimension. Gen Z builds environmental awareness through evolving digital cultural values, especially through social media. They not only acquire information but also educate and remind each other in the digital community. This creates a new culture of sustainability, which is seen in concrete actions such as reducing the use of single-use plastics and energy. Social Media acts as a tool for spreading environmental values that are slowly becoming part of their lifestyle. These findings theoretically affirm Flor's (2004) perspective that environmental communication encompasses a cultural dimension. Generation Z's engagement with environmental issues through digital platforms demonstrates the emergence of a sustainability-oriented digital culture. Their use of social media not only facilitates information exchange but also cultivates shared values and behavioral norms—such as reducing single-use plastics and conserving energy—indicating that environmental values are becoming integrated into their lifestyle.

Rogers' (2003) Diffusion of Innovation Theory helps explain how information about climate change spreads among Gen Z. They act as "early adopters" in receiving information and adopting environmentally friendly behaviors. With their active role in disseminating information through social media, Gen Z is not only a consumer of the information but also an agent of change that helps accelerate the spread of environmental awareness among peers and the wider community. The findings provide theoretical validation for Rogers' (2003) Diffusion of Innovation Theory, as Generation Z exhibits characteristics of early adopters in the context of climate change information and environmentally friendly behaviors. Their active role in not only adopting but also disseminating environmental messages through social media demonstrates their function as change agents, thereby accelerating the diffusion process and expanding environmental awareness across their networks.

Meanwhile, the Theory of Uses and Gratifications provides an understanding of Gen Z's preference for social media, especially Instagram, in seeking information about climate change. Gen Z uses this platform to meet their information needs, social engagement, and express their identity as an environmentally concerned generation. Social Media is not only a source of information, but also a container for sharing values and participating in environmental campaigns that strengthen collective consciousness. The findings offer theoretical confirmation of the Uses and Gratifications Theory, as Generation Z's use of Instagram to seek climate change information, engage socially, and express their environmental identity illustrates how media consumption is driven by specific psychological and social needs. Their active participation in environmental campaigns and value-sharing on social media further reinforces the theory's relevance in explaining media behavior in the digital age.

Social Media is also involved in supporting environmental campaign aspects with alert, amplify, and engage functions as explained by Pezzullo and Cox (2018). Gen Z uses social media to raise awareness through information and discussion, promote these issues by sharing relevant content, and engage in online campaigns that encourage collective action. It shows how they communicate effectively in the context of social change through the digital space. The findings confirm the theoretical framework proposed by Pezzullo and Cox (2018), as Gen Z effectively utilizes social

media to support environmental campaigns through alerting, amplifying, and engaging in online discussions and actions. Their active involvement in raising awareness, sharing content, and participating in digital campaigns aligns with the theoretical understanding of how social media functions as a tool for social change and collective action.

Educational institutions is part of an important role in developing Gen Z environmental literacy. Based on the theory of environmental literacy of Jurin et al.(2010) a strong understanding of climate change allows them to take concrete action. The findings showed that the majority of Gen Z experienced that education and climate change campaigns are quite influential, although there is still a need to improve the quality of the material taught. Therefore, collaboration between social media and educational institutions can be an effective strategy for sustainably strengthening Gen Z environmental awareness.

The findings validate the theoretical framework of environmental literacy by Jurin et al. (2010), which emphasizes the importance of strong environmental knowledge in enabling Gen Z to take concrete actions on climate change. The majority of Gen Z respondents confirmed the significant influence of education and climate change campaigns, although they noted the need for improved material quality. This aligns with the theory, further suggesting that collaboration between social media and educational institutions is an effective strategy to sustainably strengthen Gen Z's environmental awareness.

Conclusions

Generation Z shows a high level of awareness of climate change, with a deep understanding that this phenomenon is a direct consequence of human activity. This awareness is reflected in their concrete actions, such as reducing the use of plastics and energy, which reflect personal responsibility in taking care of the environment. In obtaining information about climate change, social media, especially Instagram, became the main source on which they relied. This Platform not only serves as a tool for education but also as a space to share environmental messages. Social Media have an important role in developing their opinion and identity as a generation that cares about sustainability. Through engaging content, such as educational videos, Gen Z is increasingly motivated to engage in collective and personal action to support environmental conservation.

In addition, educational institutions also become a part of an important role in strengthening environmental perception and literacy among Gen Z. Formal education that teaches about climate change provides a stronger foundation for them to understand environmental issues in greater depth. With the support of educational institutions, they not only gain greater insight but are also encouraged to implement sustainability values in daily life.

The study reveals that Generation Z demonstrates a strong awareness of climate change, identifying human activities as the main contributor. They proactively gather information via social media, especially Instagram, and enhance their knowledge through educational institutions. Educational content in visual formats, along with guidance from educators, plays a significant role in influencing their attitudes and prompting tangible actions, like minimizing plastic use and energy consumption, to foster environmental sustainability.

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