




## Enhancing Student Learning Through #DigitalPowerups, “Pushed me to be Creative”: Student Discussions in Environmental Sociology Course

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 10.46303/ressat.2024.3

### Article Info

Received: July 1, 2023

Accepted: November 10, 2023

Published: February 3, 2024

### How to cite

Soyer, M., Yigit, M. F., Ziyanak, S., Kasu, B. B., Thurston, T., & Suggs, J. (2024). Enhancing Student Learning Through #DigitalPowerups, “Pushed me to be Creative”: Student Discussions in Environmental Sociology Course.

*Research in Social Sciences and Technology*, 9(1), 1-30.

<https://doi.org/10.46303/ressat.2024.3>

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### ABSTRACT

The use of #digitalpowerups is a technique that involves associating keywords with prompts in online discussion forums, which enables students to have more choice and voice. These powerups not only help structure responses but also enrich discussions and develop academic skills necessary for online assignments. The approach leverages the social media interaction space of discussion forums by introducing hashtags that remind students of the prompt being addressed and indicate the level of Bloom's being engaged. By using the powerups, students can engage in mid-levels and higher-order levels of Bloom's, along with the lower levels that they typically engage in based on the design and facilitation of the discussion. Students typically participate in the lower levels of Bloom's taxonomy (#remember, #understand) due to the way the discussion is structured and facilitated. However, the use of #digitalpowerups encourages students to move beyond these levels and engage in mid-levels (#apply, #analyze, #evaluate) and higher-order levels (#create, #connect) during discussions. The powerups also scaffold or frame student responses with habits of mind skills. This article examines how the #digitalpowerups strategy supports learning in a virtual community for Environmental Concerns in the Environmental Sociology Course through content analysis of student discussion postings. The primary data (total of 375 postings) were collected from the Environmental Sociology Class throughout the following academic years: Fall 2020 (96 postings), Fall 2021 (67 postings), Spring 2022 (92 postings) and Spring 2023 (120 postings).

### KEYWORDS

Student engagement; environmental sociology; digitalpowerups.

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## INTRODUCTION

Integrating digital technology into the classroom has given educators an excellent opportunity to go beyond the confines of conventional pedagogical practices and design authentic and exciting learning environments for their students. Although the pros and cons of learning at a distance have been debated on and off for quite some time, the concept of distance education took center stage during the COVID-19 pandemic (Al-Mawee et al., 2021). It has been argued that students' active engagement is essential to the success of distance learning (Jung et al., 2002). The efficiency of distance learning is significantly influenced by active learner participation. When students participate actively in their education, they interact with the content of the classes, share their thoughts and perspectives with their classmates and teachers, and take responsibility for their own academic growth. As a possible outcome of this participation, an enhanced capacity for learning and memory recall may emerge.

Much research has been done on the challenges of distance learning. Some of these negatives consist of things like isolation, loneliness, difficulty in focusing, and delayed feedback (Lei & Gupta, 2010; Venter, 2010; Young & Norgard, 2006; Zuhairi et al., 2006). Utilizing the Community of Inquiry framework, instructors can create a social constructivist learning environment for students to engage with each other (Joksimović et al., 2015) and encourage discourse and community building as a means of engaging students in an educational experience (Garrison et al., 2010). Online discussions are one way that students have the opportunity to work together, share ideas, and learn from one another in the classroom setting (Baglione & Nastanski, 2007). Such an interactive community encourages students to work together and can give them a sense of belonging among their peers (Andresen, 2009). Also, when students work together, they often do better work than they would have if they had worked alone (Moore, 2021). Online discussion boards and forums allow students to engage with their teachers and the other students in a useful way from a distance, often at their own pace. These message boards' threaded layout permits the branching and growing of messages and replies, offering a versatile forum for discussion (Sull, 2014).

Although having the ability to participate in a discussion at different phases, commenting on other students' postings, and repeatedly responding to one's own and other people's remarks if online discussions are structured and supported properly, they can inadvertently hinder student learning. The inadequacies of online discussions include: not engaging students in higher-order thinking (Gao et al., 2013) not allowing for the co-construction of knowledge and reflection (Cho & Cho, 2016); and pertinent posts being buried in the discussion threads (Rubin et al., 2013). It may become increasingly difficult for participants to keep up with the discourse as the number of threads and disputes grows. Because of this, there is a possibility that students may be inundated with information, which will make it difficult for them to process and respond to all that they have been given (Dwivedi & Bharadwaj, 2012). As a result, the learning process as a whole may suffer from a lack of engagement and dissatisfaction. For this reason, it is vital to locate a helpful medium that can protect students from information

overload and encourage their engagement in the online community to establish a productive online learning environment where students can develop and learn. When instructors use the #digitalpowerups strategy which employs social media engagement features into the discussion threads students have the resources and supports needed to be successful and addresses the inadequacies that online discussions have on their own.

The usage of social media features, for instance, the "like" button in threaded discussions, is one promising area of inquiry for researchers looking to enhance the online learning experience for students (Makos et al., 2013). Integrating social media aspects into online conversations can promote community involvement, support students feeling emotionally connected, and help avoid information overload (Lee & Bonk, 2016). Hashtags have the potential to become an efficient tool for stimulating academic conversations online and for facilitating student engagement and cooperation in the production of new knowledge through threaded discussions that can take place both online and in traditional classroom settings (Pacansky-Brock, 2012). Threaded online conversations using hashtags can be an effective instructional strategy calling for individual and cooperative student participation and active knowledge reflection (Mardi, 2020).

The use of #digitalpowerups is a technique that involves associating keywords with prompts in online discussion forums, which enables students to have more choice and voice. These powerups help structure responses, enrich discussions, and develop the academic skills necessary for online assignments (Thurston, 2020). This method uses the public nature of online discussion boards by having students use hashtags to track the question they are responding to and the degree of Bloom's taxonomy at which their responses fall. By using the powerups, students can engage in mid-levels and higher-order levels of Bloom's taxonomy, along with the lower levels that they typically engage in (Christopher et al., 2004), based on the design and facilitation of the discussion. Students usually participate in the lower levels of Bloom's taxonomy (#remember, #understand) due to how the discussion is structured and facilitated. However, the use of #digitalpowerups encourages students to move beyond these levels and engage in mid-levels (#apply, #analyze, #evaluate) and higher-order levels (#create, #connect) during discussions. The powerups also scaffold or frame student responses with habits of mind skills (Henderson et al., 2023). This article examines how the #digitalpowerups strategy supports learning in a virtual community for Environmental Issues in the Environmental Sociology Course through content analysis of student discussion postings. Additionally, the article shares theoretical underpinnings and results from scholarship of teaching learning studies using #digitalpowerups. Our research aims to provide insights into the potential benefits of using hashtags or digital powerups as a tool to promote student-centered learning and collaborative knowledge creation. By sharing our findings with the larger educational community, we intend to encourage new approaches to digital classrooms that prioritize student engagement, collaboration, and active participation, eventually leading to more effective and influential educational experiences for all. By understanding how students interact and develop in online

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discussion forums, this paper seeks to illuminate the growing potential for digital technology to revolutionize educational experiences, from how students approach class material to how well they understand it.

The structure of this article begins with a background introduction and literature review followed by a methodology section. The results are presented in the next section with some subsections/key themes identified in this study. A summary of the concluding discussion and conclusions is then shared with some of our limitations, theoretical contributions, and recommendations for future studies.

### **LITERATURE REVIEW**

Engaging students in online learning communities has been the subject of over two decades of research, indicating that enable students to share and cooperate on their knowledge regardless of the student's physical locations or the time restrictions they face (Curtis & Lawson, 2001; Ellis & Cohen, 2009; Fani Sani et al., 2013; Garrison et al., 1999; Marks, 2011; Oliver & Shaw, 2003; Patel & Aghayere, 2006; Picciano, 2002; Swan et al., 2009). Students can have meaningful conversations with their classmates and teachers through various online learning communication tools, such as message boards, discussion forums, and other media. Creating and facilitating a collaborative learning environment like this helps participants improve their critical thinking and problem-solving, encourages a sense of community, and provides participants with the necessary support. Furthermore, online education allows students to learn at their own pace and on their own time, which can boost their satisfaction and motivation. The COVID-19 outbreak has had far-reaching effects on the education system, and officials have been forced to make many difficult choices quickly, most notably shifting the education system to a distance learning approach (Celik et al., 2022). Therefore, this rapid use of online distance education presented new issues for students, teachers, and parents (Kidd and Murray, 2020).

Online discussion forums quickly become among the most popular platforms for facilitating text-based communication and engagement between teachers and students (Garrison et al., 1999; Garrison, 2007). Teachers who want to implement discussion-based, collaborative-learning courses would benefit significantly from having access to online discussion forums. In these forums, students can discuss course material, offer their perspectives, and learn from one another. Due to the asynchronous nature of these platforms, students can participate at their own pace without feeling compelled to respond in real time (Hamer et al., 2011), and they can process their thoughts before creating a post or response (Lima et al., 2019). Moreover, discussion boards let teachers gain insight into students' activities and adjust their teaching accordingly (Jiang et al., 2015; Stephens-Martinez et al., 2014). Learners who participate in online forum discussions receive many benefits, one of which is an improvement in their overall learning experience (Almatrafi and Johri, 2018; Chiu and Hew, 2018).

However, according to Gao et al. (2013), threaded forums do not always produce fruitful interactions despite their widespread use. The ability to be productive while using these forums can be hindered by a number of different variables, one of which is the challenge of being focused on the task. Another factor is the possibility that many messages will go unanswered. Peterson and Roseth (2016) also found that during participation in an online forum, the absence of non-verbal social cues lowers communication quality and obstructs social interaction development, which negatively affects learning performance. Another negative aspect of online discussions is when more information and ideas are generated, the conversation may become disorganized and unproductive (Ioannou, 2011). Students may find it challenging to participate in online threaded conversations or to determine the main topic or focus when several lines of thought develop. This creates even more communication barriers and more room for misunderstanding, misinformation, and conflict. Because of this, students may feel lost in online discussions and unable to participate (Peters & Hewitt, 2010). They can feel compelled to read and respond to every post, even if they have nothing to do with the topic. This can prevent the reader from grasping the essential ideas being discussed rather than just skimming over them. (Avery et al., 2019). The outcome could be a drop in motivation and involvement if students feel disinterested or frustrated with the discussions (Marbouti & Wise, 2016). According to Thomas (2002), fewer and fewer people read a thread as the number of postings increases. The chances that everyone in a conversation will see and reply to every single post decrease as the number of posts increases. This can cause people to lose out on crucial arguments that their peers have made and weaken the discussion as a whole.

In addition, other challenges may prevent students from contributing meaningfully to online debates and discussions. When a person has many things going on at once, both in and out of academic duty, it can be challenging to keep track of everything. This can cause individuals to feel overwhelmed or burned out, which prevents them from participating entirely in the conversation and offering helpful insight (Gill, 2014; Ioannou, 2011). Therefore, asynchronous threaded discussion might improve critical thinking and shared understanding, however there are studies discussing that the online discussion platforms do not help students gain the knowledge at the desired level unless they actively participate in discussions (Gill, 2014).

Hashtags are often used on social networking sites to organize and filter content. Twitter and Instagram, and TikTok have greatly facilitated the usage of hashtags in online interactions. It allows individuals to include relevant hashtags or keywords, increasing the likelihood that their posts will be seen and engaged with by other users. The use of hashtags in social media has greatly improved the efficiency of finding and sharing information. They have aided the development of interest-based internet communities by making content easier to find (Raman et al., 2020).

Hashtags are also often useful for academic purposes (Celik et al., 2022), and using education-related hashtags on various social platforms can help expand relevant stakeholders' professional networks and interactions (Carpenter et al., 2020). Hashtags are a great way to

encourage interaction and participation during online events like webinars and courses. Teachers can facilitate online discussions about their classes by establishing a unique hashtag for use by their students. This enables student communication, review of previously presented material, and inquiries about the course content. In addition to classifying lessons, hashtags can be used to share supplementary materials and links with students. Presenters at conferences, for instance, can include hashtags in their slides so that attendees can easily access related articles, videos, and other resources. Hashtags allow users to find and participate in discussions about specific material rapidly. By doing so, they can absorb more information about the topic at hand and be better prepared to pursue more studies once the course or presentation has ended (Avery et al., 2019). Furthermore, hashtags are no longer a passing fad; they have become an indispensable resource for users in various digital contexts. They help spread information by broadcasting it to a broad audience. In computer-mediated learning environments like a learning management system (LMS), students can put into practice the natural hashtag communication behaviors similar to other online community places (Raman et al., 2020). Apart from this, one of the many advantages of using tags in online discussion forums is its straightforward and inexpensive implementation. Users' familiarity with tagging through social media use makes introducing this concept in a classroom context simpler. According to a study (Dennen et al., 2018), students can quickly grasp the idea of tagging and apply it to their own online education. Students' skillful tagging demonstrated a swift conceptualization of the potential of tags in online education. Different types of discussion prompts have been found to increase student engagement in online discussions (DeNoyelles et al., 2014) and the #DigitalPowerups strategy builds on these ideas by connecting a hashtag that corresponds to a level of Bloom's taxonomy, and to an associated question or prompt.

## METHODOLOGY

### **The Context of Environmental Sociology Class**

Undergraduate students at Utah State University, a large land grant university in the United States, majoring in sociology-related subjects were required to take the Environmental Sociology course, a 4000-level class. Students develop the ability to critically assess assertions concerning environmental risk and vulnerability from various perspectives by taking part in this course. They also evaluate environmental debates by looking at all parties' perspectives and considering their interests, resources, factual claims, and value judgments. Moreover, through engaging written communication, students develop the skills to explain how people create and resolve environmental concerns from various viewpoints. They identify the social, political, economic, cultural, and psychological factors that shape our interactions with the environment and natural resources. This course aims to equip students with the tools necessary to competently evaluate environmental issues and engage in informed debates about environmental controversies. The goal is for students to acquire a more nuanced comprehension of the intricate social dynamics behind environmental decision-making

processes with due consideration to the myriad perspectives brought to the table by various groups. As a component of the curriculum, students have the chance to participate in online discussions using the #digitalpowerups assigned to them throughout the semester. In total, during the course of the 15-week semester, all of the students from 4 different semesters (39 students from Fall 2020, 32 students from Fall 2021, 44 students from Spring 2022, 46 students from Spring 2023) attended this class and engaged in the online discussions.

### **Data Collection Tool and Process**

The book entitled *“An Invitation to Environmental Sociology”* by Michael Mayerfeld Bell, Loka L. Ashwood, Isaac Shon Leslie, Laura Hanson Schlachter (2020) has been used as a required material for SOC 4620 Environmental Sociology Class. The data is derived from the digital powerups discussion postings of Chapter 8, which is about The Ideology of Environmental Concerns. This chapter argued that environmental concern has three primary sources: the moral attractiveness of nature, the degree to which human activity has transformed the environment, and the spread of democratic attitudes and institutions. The chapter begins by discussing the arguments put forth by Rachel Carson and then delves into the history of environmental concerns among ancient philosophers from Greece, China, India, and Rome, highlighting the concept of a natural conscience - the notion that there is a source of moral value that is beyond the influence of human interests and pollution. Moving on to modern times, the chapter explores the rise of environmental concern, further examining the concept of a natural conscience and introducing two related concepts: the natural other and the natural me. The chapter also reviews evidence on the social bases of contemporary environmental concern and disputes the idea that environmentalism is a passing issue that only concerns elites. Using recent survey data, the chapter argues that environmental concern is persistent and that the elites tend to be least concerned about environmental problems. Additionally, the chapter documents the increasing partisan divide in the United States over environmental issues. The chapter explores the ideological significance of material factors in the transformation of the environment, focusing on three theories: Inglehart's theory of post-materialism, Riley Dunlap and others' theory of paradigm shift, and Arthur Mol and Gert Spaargaren's theory of ecological modernization. While the chapter offers critiques of each of these theories, it ultimately argues that material factors have played a crucial role in the development of contemporary environmental ideologies.

Students were provided with each of the #digitalpowerups with their associated prompts as originally published by Gustafson (2016, p. 115). Using these the social media features like hashtags to label their posts and comments within the discussion with their peers, students engaged in the online discussions within the Canvas learning management system (LMS) using the threaded discussion feature. All students in this class were required to contribute to the weekly online discussions with the use of lower (#remember, #understand), mid (#apply, #analyze, #evaluate), and higher-order levels (#create, #connect) of Bloom's Taxonomy. Each student utilizes five powerups, beginning with three powerups in their initial post and being

required to include two in their responses to classmates' posts. The primary data (total of 375 postings) were collected from the Environmental Sociology Class throughout the following academic years: Fall 2020 (96 postings), Fall 2021 (67 postings), Spring 2022 (92 postings) and Spring 2023 (120 postings). Details are presented in **Table 1** and **Figure 1**.

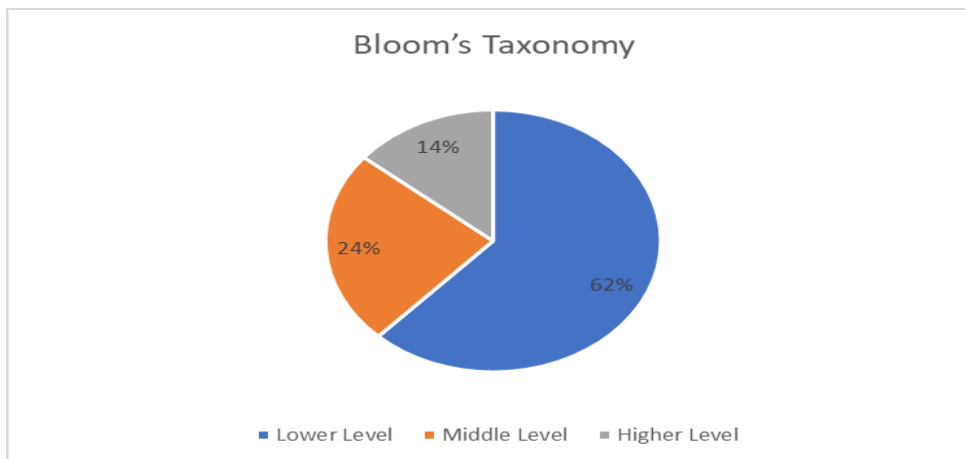
**Table 1.**

*Distribution (Number and Percent) of #DigitalPowerups*

	#remember	#understand	#apply	#analyze	#evaluate	#create	#connect	Total
Fall 2020	55 (32%)	52 (30%)	30 (17%)	9 (5%)	10 (6%)	7 (4%)	11 (6%)	174
Fall 2021	45 (34%)	38 (29%)	11 (8%)	17 (13%)	7 (5%)	0 (-)	14 (11%)	132
Spring 2022	50 (30%)	55 (34%)	15 (9%)	8 (5%)	4 (2%)	11 (7%)	21 (13%)	164
Spring 2023	70 (35%)	54 (27%)	6 (3%)	26 (13%)	16 (8%)	4 (2%)	26 (13%)	202
Bloom's Taxonomy	419 (62%)		159 (24%)			94 (14%)		672
	Lower Level		Middle Level		Higher Level			

**Figure 1**

*#DigitalPowerups encourage students to participate in all levels of Bloom's taxonomy*



The data was acquired from Canvas LMS, where students post their thoughts using the #digitalpowerups hashtag, and the only texts used were those from the discussion boards that had been stored and de-identified. The students' voices and writing styles are preserved by shortening quoted text only when it is essential and by leaving it otherwise unmodified, including grammatical errors. The introduction of powerups aims to facilitate the organization of responses and enhance the value of the discussion boards as a venue for learning and engagement between users.



### **Data Analysis Techniques**

The data analysis focuses on using #digitalpowerups by students in their 375 discussion postings on environmental issues. This study utilized a qualitative content analysis technique to evaluate how digital powerups affect student participation in online debates and discussions related to environmental concerns. Content analysis is becoming increasingly popular and applied in diverse contexts (Duriau et al., 2007; Krippendorff, 2013). Specifically, Vitouladiti (2014) defines content analysis as a research method that examines textual material for patterns and structures, extracts the crucial aspects to which researchers wish to pay attention, generates concepts for understanding the text and assembles them into comprehensible wholes to comprehend the text's meaning. This study attempted to answer the research question of how digital powerups might affect student engagement in online discussions by conducting a content analysis of the discussion board postings and comparing the results to existing scholarship on student engagement. The qualitative content analysis approach enabled a thorough investigation of the research question by examining the content of the discussion board posts and comparing the findings to the existing literature on student engagement. This allowed for a nuanced understanding of the impact of digital powerups on student engagement in online discussions related to environmental issues (Soyer & Ziyanak, 2014; Ziyanak & Soyer, 2017). The initial phase of the analysis of the discussion posts consisted of encoding the posts themselves along with the #digitalpowerups that corresponded to them and classifying the postings as either original posts by the students themselves or their responses to peers' posts. Following this, they were sorted into "code groups" based on the relevant criteria, and extensive notes were collected during this structural sorting process to develop a subset of code structures related to emergent patterns of content and conversation. Finally, the patterns found inside and between #digitalpowerups, original posts, and responses were analyzed to understand better how students structured and organized their thoughts.

### **Content Analysis Results from the #DigitalPowerups posts**

In this section, we presented the findings that we obtained from doing a content analysis of digital powerups posts. We identified several significant themes after analyzing how students voiced their opinions on various environmental concerns. Below, we emphasize these major themes and the student's thoughts on them:

#### **Student's Environmental Awareness**

#DigitalPowerups are keywords displayed as hashtags that are associated with corresponding prompts in online discussion forums allowing for both student choice and voice. Environmental awareness emerged as a prominent theme throughout the canvas board discussions and peer responses. With a steadfast commitment to notify others, the respondents highlighted the significance of fostering awareness and confirming that authorizing individuals to make informed decisions and contribute positively to the world around them. By applying #remember hashtags, this theme captivated the respondents' attention, who expressed their thoughts and opinions with great clarity. For instance, one respondent mentioned:

*“A quote from the article in the Scientific American states the “human imprint on the global environment has now become so large and active that it rivals some of the great forces of nature in its impact on the functioning of the Earth system.” This was extremely eye opening to me because when I think of environmental disasters I always think of things that come from natural causes like earthquakes or tornados, and it is altering to hear that the majority of ecological damage comes from human imprints”*

Another participant expressed her view using the #remember hashtag:

*“We need to take care of the environment and it's non-debatable. Industries have already done so much damage to the environment and it cannot heal on its own. It is comforting that most people still agree that taking care of the environment is a good thing and something that we need to do”.*

Some respondents used #understand to mention their environmental consciousness, such as the below quote was expressed by one student:

*“Overall, I like this view of how people should live their lives and it seems like living with this mentality would make people more environmentally conscious we do need to take care of ourselves, I think that taking care of the environment is a form of taking care of ourselves and paying it forward”.*

The respondents showed a profound understanding of the significance of raising awareness concerning several issues, be it social, environmental, or personal well-being. Moreover, the remarks provided by respondents were detailed and comprehensive, demonstrating their aspiration to spark social transformation and foster a heightened awareness among members of society. As one respondent specifically said:

*“What do you think we can do as individuals to address this? In chapter 8 it talks about the paradigm shift of environmentalism. People are slowly becoming more conscious of the impact they have on the environment. They are making small changes to their behaviors to better the environment”.*

Another respondent also pointed out that:

*“I knew that extinction was a problem we were facing, but I had no idea it had grown exponentially in this short time.*

In addition, a few of the respondents expressed such high levels of concern that they looked for alternative approaches for the future. One of the responses using #apply was,

*“We need to find a way to curb this because if we keep going down this path, nature we once enjoyed as kids won't be around for our grand-babies.”*

Another respondent using #understand worried about slow changes, such as

*“It seems that people are slowly becoming aware of the negative impact humans are having on the environment, but a big changes needs to happen now before it's too late.”*

### **Perception of Environmental Sustainability and Economic Growth**

This theme using #understand is generated from a question that respondents were seeking to answer, “What do you think should be given priority: environmental protection or economic

growth, or is it better for them to have an equal share in society?". We found that most respondents highlighted progress towards balancing economic expansion with environmental protection. Some respondents stressed the importance of balancing economic growth and environmental protection as key to achieving a sustainable future. For instance, one respondent used #understand and stated that,

*"I think it's best that each work together to find that balance; I'm not sure that a 50/50 split would reach the harmony that I believe is required to keep both the earth and the people living on it alive."*

Another student responded to this in the following way:

*"I think we are gradually changing from materialist society to postmaterialist since the awareness of environmental conservation is reaching wider population across the world. The following research supports my claims "Until the 1970s, it was nearly universal for individuals to prioritize so-called materialist values such as economic growth and maintaining order; on the other hand, postmaterialists give top priority to such goals as environmental protection, freedom of speech, and gender equality".*

One respondent using #connect highlighted,

*"I find it interesting that concern for economic growth overtook environmental protection in 08, or during the recession. The impact of the recession had quite the impact on public perceptions of certain issues."*

Furthermore, some respondents used #understand and #analysis and suggested that the theme of environmental sustainability and economic growth can be understood through ecological modernization theory. Some respondents found the idea intriguing. One student replied by posting a graph explaining the strategy and arguing that society can achieve sustainable development by welcoming new forms of technology and thought.

However, when respondents prioritized economic expansion over environmental conservation, they demonstrated a lack of commitment to ecological modernization. Respondents expressed concern over the long-term effects of ignoring environmental problems for the sake of short-term financial rewards and political pressures. For instance, one respondent mentioned:

*"From the textbook, I thought it was really interesting to read about how environmental regulation can cause economic savings. For example, in 2003, the Office of Management and Budget conducted a study and found that the \$23-26 billion spent on retrofitting power plants to meet clean air standards saved the economy \$120-193 billion that didn't have to be spent on health problems and lost workdays. This implies that the environmental regulations increased worker productivity since health was improved and less time was taken off of work. I found this super simple graphic showing the costs and benefits of the 1990 Clean Air Act. It shows that the benefits significantly exceed the direct costs. Similar to the power plant scenario, American welfare is improved because benefits like fewer sick days and lower medical costs offset the economy-wide cost of investing in pollution control. This cost-benefit analysis should be considered in proposals for*

*renewable energy projects since the benefits will likely exceed the initial costs long-term”.*

### **Climate Change Perspectives**

Respondents who used the hashtag #apply shared various perspectives on climate change, focusing on human-induced issues and the accompanying unwillingness to act. Several respondents voiced their worries and provided insightful views on the intricacy of this worldwide issue by citing examples such as one student expressed his opinion in the following way:

*“Climate change refers to long-term shifts in weather patterns and global temperatures, resulting in more frequent extreme weather events, rising sea levels, and changing ecosystems. Human-caused climate change, often attributed to greenhouse gas emissions from human activities such as burning fossil fuels and deforestation, is exacerbating these natural climate variations and posing significant challenges to the planet's ecosystems and human societies”.*

Another participant expressed a mixed opinion:

*“I think it is a mix of both humans and nature doing its own thing. Humans emitting the amount of greenhouse gases that they are is speeding up what nature is doing on its own. If you look at the history of climate change there have been many fluctuations in temperatures. We had the ice age melt, and we had before that very nice temperatures, but the average temperature of all the fluctuations is the one that is rising and that should stay the same”.*

Through an analysis of the respondents' points of view, we noticed that some persons actively participated in the discussion on climate change by providing methods to mitigate the effects of climate change and new technical adaptations using the hashtag #remember. For example, one student said:

*“In Clive Hamilton's article, he talks about the "techno-utopian" ideal and the assumption that our human ingenuity will essentially save us from any messes (such as climate change) we get ourselves into. With this in mind, some would argue that we need not change our ways, but rather develop new technologies that allow us to continue what we are doing. I feel like this idea has lost steam in recent years, (the article was written in 2014), but I figured I would pitch the question to the discussion: Do you feel that this techno-utopian idea holds any water knowing what we know today about climate change”.*

Students also shared their views on who they believe should be responsible for taking action to lessen the adverse effects of climate change. The following quotes highlighted some of their opinion regarding this issue:

*“One of the slides talks about how climate change is always a political conflict in the PowerPoint. This stuck out to me because climate change is something that has been proven, and there are plenty of facts behind it all, but there are still people who don't think it's a problem. Some people think that just something they do won't make a*

*difference, but even we can make a difference”.*

*“I agree that anyone can make a difference when it comes to climate change. A single act may be a drop in the ocean but it starts a chain reaction and begins to change the ways you do other things and bring more awareness to the issue of climate change to those around you”*

*“Belief in the importance of Climate Change solutions falls along party lines. More effort needs to be given to bridge the gap between parties. Civil, respectful conversations can be had and as the effects of Climate Change become larger and more evident, perhaps those discussions will become easier. The following is a set of graphs of a comprehensive overview of global attempts to create climate resilient societies”.*

Furthermore, some respondents who used #apply also provided critical evaluations regarding the actions of affluent individuals in adopting environmentally sustainable practices. Some other respondents expressed the idea that wealthy individuals bore significant responsibility in addressing climate change and recommended their engagement in investments in clean technologies and advocating for supportive climate policies. One respondent explicitly explained that in the following manner:

*“The book discussed how it is easy for wealthy people to be concerned with climate change, and at the same time, it's easier for them to deny it. This picture is from an advertisement campaign in the 90's made up of major electrical and oil companies that set out to make climate change viewed as more of a theory than a fact. Companies, such as Exxon Mobile, knew about climate change for many years and decided to push this narrative, because they actively benefited from the harmful processes. Many of the issues we struggle with today when trying to keep all groups of people informed and active in the fight for the environment were funded by companies like this”.*

Another replied:

*“...as much as I would hope that the masses could make a difference, I don't think that they can be rivaled by all the richest people in the world. We live in a world where the phrase "put your money where your mouth is" is becoming increasingly more relevant. By having money, you in turn have more influence. Therefore, I think your question is a double-edged sword. How can we really separate the two groups in the first place? But, overall, I think that money makes things happen, and as such, those with said money would have more of an influence on climate change than anyone else”.*

A respondent using #apply expressed his perspective on the general reluctance to take action, citing unreliable collective thinking when addressing climate change, such as

*“The book gave some poll data regarding American's perceptions on climate change. I am a visual thinker, so I wanted to find a reliable graph that would illustrate the fluctuations in our collective thinking on the climate. I found this Gallup poll, which shows an interesting spike in our acceptance of human-caused climate change right as we elected a president who has been reluctant to accept climate science”.*

## The Integration of Natural Phenomena into Belief Systems

Respondents consistently emphasize the significant relationship that exists between different religions, spiritual practices, and the natural world. Recognizing these interdependent facets makes a significant contribution to the profoundness of their conversation and the allure of the nature of their experiences. As a result of the discussions on the canvass boards and the comments made by the respondents, we concluded that the natural world has served as a wellspring of ideas for religious communities for a very long time. Its cosmic settings and innate beauty are frequently regarded as a manifestation of the divine. Using #create, one student expressed her opinion that:

*"I thought it was really interesting that you chose to focus on the interactions between religion and nature. I do think that people tend to believe that they are in competition with each other, but I think you're right that they complement each other instead".*

Another participant used #remember and said that:

*"After watching Dr. Katharine Hayhoe Talk about Climate Change and Christians, I have a new understanding of religion and science. She states that she does not believe in climate change yet looks at the science of it. There is a difference between faith and science, science tells us global temperatures and impacts whereas faith is something that will move societies forward with different values. Yet, it is important to know that faith and science are not in competition, they complement each other in the sense of societies moving forward. I like How Dr, Hayhoe asked the audience what the Christian faith gives to come up with climate solutions: power, love, and a sound mind. She is stating that God gave us these three spirits to combat climate change, and it is not something to believe in it is something to act on".*

One of the respondents used #remember and commented that:

*"I have not studied religion that much at all but it was interesting to see that Buddhism and Islam beliefs are rooted in nature. Back in those days the people relied 110 percent on nature, it was the core of their lives so it makes sense that their morals and foundations of character are rooted in nature".*

Respondents also used #connect to describe the issue as emphasizing the interconnectedness of all living beings and endorsed stewardship of nature, inspiring believers to shield and preserve the environment as a sacred duty. One stated that,

*"I am taking an anthropology of religion course this semester and it is so interesting how nature is tied into different religions. Everyone has some kind of beliefs and it is very interesting how often people find peace or their god(s) within nature. There is a religious specialist that we have been discussing in my anthropology class called an herbalist. An herbalist is basically someone who uses plants for healing. This is just another way that nature can be directly tied into beliefs".*

The fact that respondents acknowledged that pondering nature might frequently lead persons to involvement in a profound sense of spirituality is an additional noteworthy perspective

connected to this theme. Students felt a connection to something bigger than themselves when they wondered about the natural world. One respondent used #connect and explained that:

*“Your thought about pantheism is becoming more relevant every day. Our generation is switching more and more towards this spiritual way of thinking. New ideas are becoming widely spread and I believe we are on the brink of another mindset shift similar to the size of great awakening. I am from Oregon where beliefs like this guide people’s lives and they basically live in the natural world because of it”.*

Another student stated that:

*“Many religions are based on nature and the natural world. An example of this is the pantheism religion, they believe that there isn’t a physical god or gods but rather god is the universe and the within the earth”.*

Regarding environmental beliefs, respondents mentioned that nature gives them a sense of togetherness and calm within its harmonious rhythms. One respondent used #remember and highlighted their concerns about a deeper sense of purpose and meaning, such as,

*“I watched the YouTube video titled "Religion and a New Environmental Ethic" from this week's module. The video discussed how religion guides people into new human-earth relations as religious groups make statements on environmental concerns. The environment is essential to many religions as many rituals are nature-based, and religions view environmental issues as issues of social justice as well. As religion continues to adopt environmental views, it could help society undertake its paradigm shift to the new ecological paradigm. It could also help people's environmental beliefs and environmental values better align”.*

Several other students also shared their perspectives on the significance of appreciating nature, which eventually helps them to feel refreshed and connected to it. Following quotes are represented this view:

*“Sometimes we forget that our ancestors were so in tune with nature and so it is so easy for us to become disconnected from nature. One of my favorite spots to just sit in nature is Rendezvous Park in Logan. I try to find a spot by the river that is quiet and not by the walkway and I can feel such a strong connection to the world around me”.*

*“I think spending time in nature is extremely beneficial to our physical and emotional health. There are many studies that show how green and open space are restorative environments that speed up the process of healing”.*

*“I know that when I am in nature I feel better physically and mentally. Nature has a unique way of healing each person”.*

*“I agree that spending quality time with nature can help strengthen our personal connection with nature. Through this stronger connection we will be able to appreciate it more and be more likely to take measures to protect it. I believe this is a positive cycle that could form, connecting with nature and feeling protective of it in order to continue to be able to utilize and appreciate it more”.*

### **Technological Effectiveness as well as Lifestyle Change (Minimalism) as a Solution**

The ability to effectively communicate environmental problems is greatly aided by technological advancements that spur creative approaches. Many students believe that modern technology can aid environmental sustainability. One student used #apply and stated that:

*"I, like many others, loved your graphic. I am for sure a visual learner and the ramifications of technological growth, as well as growth as a society, has come at many costs, and I think that this graph is but a sliver of the damage that society has ultimately done".*

Another student used #remember and expressed that:

*"I found the mention of ecological modernization interesting because it brings out ways that have made life easier but provide these options with an ecological perspective. Biking, car sharing, and recycling are all ways of making good choices in everyday life. I find this to have a significant impact on preserving the environment and it is good to see that some of the practices and new technology are not always bad for nature".*

In order to guarantee a more sustainable future, it is crucial to strike a balance between technological progress and its influence on the environment. As one student expressed his interest in balance approach highlighting that:

*"One rebuttal I have to mention, I wrote that the more natural our environment, the healthier we would be. If one lived out in the woods with no amenities or technology, they would probably not be healthy for long. So a balanced and minimalist approach is what I am promoting".*

Another student responded using #understand and stated that:

*"Technoutopian ideal has saved our society from many problems in the past and continuing still. I don't think it will save humans from all of our problems though and especially climate change. I always wondered why science hasn't already figured a solution to our ozone layer issues but that made me realize how much this society relies on science to get by. We just expect technology to fix all our problems so we can live on".*

However, some other students also opined that technology is not able to solve all problems. Some important quotes are highlighted below who expressed their concern regarding effectiveness of the technology. For instance, students said:

*"I think many people assume electric cars or new technology is going to fix all of our problems. But it won't. Just like you said technology won't replace ecology".*

*"The way I think of it, we don't have the technology to build so much as a gnat or blade of grass from basic resources. Why then do we think that technology could replace ecology? Ecology is the ultimate choreography of intertwining organisms and environments. The only successful technology would be that which works with and for the natural environment of which or bodies are a part".*

Furthermore, respondents were also involved in lifestyle change or adoption of a minimalistic lifestyle as a solution to environmental problems. One respondent using #analyze clearly wrote



that,

*"... This concept of minimalism is relevant to our own lives, as we often accumulate more than we need and contribute to unnecessary waste and consumption. By embracing minimalism and consuming only what we need, we can reduce our impact on the environment and live more sustainable lives".*

Using #remember, another respondent stated that,

*"... That is, that contentment comes not from having more but from wanting less. We can learn a lot from the way animals live and how they only take what they need for survival. This minimalism allows the natural cycles of earth to flourish. But when we start to over consume and exploit natural cycles, that is when they begin to decline drastically".*

Comparing different societies and using #remember, another respondent said that,

*"... how different societies are cultures favor minimalism more than others. For example, Japanese culture is minimalistic regarding interior and exterior designs. They appreciate the space and use natural resources as the primary motive for style choices. This small decision leaves an example of simple we can use our spaces to minimize our footprint".*

### **Opinion Regarding New Ideas and Being Genuine**

One of the most surprising things that came out of reading everyone's responses was that a lot of them tended to be judgmental, forming opinions about what they think is right or wrong with regard to new ideas and different generations. In addition to this, this piqued the interest of other peers participating in the discussion board, which in turn encouraged them to participate in the dialogue and share their perspectives. For example, one student using #evaluate stated that,

*"Your time is limited, so don't waste it living someone else's life." -Steve Jobs. I like this quote because it is true. Don't live your life trying to be someone else, or being who society thinks you should be, be yourself".*

Another responded also noted that:

*"Nowadays so many people are trying to copy influencers and celebrities to feel a vibe of acceptance in society. But it's not the correct way to do it. People should be themselves because originality is a winning personality in society. People don't like fakes things or people, they want the real deal".*

Some forum participants added to the discussion by expressing support for novel concepts and noting that originality is sometimes a desirable quality. For example, one respondent noted that:

*"What I love more our the newer generations though is that they are learning to not be afraid to be different".*

The discussion implies that students were broadly judgmental and inclined towards new idea (of taking proper action to protect the environment), even though society engages in detrimental practices. They were not afraid to be different, if their action was right (creating environmental sustainability).

### **Student's Ability to Connect Their Readings to the Present**

We found that our students were able to establish connections between the readings that were assigned to them and draw conclusions from those readings to respond to the comments made by their classmates. For example, one respondent stated that,

*"The book talked about a few ancient cultures though about the environment. In that section, the Roman poet Horace talked about the peaceful simplicity of living in the country. On the other hand, "The urban, commercial life of empire brought with it a widespread feeling that everything was becoming political that social life was moved not by virtue but by self-serving desires for power, influence, and material possessions." I think this statement still applies to the world today and but if we thought, as you said, that less is more perhaps we would be able to move away from self-serving desire".*

Another respondent also noted in a similar way that:

*"Chapter 8 talks about Horace and his views on nature. He emphasized simplicity and staying close to nature without the distraction of urban contrivances. According to Horace, "life in harmony with Nature is a primal law" (p. 260). He also notes that nature will always come back to people. I think this is such an interesting theme to consider and see how it is applied to treating nature today. Even though nature is often recognized as being the most important factor for life or a "primal law", it has too often been neglected in history and in today's societies".*

Taking into account the various theoretical viewpoints and exercising critical thinking, one of the most interesting aspects of this debate was seeing how the individuals who participated applied the theoretical perspective that they had gained from the readings. Our findings show that respondents utilized theory to explain how environmental challenges are contextualized and analyzed, taking into consideration the complexities of the problems at hand. For example, one respondent stated that:

*"This attitude of embracing power seems dangerous, as it may be assuming that humans are the "cure" to this problem that we are causing. One theory we talk a lot about in landscape architecture is man's changing attitude towards the environment: fear, adaptation, aggression, and stewardship. This article seems to be pointing to the aggression phase, but to move into a healthier relationship with the environment, we need to adopt stewardship attitudes".*

Another respondent also explained that:

*"Hamilton argues that because Shellenberger and Nordhaus' philosophy is centered in man-as God consciousness, we can only expect that by adopting this into our collective consciousness that humans will have created for themselves a completely new era of human-impacted climate. While Hamilton is quick to criticize this thinking, he does not clearly provide an alternative viewpoint. Therefore, it may be that in assuming personal responsibility for climate change and combining new behaviors towards in environment alongside new technologies we can reverse the damage already created"*

We found that respondents were establishing links between theoretical concepts and examples from the actual world. As a result of this, discussions became more interesting and fostered critical thinking, which ultimately led to a more in-depth understanding of environmental issues and potential solutions. The below quote from a student shows his critical concern:

*“Bell presents the following dilemma in regard to the idea that humans are not separate from the natural world, but are very much a part of it. “if humans are natural, why should we exclude houses, roads, open pit mines, and McDonald’s from wilderness areas? And why should we see cities and farms as less wild and less in need of the attention of environmentalist concern”.*

Similarly, another respondent demonstrated critical thinking with his question in the discussion board, such as,

*“After reading Hamilton’s article, what solutions may one infer through this dissection of technoutopian philosophy? Is there some credence to the idea of using technology as an effective adaptation to climate change? Does the early Anthropocene theory discount human responsibility in climate change”.*

### **Remarks on the Dynamics of Power and Politics**

The primary focus of the conversation that was driven by this issue was on the dynamics of power and politics, both of which, in the end, are unable to make a beneficial contribution over the long run. The questions of power and politics regarding environmental concerns have been articulated very clearly by respondents. Many students believe that corporations and wealthy elites should be held accountable for covering the environmental threats. For example, one respondent stated that:

*“I like what you have said in your #Understand. I think that it is silly that politics can decide what is right and what is wrong. And in this case, politics thinks that citizen science is wrong. What is right and what is wrong is more decided by what the chapter is talking about as far as our conscience is concerned, not what politics think”.*

Another responded also exposed his concern about environmental hazards, such as:

*“I think that oftentimes, politics are relatively short-sighted. As is the case with this particular law, the motivations were based on retaining power by supporting the extensive ranching corporations who were responsible for the environmental hazards being hidden. I think that, when things become about power instead of people, that it doesn't really help anyone in the long run at all”.*

One of the respondents stated a sense of helplessness and a belief that the legislation and the current political system are unlikely to bring about any significant improvements in regard to environmental challenges. He said:

*“I do not think that the law is helping anyone or anything in the long term but is just making more issues. It is crazy that the major political party can have so much power to turn an eye to what they do not want to see or hear about”.*

Another student expressed concern on the strong relationship between power and politics

mentioning clearly that,

*"... there are powerful people in the world who are spreading lies, saying that climate change isn't real, turning it into a political issue, and trying to discredit professionals who have been studying these events their entire career".*

### **Graphical Representations Concerning the Phenomenon of Extinction**

Many respondents mentioned that graphics offered a visual narrative that might demonstrate the evidence and consequences of species extinction. In the course of the conversation that took place on the discussion board, several of the participants decided to present the facts and information in a way that was both visually appealing and easy to grasp in order to increase awareness and to promote comprehension on the topic of endangered species. One respondent stated that:

*"It is crazy to see how fast species are becoming extinct and it makes us feel helpless. I believe that this graphic can change a lot of people's minds about humans causing this extinction".*

Other students also expressed similar concerns. For instance:

*"This graph is very alarming. I knew that extinction was a problem that we were facing, but I had no idea it has grown at such an exponential growth in this short amount of time. I would be interested to see how the advancement of technology has caused this rate to increase over the years".*

*"That graph is very alarming. It's scary to think about how the industrial revolution impacted everything, including nature. Since then, extinctions have gone up and so has pollution. We need to find a way to curb this because if we keep going down this path, nature we once enjoyed as kids won't be around for our grand-babies".*

Some of the responses used the same approach, which consisted of utilizing social media to discuss the disappearance of habitats that were essential to a species. Some comments include general arguments regarding the different factors driving widespread extinction, including habitat destruction, pollution, etc. One respondent described that:

*"In the YouTube video titled Religion and a New Environmental Ethic, Ms. Tucker also discusses mass extinction and what humans can do to slow it. She states, the excitement about it is that there is great work to be done. There's all kinds of work within economics and technology, and politics to make this actually happen".*

Another student expressed similar views.

*"In the Youtube video titled Religion and a New Environmental Ethic, the spokes woman, Mary Evelyn Tucker, states, "We are facing the death of life. We are facing the extinction of species at twenty and thirty thousand species a year. This has never happened for 65 million years." I knew that we were currently living through the 6th mass extinction on earth, but I didn't know that there were tens of thousands of species that we were losing annually! It sure does make you feel helpless".*

One student suggests some ways to decrease the rate of extinction. As she said:

*“as individuals, there is only so many things we can do to help slow the extinction of animals. There is funding to organizations like Global Wildlife Conservation, where they take donations to help educate others and save all types of species. Donations to organizations is very helpful and will help spread the word of saving certain species”.*

## DISCUSSION

Asynchronous class discussions are one way that teachers can foster a sense of community among their students during their online classes (Andresen, 2009). The application of technology within the context of the modern educational system has evolved into an essential component of academic achievement. The #DigitalPowerups strategy can bring a variety of advantages to students, including enhancements to their capacity for improved online communication and collaboration. The purpose of this study was to gain a better understanding of the potential that digital powerups have in facilitating students' ability to articulate their critical thinking and explore how the use of digital powerups might influence students' participation in online debates and discussions. Usually, students who are active participants in online discussion forums are afforded more frequent opportunities to collaborate with one another, exchange their thoughts and perspectives, and acquire new knowledge from their classmates. Discussion-based, collaborative-learning courses can benefit greatly from the usage of online discussion forums (Hiltz et al., 1999; Hamer et al., 2011).

Hashtags are a useful technique for effectively organizing information, which makes them particularly useful in educational settings. In the current study, we realized that the #DigitalPowerups motivate students to surpass these lower levels of engagement and actively participate in mid-level (#apply, #analyze, #evaluate) and higher-order (#create, #connect) thinking during discussions. In order to explore the impact that digital powerups have on student participation in online debates and discussions regarding topics relevant to environmental issues, we utilized the qualitative content analysis methodology, which is a widely used in various contexts (Krippendorff, 2013; Duriau et al., 2007). Particularly, we analyzed the substance of the postings made on the discussion board, including the answers made by peers, and compared the results of this study with the existing literature. The #digitalpowerups approach gives students agency through choice, voice, and co-creation to foster an engaging and meaningful educational experience (Thurston, 2020) develop essential skills like critical thinking (Kallick & Zmuda, 2017), and it is an effective method of involving students in academic activities (Lee et al. 2015; Reeve & Jang, 2006). According to Thurston (2020), by using the digital powerups, students can more effectively engage in online discussions.

This study's findings demonstrated respondents' ability to identify the social, political, economic, cultural, educational, and psychological factors that impact their interactions with the environment and natural resources. The findings were also consistent with the existing literature, such as improving the online learning experience for students, which has identified

the utilization of social media functionalities, such as the "like" button, in threaded discussions as a promising area of investigation (Makos et al., 2013). We found that students shared their diverse viewpoints on climate change, power and politics, environmental sustainability, technological effectiveness, and other topics, as well as their concerns regarding a variety of environmental challenges. There is no doubt that the effects of climate change provide a substantial obstacle and are currently one of the most pressing concerns facing modern society (Filho et al. 2014). Through the online discussions it has been shown that a significant proportion of students are concerned about human actions that contribute to climate change or environmental difficulties. Furthermore, it appears that these students value the environment and are encouraging people to safeguard it from further calamities. Previous research carried out on university students to investigate their perspectives on climate change revealed that the majority of respondents agreed that human activities are a major contributor to climate change in many parts of the world (Ahmed et al., 2021; Haq and Ahmed, 2020; Morgado et al. 2017; Santos et al., 2016;). In recent years, the connection between economic growth and environmental sustainability has been an increasingly central topic of discussion and research in the field of sustainable development. The concept of economic growth being a fundamental engine of global economic development has been central for a long time, but the concept of environmental sustainability aims to safeguard natural resources and limit the impact that human activities have on the world. There are also divergent claims that exist in the literature (for instance ecological modernization and the treadmill of production theory) regarding the relationship between economic growth and the environment (Jorgenson and Clark, 2012). Ecological modernization theorists acknowledge that past developments have exacerbated environmental issues, but they see reformed economic development as a means to remedy these issues (Givens and Jorgenson, 2011). On the other hand, the treadmill of production theory views economic growth as inherently incompatible with environmental sustainability (Gould et al., 2004). According to the findings of this study, a significant number of students do not wish to give precedence to either economic growth or environmental sustainability; rather, they seek a balance between the two. They also realized the need to raise awareness and take action to improve the situation. In other words, students expressed their belief that a sustainable future can only be achieved by striking a balance between environmental sustainability and economic growth. They argued that an imbalance or too much focus on economic growth has led to climate change and it is happening because of misuse of power and politics. Moreover, students also expressed their concerns and proposed that affluent individuals and cutting-edge technology could be used to slow down climate change. They also engage in the discussion of the relationship between nature and religion and spirituality. They noted that religion often sees the beauty of nature as the reflection of the divine, while spirituality views nature as a way for individuals to connect with something greater than themselves, which could lead to inner peace or self-discovery.

## CONCLUSION

Our findings show that the utilization of powerups is a great way for students to engage in higher-order learning and develop habits of mind skills. Similar to results found by Thurston (2020) & Mardi (2020) the students in this study engaged in metacognition, thinking interdependently, questioned and posed problems, and remained open to continuous learning. For instance: students used #remember to recall memory and encourages them to make notes of interesting facts as they learn as well as encouraging their active reading and listening practices. Meanwhile, #understand encourages digging deeper and makes it easier to ask questions based on the reading materials or students' discussion posts which further foster their creative and critical thinking. The students frequently answered the questions of their fellow classmates using the hashtag #understand, so educating themselves by instructing their fellow classmates. Students used #analyse makes links between the topics, and it gives them the ability to relate the information they are learning in this course to information they have learned in previous subjects. Finally, students had the opportunity to engage in a thoughtful conversation with their classmates that is evidence-based when they used the #evaluate hashtag. According to findings from a study (Hennessy et al., 2016), educational hashtags can be utilized to increase student participation. In another research study, Celik et al. (2022) found that Turkish people and government institutions have been utilizing the hashtag #NotHolidayButDistanceEducation to discuss and debate various elements of online distance education during the current pandemic.

The combination of all of the different categories results in a one-of-a-kind discussion for each and every subject covered in the class. This may call for more participation from the students than the usual format of posting on discussion boards, but it also results in improved educational outcomes. However, powerups should be kept reasonable enough that the amount of time spent on the project is appropriate for learning goal. Because digital powerups are more extensive than regular discussion prompts, it is vital to take the amount of time that they take into consideration. Past studies found that when there is so much information shared online, students frequently report feeling overwhelmed and unable to keep up with the debates because it is tough for them to keep up with everything (Kear & Heap, 2007; Peters & Hewitt, 2010). According to Jones et al. (2004), those who report feeling overwhelmed are more likely to cease making contributions. Nevertheless, making accommodations for a wide variety of learning approaches gave students the opportunity to shape and exercise some degree of autonomy over their experience in the classroom. It fosters authentic interaction and interdependent thinking not only between students but also between the instructor and the learner. In general, our study findings show that #digitalpowerups improve both the experience of using discussion boards and the entire experience of being in a class among students. They also have the potential to help to learn and create environments that are both safe and brave.

### ***Theoretical Contributions***

This study contributes to the literature on online discussions as another example of the

#DigitalPowerups strategy for online discussions being implemented in higher education courses, and serves as another example of the effectiveness of providing students with choice and challenging them to engage at different level of Bloom's taxonomy. In addition to gains in engagement, this study contributes to the literature on the importance of supporting students in building critical thinking skills and other habits of mind that are not only key to succeeding in college courses, but will continue to support students as lifelong learners with the ability to engage key topics in their community like environmental sociology.

### **Limitations and Future Study Recommendations**

Although our study did produce some intriguing results concerning the effect of digital powerups in enhancements of student learning, we still have some limitations. One of the study's weaknesses is that it relies solely on one course over four semesters at one university. Therefore, these results are not entirely generalizable to all other settings due to the study's single-site research design. Furthermore, another limitation of this study is related to the involvement of students in Bloom's taxonomy. The use of #DigitalPowerups encouraged students to participate in all levels of Bloom's taxonomy. However, students were still participating less in middle (24%) and higher (14%) levels in comparison to lower (62%) levels indicating that greater attention should be paid in the future to design discussion and facilitation. To acquire a more in-depth understanding of digital powerups' function in increasing student learning in environmental sociology or other courses, future studies should focus on replicating the findings in different educational settings. Further studies should consider extending the number of classes to collect more comprehensive insights. Moreover, conducting the study in different locations across the USA would be valuable in discovering potential variations in the findings. Future research might consider concentrating on diverse student demographics, such as those located in various parts of the world or those with varying degrees of access to multiple resources. Additional studies might be done to investigate the extent to which students are engaged with digital powerups and how this involvement influences their learning. Finally, given the fast-paced nature of social media, including new hashtags in future studies would enable a more in-depth analysis of students' discussion board dialogues.

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