PROMOTING ENVIRONMENTAL LITERACY IN BY STEM IN TEACHERS IN A MULTICULTURAL EDUCATION IN ISRAEL

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Abstract: *Values education, empowerment, and active citizenship are emphasized in Israel through environmental education and multicultural education, each based on the principles of respect, compassion, environmental responsibility, and celebrating diversity. These educational approaches view education from a social perspective, promoting societal reform by facilitating personal and social change. Nowadays , environmental studies is a part of Science and Technology Studies, which covers a broad range of scientific topics,ethical concerns. STEM is an acronym that stands for Science, Technology, Engineering, and Mathematics. It refers to a curriculum and educational approach that integrates the teaching and learning of these four subjects to prepare students for the 21st-century workforce.*

As such, many schools, both in developed and developing countries, are now prioritizing STEM education and providing more opportunities for students to study these subjects. In this study , the level of environmental behavior of new students in two major teacher-training colleges in Israel have been measured to investigate the relation between behavior and back-ground culture . An analysis of students' responses resulted in grouping of environmental behavior items into four categories that represent increasing levels of environmental commitment. The findings of the study indicated that graduates of the educational system who chose to become teachers had a low level of environmental literacy, as evidenced by their limited performance of behaviors that require a high level of commitment.

Conversely, those who demonstrated a high level of environmental literacy tended to engage in behaviors that required a high level of environmental responsibility and multicultural education. Together, these educational trends emphasize collaboration for sustainability and global citizenship , reflect a growing awareness of the interconnectedness of our environment and the need for collective action to address global challenges.

Keywords: *Environmental education, multicultural education, sustainability, Environmental Responsibility Behavior .*

Introduction

A major goal of education is to prepare responsible citizens to understand their society's problems and to act accordingly to help solve them. A good education can foster such behaviors by imparting expert knowledge about social issues, cultivating critical thinking skills, and teaching pro-active problem-solving skills. It is essential for people to know and understand their local environment, listen to others and live in harmony with it in order to achieve cultural and local sustainability. This article presents ideas in improving environmental education where schools and teachers are more committed to instilling values and knowledge related to the environment in classrooms. In spite of this, school curricula place a high emphasis on natural sciences , geography, and, most importantly, environmental education when it comes to sustainability and related topics. The purpose of this study was to examine the relationship between students' behavior and background characteristics in teacher-training in two colleges. Furthermore , it is equally important to protect and preserve a healthy social and cultural community when attempting to create a sustainable future . The present review has examined the commonalities and interrelationships between environmental education and multicultural education.

It has become apparent as an environmental educator how important it is to clarify the vision of the future, which is the understanding of sustainability and all its dimensions for environmental education. (McKeown & Hopkins, 2013; Tilbury & Henderson, 2018).

Schools and societies with multiculturalism may have difficulty achieving environmental education's objectives. In the long run, it would be interesting in reorienting education to better meet the requirements of a sustainable society by further developing environmental education. Analyzing the cultural dimension of environmental education through a multicultural lens is only the beginning of a line of work that can lead to more holistic practices that cater to all aspects of sustainability in environmental education. Nowadays , environmental studies are part of Science and Technology Studies, and they cover a broad range of scientific topics, as well as economic, social, and ethical concerns. A quarter of the defined goals in both curricula relate to human activities effects on the environment . Environmental problems result from environmental practices, which in turn are cultural activities (Castells, 2017; Saul, 2011). It is inevitable that both the environment and culture will change over time. Because neither culture nor the environment are static, people transform their environments and cultures as well. On the other hand , there is a lack of teachers who are properly trained to implement Environmental Education (EE) in the formal school system which is an interdisciplinary field that requires the successful integration of social aspects , values and

scientific knowledge and skills. This poses a significant challenge to the effective implementation of EE in schools. Moreover, despite the recognition of the importance of EE within the formal educational framework in Israel, there is a shortage of research addressing questions about the implementation of EE within the school curricula, as well as questions pertinent to the preparation of teachers. This gap in research further compounds the challenges faced by educators who are trying to integrate EE into their teaching practices. The study conducted by Whitburn, J., Linklater, W. L., & Milfont, T. L (2018) on the effects of ethnic and cultural background on environmental awareness, attitudes and willingness to act with a high responsibility towards the environment among high school and teacher-training students is a valuable contribution to the field of environmental education research . However , there is any comprehensive and significant study about EE in teacher –training programs in Israel. Yet , it is essential to evaluate the existing programs and to characterize the environmental literacy level of teacher-training students at different stages of their training . According to Roth (1992) and Disinger and Roth (1992), an individual's EL (environmental literacy) is the result of interplaying attributes, including knowledge of ecological concepts, environmental issues, and environmental action strategies, skills in the use of environmental action strategies, and affects such as values, environmental sensitivity, environmental attitudes, and locus of control. Actually , it is important to consider cultures in diverse societies which grow and develop in response to other cultures and changes in their environment (Ferreira, 2014). Ingold (2013) argues that the environment as a concept is built on individual's perceptions. It is a personal construction of space based on awareness, values and memories. Yet, according to Willamo (2019), if individuals place themselves outside of this concept, they might feel excluded from the environment . Social and cultural environments are as equally important as natural environments for human beings. The proposal put forth by Kymlicka (2016) regarding the contribution of multiculturalism to environmental education (EE) is indeed interesting. Kymlicka emphasizes that multiculturalism can play a crucial role in enhancing EE by providing diverse perspectives and knowledge about environmental issues. One of the proposed contributions of multiculturalism to environmental education (EE) is through policy planning and implementation. This approach recognizes that different cultures have unique values, beliefs, and practices related to the environment. Therefore, integrating these diverse perspectives into environmental policies and programs can lead to more effective and culturally appropriate strategies for addressing environmental issues.

It is essential to recognize and embrace the diversity of cultural perspectives to develop more comprehensive and effective strategies for addressing environmental issues. The second

proposed contribution of the multicultural approach to EE addresses the content of EE and how it can be integrated into a multicultural framework.

Kymlicka (2016) proposes that multicultural EE should include three different types of content: a) modifying universal environmental topics to address the specific needs and perspectives of different cultural groups b) Topics related to environmental epistemologies and practices unique to other cultures: These are topics that reflect the specific knowledge and practices of other cultures in regard to the environment . Through these topics, students can gain a deeper understanding of diverse environmental perspectives and learn from other cultures' practices. By incorporating these different types of content, multicultural EE can provide a more comprehensive and inclusive understanding of environmental issues. It can help to bridge cultural divides and promote environmental justice by recognizing the different ways in which cultural groups experience and interact with the environment. Therefore, current multicultural education model emphasizes a holistic perspective that recognizes the interconnectedness of all aspects of human life and experience.

It also places a strong emphasis on values clarification, helping students to identify their own values and beliefs and to understand and respect the values and beliefs of others. By focusing on these key principles, multicultural education aims to promote cultural awareness, understanding, and respect, and to create a more inclusive and welcoming learning environment for all students. This includes recognizing and celebrating the diversity of cultures, languages, and experiences that exist within our communities and schools, and using this diversity as a source of strength and learning. Ultimately , the goal of multicultural education is to help students develop skills, knowledge and attitudes needed to succeed in an increasingly diverse and interconnected world .

RESEARCH QUESTION

Is there any difference among the participants from different backgrounds (urban, rural (including Bedouins settlements), and community development ?

How can cultural practices and STEM education be integrated to promote sustainable environmental practices in communities?

HYPOTHESIS

The more participants are exposed to STEM and culture combined in environmental education, participants can gain a more comprehensive understanding of the environmental challenges facing their communities.

METHODOLOGY

PARTICIPANTS

Last fall of 2019 , 55 students in two teacher-training colleges in Israel (Achva College of Education, Seminar Hakibbutsim Academic College) were selected to be prepared to study environmental education to get their certificate with a bachelor of education degree (BEd) and a teaching certificate within four years . The educational program has two main components : The first component is disciplinary studies, which involves studying one or two specific fields of knowledge in depth. The number of fields that a student studies depends on the training track they participate .

The second component of the educational program is education and teaching studies, which are specifically designed for the school level that the student is training for. Depending on whether the student is training to teach pre-school, elementary school, or secondary school, the courses they take may vary. The study focuses on a diverse group of 55 individuals who are interested in pursuing a career in teaching.

This group may include people from various backgrounds, cultures (jews, Arabs, ,Bedouins) and socio-economic status. The study aims to provide them with the knowledge and skills necessary to become effective teachers and positively impact the lives of their students. Actually , a questionnaire in this study was designed to assess various aspects related to environmental behavior and attitudes.Promoting sustainable environmental practices in communities requires a multidisciplinary approach that combines STEM (Science, Technology, Engineering, and Mathematics) with cultural methods to engage and educate people

It has also consisted of five sections, including demographic variables, sources of information, environmental behavior inventory, psychosocial variables, and environmental and ecological knowledge. Yet ,the results were related to environmental behavior and its relationship with culture variables. Environmental behavior was assessed by asking the respondents to state to what extent they carry out 20 environmentally related activities, with a Likert response scale from 1 (never) to 5 (almost always). Then , multiple choice questions were selected from alternative behavioral options among the selected students for diverse activities to enable cross-evaluation of reported environmental behavior .

The questionnaire has included a set of questions about the students' background / culture: age, gender, hometown, ethnicity (Jewish, Arab, Bedouin), and the disciplinary subject chosen as an academic major. We classified students according to the environment of their environment into three groups: (a) urban, (b) rural (including Bedouins settlements), and (c) community development. Teachers were classified by their environmentally affiliated fields such as

environmental science, agriculture, geography, land of Israel studies, natural and life sciences and students who majored in non -environmentally affiliated fields (social studies, history, literature, mathematics, physics, computers, arts, physical education). The demographic data provided in the study shows that a large majority of the students (two thirds (68%) of the students) grew up in urban environments, which may suggest that they are less exposed to natural environments and thus may have lower levels of environmental literacy. However, it is also possible that students who are interested in environmental issues may choose to study in non-environmentally related fields but still have a high level of environmental literacy concerning their culture such as the Bedouin students . It has been used SPSS for data analysis, to determine standard deviations, and percentages through descriptive statistics.

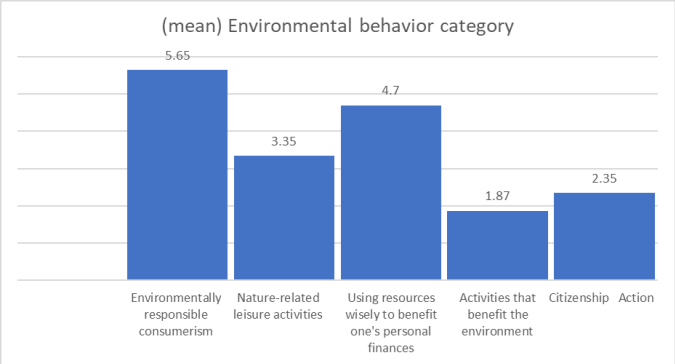
Yet, Pearson's correlation was also used to determine the relationship between the environmental behavior categories. Analyses of variance (ANOVAs) and Scheffe's post hoc tests was conducted to examine the relationship between students' hometown environment, culture and environmental behavior. T test was used to examine differences in environmental behavior between students who chose to major in environmentally related fields and students who chose to major in non - environmentally related fields, and between students of different ethnic backgrounds (Jewish, Arabic and Bedouin). Spearman correlations have been determined to test the relationship between environmental behavior results in the two kinds of items, Likert questions (Part 1) and multiple-choice questions (Part 2).

Results

TABLE 1. Mean Scores for Categories of Environmental Behavior

Environmental behavior category	M	SD
Environmentally responsible consumerism	5.65	0.48
Nature-related leisure activities	3.35	0.43
Using resources wisely to benefit one's personal finances	4.7	0.68
Activities that benefit the environment	1.87	0.88
Citizenship Action	2.35	.55
Average for all items	**3.58**	**.60**

Note. Mean scores ranged from 1 to 5.



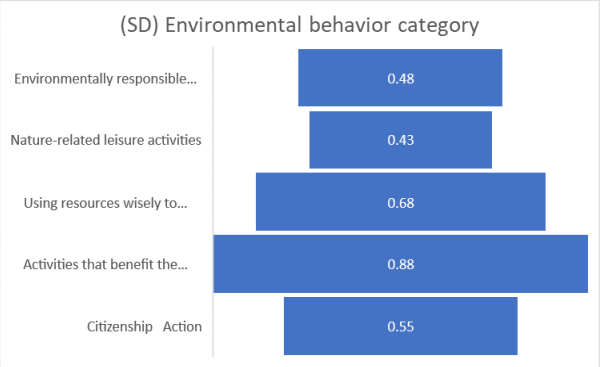


Table 1 presents each category of environmental behavior is represented by an average activity level score, as well as the overall mean score.

Each category of environmental behavior item's average activity level score and overall environmental behavior mean score.

A mean of 3.7 indicates that students participated in environmental activities occasionally (M = 3.7).According to the survey, respondents participated most frequently in the environmental behavior category using resources wisely to benefit personal finances (M = 4.7), while they participated least frequently in activities that benefit the environment (M = 1.87).

Correlations Between Environmental Behavior Categories

TABLE 2. Correlations Between Environmental Behavior Categories

*p = .01.

Subscale	1	2	3	4	
1. Environmentally responsible consumerism	0.14	-	-	-	
2. Nature-related leisure activities	0.152	0.1	0.29	-	
3. Using resources wisely to benefit one's personal finances	0.348	0.302	0.31	-	
4. Activities that benefit the environment	0.13	0.250	0.35	0.1	
5. Citizenship Action	0.06	0.14	0.32	0.2	

Correlations between environmental behavior categories are shown in Table 2.

All other environmental behavior categories , the lowest correlation (r < .30) was statistically significant correlated with resources wisely to benefit one's personal finances,but there was no statistically significant correlation between this behavior category and environmental activism.

The results indicate a strong correlation (r > .30) between environmental activism, citizenship action, and leisure activities related to nature;

It is accepted that a correlation coefficient of 0.30 determines the extent of the relationship between the variables (Hinkle, 2008).

Table 3 :

Correlation Between Results for Behavior Items and the Respective Multiple-Choice Question

Behavior item	Question	Correlation
Environmental Activism :		
Purchase of environmentally friendly products (ozone-friendly, rechargeable batteries.)	A	0.35*
Nature-related leisure activities (Biking, Hiking, Photography)	B	0.37*
Use of household goods (natural cleaning products)	C	0.20*
Waste disposal (recycling, composting)	D	0.43*
Student's mean score for environmental behavior items	E	0.38*

*p.01.

Table 3 presents the second part of component where students were evaluated by their environmental behavior by investigating the correlation between the answers to both groups of questions.

It is important to mention that participating in Stem environmental activities accelerates the student's development in the field they are interested in by training them in the field they want to direct their career such as water filtration system (building a model water filtration system using different layers of materials like gravel, sand, and activated charcoal.) , where they explore the principles of filtration, adsorption, and purification.

Table 3 presents the distribution of students' choices from alternative behavioral options. The environmental activities in this section were covered some of the behaviors mentioned in the Likert statements.

It presents the distribution of students' choices from alternative behavioral options. It shows correlations between environmental behaviors found in the multiple-choice questions and responses to environmental behavior items in the Likert section.

Regarding consumer behavior and personal contribution to environmental activism and saving natural resources, there is a low correlation (r = 0.35 and r = 0.20) between the results obtained in behavior items (A and C) .

With respect to nature-related leisure activities (Biking, Hiking, Photography building a water purification system), a relatively high correlation (r = 0.37 and 0.43) between the results(B and D) obtained in waste disposal (recycling, composting).

Yet, it was found that students' perception of their environmental behavior to be relatively highly correlated to the overall mean score of environmental behavior items (r=.38).

Table 4 Relationship Between Students' Scores for Environmental Behavior Categories and Ethnic Background among 55 students (Jewish/Arabs/Bedouins).

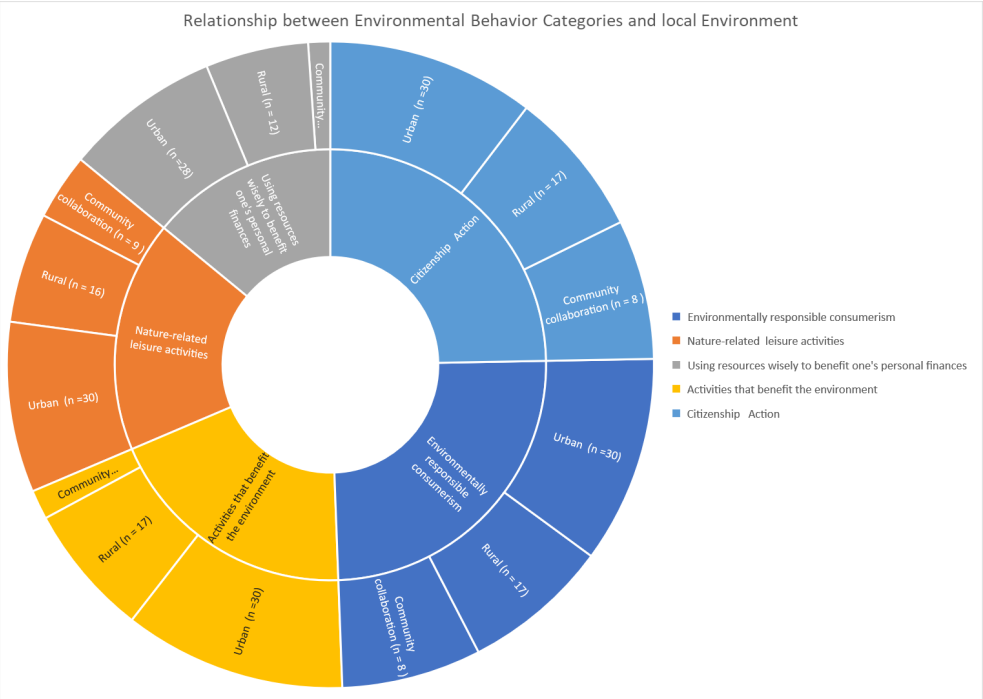
Environmental behavior category	**Ethnic Group: (Jewish/ Arab / A Bedouin).**				
Environmentally responsible consumerism	Jewish *(n =25)* Arab (n = 15) Arab Bedouin (n = 15)				
Nature-related leisure activities	Jewish *(n =25)* Arab (n = 10) Arab Bedouin (n = 20)				
Using resources wisely to benef personal finances	Jewish *(n =30)* Arab (n = 15) Arab Bedouin (n = 10)				
Activities that benefit the envir	Jewish *(n =25)* Arab (n = 15) Arab Bedouin (n = 15)				
Citizenship Action	Jewish *(n =27)* Arab (n = 15) Arab Bedouin (n = 13)				

Effects of Background Variables (Culturalism) on Environmental Behavior after being exposed to STEM stages

Table 4 shows, Arab students had significantly higher scores than did Jewish students in the environmental behavior categories of citizenship action (p = .003), environmental activism (p = .000), and nature-related leisure activities (p = .005). However, the Jewish respondents had significantly higher scores than did Arabic participants in the environmentally responsible consumerism (p = .006) and category of nature related leisure activities (p = .005) categories. We did not find a difference between the groups in the category of resource-conserving actions with personal financial benefit.

Table 5 : Relationship between Environmental Behavior Categories and local Environment among 55 students exposed to STEM practices

Environmental behavior category	Type Of Hometown (Urban/Rural/Communi Collaboration).	M	SD	df	p
Environmentally responsible consumerism	Urban *(n =30)* Rural (n = 17) Community Collaboration *(n* = 8)	2.82 2 1.9	0.22 0.1 0.2	1500	0.02
Nature-related leisure activities	Urban *(n =30)* Rural (n = 16) Community collaboration *(n* = 9)	2.32 1.5 0.9	0.21 0.1 0.3	1500	0.01
Using resources wisely to ben one's personal finances	Urban *(n =28)* Rural (n = 12) Community Collaboration *(n* = 15)	2.12 1.4 0.3	0.67 0.1 0.3	1600	2.02
Activities that benefit the environment	Urban *(n =30)* Rural (n = 17) Community Collaboration *(n* = 8)	3.02 1.8 0.4	0.68 0.1 0.22	1836	3.02
Citizenship Action	Urban *(n =30)* Rural (n = 17) Community collab = 8)	2.82 2 1.9	0.82 0.1 0.2	2520	0.05



My local environment. Table 5 presents the impact of the environment in which the students were born and grew up on their environmental behavior . It could be noticed : there is no difference in students' scores for Environmentally responsible consumerism and Nature-related leisure activities .However, significant differences in scores for citizenship action (p = .005) and using resources wisely to benefit one's personal finances (p = 2.02), and Scheffe's post hoc test indicated that the source of these differences was between students who grew up in an urban environment and those who grew up in a rural environment. The difference between groups for environmentally responsible consumerism was also significant = 0.02), and Scheffe's post hoc test indicated that the source of this difference was between all the groups.

DISCUSSION

Environmental Behavior Categories and Responsible Environmental Behavior

The ultimate goal of EE is acquisition of responsible environmental behavior (Hines et al., 1986-1987; Sia et al., 1986; UNESCO-UNEP, 1978) .

The literature on responsible environmental behavior (REB) often categorizes environmental actions into different categories, which are sometimes referred to as citizenship

skills or environmental competencies. These categories may vary slightly depending on the source, but some common examples include :

Actions that aim to reduce the consumption of resources, such as water, energy, or materials, and to minimize waste and pollution. Actions that aim to restore or enhance the natural environment, such as planting trees, restoring wetlands, or cleaning up polluted areas. Actions that aim to promote environmental awareness and engage others in environmental issues, such as participating in community campaigns, writing letters to elected officials, or using social media to spread environmental messages. Actions that aim to develop new technologies or processes that can help to address environmental challenges, such as designing sustainable products or developing renewable energy sources. These categories of environmental actions reflect different aspects of responsible environmental behavior, and individuals who engage in these actions can be considered responsible environmental citizens who are contributing to a more sustainable future. (Head, L., Klocker, N., & Bielschowsky, I. A. (2019).

Environmental actions that reflect responsible environmental behavior (REB) have been divided in the literature into a number of environmental action categories, also recognized as citizenship skills (Hungerford, 1981; Vaske, J. J., & Kobrin, K. C. (2021); Smith-Sebasto & Ayres, 1995). Ramsey et al., divided REB into five action categories: (a) eco management, (b) economic action, (c) persuasion, (d) political action, and (e) legal action.

The five categories in this study (see Table 1), derived from factor analysis of 55 students' reported behavior, represent a different categorization of environmental actions and may contribute another perspective to REB (Responsible Environmental behavior). According to this study, categories are not predefined theoretically, but are based on respondents' perceptions of environmental behavior. Thus, they may reflect an environmental agenda within the Israeli context. Organizing the environmental action categories on a scale according to the frequency at which they were carried out by the training teachers (see Table 1) revealed the perspective of environmental commitment.

According to this perspective, resource-conserving actions with personal financial benefits are the least environmentally responsible actions. Due to the financial benefits associated with these actions, respondents may be motivated by economic interests rather than environmental concerns. In order to express environmentally responsible consumerism, it is needed to take steps that express our environmental commitment .

While performing these activities exhibit some degree of environmental awareness, personal interests may still be the main motivator, despite the fact that these activities relate to

household products.In the following level is the category of Environmentally responsible consumerism and Nature-related leisure activities may be a reflection of Israel's environmental agenda that students perceive biking, hiking, photography activities as separate from other activities. .

Waste disposal (recycling, composting) is one of the focal points of environmental efforts at a national level, as reflected in legislation, media exposure, and investment in infrastructure (Ministry of the Environment, 2019). Nowadays , multicultural education model at present emphasizes a holistic perspective, values clarification, and social justice and equity as democratic principles.

Cultural education, however, emphasizes ensuring equal access to education for students from diverse ethnic and racial backgrounds by reforming educational systems at all levels . (Braun, T, 2019). Similarly, multicultural education fosters individuality and personality within natural ecosystems, which ultimately supports genetic diversity. Environmental education and multicultural education can be separated as two distinct areas of focus. Therefore, the main question is whether Environmental education and multicultural education find common ground in preserving diversity. Environmental education and multiculturalism usually focus on teaching students about the environment, including topics such as climate change, conservation, sustainability, and environmental justice. Ferreira, M. (2014).

The goal of environmental education is to help students develop a deeper understanding of the natural world and the impact that human activities have on it. While there is some overlap between environmental education and multicultural education (environmental justice issues often disproportionately affect marginalized communities), they are generally considered separate areas of focus with distinct goals and approaches. Therefore, integrating environmental education and multicultural education with global education can provide a more holistic approach to education that promotes both environmental and cultural awareness.(Liobikienė, G., & Poškus, M. S. (2019).

This would enable students to develop critical awareness and sensitivity regarding real-life issues, enhance their sense of global solidarity, and prepare them to adapt to a changing world and make informed decisions. It would also foster respect for diverse cultures and improve cross-cultural understanding and competence.

Multicultural and environmental education also share a global viewpoint that promotes the knowledge and understanding of global issues and how all systems and societies are interconnected. The importance of understanding the close interconnection between

individuals, sectors, and species, their daily actions, and how international events affect them, cannot be overstated.

Differences in environmental behavior between students from different ethnic backgrounds (Jewish, Arab) revealed environmental education, multicultural education, and global education share many similarities, leading to suggestions for their integration. Teachers who grew up in a rural environment may have less direct experience with nature and may need additional support and training to effectively teach environmental concepts. In this article, the level of EL (Environmental Literacy) of graduates of the educational system who chose to prepare themselves for a profession as teachers the new teacher-training students were characterized by a low level of EL, as reflected by their environmental behavior. Teachers who grew up in an urban environment were less active than were students who spent their childhood in a rural environment. The low level of environmental literacy among new teacher-training students is a concerning issue, as teachers play a critical role in educating future generations about the importance of sustainability and environmental responsibility. It is important to recognize that environmental literacy is not only about knowledge, but also about behavior and action. Teachers who are more environmentally literate are likely to be more effective in promoting sustainable behaviors and practices among their students.

The fact that teachers who grew up in rural environments were more environmentally active than those from urban environments suggests that personal experience and exposure to nature may play a role in shaping environmental behavior. This highlights the importance of providing all students with opportunities to connect with nature and learn about environmental issues, regardless of their background. Efforts to improve environmental literacy among new teachers should focus on providing comprehensive training and professional development opportunities that address both knowledge and behavior. Moreover, it is also important to recognize the influence of personal background and experiences, as discussed earlier. Teacher education programs can work to create opportunities for all students to gain direct experience with nature and environmental issues, regardless of their upbringing. This could include field trips, outdoor education programs, and service learning opportunities that allow students to engage with the environment and apply their learning in a real-world context .

The characteristics of teacher-training students, as identified by the data, should serve as a guide for developing comprehensive training programs that prioritize the development of environmental literacy competencies . By providing teacher-training students with the knowledge and skills needed to effectively teach environmental and sustainability concepts, teacher education programs can help to close the gap between students' recognition of the

importance of responsible environmental behavior and their actual participation in such behavior.

To achieve this goal, teacher education programs should consider incorporating a range of pedagogical approaches that promote active and experiential learning. This could include project-based learning, inquiry-based learning, and place-based education, all of which provide opportunities for students to engage with real-world environmental problems and develop the critical thinking and problem-solving skills needed to address them.

Furthermore , Salter-Stith (2018) believe that multicultural education and environmental education, have a direct correlation to our chances of survival as a society on a life-sustaining planet. Allahwerdi, 2001; Tilbury & Henderson, 2003 have mentioned that though environmental education contribution to international education or intercultural learning has been considered quite limited in previous articles, in contrast environmental education also offers much for multicultural education. Developing a more sustainable world requires environmental education and multicultural education to work together. In order to build a more sustainable world, environmental education and multicultural education are interdependent. Effective integration of multicultural education and environmental education requires a well-planned syllabus that incorporates both perspectives in a meaningful way. Such a syllabus should consider the unique cultural backgrounds and experiences of students, as well as their local environmental context. This means that teachers must be intentional about creating a learning environment that is respectful of diverse cultures and perspectives, while also promoting environmental sustainability.

To become knowledgeable, caring, and active global citizens in the twenty-first century, students must develop attitudes, skills, and behaviors that are both environmentally and culturally sustainable. This means that students must not only understand the interconnectedness of social, cultural, and environmental systems, but also be able to act in ways that promote sustainability and social justice. Attitudes such as empathy, respect, and open-mindedness are critical for developing a global perspective and understanding diverse cultural and environmental perspectives.

On the other hand , the integration of STEM and environmental education has offered a powerful approach in engaging participants from different backgrounds in understanding and addressing environmental challenges. By STEM education they have explored and investigated environmental issues through scientific inquiry, technological applications. They have used tools such as sensors, data loggers, remote sensing technologies, and Geographic Information

Systems (GIS) to collect and analyze environmental data. STEM education equips students with the technological skills to utilize these tools and process data to gain insights into environmental patterns and trends.

Some of the participants had identified environmental problems, brainstorm solutions, and create prototypes to design and to construct model for waste management solutions in an urban/rural area by fostering creativity and critical thinking in environmental problem-solving.

By integrating STEM principles and practices into environmental education, students can develop a deep understanding of environmental concepts while gaining valuable scientific, technological, engineering, and mathematical skills. This interdisciplinary approach fosters critical thinking, problem-solving abilities, and prepares students to become environmentally literate citizens capable of addressing complex environmental issues. Students must also develop skills such as critical thinking, problem-solving, and communication, which are essential for addressing complex environmental and cultural issues.

Therefore, environmental and multicultural education must work together to build a sustainable society and be active global citizens in the 21st century.

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