



Students' Perspective About Global Warming: A Systematic Literature Review

Hamza Atifnigar * 

English Department, Faculty of Literature and Human Sciences, Laghman University, Afghanistan

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* Corresponding author:

Hamza Atifnigar, e-mail:
hamza.honaryar@gmail.com

Abstract:

As the temperature of the globe is increasing day by day, all existing creatures are in great danger including animals, plants, and human beings. Most people are in a panic about global warming, particularly students who are always more concerned than any other in the world. In addition, there are global combats against the rise of global warming but still, there has been a lack of awareness and action in mitigating the crises of global warming. Therefore, this systematic literature strives to explore students' status regarding global warming. In order to support the goal of this study, the researchers utilized (n=25) journal articles from various reliable resources. After critically analyzing the papers, we have found students' related insights about the (a) definitions, (b) awareness, (c) beliefs, (d)

knowledge, (f) willingness, and (g) action against the global warming which are discussed in details in the body of this study. Finally, educational related institutions are suggested to put into practice the awareness and mitigate the rise of global warming among students.

Keywords: *students, global warming, attitudes, perception, awareness, willingness, action.*

Introduction

Climate change is a crucial issue in the current technological world. Climate change is happening due to unbalanced incoming and outgoing radiation in the atmosphere that impacted both natural and human systems (Atifnigar et al., 2020; Edenhofer, 2015; Islam et al., 2016; McMichael, 2013). Global warming is considered one of the climate change factors that varies from the past degrees of it. In this regard, it is foreshadowed that there will be an average rise of 5.4°C in temperature around the globe by 2100. Indeed, global warming is a sort of impact caused by carbon dioxide and evaporation of water which segregates the earth's planet and elevates the atmospheric heat of the earth by avoiding heat loss. It finally

causes environmental, seasonal, and climate changes in the world, nevertheless, every aspect of dwelling, environmental sectors, natural resources, and every aspect of life is impacted (Sah et al., 2015). As a matter of fact, climate change is a gigantic global health menace to the 21st-century world (Ahima, 2020). Moreover, the bulk of research indicates that melting of icebergs, emission of gasses out of greenhouses, uses of fossil fuels, cutting down trees and animals, urbanization and rapid industrialization which accumulate in the atmosphere are the main reasons for global warming (Aydin, 2010); Rises in the average temperature of the earth near-surface air and oceans since the mid-20th century and it anticipated progression (Atifnigar, Zaheer, et al., 2020; Chakraborty et al., 2015); rises of sea level that increase the degree of



extreme precipitation, water stress, shortages in crops, and changes in showers' pattern (Atifnigar et al., 2022; Canadell et al., 2010; Cook et al., 2013; Nijat et al., 2019; Weart, 2010).

Climate changes can directly or indirectly affect all sectors in the world. Undeniably, the educational system might be also affected. For instance, educational outcomes might be also impacted by different forms of climate changes, in the general sense, events related to extreme weather for instance tropical cyclones may destroy the infrastructures of schools, or displaced people may shelter in the schools from their homes which avoid students from attending the schools and sometimes most of them may not returns to their studies (Randell, 2019). In such a situation, most educational contexts around the world are vulnerable to global warming, particularly in warmer regions of the world. Many investigations have been conducted on educational contexts to find the impacts of global warming on students' lives. Indeed, one of them is students' perception, awareness, attitudes, practices, knowledge, willingness, and act toward global warming (Gadabu, 2020).

However, so far, there has not been observed any particular systematic review paper on students' regarding global warming to address the overall perceptions of students about global warming. Systematic reviews and meta-analyses are essential tools for summarizing evidence accurately and reliably (Liberati et al., 2009). Thus, the purpose of this review is to scrutinize various online resources to support students' perceptions, beliefs, knowledge, and awareness of global warming and further enrich the current literature on global warming from the students' point of view. Furthermore, this paper will also identify the gaps in the field of education and global warming.

Literature Review

The overall temperature of the world is raised by at least 0.74 C° and the reason behind this phenomenon is the increasing level of the greenhouses in the earth's atmosphere

significantly leads to the heat of the world and changed in the climate (Urry, 2015). Ultimately, climate change has been an intimidating global ecological variation of this epoch (Cardwell, 2011). Global warming is an ecological, social, and economic danger to the present and future generations. School age is an influential stage in everyone's lives; to promote and develop sustainable health-related behaviors, as well as beliefs and attitudes (Rishi Nath et al., 2021). Global Warming is an increase in the earth's average temperature. Increases in global heat cause changes in precipitation rise in ocean surfaces, changes in plants and wildlife; human beings. One of the major sources of global warming is the effects of greenhouses gases. Currently, carbon dioxide, methane, and nitrous oxide are playing a crucial role in increasing world temperature. The gases of greenhouse trap heat in the earth's atmosphere and thus result in increasing the temperature of the earth (Meehl et al., 2007). In addition, the occurrence of extreme weather phenomena includes heat waves, drought, torrential rainfall, the acidity of the ocean, and extinction of species due to the shifting systems of temperature. However, human beings are vulnerable to global warming due to shortages of crops and flood flushes (Battisti & Naylor, 2009).

The educational system is also impacted by global warming and there have been conducted many researches on both teachers and students globally while most of them are carried out on students' perception, awareness, attitudes, practices, knowledge, willingness, and actions toward global warming (Andersson & Wallin, 2000; Boon, 2009; Boyes & Stanisstreet, 1993; Freije et al., 2017; Rajeev Gowda et al., 1997; Rye et al., 1997; Shepardson et al., 2009; Shepardson, Niyogi, Choi, et al., 2012). Initially, knowledge of students about global warming has been described as a systematic content of information that creates the foundation of perceptions later information becomes knowledge when utilized by the people to make predictions or decisions. Attitudes are generally referred to as the personnel view, opinion, or a common emotion about something while willingness is the focal point toward mitigation and adaption of climate

change through individual attempts (Dietz et al., 2005; Edet & Eyiwumi, 2018).

A considerable amount of investigations have been conducted on the willingness of people, significantly on students' perception, ideas, effects of climate change and global warming (Bozdoğan, 2009; Haşiloğlu et al., 2011; Liarakou et al., 2011; Yazdanparast et al., 2013). Indeed, people are advised to understand the impacts of climate change on people and learn the ways of coping with them, particularly they must strive to understand the causes and solutions of global warming (UNEP, 2003). Therefore, it is essential to train people and make them aware of global warming topics in educational curriculum and syllabus at all levels, as well as expose students' and people's misconceptions about global warming through media coverage. Recently, environmental education about global warming is now the most effective strategy in improving ecological awareness among nations which is ranging from elementary school to tertiary levels (Andersson & Wallin, 2000; Boyes et al., 2009; Taber & Taylor, 2009).

Numerous studies conducted since the UN Framework Convention on Climate Change's creation have found that the majority of people with possessing high sensitivity to its effects, particularly in developing nations, are unaware of climate change (Gupta et al., 2010; Jaffer et al., 2006; Organization, 2008). Climate change and the threat of global warming were inadequately figured out by the American people in 2005, according to an MIT study, and taking action to mitigate their impact was not a high priority for them (Esa, 2010). Some the countries have trained and taught their nation about global warming to form their attitudes toward global warming, for instance, Turkish students are aware of the advantages of decreasing global heat and are ready to adopt them in their daily life. In addition, most of them showed their willingness to switch off unused electrical devices and increase the uses of public transportation (Kılınç et al., 2011). According to a survey, the awareness of Mexican students is extremely low about global warming followed by the use and Cubans citizens (Brechin, 2003). In

one of the pieces of research conducted on Bengali students of India, it is concluded that most of them have various forms of knowledge about global warming in terms of age and sex (Chakraborty et al., 2015). Among all the students globally, university students particularly science students are more aware of global warming. It is revealed Food and Agriculture students were more aware of biotechnology and its ecological effect than other college students (AbuQamar et al., 2015).

Some studies revealed that most of the students' understanding of climate change is lower and they endure misconceptions such as ozone depletion and air pollution (Andersson & Wallin, 2000; Svihla & Linn, 2012). Regarding educational context, all institutions are obliged to inculcate the culture of raising the well-being of students toward global warming and awareness about the global environment, if not then the consequence will be harmful to the ecology (Shepardson et al., 2009). Students' willingness about climate change and global warming provides a real-world context for science through personal and social settings (Bélanger, 2003; Shepardson, Niyogi, Roychoudhury, et al., 2012). Education plays a critical role in encouraging learners' lifestyles for example lowering waste and increasing the public use of transportation (Svihla & Linn, 2012; Tolppanen & Aksela, 2018).

Research on learners' perception of global warming is significantly referred to secondary school students (Rickinson, 2001) and there is a limited number of exceptions, such as students in Singapore, England, and Australia who were concerned about the global heating year before (Boyes et al., 2009; Francis et al., 1993; Lester et al., 2006; Wells & Arauz, 2006). Moreover, =n According to a study carried out on Australian students their willingness to behave in a pro-environmental manner was sometimes higher it was expected based on their beliefs in the acts would be effective. However, in most of these cases, limited inconveniences were involved, such as turning off electrical equipment (Boyes et al., 2009). Similarly, students in Spain had similar findings, they expressed their willingness to undertake some actions even if they did not

believe that such behaviors may impact the elimination of global warming while such action could cost some minor financial and personnel support (Rodríguez et al., 2010). Moreover, a study by Ricknosno revealed that aged learners were more concerned toward the ecological issues rather than younger ones. In addition, several numbers of studies revealed that both primary and secondary learners' willingness toward taking ecological actions (Boyes et al., 2009; Chu et al., 2007; Rickinson, 2001; Yilmaz et al., 2004). Indeed, social activities are defined in a manner that which learners are taking individual responsibility and actions in solving the society-related problem and impacting the activities of others (Lester et al., 2006). Finally, there have been observed important variations among students regarding the effectiveness of different actions and willingness in decreasing global warming (Boyes et al., 2009).

In terms of students' knowledge about global warming has been scrutinized by several researchers and most the belief that the impacts of global warming is getting increased day by day. Our understanding of the dangers, impacts, and preventive measures is important and has become strong for the human being. The predictable repercussions have an impact on sea levels, beaches, agriculture, wild animals, and human health, social and political issues. We may not avoid its consequences in the future by taking or simply considering the steps, but we can prevent further global climate change, such as beach damage. To keep seawater, we must protect it by the surrounding wall or barrier around them. On the other hand, the government should relocate coastal residents to higher places. Those who dwelled in the USA protected plants and animals by keeping their residency calm and soothing. However, global warming has been considered by the government of Indonesia for its imperfect curriculum in its education setting, the nonexistence of law enforcement against ecological preservation, and they're still people who do not know and take care of the environment (Rosidin & Suyatna, 2017). Similarly, research showed that both teachers

and students' understanding was lower towards global warming (Suyatna & Rosidin, 2016).

Methods

A plethora of research conducted on the effects of climate change on its different essential corners of the world comprising economy, agriculture, oceans, and weather, human, animal, education, and more. Indeed, this review paper is aimed to explore students' perceptions, beliefs, knowledge, and awareness of global warming by using existing literature and the latest research papers. In order to represent systematic and reliable data within this paper, the researcher exploited the PRISMA 2009 Model for the overall process of developing this paper. Indeed, the PRISMA model focuses on ways in which authors can ensure the transparent and complete reporting of systematic reviews and meta-analyses (Liberati et al., 2009). The data for this study excluded and included from various online published journal articles from 2007 and 2021 through using the Google Search Engine in which different reliable online resources such as Wiley, Web of Science, Scopus, Elsevier, Google Scholar, Research Gate, and many more sources.

In order to collect data for this study, initially, the researcher searched for the keywords "Effects of climate change on education and human" in Google Scholar, at the first attempt, we found 14000000 entries which were quite paramount and extremely general. Later, the researcher narrowed down the topic based on its significance to "Students' perception about global warming" on the same platform. This time without bounding the year of publications we have found 15000 links towards it. Later, we limited the duration of published articles between 2007 and 2021 in which 12000 links were found and have been further refined to 3000 articles. Afterward, the researchers downloaded the most significant articles that supported the aims of this paper and saved them in a specified folder. After downloading 130 journal articles on the effects of climate change and students' perception of global warming, later the researcher screened all the published articles into 78 articles of which 43 of them were

excluded and 25 of them were included in this study for further analysis to support the topic students' perception towards global warming.

Figure 1 is an explanation of the PRISMA 2009 model used in this study.

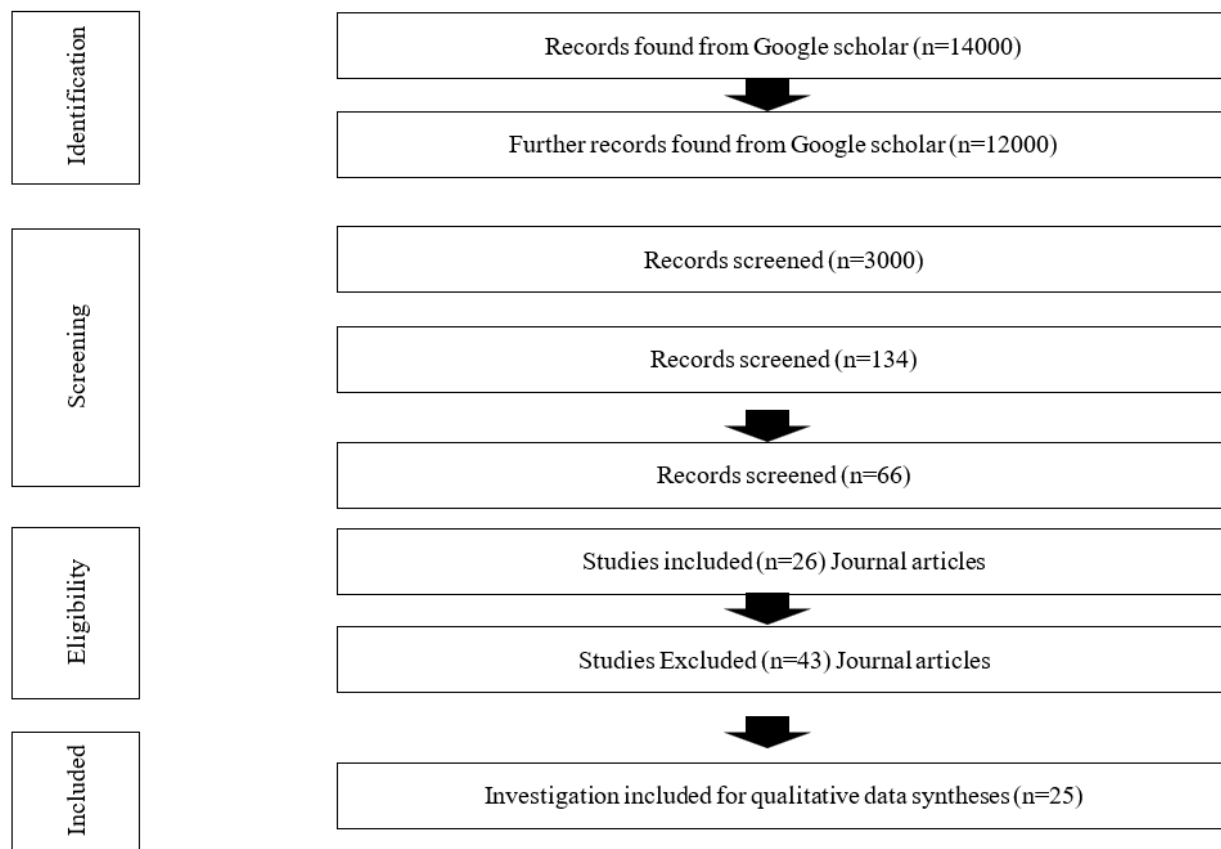


Figure 1. PRISMA Model 2009 for Developing Systemic Literature Review and Meta-Analysis Including Criteria

Results and Discussion

This review paper aims to explore students' points of view about global warming. After collecting various updated scholastics papers from various online resources, the researcher found different points of view of students regarding global warming within their educational context. We have further scrutinized the data and came to the following categories:

1. Global warming from students' point of view
2. Students' awareness of global warming
3. Students believe in global warming
4. Students' knowledge about global warming

5. Students' willingness and action toward global warming

Definition of Global Warming

Numerating numbers of scholars proposed numerous definitions of global warming GW for the last few decades but the recent definition discovered from the student's point of view in a study conducted by (Pratami et al., 2021), alleviated that global warming is the rapid increase in the temperature, depletion of the ozone layer, and greenhouse gas and human tasks as the major causes of global warming. Moreover, a similar baseline was carried out by (Aydin, 2010) on secondary school students to gain learners' perception of global warming. After his phenomenological analysis, he

concluded six definitions of global warming: (1) GW is a rise in the overage temperature of the world, (2) changes in climate and seasons are GW, (3) GW is the destruction of ecology or nature, (4) GW is caused by the people of the

world, (5) GW is considered as environmental dilemma that can cured if protections steps are followed and (6) finally GW is the demolishing of human being and plant.

Table 1. Definition of Global Warming

No	Author	Title	Result and findings
1	(Pratami et al., 2021)	Investigating junior high school students' perception of global Warming topic using semantic network analysis	After the process of analysis, there were their main statements to students to define global warming: (1) Increase in earth's temperature, (2) depletion of the ozone layer, and (3) greenhouse gas and human activities as the cause of global warming.
2	(Aydin, 2010)	Secondary school students' perceptions towards global warming: A phenomenographic analysis	The findings showed six definitions of global warming, (i) average increases in temperature, (ii) changes in climate and seasons, (iii) destruction of the ecosystem, (iv) GW is caused by a human being, (v) GW is an ecological dilemma which can be mitigated in case precaution are taken, and (vi) and GW is the major reason of demolishing of humankind.

Students' Awareness of Global Warming

Based on the table 2 about the students' awareness of global warming, it has resulted from the article (Tshuma, Risiro & Murwendo, 2014; Parashar et al., 2013) that students had awareness about global warming. While a study

conducted on the environmental awareness of university students in Ankara, Turkey by (Oğuz, Çakci & Kavas, 2010), showcased that besides taking numerous courses on environmental issues, awareness and environmental behaviors were then they were expected from it.

Table 2. Students' Awareness of Global Warming

No	Author	Title	Results and findings
1	(Oğuz et al., 2010)	Environmental awareness of University students in Ankara, Turkey	Research findings show that even though students take many courses on environmental issues, their environmental awareness and environmentally responsible behaviors are lower than expected and students' grades show no significance to the results. It is concluded that environmental knowledge does not always influence awareness and behavioral intentions, a national strategy is needed for environmental education in higher education, and current curricula should be reconsidered in terms of effectiveness.
2	(Parashar et al., 2013)	Awareness and practices regarding global warming and its health hazards among the medical Students of Meerut	The majority of students had awareness regarding global warming but improvement for mitigation is required.
3	(Tshuma, Risiro & Murwendo, 2014)	Global warming: facts and misconceptions by staff and students at great Zimbabwe university	Most of the learners showed awareness regarding global warming in contrast to the personnel. Also, learners showed their understanding of the causes, results, and measures to restrain global warming.

4	(Nath et al., 2020)	“A study on the knowledge attitude, and practices about the effects of global Warming among school children aged between 11 – 15 years in Annai Sathya Nagar, Dharmapuri District, Tamil Nadu”	Global warming is mainly due to the Lack of awareness among people, excess use of electricity, fossil fuels, pesticides, and plastics which affects the environment and causes the spread of diseases like malaria and changes the climatic condition. Global warming can be prevented by creating awareness among school children and by doing alternative procedures to save the community for our future needs.
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Indeed, environmental understanding failed to influence awareness and behavioral intentions. Likewise, it is concluded that existing of global warming is directly linked to the lack of awareness among people, massive consumption of electricity, fuels, pesticides, and plastics can impact the ecosystem and disperse the infection of Malaria, and caused climate change. However, it is doomed that global warming can be paralyzed through forming awareness programs among school students and saving the community in the future.

Students’ Beliefs About Global Warming

As indicated in the table 3 most of the students have considered the issue of global warming when involved in the educational setting. It is believed that there are six numbers of factors that affect global warming, for instance: the effects of greenhouses, depletion in the ozone layer, the utility of fossils, fire in forests, use of chemical material, and the pollution catered through industries in the world (Handayani & Putra, 2019).

Table 3. Students’ Beliefs About Global Warming

No	Author	Title	Result and Findings
1	(Handayani & Putra, 2019)	“Student Cognition in the Context of a Climate System: Global Warming and Greenhouse Effect”	The result showed six factors including effects of greenhouses, destruction of the ozone layer, uses of fossil fuel, burning of forests, chemical uses, and commercial air pollution. In addition, they believed that ocean, soil, air, plantation, livestock, humankind, weather, and season changes play a significant role in causing global warming.
2	(Dogru & Sarac, 2013)	Metaphors of primary school students relating to the concept of global warming	The vast majority of the students considered global warming as a damaging concept of increasing temperature. In addition to this, while conceptual categories did not differ based on the gender of students, they were significantly different from each other in terms of levels of grades.
3	(Ambusaidi et al., 2012)	Omani students’ views about global warming: Beliefs about actions And a willingness to act	Omani students believed that global warming is occurring, taking action, and showing their willingness to mitigate global warming by switching off electrical devices.
4	(Kilinc et al., 2008)	Turkish Students’ Ideas about Global Warming	Most Turkish students believe that the increase in global is directly linked to the radioactivity which is leaked from nuclear power stations and were confused about the depletion of the layer that causes global warming.
5	(Boyes et al., 2009)	Global Warming Responses at the Primary Secondary Interface: Students’ Beliefs and Willingness to Act	The majority of the student believed that the actions and willingness taken for mitigation of global warming were effective and they had different beliefs in terms of action against global warming and proposed explanations for each.

As a matter of fact, most learners believe that global is a damaging concept with increasing temperature (Dogru & Sarac, 2013). The majority of the Omani learners believed that they are currently observing global warming from the close and are concerned about it, indeed, they undertake actions against the increase of global warming for example: switching unexploited electrical tools, the utility of communal transport, and even they strongly believed that people will play a significant role in purging global warming (Ambusaidi et al., 2012). Likewise, numerating numbers of students believe that most actions and willingness are

required to reduce global warming (Boyes et al., 2009).

Students' Concept and Knowledge of Global Warming

The table 4 shows the results of learners' concepts and knowledge about global warming, it is perceived that most of the learners' concepts were different to some extent with enough knowledge about global warming. Initially, based on our provided data, it resulted that the conceptual structure of the students was different concerning global warming.

Table 4. Students' Concept and Knowledge of Global Warming

No	Author	Title	Result and Findings
1	(Dikmenli, 2010)	Biology students' conceptual structures regarding global warming	The results of this study have shown the conceptual structure of the participating students relating to global warming in its various aspects. It was seen that the participating students knew of, and could conceive of to a degree, at least one basic aspect of the global warming issue. However, it was also seen that the conceptual structure of these students relating to global warming was quite simple, superficial, and limited. Furthermore, it was determined that the conceptual structure of the participating students was based on the effects of this phenomenon rather than the causes and sources thereof. Moreover, these students had some alternative conceptions about global warming, and these alternative conceptions were similar to those determined during previous research. For example, some of the students were erroneously associating global warming with ozone layer depletion, skin cancer, and unleaded petrol.
2	(Shepardson et al., 2009)	Seventh-grade students' conceptions of global warming and climate change	Different categories emerged from the students' concepts about climate change and global warming. Significantly, students' concept of global warming was due to the lack of rich conceptualization of the effects of greenhouses on global warming.
3	(Mohapatra & Mohapatra, 2008)	A survey of school students' knowledge and attitude about the global warming	The results showed differences between boys' and girls' knowledge about global warming. Indeed, they had hesitation about the main causes of global warming and their response to it, they were well informed about the carbo dioxide and CFCs and greenhouses and global warming causes warm weather and melt won ice and reduces plantation
4	(Sah et al., 2015)	Assessment of the Knowledge and Attitude Regarding Global Warming among High School Students of Ramnagar, Belagavi city: A Cross-Sectional Study.	Nearly three-quarters of the students had an average level of knowledge and attitude towards global warming. None of the students had a good attitude towards the same.

5	(Freije et al., 2017)	Global warming awareness among the University of Bahrain science students	As a result, most of the biology students had a great understanding of global warming due to their educational curriculum.
6	(A Ibrahim et al., 2018)	Knowledge and Attitude regarding Global Warming Phenomenon among Assiut University Students	“The study found that nearly two-thirds of the studied students were in the age group of 20 years and more. Also, about half of the studied students had poor knowledge of global warming and the majority of them had a positive attitude toward the same subject.”
7	(Lin, 2016)	Chinese grade eight Students' understanding of the concept of global warming	The findings showed that most of the students understand the term CO ₂ and admitted the presence of global warming and their conceptual understanding was low against combating global warming. In addition, it resulted that mass media learners were more knowledgeable than any other students in science education.
8	(Yanger, 2016)	This study was conducted to investigate the understanding of global warming of first-year high school students taking Integrated Science in Tacloban City, Leyte, Philippines	The findings revealed that students in terms of age, gender, and economical status had a positive connection with the understanding of global warming. Older students had more knowledge about global warming than younger. On the whole, the female had a higher score than the male participants.
9	(Rosidin & Suyatna, 2017)	Teachers and Students' Knowledge about Global Warming: a Study in Smoke Disaster Area of Indonesia	As a result, both students and teachers had low knowledge about global warming. However, students' knowledge was a bit higher than teachers' due to their level of education in which secondary students had a significant understanding of global warming compared to the primary one. Moreover, from the findings, a strong relationship between senior students and their knowledge of global warming but no significant relationship has been observed with junior high school students.
10	(Edet & Eyiwumi, 2018)	Comparative Analysis of Senior Secondary Schools Science Teachers and Students' Knowledge, Attitudes and Practices to Global Warming in Kwara State, Nigeria	The findings revealed that science teachers had significantly higher knowledge of global warming than the students. Also, science teachers obtained significantly higher attitude mean scores than the students.

For example, learners who participated in a study knew and understood the basics of global warming, particularly their conceptual structure was simple, insignificant, and inadequate, indeed their concepts were based on the phenomena rather than the cause of global warming (Dikmenli, 2010). Meanwhile, a study shows similar findings, however, they lack enough concept of greenhouses in reference to global warming (Shepardson et al., 2009).

Amazingly, several studies were conducted on the students' knowledge about global warming across the globe which was an average level, however, a limited number of them had an average level of understanding. Several studies revealed that nearly more than of the learners possessed average of level of understanding toward global warming while none of them

possessed good attitudes towards it, while some of them even combated against the increasing of temperature which could be referred to designed curriculum, more knowledgeable about carbon dioxide, (Sah et al., 2015), (Freije et al., 2017) (A Ibrahim et al., 2018). In addition, it is exposed that most of the learners had a positive correlation with their understanding of global warming concerning their age, gender, and economic status, while in this study females were more knowledgeable than males (Yanger, 2016). However, some researchers concluded that student knowledge were in low level, indeed there is difference between in learners' understanding about global warming in term learning experience but on gender and also similar study showed that student knowledge

was low then teachers (Rosidin & Suyatna, 2017; Edet & Eyiwumi, 2018).

Students' Willingness and Action Toward Global Warming

As can be observed from the table 5 most of the students who were involved in understanding their willingness toward taking action against

global warming were strong. For example, a study showed that Indian students showed a high level of concern over climate change and had a strong will to fight against global warming in the favor of ecosystem which their findings were to the Spanish and Australian students (Chhokar et al., 2011).

Table 5. Students' Willingness and Action Toward Global Warming

No	Author	Title	Results and Findings
1	(Lehnert et al., 2020)	Czech students and mitigation of global warming: Beliefs and willingness to take action	The results show that Czech students are generally skeptical about the usefulness of the actions suggested and are among the less willing, in a wider international context, to participate in actual processes that might ameliorate global warming. However, Czech secondary-school students, particularly females, are significantly more willing to act than upper-primary students. Although relatively high PEE values were observed, Czech students tend to underestimate the role of personal consumption, and male students, in particular, are not willing to take actions that involve no immediate personal benefit.
2	(Boyes et al., 2009)	Australian Secondary Students' Views About Global Warming: Beliefs About Actions, and Willingness to Act	Students showed willingness in acting against global warming since they believed in its effectiveness of it and the actions included switching off used electrical devices, recycling, using public transport, and buying small cars to mitigate global warming. Obtaining more electricity from nuclear power stations, fell into this category.
3	(Chhokar et al., 2011)	Indian secondary students' views on global warming: beliefs about the usefulness of actions and the willingness to act	The findings indicated that this cohort of Indian students exhibited high levels of concern about climate change and a strong willingness to act against global warming and in favor of the environment. The findings are tentatively compared with those from similar survey studies conducted in Western contexts (Spain and Australia).

The majority of the Omani learners believed that they are currently observing global warming from the close and are concerned about it, indeed, they undertake actions against the increase of global warming for example: switching unexploited electrical tools, the utility of communal transport, and even they strongly believed that people will play a significant role in purging global warming (Ambusaidi et al., 2012). Likewise, numerating numbers of students believe that most actions and willingness are required to reduce global warming (Boyes et al., 2009). Another research carried out on Czech students concluded that they have a strong will about the global heating, particularly female student's willingness toward taking against high temperature was strong enough than in upper primary school. However, male students were

skeptical about the positive impacts of willingness to take action against global warming (Lehnert et al., 2020). As a matter of fact, it is also revealed that most of the students are seriously showing their willingness to take action in tackling global warming, for example, they usually switch off unused electrical tools, practice recycling materials regularly, and use public transport rather than their private cars to reduce the emission of gases that causes the depletion of the ozone layer (Boyes et al., 2009).

Conclusion

As this review paper was based to explore the role of students in tackling global warming. In short, this paper explored definitions of global

warming from the students' points of view, misconceptions about global warming, students' awareness, beliefs, knowledge, concept, perception, and they are willing to tackle global warming. Based on our findings, it is concluded that global warming is perceived as an increase in the temperature, depletion of the ozone layer, and emission of gases from greenhouses and other human-related activities in the world. In addition, changes in climate and seasons, destruction of the ecosystem, and finally extinction of human beings and plantations. Based on the research, still, majority of the students have misconceptions about the global warming, for instance, most of the students believe that lead-free petrol may increase the causes of global warming and defection of the ozone layer. One of the misconceptions of students about global warming was that ozone holes cause skin cancer among people. It resulted that most of the student's awareness of global warming was positive, indeed they were aware of environmental behaviors issues. However, a vast number of students concluded that global warming can be directly linked to the lack of awareness among people for example massive uses of electricity, fuels, pesticides, and plastics which can impact the environment and disperse the infection of Malaria and consequently cause climate change. Regarding students' beliefs about global warming, most of the students believed that six factors increase the global warming which are the effects of the greenhouse, depletion of the ozone layer, uses of fossil, firing in the forest, uses of chemical materials, and the pollution created from industries. In addition, students believed that global warming is currently happening and they are taking action against the increase of global warming, for example, they switch off the unused electrical device, using public transport.

After analyzed of many papers about students' concepts and knowledge about global warming, it is concluded that the majority of the students had different perceptions and knowledge about it. It is revealed that most of the students understand the basic knowledge of global warming, their conceptual structures were simple, intricate, and inadequate and their

concepts were based on the phenomena of global warming rather than its causes. On another hand, the limited number of studies show that students lack enough of the concept of greenhouse about global warming. In addition, students' knowledge about global differed across the globe but most of them had average knowledge and even they combated against global warming due to their understanding in their curriculum, and greater understanding of the consequences of carbon dioxide. In addition, it is exposed that most of the learners had a positive correlation with their understanding of global warming concerning their age, gender, and economic status, while in this study females were more knowledgeable than males. However, some researchers concluded that student knowledge was at a low level, indeed there is a difference between learners' understanding of global warming in terms of the learning experience.

After collecting numerous papers about the willingness to take action against the increase of global warming, it is revealed that Indian, Spanish, Omani, and Australian students' willingness in combating global warming was strong enough and they believed that people can play a significant role in eliminating global warming. Another research revealed that Czech students concluded that they had a strong will about the global heating, particularly female student's willingness to take against high temperature were strong enough than in upper primary school. However, male students were skeptical about the positive impacts of willingness to take action against global warming.

Recommendations

Several recommendations are provided at the end of each paper, this paper also has some recommendations for educational institutions and students across the world. Initially, it recommended that all educational institutions are obliged to provide and place an effective syllabus in their curriculum to raise awareness, perception, and knowledge and order to have the willingness to act about the increase of global

warming. In addition, students are recommended to increase their knowledge and concept about the negative impacts of global warming and play a vital in raising awareness among the youth in their societies.

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