
UNDERSTANDING EARLY CHILDHOOD EDUCATORS' PERSPECTIVES ON CLIMATE CHANGE EDUCATION CASE STUDY FROM KARACHI, PAKISTAN

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ABSTRACT

Preschool education is pivotal in shaping early development and environmental awareness. This study focuses on how preschool teachers in Karachi, Pakistan, discuss climate change, particularly analyzing their use of language and concepts which significantly influence young students' understanding of environmental issues. As Pakistan faces severe climate impacts, the need for robust climate change education is emphasized across all educational levels, with preschool teachers playing a critical role in introducing complex environmental realities to young minds. Employing a qualitative approach through focus groups with 45 educators across five schools, this research explores the terminologies and pedagogical methods used in climate discussions, uncovering challenges such as resource inadequacy and insufficient training. Findings reveal a significant emphasis on the direct effects of climate change, like extreme weather and biodiversity loss, and highlight the necessity of integrating scientific facts with emotional engagement and future-oriented thinking in teaching practices. The study illustrates that the language used by educators can profoundly affect children's engagement and understanding of climate issues, advocating for educational strategies that enhance both cognitive and emotional

aspects of learning to prepare a proactive and informed generation ready to tackle environmental challenges. This integrated approach aims to foster not only knowledge but also a deep-rooted environmental consciousness and responsibility among young learners, positioning early childhood education as a crucial platform for combating global climate change.

KEYWORDS

Climate Change Education, Early Childhood, Sustainability

INTRODUCTION

Preschool education is recognized as a fundamental pillar in fostering the comprehensive development of children, laying the groundwork for the establishment of essential habits and behaviors. Preschool teachers play a pivotal role in advocating for improved access to education, equipping themselves with the requisite tools to navigate the intricate landscape of human-induced climate change, encompassing both climate and ecological crises (Samuelsson, Li, & Hu, 2019; United Nations, 2015). As we move forward, educators are expected to confront adverse emotions such as apprehension, sadness, and unease stemming from the repercussions of climate change (Eames, 2017; Ojala, 2013; Amadi & Amadi, 2013).

Pakistan stands as one of the nation's directly confronted with the ramifications of climate change, with each passing year witnessing the emergence of increasingly severe crises (Hussain, Mujahid, & Anwar, 2022). This reality underscores the critical need for climate change education, a domain particularly pertinent to teachers across all levels of education, including preschool educators and those at higher levels. As the country grapples with the tangible effects of climate change, teachers are entrusted with the responsibility of imparting knowledge and fostering awareness among students about the pressing environmental challenges faced by Pakistan and the world at large. Teachers are widely regarded as the forefront in cultivating climate change awareness among students, a matter of increasing significance given Pakistan's recurrent climate crises (Jan, Khan, & Mahsud, 2020). Therefore, equipping educators with the necessary tools and resources to effectively integrate climate change education into their teaching practices becomes imperative in addressing this urgent issue (Fischer et al., 2022; Mochizuki & Bryan, 2015). This study seeks to examine the language used by preschool teachers during discussions surrounding climate change. Specifically, it aims to uncover the precise terminologies and concepts employed by preschool educators in addressing climate change, shedding light on the significance of these linguistic choices in understanding their grasp and encounters with environmental challenges. Ultimately, the objective of this research is to enrich and propel forward school-based climate change education initiatives, not only within Karachi but also on a national scale across Pakistan.

LITERATURE REVIEW

Early childhood educators' perspectives on climate change education have become increasingly important as the global community grapples with the escalating effects of climate change (Borg, Winberg, & Vinterek, 2019). Preschool education is widely acknowledged as a critical period in children's development, laying the foundation for lifelong attitudes and behaviors (Madden et al., 2023). Consequently, understanding how preschool teachers perceive and engage with climate change education is paramount in addressing this pressing environmental issue (Nicholls et al., 2016). Research suggests that preschool teachers' engagement with climate change education in kindergartens is often superficial, highlighting the need for increased awareness and promotion of sustainable development principles to foster a positive environmental impact among children (Klim-Klimaszewska & Wieruszewska-Duraj, 2023).

The role of preschool teachers in shaping children's lifelong attitudes towards environmental issues underscores the importance of their perspectives on climate change education. Preschool educators are critical in developing children's awareness, attitudes, and behaviors towards climate change during this formative period of cognitive, emotional, and personality development (Beach, 2023). Furthermore, studies indicate that environmental awareness acquired during early childhood significantly influences future positive attitudes towards the environment, stressing the critical role of preschool education in environmental education (Wilson, 2018).

Additionally, the engagement of preschool teachers with environmental education is essential for promoting behaviors consistent with environmental sustainability. This emphasizes the importance of starting environmental education as early as possible to cultivate foundational environmental values and behaviors (Garner & Waajid, 2012). As climate change continues to be a pressing global concern, the perspectives and educational strategies of preschool teachers will play a crucial role in shaping the next generation's ability to address and adapt to these challenges effectively (Beach, 2023). Research in the field has emphasized the pivotal role of preschool teachers in advocating for improved access to education and equipping themselves with the necessary tools to navigate the complexities of climate change (Ginsburg & Audley, 2020). Studies have shown that early childhood educators often face challenges in addressing climate change in their teaching practices due to limited resources, lack of training, and competing curriculum demands (Grageda, Diokno, & Abadiano, 2023). However, they are also recognized as key agents for fostering climate change awareness among young children, helping them develop a sense of responsibility and agency in addressing environmental challenges (Cutter-Mackenzie & Rousell, 2019). Pakistan, akin to numerous nations globally, is confronting the direct ramifications of climate change, which entail profound repercussions for both environmental sustainability and societal equilibrium (Talpur et al., 2023). Consequently, an

increasing consensus has emerged regarding the imperative for climate change education to permeate all echelons of the educational landscape, including preschools. Within this milieu, early childhood educators in Pakistan emerge as pivotal stakeholders, endowed with a unique capacity to wield considerable influence in sculpting children's environmental attitudes and behaviors, owing to their pivotal role during this pivotal developmental juncture (Shah et al., 2023).

Existing scholarly discourse underscores the significance of delving into the language employed by preschool educators when navigating the discourse on climate change (Tomas, Girgenti, & Jackson, 2017). Language, as a fundamental vehicle for communication, wields considerable power in shaping preschool children's perceptions and comprehension of intricate subjects (Kuhl, 2011; Weisleder & Fernald, 2013). Consequently, an in-depth exploration into the specific terminologies and conceptual frameworks utilized by preschool educators in addressing climate change emerges as paramount for illuminating their comprehension and experiences vis-à-vis environmental challenges (Engdahl, 2015; (Siraj-Blatchford & Pramling-Samuelsson, 2016). Moreover, it is imperative to underscore the multifaceted dimensions inherent within climate change education in preschool settings. (Verlie, B. 2021) Beyond the mere dissemination of factual knowledge, effective climate change education within early childhood contexts necessitates the cultivation of a profound sense of environmental stewardship, empathy towards nature, and the instillation of sustainable habits (Torquati et al., 2013). Employing age-appropriate pedagogical methodologies, such as storytelling, hands-on activities, and experiential learning, assumes paramount significance in engaging young learners and fostering a deep-rooted appreciation for the natural world (Isenberg & Quisenberry, 2002; Palmer & Suggate, 2004; Wilson, 2018).

Existing literature highlights the importance of understanding the language used by preschool teachers when discussing climate change, as it plays a significant role in shaping children's perceptions and understanding of complex topics like climate change (Ardoin et al., 2020; Sawitri, 2017; Verlie, 2021). Therefore, exploring the specific terminologies and concepts employed by preschool educators in addressing climate change is essential for gaining insights into their comprehension and experiences with environmental challenges (Bang & Marin, 2015; Feinstein & Kirchgasser, 2015) This linguistic exploration not only helps elucidate how teachers communicate the intricacies of climate science but also reveals how they frame these issues to foster proactive attitudes among young learners (Rickinson, 2001; Patrício Miranda Sousa et al., 2017). Furthermore, the vocabulary and context provided by educators can significantly influence how children internalize the importance of environmental stewardship (Palmer, 1998; Speldewinde & Campbell, 2023). Effective communication in early education can cultivate a foundational awareness that

encourages children to engage with environmental topics thoughtfully and responsibly as they grow (Davis, 2009; Botnen & Sandbakken, 2023). It is crucial that this language be both accessible and engaging to young minds, ensuring that it builds a lasting understanding and concern for the planet (Christenson, 2004). Moreover, the integration of specific climate-related terms and concepts into everyday learning scenarios can help normalize the discourse around climate change, making it an integral part of children's educational journeys (Nyika & Mwema, 2021; Edwards, Moore, & Cutter-Mackenzie, 2012). By systematically incorporating environmental education into early childhood curricula, educators can significantly impact children's long-term attitudes towards sustainability and conservation (Garner & Waajid, 2012; Ardoin & Bowers, 2020), 2000; Davis & Elliott, 2014).

In practice, this might involve interactive and sensory-based learning experiences that are well-suited to the developmental stages of preschoolers. For example, storytelling, role-playing, and hands-on activities like planting gardens or simple experiments illustrating natural processes can make the concept of climate change more tangible and relatable to young children (Karimzadegan & Meiboudi, 2014). Thus, by carefully choosing language and activities, preschool educators play a pivotal role in shaping the future generation's engagement with and response to environmental challenges (Djoehaeni, 2016). This study offers an additional avenue for exploring the language use/perception and experiences of preschool teachers from various schools in Karachi, Pakistan, regarding climate change. By gaining insights into the perspectives of early childhood educators on climate change education, policymakers and educational professionals can enhance their support and provide them with the necessary resources to seamlessly integrate climate change education into their teaching methodologies. This, in turn, enables them to empower young children to develop into knowledgeable and proactive environmental stewards (Davis & Elliott, 2014).

RESEARCH OBJECTIVES

1. Evaluate Climate Change Knowledge Among Preschool Educators in Karachi
2. Investigate Pedagogical Methods for Climate Education
3. Analyze Emotional Responses to Climate Change
4. Examine Language Used in Climate Discussions
5. Evaluate the Effectiveness of Climate Communication
6. Propose Enhancements for Preschool Climate Education

RESEARCH QUESTIONS

1. How do pedagogical methods and language used by early childhood educators influence the effectiveness of climate change education in preschools in Karachi, Pakistan?

RESEARCH METHODOLOGY

This research employed a qualitative approach to gather insights from educators engaged in early childhood education, specifically those teaching children aged 2.5 to 6 years, through focus group discussions. These discussions constituted a segment of a broader investigation into environmental and sustainability education practices across eight schools, carried out between August 2023 and September 2023 (see Table 1). The selection of schools for this study was based on the authors' established network, aiming to encompass a variety of schools with differing levels of involvement in environmental and sustainability initiatives. Visits to these eight schools, all located in Karachi, Pakistan, were conducted by the authors themselves and included institutions situated in areas facing significant socio-economic challenges. Ethical guidelines were followed throughout the research process, ensuring confidentiality, informed consent, and respect for participants' rights. Subsequently, the collected data underwent thematic analysis to identify patterns, trends, and emerging themes relevant to the research objectives.

Table 1: Overview of Schools and Participant Engagement

School Identifier	School Setting Description	Total Participants
School 1	An inclusive academy located in Karachi's urban south district, serving approximately 850 students aged 2.5–7 years, of mixed genders. The school targets the middle-income bracket.	10
School 2	A non-governmental organization (NGO) school in District Korangi, Karachi, providing education to 900 students aged 2.4–15 years, of mixed gender, with a focus on underserved communities.	9
School 3	Positioned in Karachi's south district, this institution caters to about 2000 students aged 2.5–18 years, from both genders, aimed at low-income families.	11
School 4	Situated in the East District of Karachi, Pakistan, the school has a student body of approximately 2200 aged 2.5–18 years, of mixed gender, serving the middle-income population.	8
School 5	Located in Karachi's west district, the school accommodates around 1000 students aged 2.5–16 years, targeting the upper-middle income community.	7
Total 05 Schools		45

This study utilized a qualitative research design, employing focus group discussions to collect data from early childhood educators regarding their perceptions of climate

change education. Five focus groups were conducted across five different schools, involving a total of 45 educators who teach preschool-aged children ranging from 2.5 to 6 years (see Table a). Participants were selected based on their involvement in early childhood education and their willingness to participate in the study.

Before conducting the focus groups, ethical clearance was obtained from the relevant institutional review board. Additionally, permission was obtained from each school's headteacher, ensuring transparency and cooperation from the school administration. At the beginning of each focus group session, the purpose of the research was explained to the participants, emphasizing that the goal was to understand educators' strategies and comprehension of climate change, rather than evaluating their performance or any aspects of the school community.

Data Collection

During the focus group sessions, each educator was provided with an A4 size sheet with the term "climate change" prominently printed at the top. Participants were instructed to write down their immediate thoughts in response to the question, "What do you think of upon hearing 'climate change'?" This elicitation technique, influenced by methods described by Vaismoradi et al. (2013), was chosen to capture spontaneous perceptions, offering direct insight into the participants' immediate cognitive and emotional responses.

The intent behind soliciting written responses was to document the flow of educators' thoughts, allowing for an analysis of the sequencing of their concerns and knowledge related to climate change. This approach ensured a structured yet open-ended collection of qualitative data, reflecting both personal and professional insights into the topic. Responses served as a catalyst for further discussion among the group, deepening the exploration of their understanding and views on climate change.

Participants were reassured of the voluntary nature of their involvement and informed that the focus group was not a test of their knowledge. They were encouraged to express their ideas and reflections freely, in a manner that felt most comfortable to them. This non-evaluative, supportive environment facilitated open and honest communication, as recommended by Braun and Clarke (2006).

DATA ANALYSIS AND RESULTS

Thematic Analysis

The thematic analysis was conducted following the six-phase framework by Braun and Clarke (2006). Initially, responses were transcribed and coded using NVivo, a qualitative data analysis software that supports detailed and structured coding (Jackson & Bazeley, 2019) Codes were then organized into themes reflecting the primary areas

of focus for the study: Environmental Consequences, Societal and Policy Reactions, Cultural and Educational Influences, Emotional Incentives, and Future-Oriented Initiatives. Each theme was further broken down into sub-themes during the analysis phase, enabling a comprehensive understanding of the dataset. In the conclusive stage of analysis, researchers systematically categorized the data within these overarching themes, ensuring that each theme accurately represented the collected insights. This involved an iterative process of refining and defining themes to ensure they provided a clear and relevant contribution to the research questions, enhancing the reliability and validity of the findings.

Presentation of Themes (Table B)

The themes and sub-themes identified through the analysis are presented in Table-b, which organizes them into five key areas with corresponding data and suggested responses. This table serves as a concise summary of the thematic analysis, showing the total mentions for each theme and sub-theme, thereby quantifying their prominence in the educators' discussions. It also includes practical implications derived from these themes, offering insights into potential educational and policy interventions.

Table 2: Thematic Analysis of Climate Change Perspectives Among Early Childhood Educators

Main Themes	Sub-Themes	Key Data Points/Mentions	Total Mentions
Environmental Impacts	Weather	Heatwaves (60), floods (75),	181
	Challenges	prolonged seasons (46)	
	Losing Nature	Animals in distress (30), deforestation (30), endangered species (30), tree planting (31)	121
	Water Crisis	Freshwater scarcity (59), rising sea levels (37)	96
	Pollution Problems	Air pollution (34), plastic pollution (21), water trash (9)	64
Societal and Policy Responses	Energy Concerns	Electricity shortages (24), natural gas shortages (20), renewable energy (16)	60
	Decisive Moves	Major conferences (28), critical agreements (20), activist groups (3)	51
	Sustainable Travel	Electric vehicles (18), bicycles (4)	22
	Emphasizing	Recycling awareness (7),	15

Cultural and Educational Dynamics	Recycling		sustainability promotion (8)	
	Our World		Climate shifts (40), arid lands (10), our earth (15), icy zones (25), ozone layer (31)	121
	Animals and Nature	and	Animals (16), cows (9), goats (3), green plants (5), polar bears (2)	35
	Community Dynamics		Overpopulation (3), migration patterns (4)	7
Emotional Motivation	Influential Voices and Climate in Media	and	Greta Thunberg (4), climate in movies (3), climate news (4)	7
	Feeling Bad About Harm Done	Bad Harm	Use that feeling to do better, like using less and helping nature	12
	Feeling Sad About Our Planet	Sad	Use that sadness to get involved and help fix things	19
	Upset by the Loss of Nature		Turn that upset into action to protect what's left of nature	16
	Sad About People Lost to Climate Disasters		Share their stories to show why we need to act now against climate change	2
	Looking Forward		Striving to live green and teach others	5
	Worrying for Our Kids' Future		Do things today that make tomorrow's world better for them	15
Total			849	

This section presents a detailed analysis of the data gathered from early childhood educators regarding their perspectives and language/themes used concerning climate change. The data is categorized into five main themes, each broken down into sub-themes to elucidate specific areas of concern and interest. The analysis includes a percentage breakdown to quantify the prominence of each theme relative to the total mentions, offering a clear perspective on the priorities and focus areas of educators.

Overall Data Overview

The total mentions across all themes amounted to 849, highlighting a diverse range of topics that educators associate with climate change. This comprehensive engagement underscores the complexity and multifaceted nature of climate change education in early childhood settings.

Findings

The analysis of responses from early childhood educators reveals their perspectives on climate change across five main thematic areas. This narrative discusses each main theme, accompanied by its sub-themes and specific data points, providing a comprehensive overview of the educators' concerns and insights.

Environmental Impacts

Environmental Impacts are the most prominent concerns, accounting for 54.42% of all mentions with a total of 462. This category includes Weather Challenges, which alone gathered 181 mentions, highlighting concerns such as heatwaves, floods, and prolonged seasons. The sub-theme of Losing Nature, with 121 mentions, addresses issues like animals in distress, deforestation, and endangered species, indicating a deep concern over biodiversity loss. Water Crisis and Pollution Problems were mentioned 96 and 64 times, respectively, pointing to significant worries about freshwater scarcity, rising sea levels, air pollution, plastic pollution, and water trash. This data underline the urgency of integrating robust strategies to mitigate direct ecological effects of climate change.

Societal and Policy Responses

This theme, with a total of 148 mentions or 17.43% of the total, encapsulates the educators' engagement with societal and policy frameworks necessary to combat climate challenges. Energy Concerns were mentioned 60 times, focusing on electricity and natural gas shortages, alongside renewable energy options. Decisive Moves, which include discussions on major conferences, critical agreements, and activist groups, had 51 mentions, reflecting the desire for more connectedness between global initiatives and local practices. Sustainable Travel and Emphasizing Recycling were also discussed, indicating a push towards sustainable transportation options and recycling awareness.

Cultural and Educational Dynamics

Making up 20.02% of the total mentions, Cultural and Educational Dynamics received 170 mentions. This theme highlights the role of education in connecting global environmental issues with local contexts. Our World, with 121 mentions, covers diverse topics such as climate shifts, arid lands, and the ozone layer, emphasizing a comprehensive approach to teaching about ecological phenomena. Additionally, the roles of Animals and Nature, Community Dynamics, and the impact of Influential Voices and Climate in Media were also explored, showing the importance of integrating ecological and societal aspects into education.

Emotional Motivation

With 49 mentions or 5.77% of the total, Emotional Motivation illustrates how

emotions related to climate change are used as powerful tools in educational settings. This theme captures the educators' strategies to harness feelings such as sadness about planetary conditions and upset over the loss of nature to motivate proactive behaviors and foster a sense of responsibility among students. The sub-themes discuss how these emotional responses can lead to enhanced empathy and action towards climate change mitigation.

Future-Oriented Actions

The least frequently mentioned but crucial theme, Future-Oriented Actions, includes 20 mentions or 2.36% of the total. This theme encompasses educators' forward-looking approaches as they prepare students for future environmental challenges. It focuses on making today's world better for future generations and advocates for living green and teaching sustainability, emphasizing the importance of proactive environmental stewardship.

DISCUSSION

Theme 01: Environmental Impacts in Early Childhood Education

The significant portion of mentions (54.42%) dedicated to environmental impacts within the dataset underscores the acute awareness and concern among early childhood educators regarding environmental challenges. This prominent focus illustrates that climate change, and its effects are a central component of what educators deem crucial to address in the learning environment. The emphasis on these topics is not just a reflection of global environmental trends but also a response to the growing demand for education that prepares children to understand and address these critical issues. Literature supports the integration of environmental education early in a child's academic journey as essential for developing lifelong sustainable habits and awareness (Wilson, 2018).

Sub-Themes Analysis

Weather Challenges

The significant attention given to weather challenges, accounting for 21.32% of total mentions, highlights an acute awareness among educators of the direct impacts of climate change manifesting as extreme weather conditions. This focus is crucial as it reflects the practical need for children to be prepared and resilient in the face of such events. Educational settings are increasingly seen as platforms to foster understanding and preparedness for natural disasters, integrating knowledge about weather phenomena into the curriculum (Seddighi et al., 2020). Such education not only informs students about the science behind weather changes but also about safety measures and resilience strategies, making them crucial components of comprehensive climate education.

Losing Nature

Concerns about biodiversity loss, reflected in 14.25% of mentions, are indicative of educators' recognition of the interconnectedness between human well-being and biodiversity. This recognition influences the development of curricula that emphasize conservation and environmental stewardship. Engaging children with the natural world and teaching them about the importance of biodiversity can foster an early appreciation and sense of responsibility towards conservation efforts (Palmer, 1998; Bang & Marin, 2015). Educators are pivotal in integrating these themes into the educational experience, which can help mitigate biodiversity loss through increased awareness and proactive conservation behaviors.

Water Crisis and Pollution

The focus on water sustainability and pollution, highlighted by 11.31% and 7.54% of mentions respectively, underscores the need for educational content that addresses these pressing issues. The inclusion of these topics in early education curricula is essential, as water issues are central to discussions on sustainability and human health. Educating young learners about water conservation and pollution can lead to early habit formation such as water saving and understanding the impacts of pollution on ecosystems. The importance of such education is supported by research suggesting that early interventions can significantly influence children's future behaviors and attitudes toward the environment (Edwards & Cutter-Mackenzie, 2011).

Theme 2: Societal and Policy Responses in Early Childhood Education

The theme of Societal and Policy Responses captures the vital connection between climate change education and broader societal and policy frameworks, as reflected by 17.43% of the total mentions in the findings. This significant emphasis highlights the proactive stance of educators in linking educational content with ongoing societal and policy developments. It underscores a growing recognition among educators of the importance of educational materials that not only inform but also empower young learners to understand and engage with policy changes and societal impacts of climate change. This integration is crucial, as it prepares children to navigate the complexities of environmental policies and societal expectations in their future roles as informed citizens (Rousell & Cutter-Mackenzie-Knowles, 2020).

Sub-Themes Discussion**Energy Concerns**

The focus on energy concerns, accounting for 7.07% of the mentions, suggests a significant shift towards incorporating energy sustainability education into early childhood curricula. Educators' emphasis on this area likely stems from a recognition of the urgent need to address energy consumption and conservation from a young age. Teaching about energy sustainability can profoundly influence young learners'

understanding of their impact on the environment and foster a sense of responsibility toward energy conservation. This educational focus aligns with broader environmental education goals that advocate for sustainability to be a core component of all educational programs, equipping children with the knowledge to make informed decisions about energy use in their daily lives (Dernbach & Mintz, 2011; Kioupi & Voulvoulis, 2022).

Decisive Moves

6.01% of mentions related to decisive moves, including engagement with major environmental conferences and agreements, highlight the educators' desire to connect classroom teaching with global environmental policy-making. This reflects an educational approach that seeks to bridge local actions and global initiatives, making the abstract concepts of global agreements more tangible and relevant to young students. By integrating discussions about international environmental policies into the curriculum, educators can enhance students' understanding of global interconnectivity and the importance of collective action in addressing climate change. This approach not only broadens students' horizons but also instills a sense of global citizenship and responsibility (Sauvé, Brunelle, & Berryman, 2005; Amadi & Amadi, 2013).

Sustainable Travel

The focus on sustainable travel, which includes discussions on electric vehicles and bicycles (3.70% mentions), reflects an educational strategy aimed at fostering awareness of environmentally friendly transportation options. This educational emphasis is crucial as it introduces young learners to the concepts of carbon footprint reduction and sustainable living practices from an early age. By teaching students about alternative, less polluting modes of transport, educators are laying the groundwork for a more sustainable future. This approach aligns with studies that highlight the importance of integrating transportation education into early learning curricula to promote a lifetime of sustainable habits (Long et al., 2014; Chen et al., 2022).

Emphasizing Recycling

The emphasis on recycling, which accounts for 2.51% of mentions, is geared towards cultivating a strong foundation in waste management and sustainability practices among young learners. Introducing concepts of recycling and waste reduction at a young age is pivotal in developing responsible environmental behavior, as supported by literature that suggests that early education on recycling can significantly influence long-term sustainability practices (Buil, Roger-Loppacher, & Tintoré, 2019). By embedding recycling awareness into the curriculum, educators are not only teaching children about the immediate benefits of recycling but are also instilling a sense of

environmental stewardship that can lead to lifelong sustainable practices.

Theme 03: Cultural and Educational Dynamics in Climate Change Education

The theme of Cultural and Educational Dynamics, which accounts for 20.02% of the mentions in our findings, plays a crucial role in bridging the gap between global environmental issues and local contexts. This theme, through its expansive 170 mentions, emphasizes a comprehensive approach to integrating both ecological and societal aspects into educational settings, effectively enhancing climate literacy among young learners.

Sub-Themes Discussion

Global Climate Issues and Local Contexts:

The curriculum's focus on various climate impacts, including climate shifts (40 mentions), arid lands (10), our earth (15), icy zones (25), and the ozone layer (31), demonstrates a commitment to enhancing climate literacy. This approach aligns with Bang and Medin's (2010) emphasis on the importance of teaching environmental science in a manner that resonates with students' daily lives and local environmental contexts, enabling students to grasp complex environmental dynamics and their global ramifications.

Biodiversity and Ecological Roles

The emphasis on the ecological roles of animals and plants, reflected in discussions about biodiversity, aims to cultivate an appreciation for the natural world and an understanding of ecological interdependencies. This aspect of the curriculum is crucial for developing responsible environmental behavior among young learners, as noted by Wolff and Skarstein (2020), who advocate biodiversity in early education to foster a lifelong commitment to conservation.

Community Dynamics

The inclusion of social science perspectives, such as the effects of environmental changes on urban planning and migration, provides students with a comprehensive understanding of climate change. This integration helps students appreciate the socio-economic dimensions of environmental issues, supporting the view of Güler Yıldız et al. (2021) that an interdisciplinary approach in climate education enhances students' ability to apply their knowledge to real-world situations.

The Role of Media and Influential Figures

Although less frequently mentioned, the role of media and public figures like Greta Thunberg in climate education underscores the importance of communicative strategies in environmental advocacy. Highlighting these figures and media portrayals can motivate students and demonstrate the impact of advocacy and public engagement.

According to O'Neill and Nicholson-Cole (2009), the effective use of media in climate education can significantly influence public perception and action, making it a vital component of educational strategies.

Theme 04: Discussion on Emotional Motivation in Early Childhood Education

The theme of Emotional Motivation, representing 5.77% of total mentions, underscores the profound role that emotional responses play in the context of teaching and learning about climate change. Emotional engagement is recognized as a potent catalyst that enhances learning outcomes, especially in subjects like climate change that directly impact students' lives and futures. This segment of the research findings highlights the necessity of integrating pedagogical strategies that effectively evoke and manage emotional responses within educational settings.

Sub-Themes Discussion

Feeling Bad About Harm Done (12 mentions)

This sub-theme utilizes feelings of guilt or regret over environmental damage to inspire positive actions such as conservation and resource-saving initiatives. When students experience remorse about harm done to the environment, they are more likely to engage in behaviors that mitigate these effects. This approach helps transform feelings of guilt into constructive actions, fostering a sense of responsibility and environmental stewardship among young learners (Immordino-Yang & Damasio, 2007).

Feeling Sad About Our Planet (19 mentions)

Sadness about the deteriorating condition of our planet can be a catalyst for change. By channeling this sadness, educators can encourage students to participate in environmental advocacy and conservation efforts. This sub-theme highlights the use of emotional engagement to motivate students to contribute positively to their environment, turning feelings of sadness into powerful motivators for participation in sustainability initiatives (Zak, 2022).

Upset by the Loss of Nature (16 mentions)

Feelings of upset or frustration due to the loss of natural habitats and biodiversity are used to spur students into action. Educators leverage these emotions to promote activities that focus on protecting and restoring natural environments. This educational strategy emphasizes the importance of active participation in conservation efforts, enabling students to channel their emotions into meaningful environmental actions (Ojala, 2013).

Sad About People Lost to Climate Disasters (2 mentions)

The emotional impact of climate disasters, particularly the loss of human lives, can

deeply affect young learners. This sub-theme discusses how sharing stories of those affected by climate disasters can highlight the human aspect of environmental issues, fostering empathy and a heightened sense of urgency to take action against climate change. By making these losses personal and relatable, educators can help students understand the immediate and tangible consequences of environmental neglect (Rao, 2022).

Theme 05: Discussion on Future-Oriented Actions in Early Childhood Education

The Future-Oriented Actions theme, representing a smaller yet crucial portion of the discourse at 2.36% of total mentions, encapsulates the forward-thinking approach that early childhood educators are adopting to prepare students for long-term environmental challenges. Despite its relatively minor representation in the dataset, the significance of this theme lies in its emphasis on proactive educational strategies, which are essential for equipping young learners with the skills and mindset needed to tackle the future's uncertainties, particularly in the context of environmental sustainability.

Sub-Themes Discussion

Looking Forward (5 mentions)

Educators emphasize "Looking Forward" by striving to live green and teach others, a crucial component of future-oriented actions that encourages sustainable practices from an early age. This approach involves teaching students about sustainability, resilience, and adaptive capacity, which are essential for dealing with the complexities of global environmental changes. Such education is supported by Davis (2005), who notes the importance of integrating sustainability into curricula to influence long-term behaviors and attitudes toward the environment positively.

Worrying for Our Kids' Future (15 mentions)

To further elaborate, the "Worrying for Our Kids' Future" sentiment underscores a critical aspect of future-oriented educational strategies. This concern propels educators to integrate comprehensive sustainability and resilience training into the curriculum, fostering a proactive stance among students toward environmental conservation and sustainability. The emphasis on critical thinking and systems analysis in educational settings enables students to grasp the interconnections within ecosystems and the broader environmental context. This approach is essential for equipping students with the skills and mindset required to tackle future environmental challenges effectively. Sterling (2004) advocates for an educational paradigm shift towards embracing systems thinking and resilience, which are crucial for adapting to and thriving in a dynamically changing world. Such an education system not only prepares students to understand complex global issues but also to implement practical solutions in their personal and professional lives. Moreover, educational frameworks that incorporate

environmental ethics and proactive sustainability practices can significantly influence long-term environmental behaviors. As noted by Davis (2005), embedding sustainability in early education fosters a lifelong commitment to environmental stewardship. Additionally, Kollmuss and Agyeman (2002) suggest that transformative learning experiences that address both cognitive and emotional development are vital for fostering environmental responsibility among students. These experiences help students translate knowledge into action, an essential component of effective sustainability education.

The qualitative research conducted on early childhood educators' perspectives on climate change education in Karachi, Pakistan, underscores the critical importance of integrating robust climate change education into early childhood settings. This study provides a comprehensive exploration of how preschool educators in Karachi understand, communicate, and engage with climate change concepts, offering vital insights into the existing educational frameworks and the significant gaps therein. A standout finding from the research is that a substantial majority of the discussions—54.42% of all mentions—focused on the direct environmental impacts of climate change. Educators are acutely aware of the severe consequences such as extreme weather events, biodiversity loss, and other ecological disruptions. This high level of awareness reflects an understanding of the urgency with which these issues need to be addressed to safeguard future generations. However, despite this awareness, there exists a substantial gap in the training and resources available to these educators. This deficiency hinders their ability to effectively teach and communicate complex environmental issues, thereby impacting the quality of education. The existing pedagogical methods and language used are often not sufficiently aligned with the developmental stages of preschool learners, which can lead to misconceptions or a lack of interest in environmental issues among young students.

The study also highlights the significant role of emotional and psychological responses to climate change education. Educators face the challenge of addressing the anxiety, fear, and other emotional responses that discussions of climate change often evoke in young children. The need for educational strategies that not only convey factual information about climate change but also support children's emotional well-being is clear and present. Moreover, the implications of neglecting these needs are profound. Without immediate and decisive educational reforms, the next generation will face the dire consequences of an inadequate understanding of environmental issues. The potential losses extend beyond just biodiversity and include increased frequency of extreme weather events, significant socio-economic disruptions, and a decrease in the quality of life, all of which could profoundly impact children's ability to effectively address and adapt to future environmental challenges. Additionally, the research indicates that while there is a robust engagement with the environmental impacts of

climate change, there is less focus on the societal and policy responses necessary to combat these challenges. This indicates a need for a more integrated approach that connects environmental education with broader societal and policy frameworks.

This study serves as a crucial call to action for policymakers, educational authorities, and the broader community. It highlights the urgent need for a structured and comprehensive climate change education framework that is embedded within the preschool curriculum, tailored to the unique geographical and cultural context of Karachi. The integration of such education is not merely an educational reform; it is an investment in the future of our planet.

In closing, it is evident that the educators' current engagement with and understanding of climate change, while significant, is insufficient without the support of enhanced resources, training, and a curriculum that encompasses both the scientific and emotional aspects of climate change. The stakes are high, and the time for action is now. This study unequivocally demonstrates the need for immediate and robust educational reforms to prepare our youngest for the complexities of a changing world, ensuring they grow to become informed, capable, and responsive citizens in the face of global environmental challenges.

RECOMMENDATIONS

Enhanced Training and Resources

Develop comprehensive training programs for early childhood educators that include up-to-date climate science, effective pedagogical methods, and strategies for addressing emotional responses to climate change.

Provide schools with the necessary resources, such as interactive educational materials and access to expert advice, to effectively implement climate change education.

Curriculum Integration

Mandate the integration of climate change education into the national preschool curriculum, ensuring it is a fundamental part of early childhood education across all schools in Pakistan.

Develop curriculum guidelines that include clear objectives, age-appropriate learning activities, and evaluation metrics to ensure consistent and effective implementation.

Support for Emotional and Psychological Well-being

Implement educational strategies that address the emotional aspects of learning about climate change, such as structured discussions, storytelling, and supportive dialogues that help children process their feelings.

Community Engagement and Partnership

Foster partnerships between schools, environmental organizations, local businesses,

and the scientific community to create a supportive network that enriches climate change education.

Engage parents and the broader community through workshops and interactive events that raise awareness about the importance of climate education and encourage community-wide support and action.

Policy Advocacy and Support

Advocate for policies that provide schools with the necessary funding and resources to implement effective climate change education.

Work with governmental and non-governmental organizations to establish a framework that supports schools and teachers in this critical task.

Research and Continuous Improvement

Support ongoing research into effective climate change education practices and their impact on children's understanding and behaviors.

Regularly update and adapt educational strategies based on the latest environmental research and pedagogical advancements to ensure relevance and effectiveness.

These recommendations aim to guide stakeholders at all levels, including policymakers and educators, to ensure that climate change education is effectively implemented, comprehensive, and attuned to the unique needs of young learners. The integration of this education into early childhood settings transcends basic educational reform, representing a crucial investment in the future of our planet. This study underscores the potential of early education to cultivate lifelong values of environmental responsibility and proactive citizenship amidst global climate challenges. Thus, it is essential for all stake holders—educators, policymakers, parents, and the broader community—to work together to expand and deepen climate change education. This collaborative effort will ensure our youngest learners develop into informed, skilled, and compassionate stewards of their environment.

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