Early Childhood Education Journal (2024) 52:1643–1653
https://doi.org/10.1007/s10643-023-01592-7

A Comparative Analysis of Chinese and Korean Picturebooks for Early Childhood Climate Change Education

So Hyun Jang[1] · Tong Tong Kang[1]

Accepted: 9 October 2023 / Published online: 12 November 2023

Abstract
Climate change is a global crisis that all of humanity must collectively address. Therefore, there is a need to educate future generations, namely infants, on climate change through international cooperation. In this context, this study aimed to analyze picturebooks on climate change read by infants in China and Korea, two neighboring countries in East Asia. To achieve this, we examined the publication status of climate change picturebooks in both countries, identifying similarities and differences in content. The research yielded the following results. First, there were significant differences in the publication status of climate change picturebooks in China and Korea. Second, both Chinese and Korean picturebooks realistically presented the causes of climate change, but depicted its impacts as a combination of real and fictitious effects. Finally, Korea demonstrated a broader range of actions to mitigate climate change compared to China. Based on these findings, we provided insights for climate change education in China and Korea, and proposed inter-country educational cooperation.

Keywords Picturebook · Climate change education · Early childhood · Ecocriticism · Comparative analysis

Introduction

We are now living in an era of climate crisis, rather than simply climate change. For a long time, scientists have used the terms climate change and climate crisis interchangeably. However, as the damage from extreme weather events has intensified, the term climate crisis is being used more frequently. The general public is also feeling the climate crisis. In a UN climate survey (United Nations Development Programme, 2021), two-thirds of the global population responded that the current climate situation is at a worldwide emergency level (UN NEWS, 2021). Thus, today's climate crisis poses a serious threat to human health.

In the era of climate crisis, young children can become agents in addressing climate change. Early childhood learning has lifelong impacts (Chi et al., 2017). In particular, 4- to 6-year-old children are capable of understanding and thinking about environmental issues (Palmer, 1999). They can also reflect on their surroundings and actively participate in environmental improvement practices (McDonald-Harker et al., 2020). Many early childhood education institutions are currently teaching environmental issues to young children, who already understand natural disasters and climate change (Tanner, 2010). Therefore, it is necessary to provide children with opportunities to learn about climate change and take action to prevent it.

Picturebooks are effective educational tools in early childhood education. A picturebook is a book for children in which a series of images convey information and tell a story either combined with relatively simple text or without text (Nodelman, 1988/2017). Picturebooks engage young children through the two components of images and text (Kim, 2016b). As a result, picturebooks encourage children to imagine, think, and ultimately act (Baratz & Hazeira, 2012). The use of picturebooks in climate change education can enrich children's knowledge and help them practice environmental protection activities such as waste separation and resource conservation (Burke & Cutter-Mackenzie, 2010; Hsiao & Shih, 2016). In this context, there is a need to examine picturebooks from an ecocritical perspective. Ecocriticism, which explores the relationship between literature and the natural environment, proves valuable in understanding how children comprehend nature's representation

✉ Tong Tong Kang
xingkong1526@naver.com

So Hyun Jang
harveat111@gmail.com

[1] Department of Early Childhood Education, Chung-Ang University, Seoul, South Korea

in picturebooks and in analyzing the development of their connection with nature (Shimek, 2021; Tamrin, 2019).

Climate change, a global crisis, necessitates international cooperation for future generations to cope with its impacts (IPCC, 1990). Geographically proximate and ocean-connected China, located in Eastern Asia, and Korea, to the east of China, face environmental issues such as fine dust and reduction in marine life due to climate change over recent years. Accordingly, both countries signed the Intergovernmental Agreement on Climate Change Cooperation in 2015, emphasizing the importance of climate change issues and establishing information technology exchanges and joint research. However, the extent and content of climate change education varies depending on each nation's stature and education system (Læssøe et al., 2009).

This study aims to analyze picturebooks on climate change read by children in China and Korea, neighboring East Asian countries. In this study, South Korea refers to the Republic of Korea. Through this, the study intends to provide basic information for climate change education targeting young children in the field of early childhood education and propose educational cooperation between China and Korea. The following research questions were selected for the purpose of this study.

Research Questions

1. What is the current status of climate change picturebooks in China and Korea?
2. What are the similarities and differences in the content of climate change picturebooks in China and Korea?

Review of the Literature

In this section, we explore the evolution of early childhood environmental education in China and Korea, as well as picturebook studies conducted from an ecocritical perspective.

Historical and Cultural Context of China

In China, content related to early childhood environmental education first appeared in the subject of 'environmental learning' in the 'Kindergarten Curriculum Interim Rules' promulgated in 1952. After the reform and opening up, the Kindergarten Education Outline (Pilot) promulgated in 1981 introduced the age-specific characteristics and educational tasks of 3- to 6-year-old children in detail. The content about the natural environment was divided into two parts, including the subjects of morality and general knowledge. From a moral standpoint, the curriculum emphasized nurturing the consciousness of caring for the environment by looking after trees, flowers, and plants. From a knowledge standpoint, it aimed to build scientific knowledge according to the age characteristics of children. The National Action Plan for Environmental Promotion and Education (1996) subsequently officially integrated environmental education into the content of basic education in China. In the field of early childhood education, an important part of basic education, the Kindergarten Education Guidelines promulgated in 2001 encouraged children to love plants and animals, be nature-friendly, cherish natural resources, and have a basic awareness of environmental protection. The 'Learning and Development Guidelines for 3–6 Year Old Children (2012) in the science field made the goals and content of environmental education more clearly differentiated according to the developmental characteristics of children of different ages. The aim is to guide children to pay attention to and understand nature and to gradually understand how to love, respect, and protect nature. It also emphasizes the need to focus on protecting and fostering children's curiosity through their observations and investigations of the natural environment.

Historical and Cultural Context of Korea

In Korea, early childhood education institutions are divided into kindergartens and daycare centers. Kindergartens, which aim to educate children aged 5–7, operate under the Early Childhood Education Act, while daycare centers, which aim to provide care for infants aged 0–7, operate under the Childcare Act. The kindergarten curriculum was established in 1969 and revised in 1979, 1981, 1987, 1992, 1998, and 2007. Daycare centers established the 'Standard Childcare Curriculum' in 2010 and revised it in 2012, 2013, and 2020. Afterwards, a unified curriculum for kindergartens and daycare centers, the 'Nuri Curriculum', was established and revised in 2019. Looking at the environmental education implemented in each early childhood curriculum, the first kindergarten curriculum established in 1969 focused on observing natural phenomena to nurture a love for plants and animals in children. The revised second, third, and fourth kindergarten curricula focused on knowing the characteristics of natural phenomena and plants and animals with a focus on cognitive development. The sixth kindergarten curriculum established in 1998 was the first to propose preparation for environmental pollution or disasters. In the kindergarten curriculum revised in 2007, the perspective on the environment changed from a human-centric stance to one of respect for humans and nature. In the 'Nuri Curriculum for 3- to 5-year-olds' in 2012, content was composed to explore life forms and natural phenomena, encouraging children to explore the surrounding world with curiosity. In the revised Nuri Curriculum in 2019, the area of nature exploration was created with the aim of enjoying the process of exploration and adopting an attitude of living in harmony with nature. As such, Korea has been consistently providing content on

environmental education since the first establishment of the kindergarten curriculum in 1969.

Picturebook Research from an Ecocritical Perspective

Ecocriticism is a literary theory that adopts an Earth-centered approach in literary studies, examining the representation of nature and the relationship between humans and the natural world in literature (Fenn, 2015). The aim of ecocriticism is to enhance readers' ecological literacy and foster ecological awareness to care for the environment (Mishra, 2016). Especially in children's books, as a medium of interaction with children, they can influence their perspectives on future ecological issues (Massey & Bradford, 2011). Discussing ecocriticism through narrative and illustrative forms of environmental literacy can serve as a critical and creative tool to educate children about environmental issues and encourage sustainable practices for future generations (Tisnawijaya & Kurniati, 2021). Hence, there is a need to examine picturebooks targeting young children from an ecocritical perspective.

In both China and Korea, research has been conducted within the broader category of nature, focusing on ecological picturebooks. For example, Wang and Ji (2022) analyzed the themes and content of ecological picturebooks published in China. The major themes revolved around animal protection and the impact of human activities on the natural environment, and the content commonly involved anthropomorphized characters teaching children about eco-centrism. Furthermore, Wei and Li (2019) analyzed the illustrations and text of the American picturebook "The Lorax" to promote the creation of natural ecological picturebooks in China. Their research emphasized that picturebook authors can naturally implement nature and ecology education by combining text and illustrations. On the other hand, in Korea, there has been a considerable amount of research on the impact of activities utilizing ecological picturebooks on young children, such as dramatic play using ecological picturebooks (Hong, 2019), science activities (Yun & Cho, 2013), nature-friendly education (Park et al., 2009; Park & Cho., 2008), and activities making ecological picturebooks (Yim & Kim, 2011). Research that has analyzed the content of ecological picturebooks includes a study by Cho et al. (2022), which explored the emotional vocabulary represented in forest picturebooks. In this study, it was emphasized that understanding various emotions between forests and humans enables education for sustainable development. However, there has not been significant research conducted on picturebooks related to climate change. Given that climate change is a global issue, it is necessary to examine climate change picturebooks from various countries together. Hence, this study aims to analyze climate change picturebooks published in China and Korea from the perspective of joint responses.

Method

In this section, we introduce the process of collecting the picturebooks under analysis and the methodology employed to analyze them.

Sample Selection

The picturebooks were selected as follows: As of January 29, 2023, picturebooks from both countries were searched in their respective online bookstores. The specific process for selecting the analysis subjects is as follows:

In the case of China, 45 books were initially selected by searching the keyword "climate change picturebook" on Taobao (Alibaba, 2022), the most popular online shopping platform in China. In the second step, 29 original English books, 8 picturebooks on weather or the 24 solar terms rather than climate change, 2 duplicate books, and 2 elementary school-level book were excluded, leaving 4 books. The 24 solar terms combine the climate and hydrological conditions of the four seasons, dividing the year into 24 equal segments and providing essential reference material to guide agricultural activities (Lin & He, 2022). The content related to the 24 solar terms depicted in picturebooks were aimed at helping young children understand the seasonal changes and folk customs based on Chinese traditional culture (Hong, 2022). As this content is not directly related to climate change, it was excluded. Four selected picturebooks formed a set of 10 books, resulting in a total of 13 books being chosen for analysis. Finally, after purchasing the books and reviewing their content, 1 book was excluded due to its complexity and inclusion of advanced natural science concepts (such as fine particles, acid rain, and permafrost) and lengthy sentences, which were deemed suitable for elementary school students or above. Consequently, 12 books were selected as the final sample.

In the case of Korea, 52 books were initially selected, including 35 picturebooks recommended by the Ministry of Education in the 2021 "Early Childhood Climate Change Education Program," 6 climate change picturebooks recommended as excellent environmental books for children by the Ministry of Environment since 2006 (biennially), and 11 books searched under the keyword "climate change picturebook" in three major online and offline bookstores in Korea (Korean Publishers Assoication, 2022) as of January 30, 2023. In the second step, 7 out-of-print books, 3 duplicate books, 20 books classified as suitable for elementary school students only according to the age recommendation in online bookstores, and 1 workbook were excluded, leaving

21 books. Finally, in this study, 1 wordless picturebook and 2 picturebooks unrelated to climate change were excluded, resulting in a final sample of 18 books. The Chinese picturebooks selected in this way are shown in Table 1, while the Korean picturebooks are presented in Table 2.

Analysis Method

The authors, Korean and Chinese, are doctoral students in Early Childhood Education in Korea. The Korean author focuses on children's literature with an emphasis on climate change education and has taught picturebooks. The Chinese author, studying in Korea, specializes in children's literature and has experience analyzing picturebooks.

First, this study investigates climate change picturebooks in China and Korea. We checked publication years, text structures, and appendices. The books are informational, aimed at educating children about climate change. Such books often use descriptive texts or narratives with anthropomorphized characters for conveying information (Kim, 2016b; Shim, 2014).

And we employed the Critical Multicultural Analysis method (Botelho & Rudman, 2009) to analyze picturebooks on climate change published for young children in China and Korea. The specific categories for analysis were established based on prior research approaches (Kim & Lee, 2022; Sun & Kwon, 2020), involving repetitive readings and attributing meanings to discernible patterns. Scenes within the story that conveyed a singular meaning were referred to as 'Scene 1' and labeled as 'S1'. The categories of climate change depicted in the picturebooks were developed over three stages. In the first stage, by focusing on aspects such as the situations, character relationships, actions, events, and backgrounds in the picturebooks, core vocabulary was extracted. This vocabulary was then grouped by meaning, forming sub-themes, from which overarching themes were derived. During the second stage, the sub-categories within each category were further refined. In the third stage, categories that overlapped with others or that didn't specifically center on climate change were eliminated. Through this process, climate change descriptions in the picturebooks were organized into 'causes of climate change,' 'impacts of climate change,' and 'climate change mitigation actions.'

To enhance the validity of the research findings, content validity was obtained from one expert in early childhood literature education with teaching experience in China and one expert with teaching experience in Korea. The experts verified the content, illustrations, and core vocabulary consistency,

Table 1 Children's literature cited in China

No	Picturebook title	Pub year	Author	Content
C1	塑料岛 *[Plastic island]*	2019	Myeongae Lee	This story presents the perspective of a seabird on marine pollution to children
C2	哪里才是我的家*?* *[Where is my home?]*	2018	Jiehong Jin, Shan Lin, Hao Liu	It tells the story of a penguin losing its habitat due to melting ice and searching for a new place to live worldwide
C3	生态系统真神奇 *[Ecosystem is amazing]*	2020c	Om Books International	Stories that introduce the concept of natural ecology and methods of protection
C4	'污染怪兽'的大绝招 *[The great trick of the 'Pollution Monster']*	2020d	Om Books International	Stories that focus on the theme of environmental pollution
C5	机器人鲍勃坏掉了 *[Robot Bob is broken]*	2020h	Om Books International	Stories that introduce the concept of waste segregation through the narrative of discarding a broken robot
C6	垃圾处理我能行 *[I can handle garbage]*	2020e	Om Books International	Stories that provide children with knowledge about waste separation
C7	寻找地球的新能量 *[In search of new energy for the earth]*	2020g	Om Books International	Stories that introduce renewable energy to children
C8	地球会发烧吗 *[Will the earth get hot?]*	2020j	Om Books International	Stories that introduce the causes, impacts, and response strategies of climate change to children
C9	我要做森林小卫兵 *[I want to be a forest guardian]*	2020f	Om Books International	Stories related to forest conservation
C10	可爱的动物消失了 *[Cute animals are disappearing]*	2020b	Om Books International	Stories that introduce methods of animal protection to children
C11	地球队长办法多 *[Captain earth has many solutions]*	2020a	Om Books International	Stories that introduce knowledge about global warming
C12	不一样的科学课 *[Unconventional science class]*	2020i	Om Books International	Stories that describe the characteristics of the Earth and human-caused destructions of the Earth

Table 2 Children's literature cited in Korea

No	Picturebook title	Pub year	Author	Content
K1	얘들아, 기후가 위험해! *[Guys, the climate is in danger!]*	2020	Layton Neal	This is a story that explains climate change in detail to children
K2	해복치와 달복치 *[Sunfish and the moonfish]*	2021	Aarden Lisa Bula Oksana	This is a story about the impact of climate change on the ocean
K3	펭귄의 집이 반으로 줄었어요 *[The penguin's home has been reduced by half]*	2021	Inseon Chae, Jinman Kim	This is the story of an emperor penguin's harsh survival in Antarctica
K4	아기 거북이 클로버 *[Baby turtle clover]*	2020	Areum Cho	It is a story about a baby turtle heading to the ocean to live
K5	*[*투발루에게 수영을 가르칠 걸 그랬어*]* *I should have taught Tuvalu how to swim*	2008	Dajeong Yoo Jaehyeon Park	Rosa's story of losing her home to rising sea levels due to global warming and the touching parting of the ways between two cats
K6	아마존 숲의 편지 *[Letter from the Amazon Rainforest]*	2009	Bellinghausen Ingrid Biesemeyer	The story of how development is destroying the Amazon, home to unique flora and fauna
K7	거인 사냥꾼을 조심하세요 *[Beware of the giant hunter]*	1993	McNaughton Colin	It tells the story of the destruction of nature from the perspective of a giant
K8	갯벌이 좋아요 *[I like tidal flats]*	2006	Aero Yoo	The story is set on a tidal flat and depicts a variety of creatures
K9	플라스틱 섬 *[Plastic island]*	2014	Myeongae Lee	This story presents the perspective of a seabird on marine pollution to children
K10	달 샤베트 *[Moon Sorbet]*	2010	Huina Baek	It is a story of the moon melting in the heat from air conditioners, fans, and refrigerators
K11	또 마트에 간 게 실수야! *[Going to the mart again was a mistake!]*	2013	Elise Gravel	It is the story of the rabbit who spends impulsively and without planning
K12	꿈의 자동차 *[Dream car]*	2018	Aseong Huh	This is a story about Ha-in imagining a dream car with her dad
K13	지구를 위한 한 시간 *[Earth Hour]*	2011	Juyeon Park Mija Cho	It is about the global lights-out campaign for one hour
K14	요리조리 떠나는 자연학습 *[Learning from nature through experience]*	2005	Petty Kate, Maizels Jennie	A book that explains the different plants and food chains
K15	마가목의 봄 여름 가을 겨울 *[Spring, summer, fall, winter of Magamok]*	2007	Akiyama Junko	This book contains ecological fairy tales about the life of a magpie for one year, from January to December
K16	북극곰에게 냉장고를 보내야겠어 *[We need to send a refrigerator to the polar bear]*	2011	Hyeontae Kim Beom Lee	Arctic animals face environmental challenges due to global warming
K17	돌아갈 수 있을까? *[Can I go back?]*	2021	Sangok Lee Jumi Lee	It tells the story of Arctic animals who are forced to flee their home due to the climate crisis
K18	31호 꿀벌 로봇의 특수 임무 *[Special mission of bee robot No. 31]*	2022	Honam Kim	It is about designing a bee robot to help bees that are disappearing due to climate change

and in cases of disagreement, discussions were held to select appropriate content. Moreover, the researchers and experts reviewed each scene of the picturebooks classified according to the categories, adjusting the content to enhance the study's reliability and validity. The content of the final analysis categories derived through this process is shown in Table 3.

Results

In this section, we discuss the current status of climate change picturebooks in China and Korea and elucidate the similarities and differences in their content.

Table 3 Analysis category

Analysis category		Core vocabulary
Causes of climate change	Factual causes	Trash, pollution, deforestation, fossil fuels, etc
	Fictional causes	–
Impacts of climate change	Factual impacts	Sea level rise, natural disasters, decline in animal populations, health, etc
	Fictional impacts	Animal relocation
Climate change mitigation actions	Appeals	Dislike, must do, promise, let us do it, etc
	Implementation	Conservation, planting trees, waste separation, recycling, etc
	Imagination	Grass roofs, fragrance emitter, using tape to hold ice together

Table 4 Publication status

Year	Country					
	China			Korea		
	Number of Picturebook	Author		Number of Picturebook	Author	
Before 2001	–	–		1	Korean	–
					Foreign	1
2001 ~ 2010	–	–		6	Korean	3
					Foreign	3
2011 ~ 2020	12	Chinese	1	7	Korean	5
		Foreign	11		Foreign	2
After 2021	–	–		4	Korean	3
					Foreign	1
Total	12			18		

Status of Climate Change Picturebooks in China and Korea

We analyzed the publication status of climate change picturebooks in China and Korea, how the texts are organized, and the presence of appendices.

Publication Status

Examining the publication status of climate change picturebooks, 12 books were published in China between 2011 and 2020. Among these, one book was by a Chinese author, while 11 books were by foreign authors. In the case of Korea, there was an increasing trend, with one book published before 2010, six books between 2001 and 2010, seven books between 2011 and 2020, and four books after 2021. Additionally, the number of picturebooks by Korean authors has also increased in Korea. These results are presented in Table 4.

Table 5 Types of picturebooks

Category	Country	
	China	Korea
Narrative text pictuebook	2	10
Descriptive text pictuebook	10	8
Total	12	18

Table 6 Appendices

Category	Country	
	China	Korea
With appendix	0	8
Without appendix	12	10
Total	12	18

Text Organized

Upon analyzing the text organized of climate change picturebooks, it was found that there were 2 narrative text picturebooks and 10 descriptive text picturebooks in China, while in Korea, there were 10 narrative text picturebooks

and 8 descriptive text picturebooks. These results are presented in Table 5.

Appendices

Upon examining whether climate change picturebooks included appendices, it was found that only 8 Korean picturebooks contained appendices. To summarize, these findings are presented in Table 6.

Commonalities and Differences in the Contents of Chinese and Korean Climate Change Picturebooks

We analyzed Chinese and Korean climate change picturebooks for similarities and differences in environmental knowledge, causes of climate change, impacts of climate change, and actions to mitigate climate change. The analysis focused on the scenes in the picturebooks. We designated a scene that conveys a single meaning within the story as 'Scene 1' and divided it by 'S1'. The total number of scenes in the picturebooks was 107 spreads for China and 276 spreads for Korea.

Causes of Climate Change

We analyzed the causes of climate change by dividing them into real causes and fictional causes, but both China and Korea only had real causes. There were 25 spreads in China and 24 spreads in Korea depicting real causes of climate change. These results are presented in Table 7.

Impacts of Climate Change

The impacts of climate change were analyzed by dividing them into real impacts and fictional impacts. In the case of China, there were 6 spreads for real impacts and 5 spreads for fictional impacts, while in Korea, there were 32 spreads for real impacts and 9 spreads for fictional impacts. These results are presented in Table 8.

Actions to Mitigate Climate Change

Actions to mitigate climate change are divided into appeals, implementation, and imagination. In China, there were 3 spreads for appeals and 22 spreads for implementation, with implementation being the main focus. In Korea, there were 6 spreads for appeals, 9 spreads for implementation, and 4 spreads for imagination, with each action being evenly depicted. These results are presented in Table 9.

Table 7 Cause of climate change

Category	Country	
	China	Korea
Factual causes	25	24
Fictional causes	0	0

Table 8 Impacts of climate change

Category	Country	
	China	Korea
Factual impacts	6	32
Fictional impacts	5	9

Discussion

This study compared and analyzed the content of Chinese and Korean picturebooks for the climate change education of young children. The following discussion can be made based on the findings.

First, when examining the publication status of climate change picturebooks in China and Korea, it was found that China did not publish any climate change picturebooks before 2010, but 12 books were published between 2011 and 2020. Among them, one book was created by Chinese authors, and 11 books were translated from foreign authors. On the other hand, Korea has seen a steady increase in the number of climate change picturebooks published, with one book before 2001, six books between 2001 and 2010, seven books between 2011 and 2020, and four books after 2021. The proportion of Korean authors' picturebooks has also increased over time. In terms of text organization, climate change picturebooks are more likely to be descriptive text picturebooks in China and narrative text picturebooks in Korea. Although there were many narrative text picturebooks in Korean picturebooks, a significant number of them had appendices, while Chinese picturebooks did not. Through this, we can see that Korea has been steadily publishing climate change picturebooks and that its authors are creating a variety of picturebooks on different topics.

The difference in the publication status of climate change picturebooks between China and Korea can be understood through the development history of their respective picturebook markets. The Chinese picturebook market developed relatively late and experienced explosive growth around 2010 (Wang, 2020). As a result, the foundation of picturebook publishing is relatively weak, and translated books

Table 9 Actions to mitigate climate change

Category	Country	
	China	Korea
Appeals	3	6
Implementation	22	9
Imagination	0	4

from abroad still account for a much higher proportion than original works (Deng et al., 2021). There is also a tendency for repeated themes and text-heavy narrative development, indicating a lack of understanding of children's developmental characteristics (Chen, 2020). However, today's Chinese picturebooks are in a period of rapid growth, and authors and publishers are actively seeking rich topics and new technologies to create excellent works for young children (Zhou, 2021).

On the other hand, in Korea, the picturebook market was formed in the late 1970s and 1980s, and picturebooks created by Korean authors began to be published. In the 1990s, the era of publishing picturebooks in earnest began (Cho, 2006). From the mid-1990s, excellent translated picturebooks began to be imported, and the publication of original picturebooks became active (Hyun & Kim, 2005). Since then, Korean picturebook authors have won awards at various events, such as the NOMA Concours, the Biennial of Illustration Bratislava (BIB), and the Bologna International Children's Book Fair (Jung, 2021). In 2020, Baek Hee-na received the Astrid Lindgren Memorial Award, and in 2021, Lee Myung-ae won the Golden Apple at the Bologna Children's Book Fair and Kim Hyo-eun won the World Illustration Awards in the Children's Book category. In 2022, Lee Soo-ji won the Hans Christian Andersen Award. Korean picturebooks are recognized worldwide, as Korean picturebook history has developed more than China, indicating that the quality and quantity of climate change picturebooks in Korea are superior.

Second, when examining the commonalities and differences in the contents of climate change picturebooks in China and Korea, it was found that both countries presented only realistic causes for climate change in their picturebooks. Interestingly, in Korea, narrative text picturebooks had a higher proportion than descriptive text picturebooks, but there were no imaginary causes that showcased the picturebook's imagination. Delivering realistic causes of climate change through picturebooks is desirable from a cognitive approach for young children's understanding of picturebooks. Children read picturebooks in the following stages: recognizing pictures, recognizing text, connecting information in picturebooks and inferring, and connecting information in picturebooks to their experiences and knowledge (Kümmerling-Meibauer & Meibauer, 2013). Especially when learning scientific facts and concepts, books with realistic content make it easier for children to connect the content in books to their daily lives (Strouse et al., 2018). Therefore, drawing realistic causes of climate change in picturebooks in China and Korea is useful for children to gain knowledge about climate change through picturebooks.

Regarding the impact of climate change, both real and fictional effects were presented. China showed similar proportions of real and fictional effects, while Korea had many more real effects than fictional ones. This is because China had two narrative text picturebooks and ten descriptive text picturebooks, while Korea had ten narrative text picturebooks and eight descriptive text picturebooks. Moreover, as a characteristic of picturebooks, the background illustrations showed the effects of climate change, such as melting icebergs and rising sea levels, regardless of the narrative text. In addition, China's *Where is My Home?* (Jin et al., 2018) tells the story of a penguin whose house disappeared due to the melting of the glacier. The book can be stored in the refrigerator, and the text and illustrations appear when the temperature is lowered, but they become pale and disappear when the temperature rises while reading the book. Therefore, children can directly see and feel the process of ice melting due to climate change. It can be seen that picturebooks express the events caused by climate change in various ways to help children understand them better.

Finally, in terms of reducing the impact of climate change, Chinese picturebooks only depicted actions that young children can actually take, while Korean picturebooks depicted various appeals to form a common awareness among people, actions that can be taken now, and creatively imagining actions that are currently impossible. While Korea provided more diverse options for actions, both China and Korea had very little content on how to reduce the impact of climate change compared to the causes and impacts of climate change. If climate change picturebooks are used as an educational tool for young children, there is a need to provide more options for actions that can delay climate change. Environmental education using picturebooks is achieved through the processes of reading, imagining, thinking, and acting on the picturebook (Burke & Cutter-Mackenzie, 2010). In Hsiao and Shih's (2016) study, young children expressed their awareness of their own actions and a willingness to improve them through reading picturebooks that emphasized environmentally protective actions. Therefore, providing diverse actions in picturebooks that can prevent climate change not only conveys information but also increases children's creativity, which can be expected to lead to creative solutions to address or cope with future climate change problems (Kim, 2011; Yoon & Lee, 2017). In addition to knowing the causes and consequences of climate change, efforts to find various ways to prevent climate change are also necessary.

In this study, we analyzed the content of climate change picturebooks for young children in China and Korea based on ecocriticism. Picturebooks serve as a gateway for children to explore literature and learn about the world. The literature offers a deep and rich understanding of the nonhuman world in ways that other texts and media may not provide, thereby imparting environmentally friendly attitudes to readers (Myren-Svelstad, 2020). By exploring how nature is depicted in the literature, readers gain critical insights into

the human-nature relationship and reflect on the impact of human activities on the environment (Mishra, 2016). Children's environmental literature, in particular, appeals to both emotions and intellect, making it a continuous influence on children's social justice and environmental sustainability (Gaard, 2008). Consequently, to enable children to accurately comprehend climate change and take proactive action, we need to offer them a greater diversity of climate change picturebooks.

Conclusion

Climate change is a global issue that requires a collective response and is a topic that the next generation, specifically young children, must be aware of. To approach the issue of climate change on a global scale, transcending national boundaries, it is necessary to form a common knowledge about climate change and to cultivate a shared value system regarding the environment.

This study concludes with an example of regional collaboration in East Asia, where picturebook authors from China, Korea, and Japan have jointly planned a 'Peace Picturebook Series' to convey the meaning and value of peace to children. The Peace Picturebook Series was a project aiming to publish a total of 12 books across the three countries, with each country contributing four authors who each created a peace-themed picturebook. The intention was born from the desire to have "children live in a world without war" (Kim, 2016a). The series began in Korea in 2010 with the release of *Flower Granny* (Gwon, 2010), but the series has not yet been completed. Although the participants agreed on the theme of peace, there were differences in the perspectives from which they viewed peace (Choi, 2018). Of the originally planned 12 books, 11 were published in Korea and Japan, and eight were published in China. However, those involved in the planning of the Peace Picturebooks stated that they were able to achieve a 'shared understanding' through collaboration that crossed national boundaries. By jointly engaging in the planning, production, and publication of the Peace Picturebooks, they were able to share the diverse perspectives each author and each country had on a single event, which led to a deeper mutual understanding (Heo, 2010).

Through the example of the Peace Picturebook Series, we can recognize the necessity for collaborative exchanges between countries in climate change picturebooks as well. It is inevitable that there will be practical difficulties arising from differing perspectives on the causes, consequences, and coping actions related to climate change in each country. However, as climate change is a global issue, it is clear that humanity must take collective action to address it. Therefore, picturebooks that allow children, regardless of nationality, to learn about climate change issues and practical solutions for coexistence between humans and the planet are essential. Achieving this goal requires support from policymakers, picturebook authors, parents, teachers, and other adults in each country.

Limitations & Future Research

This study holds significance in comparing and analyzing the content of climate change picturebooks between China and Korea. However, it also has several limitations. First, when analyzing climate change picturebooks from China and Korea, we sought to identify culturally nuanced aspects by consulting experts with experience in children's literature education from each country. However, the researchers and experts did not engage in a process to review and analyze picturebooks beyond the selected ones, which could have increased the reliability of the findings. In future research, paying more attention to the research process could lead to a more meticulous and trustworthy study.

Second, since climate change is a global issue, it would be beneficial to include picturebooks from other countries located on different continents, such as Europe, America, and Africa, in addition to China and Korea. This broader perspective could enrich the understanding of climate change picturebooks.

Finally, in this study, we analyzed climate change picturebooks recommended by book-selling websites and major government agencies in each country. In the future, it would be valuable to examine the perspectives on climate change in picturebooks that are widely read by children in each country, such as books with high borrowing rates in libraries or frequently used books in book rental services.

These proposed future research directions could enhance the comprehensiveness and applicability of studying climate change picturebooks and contribute to a more robust understanding of their impact on young readers' perceptions of climate change.

References

Alibaba. (2022). *Fiscal year 2022 annual report*. Alibaba Group. Retrieved August 1, 2023, form https://www1.hkexnews.hk/listedco/listconews/sehk/2022/0726/2022072600087.pdf

Baratz, L., & Hazeira, H. (2012). Children's literature as an important tool for education of sustainability and the environment. *International Electronic Journal of Environmental Education, 2*(1), 31–36.

Botelho, M. J., & Rudman, M. K. (2009). *Critical multicultural analysis of children's literature: Mirrors, windows and doors*. Routledge.

Burke, G., & Cutter-Mackenzie, A. (2010). What's there, what if, what then, and what can we do? An immersive and embodied experience of environment and place through children's literature. *Environmental Education Research, 16*(3–4), 311–330. https://doi.org/10.1080/13504621003715361

Chen, L. (2020). Analysis of the difficulties, causes, and breakthrough strategies in the creation and publication of original children's picturebooks in China. *Science-Technology & Publication*. https://doi.org/10.16510/j.cnki.kjycb.20201012.004

Chi, O. J., Cho, B. Y., Seo, Y. H., & Jang, A. Y. (2017). *Early childhood environmental education for sustainable development*. Changjisa.

Cho, E. S. (2006). The history of development for Korean picturebooks. *Journal of Children's Literature and Education, 7*(2), 113–151.

Cho, H.-J., Choi, J., Choi, N., & Jo, J.-H. (2022). Exploring the emotional vocabulary related to ecosystem services and human impact on forests in picturebooks about forests. *Journal of Childrens Literature and Education, 23*(2), 123–155. https://doi.org/10.22154/jcle.23.2.6

Choi, W. H. (2018). *Will you listen to the end... The mistakes of shameful adults*. The Hankyoreh. https://www.hani.co.kr/arti/culture/book/846476.html

Deng, Y. F., Ye, N., & Wang, Q. Q. (2021). Construction of the picturebook for children in China: The current situation, cause analysis and suggestion. *Journal of Tian Shui Normal University, 4*, 123–128.

Fenn, V. (2015). Roots of ecocriticism: An exploration of the history of ecocriticism, a literary theory of the postmodern world. *Journal of English Language and Literature, 2*(2), 115–119.

Gaard, G. (2008). Toward an ecopedagogy of children's environmental literature. *Green Theory & Praxis: THe Journal of Ecopedagogy, 4*(2), 11–24.

Gwon, Y. D. (2010). *Flower grandmather*. Sakyejul Publishing.

Heo, M. K. (2010). *'Flower grandmother' who embraced pain and blossomed in peace*. The Hankyoreh. https://www.hani.co.kr/arti/culture/book/425321.html

Hong, J. M. (2019). The effects of dramatic play activities using ecological picturebooks on young children's respect for life and caring behaviors. *Korean Jouranl of Early Childhood Education, 21*(3), 41–59. https://doi.org/10.15409/riece.2019.21.3.3

Hong, R. S. (2022). The structure and practice of the 24 solar terms garden course based on the perspective of children. *Journal of Fujian Institute of Education, 12*, 19–21.

Hsiao, C.-Y., & Shih, P.-Y. (2016). Exploring the effectiveness of picturebooks for teaching young children the concepts of environmental protection. *International Research in Geographical and Environmental Education, 25*(1), 36–49. https://doi.org/10.1080/10382046.2015.1106203

Hyun, E. J., & Kim, S. H. (2005). *Understanding picturebooks 1, 2*. Sagyejeol Publishing.

IPCC. (1990). *Far climate change: The IPCC response strategies*. Intergovernmental Panel on Climate Change. https://www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_III_full_report.pdf

Jung, B. G. (2021). *Our picturebook stories*. Happy Morning Reading Association.

Kim, J. S. (2016a). *Peace picturebook series work diary coplanned by Korea, China and Japan: Records, sympathy, and solidarity of hope*. Sakyejul Publishing. https://www.sakyejul.net/bbs/m/mcb_data_view.php?type=mcb&ep=ep993587793575e55ff04653&gp=all&item=md102338684857bd0bc3cf586

Kim, M. J. (2016b). *Children's literature in early childhood education*. Jungminsa.

Kim, M. J., & Lee, S. R. (2022). Characteristic analysis of alphabet books published in Korea. *Journal of Children's Literature and Education, 23*(2), 1–24. https://doi.org/10.22154/jcle.23.2.1

Kim, S. (2011). The effects of the creative problem solving process using children's safety picture-books on the safety problem solving abilities of kindergarten children. *Korean Journal of Early Childhood Education, 31*(2), 255–282. https://doi.org/10.18023/kjece.2011.31.2.012

Korean Publishers Association. (2022). *Publishing market statistics 2022*. Korean Publishers Association.

Kümmerling-Meibauer, B., & Meibauer, J. (2013). Toward a cognitive theory of picturebooks. *International Research in Children's Literature, 6*(2), 143–160. https://doi.org/10.3366/ircl.2013.0095

Læssøe, J., Schnack, K., Breiting, S., Rolls, S., Feinstein, N., & Goh, K. C. (2009). *Climate change and sustainable development: The response from education, cross-national report*. International Alliance of Leading Educational Institutes.

Lin, J. F., & He, P. W. (2022). The collective memory of the '24 Solar Terms' and the identification of Chinese culture. *Guangxi Ethnic Studies, 6*, 83–92.

Massey, G., & Bradford, C. (2011). *Children as ecocitizens: Ecocriticism and environmental texts*. Springer.

McDonald-Harker, C., Bassi, E. M., & Haney, T. J. (2020). "We need to do something about this": Children and youth's post-disaster views on climate change and environmental crisis. *Sociological Inquiry, 92*(1), 5–33. https://doi.org/10.1111/soin.12381

Mishra, S. K. (2016). Ecocriticism: A study of environmental issues in literature. *BRICS Journal of Educational Research, 6*(4), 168–170.

Myren-Svelstad, P. E. (2020). Sustainable literary competence: Connecting literature education to education for sustainability. *Humanities, 9*(4), 141. https://doi.org/10.3390/h9040141

Nodelman, P. (2017). *Words about pictures: The narrative art of children's picturebooks* (Kim, S. W. Trans.; 2nd ed.). University of Georgia Press. (Original work published 1988).

Palmer, J. A. (1999). Research matters: A call for the application of empirical evidence to the task of improving the quality and impact of environmental education. *Cambridge Journal of Education, 29*(3), 379–395. https://doi.org/10.1080/0305764990290308

Park, S. H., & Cho, H. S. (2008). Effects of nature-friendly education using ecological picturebooks on the child`s environmentally friendly attitude and the child's social-friendly activities. *Early Childhood Education Research & Review, 12*(5), 275–298.

Park, S. H., Kim, T. I., & Park, E. J. (2009). The development of children`s prosocial behavior through the nature-friendly education program using ecological picturebooks. *Early Childhood Education Research & Review, 13*(1), 43–65.

Shim, H. B. (2014). A study of the role of a teacher's questioning during the picturebook reading process: Focus on fiction and nonfiction. *Journal of Children's Literature and Education, 15*(2), 1–28.

Shimek, C. (2021). "Let nature be your teacher": An ecocritical analysis of outdoor play in award-winning picturebooks in the United States. *Journal of Children's Literature, 47*(1), 51–61.

Strouse, G. A., Nyhout, A., & Ganea, P. A. (2018). The role of book features in young children's transfer of information from picturebooks to real-world contexts. *Frontiers in Psychology, 9*, 50–50. https://doi.org/10.3389/fpsyg.2018.00050

Sun, W., & Kwon, J. (2020). Representation of monoculturalism in Chinese and Korean heritage language textbooks for immigrant children. *Language, Culture and Curriculum, 33*(4), 402–416. https://doi.org/10.1080/07908318.2019.1642346

Tamrin, A. F. (2019). Children and nature in a picturebook "our big home": An earth poem–ecocriticism. In *Second conference on language, literature, education, and culture (ICOLLITE 2018)*. Atlantis Press. pp. 167–171

Tanner, T. (2010). Shifting the narrative: Child-led responses to climate change and disasters in El Salvador and the Philippines. *Children & Society, 24*(4), 339–351. https://doi.org/10.1111/j.1099-0860.2010.00316.x

Tisnawijaya, C., & Kurniati, G. (2021). Sustaining life with trees: Ecocriticism perspective in selected picturebooks. *Lire Journal (journal of Linguistics and Literature), 5*(2), 233–253. https://doi.org/10.33019/lire.v5i2.121

United Nations Development Programme. (2021). *Peoples' Climate Vote. United Nations Dev Program*. Vol. 1, pp. 1–68. https://www.undp.org/publications/peoples-climate-vote

UN NEWS. (2021). Climate change is a 'global emergency', people say in biggest ever climate poll. *United Nations News*. https://news.un.org/en/story/2021/01/1083062

Wang, J. (2020). The dilemma and outlet of Chinese original picturebooks. *Publishing Research, 10*, 77–82. https://doi.org/10.19393/j.cnki.cn11-1537/g2.2020.10.025

Wang, Y. I., & Ji, L. (2022). Research on publishing ecological picturebooks for children based on environmental virtues ethics. *Publishing Research, 4*, 33–38. https://doi.org/10.19393/j.cnki.cn11-1537/g2.2022.04.005

Wei, L., & Li, C. (2019). A metaphor study of picturebooks with the theme of 'Natural ecology'—The lorax as the reasearch object. *Journal of Huzhou University, 41*(7), 30–36.

Yim, Y. J., & Kim, M. J. (2011). The effect of making ecological picturebooks on children's eco-friendly attitude. *The Journal of Korea Open Association for Early Childhood Education, 16*(2), 85–107.

Yoon, J. S., & Lee, S. K. (2017). Effects of steam-based environmental art education on infants' creative drawing expression abilities and eco-friendly attitudes. *Art Education Review, 63*, 115–135. https://doi.org/10.25297/AER.2017.63.115

Yun, K. O., & Cho, S. H. (2013). The effects of science activities utilizing ecological picturebooks on children's scientific attitude and scientific problem solving ability. *International Journal of Early Childhood, 17*(5), 393–419.

Zhou, Z. Y. (2021). An analysis on the publishing path of Chinese original children's picturebooks in the new century. *Editors Monthly, 2*, 106–110.

Children's Literature Cited

Aarden, L., & Bula, O. (2021). *Sunfish and the moonfish*. Red Cedar Junior.

Akiyama, J. (2007). *Spring, summer, fall, winter of Magamok*. Hollym.

Baek, H. N. (2010). *Moon Sorbet*. Bearbooks.

Bellinghausen, I. B. (2009). *Letter from the Amazon rainforest*. Geulumdongmu.

Chae, I. S., & Kim, J. M. (2021). *The Penguin's home has been reduced by half*. Wisdomhouse.

Cho, A. R. (2020). *Baby turtle clover*. Redbeanbook.

Gravel, E. (2013). *Going to the mart again was a mistake!* Totobook.

Huh, A. S. (2018). *Dream car*. Bearbooks.

Jin, J. H., Lin, S., & Liu, H. (2018). *Where is my home?* Hunan Children's Publishing House.

Kim, H. N. (2022). *Special mission of bee robot no. 31*. Centralized.

Kim, H. T., & Lee, B. (2011). *We need to send a refrigerator to the polar bear*. Humanistbooks.

Layton, N. (2020). *Guys, the climate is in danger!* JEI Corporation.

Lee, M. A. (2014). *Plastic island*. Sang.

Lee, M. A. (2019). *Plastic island*. Shandong Education Press. (Original work published 2014)

Lee, S. O., & Lee, J. M. (2021). *Can i go back?* Hsoobook.

McNaughton, C. (1993). *Beware of the giant hunter*. Sigongsa.

Om Books International. (2020a). *Captain earth has many solutions*. Hunan Children's Publishing House.

Om Books International. (2020b). *Cute animals are disappearing*. Newyork: Hunan Children's Publishing House.

Om Books International. (2020c). *Ecosystem is amazing*. Newyork: Hunan Children's Publishing House.

Om Books International. (2020d). *The great trick of the 'Pollution Monster.'* Hunan Children's Publishing House.

Om Books International. (2020e). *I can handle garbage*. Hunan Children's Publishing House.

Om Books International. (2020f). *I want to be a forest guardian*. Hunan Children's Publishing House.

Om Books International. (2020g). *In search of new energy for the earth*. Hunan Children's Publishing House.

Om Books International. (2020h). *Robot Bob is broken*. Hunan Children's Publishing House.

Om Books International. (2020i). *Unconventional science class*. Hunan Children's Publishing House.

Om Books International. (2020j). *Will the earth get hot?* Hunan Children's Publishing House.

Park, J. Y., & Cho, M. J. (2011). *Earth hour*. Hsoobook.

Petty, K., & Maizels, J. (2005). *Learning from nature through experience*. BIR Publishing.

Yoo, A. R. (2006). *I like tidal flats*. Borimpress.

Yoo, D. J., & Park, J. H. (2008). *I should have taught Tuvalu how to swim*. Mirae Media and Books.