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The Comparative Analysis of Treatment of Environmental Issues in Three Primary School Textbooks for Ethnic Koreans Residing in China: Korean Language, Morality and Rule of Law, Character and Society

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Abstract: This research analyzed the environmental content in three series of textbooks published for Chosunjok (ethnic Koreans in China). This paper examines the treatment of environmental topics in three series of textbooks for three subjects: Korean language, Morality and rule of law, and Character and society. Findings show that the textbooks included material regarding water pollution, air pollution and soil pollution. In the case of water pollution, the books present garbage dumping, industrial waste, lack of water and domestic wastewater as the only causes of water pollution. Chinese education authorities selectively select the environmental problems to show them as global issues rather than specifically China's issues. In the case of air pollution, textbooks depict four environment issues: global warming, emission of industrial pollutants, vehicle emission and burning of crops. Regarding soil pollution, the books claim that the perpetrators of soil pollution are farmers rather than factories or companies, who are the actual culprits. None of the texts place any blame on the Chinese government or dominant groups for focusing on economic development to the detriment of the environment, nor do they portray any cases of environmental pollution in China. Overall, the textbooks educate only about general global pollution and promote the interests of dominant groups by selectively favoring particular environmental texts.

Keywords: Environmental Education, Textbook Analysis, Environment in China, Environmental Pollution, Chosunjok (Ethnic Koreans).

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Research area: pedagogy.

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Сравнительный анализ освещения экологических проблем в трех учебниках для начальных классов для этнических корейцев, проживающих в Китае: корейский язык, мораль и верховенство закона, характер и общество

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Аннотация. Проанализировано экологическое содержание в трех учебниках, опубликованных для этнических корейцев в Китае. Рассмотрено обращение к темам окружающей среды учебников по трем предметам: корейский язык, мораль и верховенство закона, а также характер и общество. Результаты показывают, что учебники включали материал, касающийся загрязнения воды, воздуха и почвы. По загрязнению воды в книгах представлены мусорные сбросы, промышленные отходы, отсутствие воды и бытовые сточные воды как основные причины загрязнения. Китайские органы образования выбирают экологические проблемы, чтобы показать их как глобальные, а не как проблемы Китая. По загрязнению воздуха в учебниках отмечены четыре проблемы: глобальное потепление, выбросы промышленных предприятий, выбросы транспортных средств и сжигание сельскохозяйственных культур. Что касается загрязнения почвы, книги утверждают, что виновниками здесь называют фермеров, а не фабрики или компании, реально загрязняющие среду. Ни один из текстов не возлагает вину на правительство Китая или доминирующие группы за то, что они сосредоточены на экономическом развитии в ущерб окружающей среде, и не показывают никаких случаев загрязнения окружающей среды в Китае. В целом учебники рассказывают только об общем глобальном загрязнении и затрагивают интересы доминирующих групп, избирательно отдавая предпочтение конкретным экологическим текстам.

Ключевые слова: экологическое образование, анализ учебников, окружающая среда в Китае, загрязнение окружающей среды, Чосунджок (этнические корейцы).

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Introduction

Since the implementation of the Reform and Opening-up Policy in 1978, China has shown high levels of economic growth, which has resulted in serious environmental problems, making it necessary for China to devise a method to balance economic growth with environmental sustainability. During this time of rapid economic growth, China currently claims 4 of the 20 most polluted cities in the world: Beijing, Chengdu, Shenyang and Wuhan (World Air Quality Index (AQI) Ranking, 2021). Due to such serious environmental pollution problems, people have become conscious of the importance of protecting the environment and their health (Han, 2015). China faces serious environmental problems, which are costing lives and also leading to a slowdown in economic growth. To offset these dual effects, the Chinese government is stressing the implementation of environmental education from primary to university levels. By enacting the *Environmental Protection Law of China* in September 1979, environmental education (EE) was introduced to primary and secondary schools in selected provinces and cities ("Environmental Protection Law of the People's Republic of China (1989)," 2004)

Education is known to be a very powerful tool which impacts both citizens and students. In particular, textbooks, which play a major role in the school curriculum, influence the formation and legitimation of ideologies, norms, and values of government (Lee, 1999; Lee, 2013).There are ample instances where political leaders have presented their own selected versions of knowledge and cultural viewpoints and norms. Many scholars, such as Apple (2004); Lee (2013); Liu (2005a) have found that the early literacy content of school textbooks served the interests of the ruling and elite classes, as well as their cultural values and norms. Political leaders often legitimize their own ruling ideologies using school textbooks. The government policy, *Implementation Guideline on Environmental Education for Primary and Secondary Schools* by the Ministry of Education, specified that all disciplinary subjects must integrate EE (Zhou, 2018). This policy has since also been applied to education of minorities in China.

In China, there are 56 ethnic minorities, and each ethnic group has an independent curriculum designed to maintain their own culture and language. At the same time, local education authorities are required to comply with the guidelines of the PRC government (Sude et al., 2020). Therefore, schools for these 56 ethnic minorities are also obliged to integrate EE in their respective curricula. The Chosunjok (ethnic Koreans) are the 13th largest group of the minorities. They are widely recognized as a 'model' minority, and mostly live in three provinces in the north-eastern part of China (Gao, 2010). Under the establishment of New China, Chosunjok have been educating their students with their own curricula, though they still follow the PRC government guidelines. This project examines how the textbooks used in Chosunjok primary schools have integrated environmental issues into the curriculum and will show how EE is implemented through textbooks.

1. Background of EE in China

Since China opened its doors to the wider world in 1978, the economy has witnessed tremendous growth. Its gross domestic product has surged from less than $ 150 billion in 1978 to $ 14.34 trillion in 2019 (Song et al., 2019). On the other hand, China's environment has been on a path of serious deterioration. China's environmental problems (including outdoor and indoor air pollution, water shortages and water pollution, desertification, and soil pollution) have become more pronounced and are subjecting Chinese residents to significant health risks (Imura, 2013). The Chinese government is beginning to focus on environmental issues and has embarked on the strategic transformation from economic development alone to both economic and environmental development in building an energy-saving and environment-friendly society (McBeath, 2014). Environmental issues in China have important implications not only on the domestic level but also on a global level, since the amount of carbon dioxide emitted by factories in China is huge, and seriously affects neighboring countries such as Korea and Japan. Hence, such countries pay attention to China's handling of transboundary

environmental problems and note what efforts China is making.

China's engagement in environmental education can be traced back to the 1970s. A few selected primary and secondary schools incorporated environmental education into different subjects gradually over the 1980s and 1990s (Qing, 2004). In 2003, *Guidelines for the Implementation of Environmental Education in Primary and Secondary Schools*, released by the Ministry of Education of PRC (MEPRC), formally required nationwide efforts to integrate environmental education into the curricula and activities of primary and secondary schools (Han, 2019).

Since the National Environment Education Guidelines (approved in 2003), the MEPRC has confirmed its commitment that China's students learn about environmental and sustainable development. The guidelines guarantee that the environment is now an essential part of the national curriculum, and emphasize the development not only of knowledge, but also of students' skills, attitudes and values towards forming a sustainable future (Curdt-Christiansen, 2021). The Guidelines apply to all Primary and Middle school students in China and stress three goals: (1) offer courses on EE as an independent disciplinary subject; (2) fully integrate EE into all school curricula; (3) offer teacher training; and (4) conduct research on EE pedagogies (Yudan et al., 2019).

Environmental education was widely used in the 1960s in terms of natural learning. However, since the Tbilisi Conference in 1977, the need for including environmental education into formal education systems in primary and secondary schools has been emphasized (Unesco, 1980). This was the first stage of applying EE worldwide and the start to the adaption of EE in formal curricula. In the 2000s, under the influence of the UN's "10 years for education for Sustainable Development", it became more specific – from EE to Education for Sustainable Development (ESD). This began the transition from EE to ESD (Kopnina, 2012).

ESD is obviously more expansive than EE. EE emphasizes the importance of the traditional approach of environmental protection, ignoring the way environmental and economic development coexist, whilst ESD pursues sustainable development, including environmental protection as well as economic and social development (Aguilar, 2018). ESD is defined as education that encourages change in knowledge, skills, values, and attitudes to enable a more sustainable and equitable society. ESD aims to support current and future generations to meet their needs using a balance of economic growth and preserving the environment (Cockerill, 2013).

Whilst most studies have explored EE policy and implementation in the mainstream in various countries, not many studies have been conducted using textbook analysis regarding EE in minority textbooks (Stevenson et al., 2016). Previously, scholars such as Iwaniec and Curdt-Christiansen (2020); Liu (2005b) and Liu (2005a) have analyzed textbooks to explore the integration of EE in Chinese national language textbooks. Their analyses were limited to Chinese language textbooks and did not investigate other disciplinary textbooks or minority groups. Therefore, it is important to investigate EE in diverse subject areas developed for minority groups in China (Kopnina, 2014). Thus, this research will examine how China's EE and ESD are implemented in the Chosunjok (ethnic Koreans) primary textbooks.

2. Methodology

Primary schools in China are divided into lower grades (grades 1–3) and upper grades (grades 4–6). The subjects relevant to this study are Korean Language (KL), Morality and Rule of Law (MRL) an1d Character and Society (CS). Three series of primary school textbooks which were published in 2016 by Yanbian Education Publishing House were analyzed. The school curriculum consists of two semesters per grade, with each subject having two textbooks per grade. KL and MRL are taught from the 1st to 6th grade, but CS is a 4th to 6th grade subject. Thus, this study analyzed 12 KL, 12 MRL, and 6 CS textbooks. The environment-related content in the three subjects was analyzed by dividing the environmental issues, with the content analysis being based on the most recently published textbook of the Korean-Chinese primary

school curriculum. The environmental analysis was classified into each environmental issue: water, soil and air pollution.

This paper also adopts the concept of environmental literacy from the North American Association for Environmental Education (NAAEE), which defines environmental literacy with seven frameworks: Affect, Ecological knowledge, Socio-political knowledge, Knowledge of environmental issues, Cognitive skills, Additional determinants of environmentally responsible behaviour (ERB), and Environmentally responsible behaviour (ERB) (Hollweg et al., 2011) (Simmons, 1994). An explanation of each of the seven detailed frameworks follows.

(1) Affect

Recognizing environmental problems at the individual level and taking an action to actively participate in environmental protection

(2) Ecological knowledge

Referring to the knowledge and understanding of how natural systems interact with society

(3) Socio-political knowledge

Including understanding of economic, social political and ecological interdependence in society

(4) Knowledge of environmental issues

Understanding of various environmental problems and issues

(5) Cognitive skills

Abilities of selecting proper action strategies for environmental protection

(6) Additional determinants of ERB

Locus of control that is an individual's perception of people's ability to bring about change as a result of their actions.

(7) ERB

Action through selected lifestyle activities, including environmentally proper consumption, assisting enforcement of environmental regulations.

Putting these two levels of analysis together, thematic classification and environmental literacy, research use the following questions to confirm the understanding of how environmental problems are provided to form a student's perspective,

Research Questions:

1) What types of environmental literacy (environmental themes) are depicted in the textbooks?

2) Whose interest/ideologies do the content in textbooks serve?

3) What are the systematic omissions and for what purpose?

3. Findings

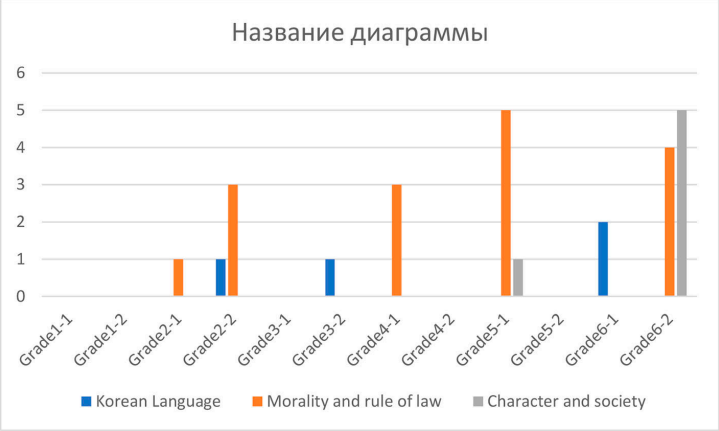
The content of the three textbooks is analyzed as follows in the table below.

The numbers indicate the frequency of references in the textbooks of each theme. The texts relating to the environmental issues were divided into three sections, which were water, air, and soil pollution. This was done by analyzing the textbooks for the three subjects (KL, MRL, CS). In Table 1, if texts or visual images included more than one environmental issue, they were included into multiple issues when categorized. To examine the texts based on the themes, critical discourse analysis and story grammar will be used, while for images, visual image analysis will be used. Also, this research analyzes the concept of environmental literacy, the ultimate goal of environmental education, which refers to citizens who have knowledge,

Table 1. Environmental issues (themes and texts)

Major Environmental themes					
Water Pollution		Air Pollution		Soil Pollution	
Garbage dumping	2	Global warming	2	Agricultural pesticides	2
Industrial waste	5	Emission of industrial pollutants	3	Domestic waste (plastic bags)	6
Lack of water	2	Vehicle emission	2	Industrial waste	2
Domestic wastewater	4	Burning crops	1	Deforestation	3
Total	13	Total	8	Total	13

Table 2. The classification of environmental issues in three textbooks distributed by grade



skills, values and attitudes regarding environmental problems, and have the ability to participate in environmental problem solving (Volk and Macbeth, 1998).

The content of environmental issues varies depending on subjects and grade. The details are illustrated below in Table 2.

It can be seen that as the grade goes up, more environmental texts are introduced in the textbooks. The textbooks for grade 4 do not include any environment issues in CS, and those for grades 4 and 5 KL also do not include any environment issues. As (Thoma, 2017) pointed out, the content is structured with consideration of the academic level of learners from the perspective of students. EE is found in grades 2, 3 and 6 in KL textbooks, in grades 2, 4, 5 and 6 in MRL, and in grades 5 and 6 in CS.

The following shows the analysis for each category of pollution:

1) Water pollution

Regarding water pollution, the texts introduced issues of garbage dumping, industrial waste, lack of water and domestic wastewater. Among them, water pollution due to industrial waste was the most frequently mentioned, followed by domestic wastewater as demonstrated in Table 1. Page 31 of 6–2 MRL[1] introduces Minamata disease, caused by industrial waste in Japan.

> 1. In the 1950s, a Japanese fertilizer company in the Minamata region discharged untreated wastewater into the sea.
>
> 2. These wastewaters contained mercury, which is harmful to the human body and severely pollutes both the sea and fish.
>
> 3. As a result, both people and animals that ate these contaminated fish were poisoned…
>
> 4. The poisoned cats convulsed crazily, jumping into the sea to commit suicide. In just a few years, it was difficult to see cats in the Minamata area.
>
> 5. Later, affected people also started to increase with the symptoms being similar to those cats.
>
> 6. At the time, people did not know the cause of the disease and named it the 'Minamata disease'.

The story grammar of the text is: setting (line 1: Minamata in Japan); protagonist (line 1: a Japanese fertilizer company); cause (line 2: wastewaters contain mercury); consequences (lines 3, 4, 5: Minamata disease broke out, so people and animals were poisoned); didactic lesson (don't discharge untreated industrial wastewater). The textbook reinforces the importance of controlling industrial waste as it can cause serious problems directly related to human health. However, the textbook writers provide the example of the Japan Minamata case that occurred 70 years ago. Despite many

[1] 6–2 means Grade 6, Semester 2, while MRL refers to Morality and Rule of Law

recent cases of environmental pollution caused by industrial waste in China, the textbook writers chose an old industrial waste case from another country as an example. They selected this story to demonstrate the after-effects of water pollution. Yet this leaves questions to the readers on why the textbook integrated an old foreign case, almost as if China does not have such sea pollution caused by industrial waste. This could imply to students that only other countries are the cause of environmental problems.

Because of the severe environmental pollution caused by industrial waste, Article 42 of the Environmental Protection Law of the People's Republic of China was cited in the 4–1 MRL (p. 79)

> *Enterprises, public institutions and other producers and business operators that discharge pollutants shall take measures to prevent and control the environmental pollution caused by waste gas, wastewater, waste residues, dust, malodorous gases, radioactive substances and noise, vibration and electromagnetic radiation generated during production, construction, or other activities.*
>
> *<Environmental Protection Law of the People's Republic of China, Article 42>*

Through this environmental law, it can be inferred that environmental pollution and damage caused by companies, enterprises, public institutions or business units account for a large proportion of China's pollution. However, no penalties are specified in the above provisions of the law; there is just information that environmental pollution caused by industrial waste must be prevented.

The second most mentioned cause of water pollution was domestic wastewater. The following story, "Blue Sea", was adopted from Korean language textbooks in South Korea (Lee, 2020).

> 1. My younger brother drew a picture, and he painted the sea with a red color.
>
> 2. Then my father said that a dirty sea looks red.
>
> 3. "Because people do not value the sea and throw away trash.
>
> 4. We pollute the sea with shampoo and soap that we use every day.
>
> 5. If we use shampoo and soap in small little amounts, the sea will become cleaner…"
>
> 6. I thought that I should use less shampoo and soap to make the sea blue…

The story "Blue Sea" (pp. 130–132) in the KL textbook portrays the severity of water pollution in the sea. The first line draws out curiosity about why the sea is colored red. The narrator's father explains why the sea appears red, as explained in line 2. Lines 3 and 4 explain the cause of the sea pollution, which in this case was throwing away trash and using shampoo and soap. However, such actions do not pollute the sea to the extent where it changes the color of the sea red. The story also suggests ways of solving the problem, such as using less shampoo and soap in their daily lives, as shown in lines 5 and 6. By using the personal pronoun 'we' in line 4, it suggests to students that they are all responsible for the pollution of the sea, and as a result, the students are encouraged to use less shampoo and soap (in line 6). Yet the sea's color won't change into blue unless significant actions are taken to reduce industrial wastewater. The textbook omitted this fact, instead blaming citizens using shampoo and soap for water pollution.

Also, the text from the 5–1 CS (p. 29) presents students' reports of river pollution in a village and water pollution due to industrial and domestic waste. The images indicate Chinese students, because they are wearing red neckties. Here line 2 states that wastewater pollution comes from chemical plants.

- Cause of contamination:

1. There is no garbage disposal plant near the river, so residents around the river throw out garbage.
2. Wastewater of chemical plant is discharged to the river without treatment.

- Actions being taken in town:

The waste problem along the river coast is already being targeted by the municipal government and the chemical plant is trying to install sewage treatment facilities.

• Our suggestions and action:

It is suggested to the relevant department to install a fixed waste disposal plant in the residential area of wastewater discharge from chemical plants.

The textbook writers stress that actions to solve the wastewater from chemical plant are already being taken now. Students also suggest that the government department install a waste disposal plant in the residential area near the wastewater discharge from chemical plants. It is recommended that the supervision of chemical plant wastewater be strengthened. These proposals can be seen to reflect the current situation in China.

The story "Calcination of water droplets" (pp. 34–37) in the 2–2 MRL textbook portrays water pollution resulting from garbage dumping and a lack of water.

This story explains that a part-time water supply was adapted due to a water shortage. The water drop says "Some people don't care for me (water) at all. Sometimes they throw away trash and pour out rubbish filth on me" (p. 34). However, there is no actor specified – the story uses the generic "some people". Instead of pointing out the main culprit of water pollution, the textbook writers ascribe that pollution to 'some people' without saying who they are. In addition, the story also portrays 'rubbish filth' as the cause of water pollution while avoiding mention of industrial wastewater. Further, water droplets are personified with the use of the word "me". Using first person pronoun "me" helps readers to identify themselves with the narrator (Lee, 2020). In such a way, authors of the textbook encourage students to indirectly feel the pain they are suffering as a victim. Further, the writers reinforce what students need to do for the environment. For example, "While I take a shower, I don't keep the water running. The water for washing the fruit can be kept in a basin and used again" (p. 37). Overusing water is undeniably one of the reasons for water shortages. Although there are other major causes, such as construction of dams, massive development of urban spaces, and desertification, they were all omitted here.

2) Air pollution

In China, air pollution is widely considered the biggest problem amongst all other environmental problems. China's air quality is very low. Three out of four city dwellers live with air that is below China's air quality standard (Delang, 2016). A major cause of air pollution is the increasing output of industrial waste gases. Ever since a clean-air policy was implemented in 2013, air pollution has steadily decreased across China, and Chinese cities no longer dominate the top cities for the most polluted cities list (Xu, 2020). The causes of air pollution are listed in the textbooks, and they include industrial pollutant emissions, burning crops, vehicle emissions and global warming.

Firstly, the story "Earth suffers from high fever" (pp. 88–91) in the MRL textbook 4–1 introduces the concept of global warming. The textbooks introduce several problems that occur when high temperature weather persists for an extended period. In page 88, there is a question proposed to students, "Do you know what symptoms show that the Earth suffers from high fever?" Here, using the plural "symptoms", writers of textbook establish that there are many consequences of global warming. "High fever" indicates a critical stage of global warming. Furthermore, page 89 of the textbook shows the three images below, that weather disasters such as floods and drought are becoming more severe due to climate change.

Although not visible outright, images 1 and 3 above relate to environmental damage caused by global warming. Yet melting ice-

Table 3. Cause, Consequence and Solution of water pollution

Cause	Consequences	Solution
Throwing away trash and pouring out rubbish filth in water	Only provides part-time water supply due to shortage of water/ cows and sheep are gone	Do not keep the water running during showers and wash fruit in a basin to keep the water

Fig.1. Melting icebergs caused by global warming
(2013, MRL textbook page 89)

Fig. 2. Global warming has caused severe drought in some parts of the planet
(2013, MRL textbook page 89)

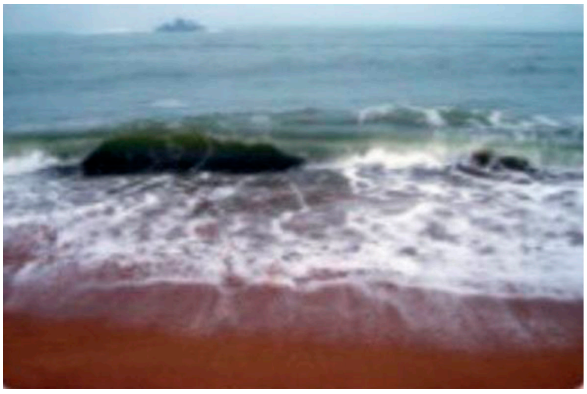


Fig. 3. Land area has decreased due to rising sea levels
(2013, MRL textbook page 89)

bergs and losing land due to rising sea levels are not problems found in China. The title of image 2 states severe drought as a problem in "some parts of the planet", not as a problem in China. By selecting images that seem unrelated to China, the authors are misleading students to think that environmental problems are all foreign issues, and that China is not directly affected or implicated.

The cause of abnormal climate is explained on page 90 in the textbook from the monologue of the greenhouse gas.

> *The monologue of the greenhouse gas follows below.*
>
> *1. Hello! We are 'greenhouse gases'. We make up the Earth's atmosphere layer.*
>
> *2. Sunlight passes through the atmosphere layer and is absorbed by the surface, and the surface radiates heat back to the atmosphere layer. This heat is absorbed by us and remains in the atmosphere layer to maintain the temperature of the air.*
>
> *3. However, because modern people are constantly making friends just like us, the balance of the atmosphere has been destroyed*
>
> *4. As we have more and more friends, we absorb more surface heat, so it becomes more like a glass door in a greenhouse, making it difficult to dissipate heat.*

In the text above, the 'greenhouse gases' greet students and explain the phenomenon of global warming. Using personification "we" and "us" in lines 1, 2 and 4, the greenhouse gases effectively express the difficulties that they are facing to students. Using passive voice, "the balance of the atmosphere has been destroyed", the authors of the textbooks have omitted the agents who destroy the balance of the atmosphere. By just saying "modern people" are the culprits of generating greenhouse gases (in line 3), the story avoids specifying the real people or companies involved. However, it is obvious that not all modern people are culprits, while many of them are in fact trying to protect the environment. Also, the story states euphemistically that they "are constantly making friends just like us". Additionally, using the collective and personal pronoun "we", the textbook stresses that blame for greenhouse gases is shared by many people in the world. Further, using the expressions "more and more friends" once and "more" twice in line 4, authors of the textbooks are stating that there is an increasing amount of greenhouse gases that is worsening global warming.

To illustrate some of the four issues of air pollution, the following two images on page 40 of *MRL* (2–2) are introduced; they show emission of industrial pollutants in Image 4 and Burning Crops in Image 5.

Air pollution in China is occurring in cities due to urbanization, with several factors: an enormous economic boom, an upsurge in the use of vehicles, population growth, and output from manufacturing (Ma & Ma, 2017; Xu, 2020). Despite this, the textbook provides the image of a farmer burning crops in the countryside as one of the two major causes of air pollution. In this way, the authors are portraying farmers as culprits of major air pollution (image 5). Image 4 depicts giant stacks emitting smoke and fumes directly from factories into the atmosphere, admitting that industrial waste gases are also culprits. Yet no human agents are depicted in Figure 4. The only people held responsible are the farmers.

Furthermore, Article 26 of the Constitution of the People's Republic of China is introduced in the textbook.

> *The state shall protect and improve living environments and the ecological environment and prevent and control pollution and other public hazards. The state shall organize and encourage afforestation and protect forests.*
>
> *<Constitution of the People's Republic of China> Article 26.*

Article 26 shows constitutional evidence that China officially pays attention to environmental protection. The Article promises the following:

> 1. *protect and improve living environments and the ecological environment*
>
> 2. *prevent and control pollution and other public hazards*

Fig. 4. Output of industrial waste gases
(2013, 2–2 MRL textbook page 40)

Fig. 5. Burning of crops
(2013, 2–2 MRL textbook page 40)

3. *organize and encourage afforestation and protect forests.*

Yet it does not mention how the state should achieve the goals.

Lastly, the story "The promise for everyone" (pp. 30–31) in the KL textbook discusses the air pollution due to vehicle emissions.

Conversation between Jiyoon and teacher

Background: Today, Jiyoon's school went on a bicycle-riding field trip. At that moment, a green bus passed by the bike path, but the green bus did not emit any smoke.

1. Jiyoon: "Teacher, that bus doesn't emit any smoke. It's amazing."

2. Teacher: "That's an electric car. Electric cars don't emit bad smoke like cars that use petrol."

3. Jiyoon: "Is petrol bad?"

4. Teacher: "If petroleum burns as fuel, it can make cars move and you can make a variety of daily necessities with materials extracted from oil. However, using too much oil pollutes the environment. Environmental pollution causes great damage to not only people but also to nature. That is why people should try to reduce pollutants."

5. Jiyoon: "What kind of efforts should we put in?"

6. Teacher: "Do not throw away trash and recycle a lot of resources. You need to have the habit of riding a bicycle in areas of proximity and using public transportation like buses or subways."

7. Jiyoon: "It would be helpful to not use a lot of air conditioning in summer, right?"

8. Teacher: "Right! Jiyoon! That is a very good idea."

9. Jiyoon: "Teacher, I will try to protect the environment starting today."

10. Teacher: "Jiyoon! You made a promise for all of us"

This is a conversation between Jiyoon and a teacher. This story explains that using electric cars prevents emitting the bad smoke that causes environmental problems. Line 4 lists the problems caused by using too much petroleum. To emphasize that petrol pollutes the environment, the story uses words such as "bad smoke" in line 2 and "great damage" in line 4. The teacher explains that electric cars do not produce 'bad' smoke, unlike regular cars. By using the descriptor 'bad', the textbook connotes that it is not good to use cars that use oil petroleum. In line 5, Jiyoon asks how they can solve the problem and her teacher explains the ways (line 6). The teacher recommends four solutions to the student: riding bicycles, recycling, not throwing trash and using public transportation. In line 7, Jiyoon asks whether it is good to not use a lot of air conditioning during summer, and the teacher responds to her question by giving positive responses, "right" and "a very good idea" in line 8. In this way, the teacher normalizes not using a lot of air conditioning in summer as one of the ways to protect the environment that is practical for a student. In response to the teacher's recommendation, Jiyoon promises to make efforts protect the environment from today. "A promise for all of us" (line 10) indicates that Jiyoon's decision to protect the environment is for all of us (for everyone's good). This encourages the readers to also participate in the teacher's recommendations, as well as to feel a sense of shared responsibility to protect the environment (Curdt-Christiansen, 2016).

3) Soil pollution

The textbooks depict four causes of soil pollution, which are introduced as: pesticides, plastic bags, industrial waste, and desertification. "Let's find out about white pollution" (pp, 72–75) in 4–1 MRL describes the pollution due to plastic bags. Page 72 illustrates the environmental problems caused by plastic bags. "Let's find out about white pollution" includes the line "In everyday life, you can see vinyl products everywhere". This indicates that the use of vinyl products can be easily found anywhere in China and implies that there is an environmental problem of white pollution because of plastic bags.

On page 73, "The plastic bag drifter" is introduced.

1. I'm a white plastic bag... As I floated leisurely and reached the sky above the fields, the farmer looked at me angrily and said, "Never sit down in our field".

2. With regret, my dry corn brother sighed and complained to me saying, "Hey, plastic bag, many of your friends are buried in the ground at my feet and it's hard for me to get nutrients and fluids. I am still hungry, so I hear a rumble…"

3. My face turned red; I left the field in a hurry. I flew and flew to a beach.

4. There was a whale that was breathing hard. What happened? When people examined the whale, it was found to have swallowed many plastic bags, which resulted in clogged organs, further resulting in malnutrition, and later starvation to the point of death…

The textbook portrays two consequences of plastic bags polluting farming areas and oceans. Line 2 has the dry corn complaining, using the phrase, "many of your friends". The writers of the textbook describe the seriousness of plastic bag pollution with the plural "many". They illustrate one victim, dry corn, which mentions that it could not get sufficient nutrients from the ground because of the 'white

pollution'. Line 3 shows that causing this pollution is shameful, as demonstrated by the plastic bag in the sentence "My face turned red, I left the field in a hurry". Additionally, in line 3, using the pronoun 'I' has the effect of presenting the narrator's view to the readers (Uzum et al., 2018). Furthermore, in the story 'plastic bag' is explaining its own story directly to students by using personification. Personification can help readers understand, sympathize with, or react emotionally to non-human characters (Flannery, 2016). Therefore, it helps students to understand the environmental problems caused by the plastic bags that people use in their daily lives. This story also demonstrates that plastic bags cause maritime pollution and the death of whales (in Line 4) which indicates their severe negative impact on sea as well as land.

After introducing the serious problem of plastic bags, the textbook integrates the solutions by providing an example of other countries' cases (page 74). The first story is "Packaging ordinance" which explains the rule that was implemented in Germany in 1992, stipulating the recycling rate of waste packaging and forcing manufacturers to take responsibility for the collection and disposal of their products' packaging. Another case is given – the Irish government reduced the use of plastic bags by requiring consumers to pay a tax levy when they asked for plastic bags at stores. Similarly, the textbook emphasizes that China also introduced "Restriction on the use of plastic bags" on the 1st of June 2008. This law limits the production, sale and use of plastic shopping bags for retail purposes. The ordinance also banned the production, retail and use of any plastic bag under a thickness of 0.025m. As a result of the policy, first, bags are reused more frequently than before; and second, more substitutes are used, meaning that more goods are placed in containers other than plastic bags (He, 2012).

Due to soil pollution caused by household waste (such as plastic bags), pages 83–85 of the 4–1 MRL suggest recycling as a solution.

Three solutions to reduce household waste are presented, along with images of recycling. Adding these images makes the texts more effective, as they demonstrate and make real the

Fig. 6. Recycling
(2013, 4–1 MRL textbook page 83)

actions that students can take to eliminate soil pollution.

Soil pollution due to the increased use of chemical fertilizers and pesticides in agricultural areas in China is central. China uses one-third of the world's chemical fertilizers. Pesticide sales have been on the rise since 2016, and ever since, there has been a serious problem in the destruction of the agricultural ecological environment (Chen & Ye, 2014). In addition, in 2014, agricultural land contaminated with pesticide residues occupied 40 % of the nation's agricultural land, making the problem of pesticide pollution a serious social issue (Li et al., 2014). Pollution caused by these chemical fertilizers and pesticides are introduced in MRL.

Page 77 of the MRL (4–1) textbook provides examples of agricultural pesticides that students have found in their daily lives. It also introduces the consequences of the excess use of pesticides.

"I saw the vegetables my grandmother bought soaked in water for a long time"

> *"My mother told me to eat the fruit after peeling the skin off. This is because pesticides may remain on the peel of the fruit."*
>
> *"I saw the fish in the river near the paddy dead after applying pesticide to the paddy field" (p. 77).*

The three main consequences of non-scientific usage of pesticides are introduced on page 77.

> • Must wash vegetables for a long time to get rid of chemical pesticides
>
> • Cannot eat fruits with peel
>
> • Fish in the river near the paddy killed.

The following page suggests the solutions. Page 78 explains the way to reduce the pollution of pesticides by students with the following:

> • reducing the excessive use of pesticides,
>
> • using government approved pesticide products, and
>
> • using them strictly according to the instructions.

We have analyzed three distinct forms of pollution, but there are some combinations of these that are depicted in the textbooks.

The story "Earth is getting harder" (pp. 26–29) in 5–2 CS textbook introduces the fact that a large amount of industrial waste and deforestation is caused by various environmental problems. The text on pages 26 and 27 explains the causes and consequences of pollution (Table 4).

Table 4 shows that acid rain is caused by waste gas. Acid rain not only corrodes buildings but also adversely affects forests, fish and farms. In China, air pollution is becoming more and more serious and the concentration of fine dust in the air is also increasing. These fine dusts are included as causative agents of acid rain (Thorjoern et al., 2006). The story depicts those fertile lands as turning increasingly to desert due to large amounts of garbage. Yet, there are many other causes of desertification other than garbage dumping, and it is an error of generalization to list only garbage dumping as a major cause of the problem. This omits the other problems of unreasonable land use, such as excessive arable clearing and grazing, which are the main causes of desertification in China.

After introducing the problems caused by industrial waste, the textbook presented writing activities, which are Earth's letter to mankind and mankind's letter to Earth (page 26). In the writing activity, the authors use personifications such as "lung" (forests and wetlands), and "blood" (river, lakes, oceans), and "skin" (soils), to enhance the compassion that the students will feel with the agony of Earth. After the students recognize the problems caused by industrial waste and garbage dumping, the activity of writing a letter to Earth will encourage them to treat Earth as they would a human being. Earth is not an agent that can do anything for the environmental issues. Such writing activities could increase the affection students feel for the earth, but there can be no response. Perhaps it would be better if the textbooks encouraged students to write letters to actual stakeholders/companies which pollute the environment in China or in other regions.

4. Conclusion

We have analyzed three subjects within the field of environment issues from three series of textbooks. Our analysis will answer the research questions.

Table 4. Causes and Consequences of Environmental pollution

Cause	Consequences
Emissions from factories	Produces acid rain in the atmosphere
Large amount of wastewater	Fish death / water pollution
Large amount of garbage on the ground	Desertification of agricultural land

Research Question 1: What types of environmental literacy (environmental themes/contents) are depicted in the textbooks?

Among the seven environmental literacy components, ***Affect*** can be confirmed in the environmental text from "promise for everyone". A student makes decisions, such as using public transportation and bicycles, and reducing use of air-conditioning, to reduce air pollution and global warming. In addition, using less shampoo and soap were listed as solutions for sea pollution, and not keep water running during showers was suggested.

In the framework ***Knowledge of environmental issues****,* diverse issues of water pollution, air pollution and soil pollution are depicted. These three forms of pollution are exemplified by garbage dumpling, industrial waste, release of domestic wastewater, industrial chemical wastewater pollution, global warming, emission of industrial pollutants, vehicle emissions, burning of crops, agricultural pesticides, domestic waste (plastic bags), industrial waste and deforestation.

For ***Socio-political knowledge***, the textbooks introduce environmental protection laws twice and provide one case for action for municipal government to take for water pollution, but there is no mention of punishment for not complying with the laws. Although political institutions and regulations can play an important role in environmental protection, punitive action must be seen as a possibility, with potential legal action being laid out clearly.

As for ***Ecological knowledge***, global warming is well presented. The cause of global warming is claimed to be deforestation, and as a result, the amount of carbon dioxide in the air is increasing. ***ERB*** is adopted in the issues of plastic bags. Text introduced regulation of plastic bags as implemented in other countries, such as Germany and Ireland. These regulations could be applied in China but the text just hints at the benefits of regulation. ***Additional determinants of ERB*** and ***Cognitive skills*** are not depicted in the textbooks.

Most of the solutions for environmental pollution are presented according to *Guidelines for the implementation of environmental Education in Primary and Secondary Schools* of MEPRC. They stress that textbooks should present environmental content which students may be able to actively participate in environmental protection and practice in daily life. However, students could do more. For instance, students writing letters to factory owners or Lord Mayors of each city could promote more interest in protection of environments, but the textbooks only depicted writing a letter to the Earth. Thus, China's real environmental problems were rarely introduced.

RQs 2 and 3: Whose interests and ideologies do the content in textbooks serve? & What are the systematic omissions and for what purpose?

The textbooks studied here serve the interests or ideologies of Chinese rulers or government, factory owners, and the ruling class. Three characteristics can be found in the texts. First, various causes of environmental pollution are introduced, but actual cases that happened in China are mostly omitted. Instead, textbooks, such as (1–2), selected an old story of water pollution that occurred in Japan in the 1950s while intentionally ignoring China's cases. This creates the impression that China is not experiencing the environmental problems that other foreign countries face. In such a way, selected school knowledge is depicted in a manner congruent with the interests and ideologies of the government and upper class of China. If textbooks depicted actual cases occurring in China, students would be able to understand what kind of environmental problems China is facing and would think about what they could do and how they could contribute to protecting the environment. The earlier (younger) they are educated and engage with environmental issues, the earlier they can develop a sense of ownership and responsibility for the environment they live in (Ideland, 2018).

Second, texts mis-portray the main culprits of environmental pollution. When introducing the causes of air pollution in China, the images containing human agency are only of farmers burning crops, implying that farmers are the main creators of air pollution. There are few mentions of factory owners or of those in powerful groups who are actually the main culprits.

Third, the textbooks show closed text, not allowing students to ask critical questions and leaving them with no choice but to accept the direction provided. From the texts, the message is that all students should listen to the textbooks as they would listen to their and teacher's voice. Students are not given opportunities to exercise critical thinking around issues of environmental protection.

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