

## **Ecological Intelligence Values in Indonesian Language Textbooks for Junior High School Students**

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### **ABSTRACT**

Ecological intelligence is our ability to adapt to our ecological niche. Teachers can improve students' understanding on ecological intelligence values and their ability to keep and preserve environment through learning using books. This research aims at investigating and exploring ecological intelligence values of the 2013 curriculum-based Indonesian language (BI) textbooks, comprising of B7 and B8. It was carried out in the exploratory stage with descriptive explanatory strategy and content analysis. On the basis of the results of analysis, it concludes that two analysed Indonesian language textbooks for junior high school students appear to contain ecological intelligence values. Both Indonesian Language textbooks contain eight ecological intelligence values. The ecological intelligence values in BI textbooks are found in materials or readings, exercises/assignments, or evaluation. Nonetheless, the drawbacks of the textbooks lie in the materials which still focus on the cognitive aspect instead of guiding students to do concrete actions for environmental preservation. Research results contribute to the development of ideas and concepts on the need of ecological education, and writers and teachers can use them as reference to develop teaching materials to foster ecological insight and empathy among students towards environmental preservation.

*Keywords:* Ecological intelligence, Indonesian language, textbook, value

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### **INTRODUCTION**

Environmental damage leads to increasing disaster risks in several countries, including Indonesia. Environmental damage level contributes to the extent of such risks. The correlation between environmental damage

level and disaster risks was revealed by the 2012 World Risk Report that 4,130 disasters happened all over the world during 2002-2011 and caused more than one million deaths and material loss of US\$ 1,195 billion ([http://www.droughtmanagement.info/literature/UNU\\_world\\_risk\\_report\\_2012](http://www.droughtmanagement.info/literature/UNU_world_risk_report_2012)).

One of contributing factors that causes natural disasters is human activity. Floods in big cities are the results of land-use changes around drainage basin (DAS) (As-syakur, 2010) and human habit of littering into rivers that reduces aqueduct's volume capacity (Sartohadi & Suryono, 2003). Illegal logging of forestry natural resources with the aforementioned various backgrounds by Kasia (2011) also influences natural balance. Many efforts to overcome natural disasters have been done such as arranging SSOP Bantal application for early detecting flood-and-landslide-vulnerable areas (Santoso, 2012), improving public participation on waste management (Riswan, Sunoko, & Hadiyanto, 2011), and revitalising the functions of drainage basin through empowering society (Suganda, Yatmo, & Atmodiwirjo, 2009). However, the efforts seem to be partially done and cover physical and technical aspects, while some efforts to overcome disasters giving priority to mental aspect of mindset change and attitude building have not been conducted. Bowers (2010) suggests that exercising ecological intelligence needs to be made part of students' culturally mediated embodied experiences—which will engage all the physical senses along with memory, and a

heightened aesthetic awareness and moral responsibility.

Building love towards the environment can be striven through education. Vallori (2014) points out that good learning involves meaningful learning experience supported by complete literatures corresponding to contexts experienced by learners. Books are a significant factor in education as they provide knowledge, skill, and positive attitude to children on the importance of keeping and preserving environment. It is in line with Khalid's (2014) argument that books play a vital role in supporting learning. By utilising textbooks based on the value of love towards nature and environment, children are guided to possess ecological intelligence. This is in line with Jung who states that intelligent human puts himself in control of the natural environment (in Utina, 2012).

Ecological intelligence can be fostered provided that children are aware of the importance of living environment. A sustainable society builds and arranges their life by relying on awareness on the importance of living environment. This awareness is so-called ecoliteracy (Capra, 1997), the capability to understand the importance of living environment. Moreover, he postulates that the principles include interdependence, recycling, partnership, flexibility, and diversity. By making a little revision on the ecological principles, Capra (2004) formulates the principles as networks, cycles, solar energy, partnership, diversity, and dynamic balance.

Barkes describes four levels of ecological intelligence as: (1) identifying both biotic and abiotic components of ecosystem, (2) understanding functions and benefits of each component in the ecosystem, (3) comprehending nature and environment management system, and (4) understanding and being able to apply values in ecological system (Pilgrim, Cullen, Smith, & Pretty, 2008).

Human has good adaptive ability, both biologically and culturally (Soemarwoto, 1991), such as adaptive ability when using polluted water. They develop resistance towards diseases in the body, and because of their habits to fight repulsion on dirty water; clean water is no longer considered a main need. This adaptation, though valuable to maintain life sustainability, should be considered as mal-adaptation or unhealthy adaptation. Khachappilly and Mathulla (2014, p. 323) outline that “knowing the body and cultivating the body needs understanding of body-personal, biological, social, religious, philosophical dimensions among other.”

Human needs to understand crises and disasters, as well as provide solution. According to Keraf (2014), the main solution offered is alternative thought or paradigm since the main cause of living environmental crises and disasters is thinking paradigm error. Only by changing paradigm, there will be new behaviour and way of life as a final solution for global living environmental crises and disasters. In reference to Chili’s research results (2014), an individual’s ecological intelligence

is determined by teachers. They play an important role in delivering substances related to ecological intelligence during the learning, and hence the materials should be well-prepared. Ecological intelligence refers to comprehension on hidden ecological impacts and problem-solving, combining cognitive skills and empathy on all life forms. Both social and emotional intelligences are set up based on the ability to see from others’ views, to feel what others feel and to show our care (Goleman, 2009). Many experts see that villagers’ ecological intelligence and insight play an important role in the efforts of natural resources management, aegis in biodiversity, and provide a model or way of life together with the environment (Turner, Ignace, & Ignace, 2000).

In reference to the theories proposed by Capra (2004) and Goleman (2009), ecological intelligence values in the textbooks include: (1) identifying the components of ecosystem; (2) comprehending the functions and uses of the components of ecosystem; (3) understanding nature management system; (4) comprehending environmental values; (5) representing concern on environmental damage and pollution; (6) applying environmental behavioural adaptation; (7) solving the problems due to environmental impacts; (8) managing/preserving natural resources; and (9) making use of environment in a positive way.

This research examined systematically ecological intelligence values in Indonesian language textbooks for junior high school students and provides suggestions for the

improvement of the textbooks. The research questions include: (1) What are ecological intelligence values in the textbooks? (2) How are they distributed? (2) How are the strengths and weaknesses of the textbooks, especially with regard to the ecological intelligence values?

## METHODS AND MATERIALS

To examine ecological intelligence values in the textbooks, both descriptive and distributive, content analysis was employed. Content analysis can be quantitative or qualitative, or both (Berg, 2001; Kondracki, Wellman, & Amundson, 2002). Qualitative approach is used to obtain general and deep understanding and evidence proof (Creswell, 2011). Hence, the researchers made an attempt to investigate both the surface structure and deep structural meaning of the message (Berg, 2001).

For this purpose, we developed two theoretical frameworks. First, Ecological Intelligence Value Content Analysis Framework to analyse the structure and distribution of the elements of ecological intelligence values in the textbooks and the extent of which the contents of ecological intelligence values are discussed in the textbooks (Kondracki et al., 2002). Second, Ecological Intelligence Value Description Analysis Framework to examine the distortion or limited information presented in the textbooks. A total of three experts (experts in the environment, education and curriculum, and Indonesian language and teaching material development) and four

Indonesian language teachers took part in this analysis.

Two Indonesian Language textbooks of ecological intelligence values were analysed, which include: (1) *Bahasa Indonesia Wahana Pengetahuan Kelas VII* (Indonesian Language: The Means of Knowledge for Grade VIII with 16 + 272 pages thick, and (2) “*Bahasa Indonesia: Wahana Pengetahuan Kelas VIII* (Indonesian Language: The Means of Knowledge for Grade VIII)” written by Fairul Zabadi and Sutejo (B8) consisting of 14+222 pages. Both were issued by the Centre of Curriculum and Books, Research and Development Agency, Ministry of Education and Culture, in 2014. The textbooks were compulsory texts for all junior high school students in Indonesia whose school has applied 2013 Curriculum in three years (i.e., since 2013).

## RESULTS AND DISCUSSION

In B7 and B8, eight ecological components were found presented in the materials/passages, exercises/tasks, and assessments/evaluations. The first component is identifying ecosystem components regarding abiotic and biotic aspects. B7 has some explanations on biotic components including soil, mountain, air, water, and garbage. The components integrated into materials of readings and exercises that consist of sea animals, land animals and plants. The components give brief descriptions on introducing environmental components, diversity of marine life, butterfly metamorphosis, container-grown

plants, story of a donkey, and benefits of ornamental fish (B7, 2014: 4, 98, 193, and 243). Meanwhile, B8 concerns more on the knowledge about flora and fauna. The description and utilisation of certain fauna are discussed; one of the quotations is a pest having some functions called the golden snail. The whole life of plants in a certain habitat is called flora, while the whole life of animals is fauna (B8, 2014: 1&2).

Abiotic components are integrated into materials in B7, such as passages and exercises. They include brief descriptions comprising introducing environmental components, soil cultivation, water treatment, formation of rainbow, and waste treatment. The materials give both explanation on the definition, as well as benefits and procedures of the treatment concerning concrete preservation of abiotic components, both naturally and artificially (B7, 2014: 6, 140, 169, and 220). In B8, abiotic aspects such as light, rain, and water are presented. B8 also explains the functions of sun light and air which send heat energy from the sun to the earth. The sun rays received by the Earth will be transformed into other form of energy, as provided in the quotation below.

*“Siang itu begitu terik. Pancaran sinar matahari tanpa ampun membakar punggung Emak yang tengah mengumpulkan batu-batu kali dari sungai yang mengering. Tampaknya, kemarau sudah kelewatan. Padahal, sekarang sudah memasuki bulan Desember. Bulan yang disebut-sebut sebagai*

*bulan hujan”* (That day is very hot. The sun glow mercilessly burns mom’s back who is collecting stones from drying river. Apparently, the drought has been unusual. Whereas, it is December now; the month which is usually called rainy month) (B8 FZ&S, 2014: 105).

The second component is comprehending functions and uses of both abiotic and biotic components of ecosystem, which are explained in B7. The material related to the functions of abiotic components is performed in the exercise, *“Kekayaan alam seperti apakah yang sudah kamu nikmati?”* (What natural resources have you enjoyed?) The students are supposed to write down their answers on the abiotic factors such as water, air, soil and light of which benefits have been felt (B7, 2014: 5). Meanwhile, the explanation of rice field ecosystem is presented several times in B8. The dry field resulting from water shortage is discussed in the explanation on ecosystem components. Some components influence one another, and thus, there are some functions and impacts of the loss of abiotic components, as shown in the following quotation.

*“Hampir semua lahan persawahan mengering, menyisakan pohon pari yang menguning kering; tidak ada rumput liar yang tumbuh menghijau; hanya ada batang-batang pohon kering yang terus menerus menggugurkan daunnya setiap kali angin berhembus.”*

(Nearly all rice fields dry up, leaving the rice trees turning into yellow and dry; there are no verdant weeds growing there; only dry trunks remain which continuously shed their leaves when the wind blows) (B8, 2014: 171).

The uses of biotic components are stated in B7 in materials consisting of questions, explanation on the benefits of marine life such as fish and sea plants for human, explanation on biotic components which can be consumed in the form of cultivated lawn crops including cassava, catfish, tilapia fish, and snapper fish, and information on the benefits of ornamental fish for human (B7, 2014: 5, 26-27, 243).

The third component is understanding the management system of nature and environment. B7 provides a material on management system of abiotic environment including proper water management to prevent flood. Proper water treatment should be based on soil condition such as saturated soil may cause water to be difficult to be absorbed. In addition, rainwater management is necessary, and therefore, water will be well-absorbed by the soil. Moreover, B8 provides materials concerning abiotic and biotic aspects. The abiotic element proposed to provide understanding of environmental management simply conveyed is identifying rivers that are usually used by people to make a living. "*Lihatlah, satu-satunya sungai yang kami jadikan sumber air pun mengering, seolah dihisap tanpa bekas, meninggalkan batu-*

*batu terjal yang membisu* (Look, the only river we employ as a water source has been dried up as if it is totally sucked, leaving the rough stones muted) (B8, 2014: 191).

B7 shows material content on the environmental management system of biotic components, either naturally or artificially-managed. The material can provide an understanding of how mutualism symbiosis occurs in cave and river environment, including symbiosis among fish, bats, birds, and insects, by giving mutual benefits. Other contents provide experiences to students to learn how to keep pets. Students will gain manual management system through an interview (B7, 2014: 6 & 23). In addition, the management of biotic components in B8 is explained on the reflection to the attitude on understanding management system of biotic components. Therefore, the book also invites the readers to love animals around them (B8, 2014: 2 & 3).

The fourth component is comprehending environmental value in B7, which is provided in description of local and normative wisdom values. The reading passage entitled "*Dewi Sri: Dewi Kesuburan* (Dewi Sri: Goddess of Fertility)" shows a belief growing in the Indonesian archipelago as one of the local wisdom manifestations related to abiotic components, comprising water, soil, weather, and air. The story explains how the agrarian society of Indonesia believes that everything they obtain from nature depends on Dewi Sri (B7, 2014: 21). It also provides understanding on the normative values linked to abiotic and biotic environments. The materials providing understanding

on normative value involve instruction or persuasion to keep and preserve the environment.

*“Lingkungan hidup di sekitar kita merupakan kekayaan yang harus dipelihara dan dilestarikan. Oleh karena itu, kita harus menjaga dan mencintainya. Kita tidak boleh mengotorinya, seperti membuang sampah dan menebang pohon seenaknya”* (Our surrounding living environment is the property that has to be kept and preserved. Therefore, we have to keep and love it. We should not make it dirty by littering and cutting down trees carelessly (B7, 2014: 4)).

The understanding on local wisdom is conveyed in the form of abiotic environment utilisation with handicraft producing activity from used cardboard, with some purposes, utilising wasteful rubbish or garbage which later becomes useful things and developing creativity (B8, 2014: 108 & 146).

Through fable, a local wisdom is informed. It is about animals having human-like characteristics; some of them are good and some others are bad. It shows harmonization between human and animals in life. The material content is presented in the form of interrogative sentence; like an argument conveyed to the readers, “Do you agree if we help each other when a disaster occurs? Why should we do it?” (B8, 2014: 6 & 10). Besides local wisdom value, religious value is packaged in the materials

to present ecological value through a story. B8 communicates a message that God is the Almighty. God provides human with ambition and hope.

*“Cita-cita itu tidak hanya diraih melalui usaha dan kerja keras, tetapi dapat juga dicapai melalui kreativitas. Kreativitas berkaitan dengan kemampuan untuk membuat sesuatu yang bermanfaat dalam kehidupan sehari-hari, misalnya mencangkok tanaman dan membuat layang-layang.”* (Ambition is not to be achieved merely with effort and hard work, but also with creativity. Creativity is concerned with the ability to make a useful thing in daily life, such as grafting a plant and making a kite) (B8, 2014: 1).

The fifth component is performing respective attitude to the environment and concern on environmental damage and pollution. This component is indicated in B7 at the explanation on abiotic and biotic aspects. The question in Task 1, “Have you been responsible for your surrounding environment?” requires students to write manifestations of their sympathy to incidents in their surrounding environment dominated by the damage of abiotic and biotic components (B7, 2014: 5). Meanwhile, one of the materials in B8 is that the information about fable becomes one of potential means of internalising moral values. The students are reflected to be able to learn and imitate good attitude from the

animals to have ethical characters. Also, there is a short story telling an adaptation process. In the story, a character decides to be river stone collector and splitter. The character has its own reason for choosing such rude profession. To him, dry season and drought do not always lead to loss and suffering (B8, 2014: 2 & 172). This concept is in line with Shumba (2011) that “Ecological intelligence expresses appreciation for what is good, appreciates inclusivity, and it demands creativity, innovation, and ethicalness”.

The sixth component is solving problem arising from environmental impacts. B7 merely shows abiotic aspects. There exists a material asking students to solve problem in their environment. The explanatory passage entitled “*Banjir* (Flood)” explains about the causal factors of and the ways to cope with flood, while the passage entitled “*Perbaiki DAS, Atasi Bencana* (Repair the River Basins, Overcome the Disasters)” containing some ways to overcome erosion through River Basins (*DAS: Daerah Aliran Sungai*) reparation is a material enriching students with knowledge on individual and group strategies to deal with environmental problems that may occur (B7, 2014: 153 & 249). In the principle, students are encouraged to adapt with environmental problems and find the ways to cope with them. When they do so, they possess what Goleman (2009) calls as ecological intelligence, i.e. an ability to adapt ecological niche.

B8 picks a biography, adapted to material of biotic component utilisation.

In the following quotation, students are expected to observe the figure’s character in utilising useless waste, “*Kondisi ekonomi yang sangat sulit memaksa Ni Wayan Mertayani harus dewasa di usianya yang masih 14 tahun. Pada pagi hari dia pergi ke sekolah di SMPN 2 Abang, Bali, kemudian dia membantu ibunya berjualan* (The very difficult economic condition forces Ni Wayan Mertayani to be mature in her 14 years of age. In the morning, she goes to school, SMPN 2 Abang, Bali, then helps her mother sell” (B8, 2014: 53)

The fauna utilisation is also performed in an interview text on a golden snail (*keong mas*), which is considered a pest. The writer tries to introduce the other sides of this. Students who are also readers will be able to use it as intelligence of environmental utilisation properly. “*Namun, jangan khawatir, walaupun tergolong jenis hama, keong emas sebenarnya dapat memberikan manfaat yang positif. Selain itu, keong emas juga dapat menjadi komoditas prospektif untuk menambah penghasilan* (But, do not worry; although categorised as a type of pest, golden snail can give positive benefits. Besides, golden snail can be a prospective commodity to increase revenue” (B8, 2014: 98).

The seventh component is managing/preserving living environment resources. Only abiotic aspects appear in B7. The materials on the strategies to preserve abiotic components are presented in some questions, “What forms of discipline behaviors have you conducted to keep your surrounding environment?” The steps can be

implemented individually and collectively; depending on the environmental scale that needs preservation. Other materials linked to dimensions to solve problems arising from environmental impacts, abiotic sub-dimension, are presented in the passage about waste management. One of the activities the students can do to manage waste is recycling, as written in the passage entitled “*Teknologi Proses Sampah (Waste Processing Technology)*”. Students will be able to make use of it as a material with economic values (B7, 2014: 214).

The eighth component is utilising environment positively on the abiotic aspects in B7 provided in the description of material on making use of land to cultivate plants and raise animals for food. “*Dengan berbagai teknologi intensifikasi sederhana, pekarangan dapat menjadi sumber bahan pokok makanan seperti beras, sayur-mayur,....*” (“With some simple intensification technologies, land can be a source of staple food, such as rice, vegetables,...”). Another material concerning waste utilisation to be economical goods is an example of the content (B7, 2014: 127 & 220).

The above analysis reveals that B7 mostly uses the themes on nature and environment. The materials dominantly containing the themes are inserted into the passages and questions for enrichment. The materials on environment are various and rich in abiotic and biotic components. Students are introduced to the components, as well as ways to manage, keep, and preserve them. However, there are some

drawbacks since the materials are limited on cognitive and sympathy stages, and do not reach to the level of empathy. Meanwhile, B8 textbook generally contains ecological intelligence values. Nevertheless, the establishment of provided context and passage is still general and does not focus on certain approaches and themes. Also, the materials are dominated by cognitive elements and do not emphasise on action elements.

The strength of B7 is the materials on abiotic and biotic environments are considered to be rich and able to provide concrete experience to students to get information directly from the resource person. Meanwhile, the strengths of B8 are: (1) the types of the selected texts are interesting to be linked to environmental governance, and (2) fable as a medium of character education for junior high school students is considered highly appropriate.

In contrast, the weaknesses of B7 are that the materials centre merely on cognitive range and do not direct students to do concrete activities in preserving the environment. Meanwhile, the weaknesses of B8 include: (1) there is no active process in the exercises, questions, and competence test which can stimulate students’ psychomotor, particularly related to environmental governance, (2) the book has tendency to discuss more on students’ cognitive activities, (3) there is no identical tendency among the themes; each of them stands separately without having the main scope of the textbooks writing purposes, and (4)

the purposes of the textbook arrangement do not direct to learning process for the purpose of empowering.

Ecological intelligence contents in both the textbooks are inadequate for teachers to develop students' insight and competence in preserving the environment. As resulted from Chili's research (2014), an individual's ecological intelligence is determined by the teachers. Thus, it is conceivable that the textbooks need improvement on their contents of ecological intelligence. Efforts to develop the textbooks are in line with Abbs and Freebaim's opinion that students' need in learning covers the need to face challenge (Cunningsworth, 1995). Students' future challenges will more complex, particularly those related to ecosystem and preservation. The development of BI textbooks by considering cultural aspects is getting more important. It is in line with Turner et al. (2000) that in some cases, ecological intelligence or insight is often related to local wisdom values of traditional community groups.

## CONCLUSION

This research concludes that both textbooks contain eight ecological intelligence values, which are presented in the materials or passages, exercises/tasks, enrichment questions or assessment/evaluation. The strengths of the book are: (1) the materials on both abiotic and biotic environments are rich and able to provide students with concrete experience to obtain the information directly from the resource person, (2) the types of selected texts are interesting to be

correlated with environment governance, and (3) fable is an appropriate medium for students' character building. Meanwhile, the weaknesses of the books include: (1) the materials centre merely on the cognitive aspect, (2) the materials do not accommodate students to make concrete action in environmental preservation, (3) there is no active process in the exercises, questions, or competence tests, related to environmental governance, (4) the books discuss too much on cognitive activity, (5) there is no similar tendency among the themes, and (6) the purposes of the textbooks arrangement do not direct to the learning for empowering. The findings of ecological intelligence values in those textbooks make significant contribution to the authors to create textbooks with ecological concept as required in 2013 Curriculum of junior high school, whereby students are required to possess spiritual attitude, social attitude, knowledge, and skill, including responsibility in preserving nature (*Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia No. 21 Tahun 2016/Regulation of Minister of Education and Culture of the Republic of Indonesia No. 21 Year 2016*). The results can also be used as teachers' reference in developing teaching materials in order to foster students with ecological insight and empathy towards environmental preservation.

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