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Improvement of the Competence and Affective Disposition of Junior High School Teachers After the Implementation of Biodiversity Literacy Textbooks Containing Material on the Local Potency of West Java

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Abstract.

This study aimed to analyze the improvement of competence and affective disposition of junior high school teachers after implementing biodiversity literacy textbooks containing material on the local potency of West Java. The study used a weak experimental design with the one group pretest post-test method. A total of 33 junior high school teachers from various districts in West Java Province were involved in the research conducted from January 2020 to August 2021. The results showed that there was an average increase in competence (71%) and affective disposition (69%) of biodiversity literacy. There was a sequential increase in biodiversity literacy competence, namely, scientifically explaining biodiversity phenomena (77%), evaluating scientific inquiry related to biodiversity (74%), scientific interpretation of biodiversity data and evidence (73%), and designing scientific inquiries related to biodiversity (68%). There was an increase in the level of biodiversity literacy competence at level 4 (21%), level 5 (15%), and level 6 (48%). There was an increase in affective disposition in the form of sensitivity and positive values (88%), self-confidence, personal and social responsibility (69%), interest (68%), and concern for biodiversity (67%). The results of hypothesis testing with the Wilcoxon Test resulted in a sig value of 0.000 for competence and attitude disposition. The study concluded that biodiversity literacy textbooks containing material on the local potency of West Java can help improve the competence and affective disposition of biodiversity literacy of junior high school teachers.

Keywords: competence, affective disposition, biodiversity literacy, local potency, West Java

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1. INTRODUCTION

One of the global problems that occurs is the crisis in the environment. The global environment is currently facing a number of issues, including environmental issues caused by the interaction of human activities with the global ecosystem [1]. One of the main problems for the global environment is the crisis of biodiversity extinction [2] . The crisis of biodiversity extinction is the most serious problem on planet earth [3]. In fact, this issue has always been one of the most pressing challenges for sustainable development [2–6].

Indonesia is a country with a very high biodiversity. Indonesia's biodiversity wealth covers various levels, namely genetic, species, and ecosystem levels. Mittermeier, Robles-Gil, & Mittermeier [7] named Indonesia as one of the world's biodiversity centers and is known as one of the Megabiodiversity countries. Species diversity in Indonesia and species endemicity are always at the forefront [8]. Even though it is a mega-biodiversity country, the threat to biodiversity in Indonesia is also very high. Thus, Mittermeier, Turner, Larsen, Brooks, and Gascon [9] included Indonesia as one of the world's biodiversity hotspots, and made it a world conservation priority area. This shows that Indonesia's biodiversity must be very high, but its sustainability in the future is very threatened so that conservation efforts are needed.

The sustainability of Indonesia's biodiversity is the responsibility of all Indonesians. Biodiversity literacy is important for the sustainability of Indonesia's biodiversity. Therefore, Indonesian citizens should have good biodiversity literacy. Only people who are biodiversity literate are able to solve biodiversity problems or issues well. Someone who is literate in biodiversity shows abilities in the dimensions of knowledge, competence, disposition, attitude, and action. Adapting the framework of scientific literacy PISA 2018 [10] , NAAEE environmental literacy 2011 [1], and biodiversity literacy that have been developed by WWF & WCEE 1996 [11], in this study a person who is biodiversity literate is characterized by possession of (1) knowledge of various concepts , problems and issues, as well as conservation strategies related to biodiversity, procedural and epistemic knowledge related to biodiversity; (2) a set of competencies to explain phenomena related to biodiversity scientifically, evaluate and design scientific inquiries related to biodiversity, and interpret data and evidence scientifically; (3) a set of affective dispositions; and (4) appropriate and effective actions to apply the knowledge and understanding in context .

Although it is believed that biodiversity literacy is a must so that Indonesia's biodiversity can be conserved, it is unfortunate that the biodiversity literacy of Indonesian

citizens is not entirely good, including teachers. Whereas Biodiversity literacy, one of which is determined by the teacher. Teachers have an important and very potential role in the success of biodiversity literacy . Teachers have an important role in biodiversity education [12]. Teachers have the potential to influence people's careers and futures [13–15]. Teachers are also role models for their students. There are a number of problems that arise from teachers, especially junior high school teachers who teach biodiversity. The results of a survey in 2015 [16] show that in general, junior high school science teachers do not understand the concept of biodiversity and conservation holistically. Teachers are also not very aware of Indonesia's position in the world as a mega-biodiversity country and one of the world's biodiversity hotspots [16] . The results of a preliminary study in 2018 also showed similar results. Exploring teachers' understanding of biodiversity, procedural, and epistemic content knowledge shows that in general, junior high school teachers in West Java really need to be improved. In addition, teachers also do not understand holistically the Basic Competencies (KD) related to biodiversity in the junior high school curriculum, and have not utilized local potency related to biodiversity in their learning.

One of the causes of the problem of biodiversity literacy in junior high school teachers is the lack of learning resources used by teachers, either to teach or to improve their own biodiversity literacy. Learning resources used by teachers related to biodiversity literacy learning are generally not varied and use sources at the same level as students, and do not contain local potency. Presenting teaching materials for teachers who can improve their insight and literacy on biodiversity, both about the material, learning activities, and how to assess learning outcomes is one of the efforts that can be done. Therefore, it is important to develop biodiversity teaching materials with local potency for teachers as an effort to increase biodiversity literacy, which in turn will be able to increase biodiversity literacy for students.

Textbooks are one of the teaching materials selected and developed for teachers. Textbooks play an important role in science education [17, 18]. The importance of textbooks is the same as that of teachers in the learning process of students [18]. Teachers have relied on textbooks, at least 90% of their teaching time [19, 20]. Research has shown that textbooks are used in several different ways namely to supplement learning, discussion, as a resource for activities, for assigned readings, and as a basis for lectures or lessons [21]. Moreover, they have a unique role as mandatory reading material in some countries [22]. Textbooks are also important not only as reading material and as mediators of knowledge, but also provide a structure for classroom activities in general [22]. Some researchers have observed that educators rely heavily on textbooks

as a source of information when planning lessons and are an important source for developing students' knowledge because in it there are various representations that affect student learning [23] [24]. Textbooks greatly affect students' understanding of subjects, either directly or indirectly. Textbooks affect students' understanding indirectly by influencing the strategies teachers use in the classroom and the order in which teaching and learning occurs [17, 25–29]. Textbooks affect students' understanding directly by prioritizing the content that students must learn and suggestions of what students should be able to do with the content [30].

In relation to literacy ownership which is expected to continue to grow, textbooks play an important role as a transition tool towards adult literacy. Textbooks become a textual path that students must go through to be able to take part in the text of the general public [22]. Teachers are adults who have the right and obligation to learn all the time. Education is a fundamental human right, a valuable public property and indispensable as a tool in building peace, sustainability and a more just society . An ongoing program launched by the United Nations, namely *Adult Learning and Education* (ALE) is intended as a program so that no one is left behind. ALE is a key component of lifelong learning worldwide, to improve policies, concepts of education and practice within the framework of the United Nations (UN) 2030 Agenda for sustainable development [31]. Literacy and basic skills are one of the three main domains of *The Recommendation Adult Learning and Education* (RALE). In the RALE document, literacy and basic skills are understood as two continuums: a continuum of learning and education that continues outside school, and a continuum of proficiency levels, ranging from low to high [32]. The existence of textbooks provided for adults, especially teachers, is an important part of the success of supporting lifelong learning as worship, as well as as part of participating in global programs for peace, sustainability and a more just society, as well as supporting sustainable development at the national and international levels. global. Through textbooks designed according to the needs of adults, especially teachers, it is hoped that they can be part of the success of increasing literacy in a well-informed and responsible society, as well as an agent laying the foundation for good literacy for the students who will eventually develop into adults.

Integrating local potency in textbooks is one way that can be used to grow biodiversity literacy. The local potency in this research is all the resources in the surrounding environment that have the potential to be used as a source for learning biodiversity literacy, both physical and non-physical. Physical resources, namely biodiversity at various levels in the area around teachers and students. Non-physical resources in the form of local realities (values, issues, problems, contexts, terms) and local wisdom related

to biodiversity and its conservation. The integration of local potency in the development of textbooks and science learning contributes to the learning experience. Community awareness of the importance of environmental conservation is increasing through the use of local contexts in learning [33, 34]. Things that are considered very important to be raised in teaching materials and used in learning biology in schools are local realities [35]. The integration of local potency into textbooks for teachers supports adult literacy programs, as stated by UNESCO [36], among them to preserve and promote cultural diversity. The integration of local potency into textbooks is also in line with the PISA program [10, 37, 38], one of which states that the selected and assessed knowledge needs have relevance to the real world. In addition, the integration of local potency into textbooks is one part of the flagship program for developing teaching materials recommended by the NAAEE [1, 39]. Environmental education learning materials (including biodiversity education) reflect current, accepted, and well-documented information from science, social science, and other knowledge systems such as traditional ecological knowledge [39]. The integration of local potency related to biodiversity into textbooks for teachers also supports the CBD (Convention on Biological Diversity) program and the Aichi Biodiversity Target 2020, in particular AICHI's Target 1. Target 1 of AICHI states that by 2020, people are aware of the value of biodiversity and the steps that can be taken to conserve and use it sustainably [40]. Teachers were categorized as group 5F based on the CEE framework [41][42]. To achieve the goal of biodiversity education for the 5F group, information is needed on biodiversity values, current status, causes of degradation, impacts of degradation, ecological concepts and linkages, information on NBSAP, Aichi, UNDB, and CBD biodiversity targets [41]. In addition to information that is global in nature, information based on local potency has the potential to support the achievement of these goals.

West Java is one of the provinces in Indonesia that has high biodiversity, but on the other hand is very threatened. This is because West Java has physical conditions that strongly support biodiversity. In terms of topography, rainfall, and hydrology are very supportive of the high biodiversity in West Java [43]. However, on the other hand, the population and activity of the population is very high so that it threatens biodiversity. The population and human activities in West Java are also very high so that it has the potential for biodiversity extinction [43–45]. The richness of biodiversity as well as its threats are local potencys that can be integrated into textbooks for teachers. The local potency of West Java related to biodiversity literacy is very much and some of them have been published, but have not been widely integrated into textbooks, especially textbooks for teachers. Therefore, the development of a biodiversity literacy textbook

containing the local potency of West Java is expected to increase the biodiversity literacy of junior high school teachers.

The biodiversity literacy textbook containing the local potency of West Java used in this study is the result of development and has gone through the validation stage. Textbook development following the Four Steps Teaching Material Development (4STMD) stages proposed by Anwar [46], namely selection, didactic structuring, characterization, and didactic reduction. In the selection stage, the author applies Logical, Evidence, Psychological (LEP) The model proposed by Stinner [47]. The next stage of structuring is carried out by compiling the macro and micro structures of the developed teaching materials. The characterization stage is carried out so that difficult materials can be packaged specifically according to the characteristics of the concept so that the textbook is in accordance with the views of the use , namely the teacher. Some aspects considered in the characterization stage refer to several theories put forward by several sources such as the *Guidelines for Excellence Environmental Education Materials* (GEEEM) from NAAEE [38], visual aspects to help understand scientific concepts [48–54], language structure [48, 54], integration of indigenous knowledge [55]. The didactic reduction stage is carried out as a reduction in the difficulty level of the textbook with didactic considerations, namely by considering psychological and scientific aspects. The teacher is already at the stage of formal operational cognitive development based on Piaget's cognitive theory so that didactic reduction is adapted to these characteristics. Textbook Biodiversity literacy containing local potency of West Java has been validated and implemented on a limited basis for science teachers in one of the Sub-rayon in West Bandung Regency, West Java Province, the results show that it is feasible to use and can increase biodiversity literacy. However, it needs to be re-examined on a wider scale, namely science teachers in West Java. Increased competence and affective disposition are part of the dimensions of biodiversity literacy that are analyzed in this research article.

Based on the above background, the formulation of the problem in this research is: "How is the improvement of competence and affective disposition of junior high school teachers after the implementation of the biodiversity literacy textbook containing the local potency of West Java?'

2. RESEARCH METHOD

The research design used was a weak experimental design with one group pre-test post-test [56]. The research subjects consisted of 33 junior high school teachers from

several districts in West Java Province, carried out from January 2020 to April 2021. The instruments used were written tests and attitude scales. Data processing is in the form of pre-test, post-test, n-gain calculations, prerequisite tests, and hypothesis testing. Calculation of normalized gain and normalized gain increase criteria use the formula of Hake [57]. Kolmogorov-Smirnov test was used to test the normality of the data. Wilcoxon test was used to test the hypothesis. All statistical tests were carried out with the help of SPSS 26 software for Windows.

3. RESULTS AND DISCUSSION

Competence is defined as a group of skills and abilities that can be called upon and expressed in a real world and assessment setting for a specific purpose [1]. In general, a person is considered competent when he or she can do something repeatedly and at a certain level of quality or precision [1]. Adopting the 2011 NAAEE environmental literacy framework [1], scientific literacy from PISA 2018 [10], and biodiversity literacy that has been developed by WWF & WCEE 1996 [11] the biodiversity literacy competencies in this study include skills and abilities to: (a) Explaining the phenomenon of biodiversity scientifically; (b) Evaluating and designing scientific inquiry related to biodiversity; and (c) Scientifically interpreting data and evidence related to biodiversity. The data on the measurement of the increase in biodiversity literacy competence of junior high school teachers after the implementation of the ex-literacy biodiversity book containing the local potency of West Java are shown in **Table 1** and **Table 2**

TABLE 1: Recapitulation of descriptive statistics of competency dimension achievements.

	N	Minimum Value	Maximum Value	Average	Mode	Standard Deviation
Pretest Score	33	11.21	62.62	31.77	30.84	12.66
Posttest Score	33	39.25	100.0	77.66	93.46	19.06
N-Gain (%)	33	30.11	100.00	70.66	100.00	22.70
mode	33	-	-	-	Medium	-
Valid N (listwise)	33					

Data in **Table 1** shows the average achievement of the competence domain by teachers. The average of early biodiversity literacy competence is 31.77 and after implementation it is 77.67. This shows that the achievement of biodiversity literacy competence dimension by teachers has increased. The average N-Gain is 71% (high category). N-Gain mode is 100% and medium increase category mode. Results of

hypothesis testing with The Wilcoxon test produces a sig value 0.000. This means that there is a significant difference between the average competency scores before and after the implementation of the biodiversity literacy textbook containing local potency of West Java for teachers. In other words, the biodiversity literacy textbook containing local potency of West Java has a real influence on the achievement of competency dimension of biodiversity literacy for teachers with medium category improvement mode.

Table 2: Achievement of biodiversity literacy competency components.

Components of Biodiversity Literacy Competency	Average value			
	Pretest	Posttest	N-Gain (%)	Category
Explaining the phenomenon of biodiversity scientifically	17.63	79.89	76.71	High
Designing scientific inquiry related to biodiversity	24.75	70.61	68.43	Medium
Evaluating scientific inquiry related to biodiversity	36.46	78.89	73.59	High
Evaluating scientific inquiry related to biodiversity	36.46	78.89	73.59	High
The total value of the realm of competence	31.78	77.66	70.66	High

Data in **Table 2** shows that each component of biodiversity literacy competence has increased with an average N-Gain of 71% (high category). The highest increase in components explains the phenomenon of biodiversity scientifically. Meanwhile, designing scientific inquiry has the lowest improvement compared to other components of biodiversity literacy competence. It can be interpreted that the application of content knowledge by teachers is easier than the application of procedural and epistemic knowledge. Designing scientific inquiry related to biodiversity requires not only a good understanding of content knowledge, but also the ability to apply procedural and epistemic knowledge. So the competence to design scientific inquiry related to biodiversity is more complex than the competence to explain scientific phenomena. This is in line with the revision of Bloom's taxonomy proposed by Anderson & Krathwohl [58] which places creation higher than understanding, applying and evaluating. In this case, biodiversity literacy textbooks containing local potency can help teachers improve biodiversity literacy in the realm of competence, but still needs further improvement and development, especially in the competence of designing scientific inquiry by further strengthening procedural and epistemic knowledge in addition to content knowledge.

Explaining some scientific phenomena, requires more than just the ability to remember and use theories, explanatory ideas, information, and facts (content knowledge), but also requires an understanding of how that knowledge was acquired and the level

of confidence one can have about any scientific claim (procedural knowledge and epistemic knowledge) [10]. Adapting from PISA 2018, the competence to explain the phenomenon of biodiversity scientifically in this research includes the ability to: (a) explain, apply scientific knowledge related to biodiversity appropriately; (b) interpret and provide explanations for the phenomenon of biodiversity; (c) generate tentative explanatory hypotheses for biodiversity phenomena; (d) make predictions and provide reasons for predictions related to biodiversity; and (e) explain the potential implications of biodiversity knowledge for society. Based on these findings, biodiversity literacy textbooks containing local potency help improve teacher competence in scientifically explaining phenomena related to biodiversity.

Competence in evaluating and designing scientific inquiries is needed to critically evaluate reports of scientific findings and investigations [10]. Adapting PISA 2018, the competence to evaluate and design scientific inquiry related to biodiversity in this research includes: (a) identifying research questions in the given biodiversity-related scientific research; (b) distinguish between possible and impossible questions to scientifically investigate biodiversity; (c) propose a way to explore a given scientific question related to biodiversity; (d) evaluate ways to explore a given scientific question related to biodiversity; (e) describe and evaluate the methods used by scientists to ensure data reliability and objectivity and generalizability of explanations related to biodiversity. Based on these findings, biodiversity literacy textbooks containing local potency help improve teacher competence in evaluating and designing scientific inquiries related to biodiversity.

Competence to interpret data and evidence scientifically is the competence to analyze and evaluate scientific data, claims and arguments in various representations and draw conclusions [10]. Adapting PISA 2018, the competence to interpret scientific data and evidence of biodiversity in this research includes the abilities and skills: (a) Transforming data from one representation to another; (b) Analyze and interpret data, and draw appropriate conclusions; (c) Identify assumptions, evidence, and reasoning in science-related texts; (d) Distinguishing arguments based on scientific evidence and theories from those based on other considerations; (e) Evaluating scientific arguments and evidence from various sources (eg newspapers, internet, journals). Based on these findings, biodiversity literacy textbooks containing local potency help improve teacher competence in interpreting scientific data and evidence related to biodiversity.

Biodiversity literacy competency achievement levels are grouped based on the latest criteria for the scientific literacy achievement scale at PISA 2018 [10]. The results are shown in Table 3**.**

Table 3: Comparison of number of teachers based on biodiversity literacy competency level.

Competency Level of Biodiversity Literacy	Total (%)	
	Beginning	End
1b	9	0
1a	33	0
2	42	9
3	9	9
4	6	21
5	0	15
6	0	48

The data in Table 3 shows that after the implementation of the biodiversity literacy textbook containing local potency, the level of attainment of the teacher 's biodiversity literacy competence has changed. At the end of the implementation, levels 4, 5, and 6 literacy competencies increased. After the implementation of the biodiversity literacy textbook containing local potency, 9% are at level 2, 9% are at level 3, 21% are at level 4, 15% are at level 5, and 48% are at level 6. Frequency The highest increase in competency level occurs at level 6.

Adopting the meaning of scientific literacy competence from PISA 2018 [10], the meaning of the achievement of biodiversity literacy competence in this study is interpreted as (a) as many as 9% of teachers are able to use basic content, procedural, and epistemic knowledge to provide explanations, evaluate, and design simple scientific investigations , as well as interpreting data in a variety of life situations, most of which require low cognitive levels related to biodiversity; (b) 9% of teachers are able to use content, procedural, and epistemic knowledge to provide explanations, evaluate, and design scientific investigations, as well as interpret data in various life situations which some (but not all cases) require a medium cognitive level related to biodiversity; (c) as many as 21% of teachers are able to use content, procedural, and epistemic knowledge to provide explanations, evaluate, and design scientific investigations, as well as interpret data in various given life situations, most of which require a medium cognitive level related to biodiversity; (d) 15% of teachers are able to use content, procedural, and epistemic knowledge to explain, evaluate, and design scientific investigations, as well as interpret data in various life situations which some (but not all cases) require high cognitive levels related to biodiversity; and (e) as many as 48% of teachers are able to use content, procedural, and epistemic knowledge to consistently explain, evaluate, and design scientific questions, as well as interpret data in various complex life situations that require high cognitive levels related to biodiversity. Based on these findings,

biodiversity literacy textbooks containing local potency help teachers increase their level of biodiversity literacy competence.

The improvement in the domain of competence after the implementation of the biodiversity literacy textbook containing local potency of West Java shows that many teachers are able to use the knowledge (content, procedural and epistemic) developed in the textbook and are able to demonstrate skills to explain scientific phenomena related to biodiversity, design and evaluate related research. biodiversity, as well as interpreting data and evidence related to biodiversity scientifically. The increase that occurred in the realm of competence also shows that knowledge (content, procedural, and epistemic) with local potency that is integrated into biodiversity literacy textbooks provides benefits for teachers. The three kinds of knowledge that are integrated into the developed textbooks assist teachers in improving literacy in the realm of competence. Scientific literacy competence requires content knowledge, procedural knowledge and epistemic knowledge [10]. The increase that occurs in biodiversity literacy, especially in the realm of competence after the implementation of the developed textbook, may have something to do with the characteristics of the book. Among them are the characteristics of the appropriateness of the content and aspects of presentation, contextual, graphic, and language adapted for teachers. Based on the results of validation by experts and expert users, the textbooks developed are in the good category. This is probably because the author tries to develop a biodiversity literacy textbook by applying knowledge about the development of teaching materials such as the 4STMD proposed by Anwar [59], LEPM activity from Stinner [47] characteristics of environmental literacy teaching materials from NAAEE [37], graph theory from several sources such as [49–54], linguistic theory from several sources such as [52–54, 59, 60]. The main and important thing is that the author applies the advice from the supervisors and input from the validator, and tries to facilitate user needs based on the needs analysis in the preliminary study. The high average and N-Gain mode in the realm of biodiversity literacy competence may also have a relationship with affective disposition. The concept of competence implies more than just the acquisition of knowledge and skills; competence involves the mobilization of knowledge, skills, attitudes and values to meet complex demands [61].

Disposition is a state or quality of a tendency to do something, a frame of mind or feeling [1]. The tendency to act has a real significance for environmental literacy [1]. Adapting from NAAEE [1] and WWF & WCEE [11], the domains of affective disposition of biodiversity literacy in this study include: (a) interest in biodiversity; (b) sensitivity and positive value to biodiversity; (c) concern for biodiversity; (d) personal and community

beliefs related to biodiversity (Locus of control, hope/desperation); and (e) responsibility (personal and social) towards biodiversity. The achievement of the affective disposition domain by the teacher before and after the implementation of the biodiversity literacy textbook containing the local potency of West Java is shown in Table 4.

Table 4: Recapitulation of descriptive statistics of affective disposition dimension achievements.

	N	Minimum Value	Maximum Value	Average	Mode	Standard Deviation
Pre Test Score	33	70.17	98.00	82.21	74.67	7.62
PostTest Score	33	75.17	100.00	93.52	99.67	7.13
N-Gain (%)	33	16.76	100.00	69.08	100.00	29.23
mode	33	-	-	-	High	-
Valid N (listwise)	33					

The data in Table 4. shows the average achievement of affective disposition by teachers. The average initial affective disposition is 82.21 and after implementation is 93.52. This shows that the teacher's initial affective disposition is good. The affective tendency to act well has the potential for good literacy as well. The data in Table 4.26 also shows an increase in the average affective disposition by teachers. Based on the analysis, the average N-Gain was 69% (medium category). N-Gain mode which is 100% and high increase category mode. Results of hypothesis testing with The Wilcoxon test produces a sig value 0.000. This means that there is a significant difference between the average affective disposition scores before and after the implementation of the the biodiversity literacy textbook containing local potency of West Java. In other words, the biodiversity literacy textbook containing local potency of West Java has a real influence on the achievement of affective dispositions for teachers with high category improvement mode.

The high mode of improvement in the realm of affective disposition after the implementation of a biodiversity literacy textbook with local potency in West Java shows that many teachers are able to change their affective tendencies in a positive direction towards biodiversity. The increase in knowledge, including knowledge (content, procedural, and epistemic) which is integrated into the developed textbook is likely to have an effect on increasing the affective disposition of the teacher, and vice versa. Knowledge, skills, attitudes and values are developed interdependently; attitudes and values are integral to developing knowledge, skills, and agency [61].

Some of the prominent affective dispositions tend to focus on nature, namely environmental sensitivity, attitude towards the environment, environmental concern, assumptions of personal responsibility, locus of control/self-efficacy , and intention to act [1, 11]. Adapting from NAAEE [1] and WWF & WCEE [11], the domains of affective disposition of biodiversity literacy assessed in this study include: (a) interest in biodiversity; (b) sensitivity and positive value to biodiversity; (c) concern for biodiversity; (d) personal and community beliefs related to biodiversity (Locus of control, hope/desperation); and (e) responsibility (personal and social) towards biodiversity. The achievements of each component of affective disposition by the teacher are shown in Table 5.

Table 5: Achievement of affective dimension dimension components of biodiversity literacy.

Components of Affective Disposition Dimension	Average			
	Beginning	End	N-Gain (%)	Category
Interest in biodiversity	78.36	91.85	68.14	Medium
Sensitivity and positive value to biodiversity	90.00	98.52	88.54	High
Concern for biodiversity	78.06	90.94	67.41	Medium
Self-confidence regarding biodiversity	78.48	92.03	69.32	Medium
Personal responsibility for biodiversity	82.12	92.82	69.16	Medium
Social responsibility towards biodiversity	86.24	94.97	68.79	Medium
The total value of the affective disposition domain	82.21	93.52	69.08	Medium

Data in Table 5 shows that each component of affective disposition has increased after the implementation of the biodiversity literacy textbook containing the local potency of West Java. The increase in the high category occurred in sensitivity and positive values for biodiversity . Meanwhile, other components of affective disposition experienced an increase in the moderate category. Based on these findings, biodiversity literacy textbooks containing local potency help teachers in improving affective dispositions related to biodiversity.

The increase that occurs in affective disposition may be obtained by the teacher through various experiences during the implementation of textbooks such as reading activities that increase knowledge related to biodiversity and its conservation, as well as various other activities such as an inventory of local biodiversity at various levels, its value, and possible causes of local biodiversity decline. Self efficacy is one part of affective disposition that focuses on nature [1, 62] The four main sources of self-efficacy beliefs are mastery experiences, vicarious experiences, social persuasion, and

physiological and emotional states [62, 63]. Research has identified five mechanisms that can increase self-efficacy namely mastery experiences, modeling/representative experiences, imaginary experiences, social persuasion, and somatic/emotional cues [64]. Mastery experience is one of the most effective sources in increasing the level of self-efficacy [62–64]. Mastery experience can be in the form of previous experience in a particular field in the form of knowledge of problems, practices, procedures, or practices [65]. Various experiences encourage the development of affective dispositions and influence individuals to be actively involved in decision making and problem solving [1].

Improvement of affective disposition related to biodiversity is important for teachers. The teacher is a model for the students. What happens to the teacher can be imitated by students and influence it. Affective disposition plays an important role in the development of environmental responsibility [66, 67]. If the teacher has a negative attitude towards the problem of biodiversity, it is unlikely that the teacher can be involved in solving the problem. People are less likely to take part in environmental actions if they acquire a negative attitude towards them [66]. Increased affective disposition has the potential to increase knowledge, use knowledge, and take appropriate action. Through an increase in affective disposition, it means that there is a tendency to act in a better direction so that it is hoped that there will also be an increase in the realm of other biodiversity literacy, namely knowledge, competence, and action. Self-efficacy can determine the way people think, feel, and act [63]. Self-efficacy beliefs can contribute to the motivational and decision processes for behavior change [65]. This happens because these beliefs affect the choice of action, how much effort will be made, how long people will endure when facing obstacles and the type of goals to be set [68]. Attitudes and values are integral to developing knowledge, skills, and agency [61].

Analysis of respondents' responses regarding the material and usefulness of biodiversity literacy textbooks containing local potency provides information about the effect of books on their readers. As stated by Waples in Muslich [69] that the book gives the reader five categories of influence such as instrumental influence, prestige, stabilization, aesthetic and appreciative, and release. When the material in biodiversity literacy textbooks containing local potency can add insight into knowledge (biodiversity, procedural, and epistemic content), biodiversity conditions in West Java, Indonesia, and the world, it can be said that the textbooks developed have a stabilizing effect. This knowledge consolidation is then beneficial for respondents to improve their competence and effective disposition. The respondents in this study were not like blank papers, but previously had knowledge and competence in biodiversity literacy, and already had a set of affective dispositions that supported biodiversity. Through the

reading material in the developed book, their competence and affective disposition are getting stronger. This indicates that in this research, biodiversity literacy textbooks containing local potency provide a stabilizing effect for their users.

4. CONCLUSION

Biodiversity literacy textbooks containing local potency of West Java can help improving the competence and affective disposition dimension of biodiversity literacy of teacher. The results showed that: (1) there was an average increase in competence dimension (71%) and affective disposition (69%) of biodiversity literacy; (2) Sequentially increasing of the component of biodiversity competence, namely scientifically explaining biodiversity phenomena (77%), evaluating scientific inquiry related to biodiversity (74%), scientific interpretation of biodiversity data and evidence (73%), and designing scientific inquiries related to biodiversity (68%); (3) The increase in the level of biodiversity literacy competence occurred at level 4 (21%), level 5 (15%), and level 6 (48%); (4) The increasing of affective disposition in the form of sensitivity and positive values (88%), self-confidence, personal and social responsibility (69%), interest (68%), and concern for biodiversity (67%). The results of hypothesis testing with the Wilcoxon Test resulted in a sig value of 0.000 for the domain of competence and attitude disposition. This means that there is a significant difference between the competency average scores and attitude dispositions before and after the implementation of the biodiversity literacy textbook containing the local potency of West Java on teachers. In other words, the biodiversity literacy textbook containing local potency of West Java has a real influence on the achievement of the competence and attitude disposition domain of teachers' biodiversity literacy.The conclusion is that biodiversity literacy textbooks containing local potency of West Java can help improving the competence and affective disposition dimension of biodiversity literacy of junior high school teachers. Therefore, the biodiversity literacy textbook containing local potency of West Java can be used as an alternative to equip and improve the biodiversity literacy of junior high school teachers on the competence and affective disposition dimension.

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