

Needs Assessment to Development of Biology Textbook for High School Class X-Based the Local Wisdom of Timor

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Abstract

This research aims to analyze the needs of the development of the X grade Biology textbook of Senior High School based the local wisdom of Timor. The subject is a Senior High School Biology curriculum Classes are taught at Senior High School X SMA in Kupang Regency on the academic years 2012/2013. Object of research includes: (1) core competency and competencies profiles of basic Senior High School Biology Class taught by strategic X insert the local wisdom of Timor (2) characteristics of the concepts relevant of Timor local wisdom is integrated into Senior High Scholl Biology textbook of class X. Research Data collected with interviews and question form, as well as analyzed by descriptive. Research findings show that: (1) there are 10 basic competency covered in Biology learning materials namely 4 material, material World biodiversity of plants sub material Classification of plants, Ecosystems and environmental science can be inserted with the local wisdom of Timor; (2) the concepts of local wisdom relevant Timor integrated into the curriculum of Senior High Scholl Biology class X, among them: local wisdom about saving the environment, ceremonial nature and environment care, Philosophical life "Atoni Pah Meto", clean water, trapping knowledge classification of plants, animals, knowledge of traditional medicines and health care utilization, properties of materials for the manufacture of traditional tools.

Keywords: biology textbook, the local wisdom of Timor, senior high school

1. Introduction

Local wisdom which contains, among others, traditional knowledge as an environmental Savior has been widely researched and analyzed the experts. Hobson (1992) have seen the influence of Aboriginal traditional knowledge in saving the environment in Canada. Riggs (2004) declares the existence of the original knowledge has formed the basis of some attitudes and educational material in the community of the Native Americans (Indians). Royyani and Walujo (2012) and noted the existence of a high participation of communities around Mount Salak by the existence of a variety of local traditions and belief in maintaining and preserving the environment. Gao et al. (2013) also stressed the link between natural resource conservation as a custodian of the wealth of North China.

Addressing the things above, there are many researchers who are now trying to integrate more local wisdom and reconstructed to be integrated in the learning materials in schools, among others, Djulia (2005) research on the role of science in the formation of local cultures, researchers here see the case studies at a high school student group of Sundanese culture, which brings a positive contribution in raising the score value and the concept of respiration and photosynthesis with reference to the concept of local which is then absorbed and scientifically constructed by students in the school.

Later research Suastra (2005) to reconstruct the original Science (indigenous science) in an effort to develop the local culture-based science education in school and later in 2010. Suastra and Nengah (2010) research about the effectiveness of science-based learning model of local culture to develop basic competence in science and value of local wisdom in junior high is a pretty effective way to increase competence of the basic science of junior high school students. From their research can be views that there should be a bridge to connect between the

traditional knowledge with modern knowledge and find a way to integrate it within the system of formal learning at school so that students understand and will never forget the values of local culture. To find out the benefits of traditional knowledge and local wisdom in improving environmental knowledge and attitude of students in keeping the environment, then a research development can be done first to dig a wide range of traditional knowledge and local wisdom that exist and thrive in the community, to then be integrated in the learning of the syllabus, RPP, learning materials, learning and media and Paper Project Student (LKS).

Until now, including Biological Sciences curriculum imposed on formal schools, ranging from kindergarten up to higher education, tend to be adopted from the West. This is one proof of in not be autonomous of teaching science. In addition, Science learning models applied by the teachers also developed from the Western tradition. Remember Western culture that underlies the development of science, and the lesson that is different from the culture of the students, then the learner's Science in school could potentially give rise to incompatibility (clash) and conflict (conflict) on students (Retug et al., 2010).

Many topics on Biological subjects which require not merely a material required by the curriculum but also enriched by the teacher as a spearhead in the process learning. Curriculum for it in 2013, the recommended method of learning is a method scientific that refers to 5M which is to observe, ask yourself, collect, process and associate as well as communicate issues in learning. For that teacher to sharp to observation see the subject matter so that integrated knowledge needs among students, a change in attitude, and the usefulness of the materials for student empowerment for the benefit of the future and its application in the world is real. One approach that can be done is what is known as the SETS (approach and Environmental Science Technology and society in the biology textbook is expected to provide assistance to teachers in the associate between the material being taught with real world situations students and encourage students to make connections between knowledge assets with its application in everyday life as well as by looking at the potential of the local environment in particular local wisdom, which include traditional knowledge, natural resources and local culture, so that teachers can be utilized optimally in the learning process. This is one of the things that is recognized by 2013 i.e. curriculum recognition of individual differences and cultural background of the learners.

Jegede and Aikenhead (2002) have conducted a review of several studies related to cultural linkages to learning Science in some Western countries. Results of studies that generally indicate that indigenous students are inclined were unable to cross the boundaries of culture. In other words, the cultural background of the students is one of the limiting factors for the students to understand the concepts of Science School from the West. In connection with it, Stanley and Brickhouse (2001) suggest that learning Science in school (College) balance between Western knowledge (Science) with indigenous traditional knowledge (Science) uses a cross cultural approach (cross-culture). Opinions were also presented, which States if a subculture of Science School harmony with the daily life of the students, then the instruction will reinforce the views of students about the universe, which in the end will make respect for the environment and makes the basic stance of the attitude of keeping environmental sustainability.

To prevent students away and drawn from its cultural roots as a side effect of learning in school, Sardjiyo and Pannen (2005) suggested that cultural environment students can take them into learning. According to them, learning environment in accordance with the cultural background of the students will be make it more comfortable, more fun, and more makes it possible to play an active role in the learning that will ultimately boils down to results of his studies. It is also delivered by Mlcek (2011), based on his research among students of indigenous Australia and New Zealand, that effective learning provide a space for students to study and work on something according himself.

With the enactment of KTSP curriculum and continued with the 2013 curriculum, then any unit of education reserves the right to develop the curriculum in accordance with the potential and the needs of the environment. Thus, this opens up the opportunity for teachers to do local wisdom-based learning innovations include integrating content where necessary and conduct the study in accordance with the culture of student learning. Because in teacher learning tends to refer to a book source, then this will be done in the research needs analysis for the next textbook development footing Foundation of biology Senior High School Class X based the local wisdom of Timor.

This research begins with the analysis of the content of the curriculum, as well as the needs and potential of each school to implement the curriculum Commission 2013. In General, the purpose of this research can be formulated as follows. First, the core competency profile and basic competency for Senior High School Class Xs taught by strategic insert the local wisdom of Timor to inserted Text Book. The second characteristic concepts relevant the Timor local wisdom is integrated into Senior High School Biology textbook of class X.

2. Research Methods

The focus of this research is the analysis of the potential and the need for learning Biology Class X to be used as a foundation in the development of Senior High School Biology text book of class X based on the local wisdom of Timor. The subject is a Senior high school Biology curriculum a class X is used in Kupang Regency on the academic years 2012/2013. The object of his research include profile core competencies and basic competency for basic high school Biology taught by inserting strategic wisdom of Timor, the characteristics of local concepts relevant local wisdom is integrated into the curriculum of Senior High Scholl Biology Class X.

The Data were collected through interviews, research and dissemination of the question form and checklist. Thus, the instruments used to collect the data is a list of entries, interviews, and the now guidelines for students and teachers. Checklist used to collect data on the core competence and the competence of the basic Senior High Scholl Biology class taught by strategic X insert the local wisdom of Timor, the concepts of the relevant to local wisdom is integrated into the X-grade text book interview against Guidelines. The principal and biology teacher used to get information about the school's learning support resource Biology; view of the principal and of the innovation of curriculum, instruction and assessment of learning outcomes; as well as the views of teachers towards learning Biology the local wisdom of Timor. Now students and teachers used to learn the views of teachers, learning materials, methods and systems and the assessment of the dominant material applied, the existing facilities at the school, students facing difficulties in learning of biology, and Biology students learning to innovation. The Data collected in this research in the form of qualitative data. The Data were analyzed by descriptive equipped with triangulation of methods and data sources.

3. Results and Discussion

From the analysis of the collected data and brings about some facts that can be obtained with regard to High school Biology learning at several schools in Kupang. Of the 31 (thirty one) public and private high school in Kupang, 2 (two) new schools which actively carry out curriculum 2013 i.e. SMA 1 Kupang West as pilot schools designated Dikmenum and the core curriculum for 2013. While the East Kupang SMA 1 implement curriculum 2013 independently. Other schools are expected to follow the academic year 2014 with descends to the core schools because some teachers and principals in high school get the training curriculum of 2013.

From interviews with some of the high school principal in the Regency of Kupang, obtained the data that many schools had difficulty in accessing the curriculum 2013 in the form of RPP (The Teacher Guidelines) and materials especially for biology that does not made the text book. In addition, some school difficulties due to lack of facilities and infrastructure following the competent teachers in implementing the curriculum of 2013. Although the education service provides help for learning materials and media Kit with Biology Education Fund but the textbook being used universally and forget the value local.

The potential of the local environment in particular traditional knowledge, local wisdom and local culture appears to have forgotten the lesson that the teachers. Teachers tend to be more wear materials so printed as a Biology text books for sale. So the content of the material is not wide spread, and national focus on local values that could be developed for teachers in classes related to the potential of the region. Based on observations and interviews and a biology teacher in Kupang regency in school, then obtained the initial information that the teacher does not enter values of local or regional potential, traditional, knowledge and local wisdom in some topics such as Biology learning, biological diversity, and ecosystem classification system. In addition to mind that teachers are still not developed the learning resource is a textbook or instructional media for LKS as well as topic-the topic in class X Senior High School.

There are 10 topics in the study of biology is taught in the classroom curriculum based X 2013, namely: (1) the scope of biology, (2) Archaeobacteria and Eubacteria, (3) Protista, (4) Fungi, (5) Virus, (6) Biodiversity, (7) The world of plants, (8) The Animal world, (9) Ecosystems and, (10) Environmental science. To the ten topic elaborated in four (4) core competencies (KI) and 23 (twenty three) Basic Competence (KD). Of the 23 KD there is 10 (ten) KD can be inserted with the local wisdom of Timor. Specifically the KD and the material can be inserting can be seen in Table 1.

Table 1. Basic competencies as well as Biological material grade X which can be inserted with the local wisdom of Timor

	Biological Material Competence that can be inserted with the local wisdom of Timor	Local wisdom will be inserted
1.1.	Admire the regularity and complexity of God's creation about biodiversity, ecosystems, and the environment.	Biodiversity Ecosystem Environmental science
1.3.	Sensitive and caring towards environmental problems, maintain and care for the environment as a manifestasi practice of the teachings of the religion adhered	Few ceremonial nature, the principle of observance of the Atoni pah Meto
2.1.	Scientific: behave carefully, diligently, honestly fits the data and facts, discipline, responsibility, and care in observation and experimentation, daring and polite in asking the question and argue, caring environment, mutual cooperation, peace-loving, argued scientifically and critical, responsive and proactive in every action and in conducting observations and experiments in the classroom/laboratory and outside of classroom/laboratory	Environmental science Wisdom local customs fine, rituals of maintenance trapping knowledge of nature, clean water
3.2.	To Analyse the results of the obervasi of data about different levels of biodiversity (genes, species and ecosystems) in Indonesia	Environmental science of local wisdom about saving the environment, clean water, trapping knowledge, classification of plants, animals, knowledge of traditional medicines and health care utilization, properties of materials for the manufacture of traditional tools
3.7.	Applying the classification to classify plants into a division based on observations of morphology and metagenesis plants and hooking his role in the survival of life on Earth	Biodiversity Ecosystem
3.9.	Analyze the information/data from a variety of sources about the ecosystem and all the interactions that take place there in	The local of wisdom about saving the environment
3.10.	Analyzing the data of environmental change and the impact of such a change for life change	The World of Plant Plant classification
4.2.	Identification of proposals presents the results of biodiversity preservation efforts Indonesia based on the results of data analysis of preservation threats a variety of diversity of animals and plants typical of Indonesia which are communicated in a variety of forms of media information	Ecosystem Examples of ecosystems on the island of Timor, the conditions of mining Manganese in the island of Timor
		The local wisdom of Timor preserve of environment, Konsep "Mansian-Muit-Nasi, Na Bua"
		Biodiversity of local examples of animals and plants native to East Timor as well as examples of conservation in Nusa Tenggara Timur (NTT)

4.9.	Designing a chart about the interactions between components of the ecosystem and food web which takes place in the ecosystem and presents the results in a variety of media forms.	Ecosystem	The Local Wisdom about energy cycle, concept “Mansian-Muit-Nasi, Na Bua”
4.10.	To solve environmental problems by making product design wastes recycling and environmental preservation efforts.	Environment science	Environmental science of local wisdom about saving the environment, examples of local recycling project

From the above table it can be seen that there are 4 (four) class X Biology materials i.e. Biodiversity, the plants of world plants sub material Classification of plants, Ecosystems and material environmental science which can be inserted with the local wisdom of Timor in the form of local wisdom about saving the environment, clean water, trapping knowledge classification of plants, animals, knowledge of traditional medicines and health care utilization, properties of materials for the manufacture of traditional tools. In addition local examples will be inserted in the form of animals and plants native to Timor, examples of conservation in East Nusa Tenggara (NTT), the wisdom of local fines customs, traditional ceremony about the maintenance of nature such as a ceremony of Thanksgiving Ceremony “onem Syukur”, “Fua Pah”, as well as the use of natural dyes used in yarn dyed “Tenun Ikat” to make East Timor.

Environmental rescue local wisdom is reflected from the principle “Atoni Pah Meto” inherent in the ethnic community native to Timor, in the form of patterns or ways of living humans, where they perceive the surrounding environment such as lawns, fields or gardens as little world (microcosmic), which are among the great world/outside (macrocosmic) and must be in harmony side by side Timorese also believes in the God of Earth aka “Uis Fua”, also often referred to as “the goddess of the “Uis Neo”. The ceremony aimed to “Goddess Uis Neo” is asking for blessings for the fertility of the soil that is being planted. In addition, the society also believe in the existence of supernatural beings who inhabit certain places, like in the Woods, springs, streams, and trees are considered sacred. Rituals to cleanse the super natural beings that are often carried out by village officials, e.i by indigenous leaders at once.

In terms of an arbitrary land opening ritual, community of East Timor also had a ritual of “Paonasi”, which is a form of apology to nature after opening the land widely. This traditional Ritual will be performed in the event of negative impacts such as floods or forest products are scarce or water discharge is shrinking. The Timorese also had knowledge of the unfriendly climate strategy in the form of drought by applying a long cultivation cycle for horticultural crops such as maize, beans and vegetables. Planting season begins when the rainy season will be close between November and December. The ceremony “Fua pah” and “Onem Syukur” is a ritual ceremony related to yields, where society gives or offerings at the master of nature.

The local wisdom is seen in the community of Timorese is just like most of the island of Timor known society the concept of a triangle of life “Mansian-Muit-NaBua” meaning humans, livestock, and forests is a unity which is inseparable and mutual reliance. Ecosystem principle and living a life of mutual networking and support is greatly appreciated. Humans interpret the benefit of livestock and forests, livestock forage in forests and forest nurture human beings. If one of these three elements is separated, it will take effect for the other elements. Technically, some form of biodiversity in NTT especially the island of Timor until recently still had a significant contribution in the rehabilitation of the land, environment and forest resource management.

Knowledge of trapping water supply used by the community on the banks of the river where they make a hole traps for trapping the water stream and store the water that flows through the soil layers so that the relative clean and could be used as drinking water. Other knowledge is planting a lot of trees in the upper reaches of the River to prevent flooding and implement strict customs sanctions for anyone who cut down trees in water sources suits custom deal.

Knowledge for the classification of plants, classified plants in traditional Timorese already implement in simple classified terms. This is expressed by giving the name “uik” for all categories of banana plants. Just type a name that distinguishes him as “muti”, “uik ambon” etc. This classification is similar to the scientific classification, where the binomial name with show first name system is a genus or clan and the second name is the epithet or pointer type. Likewise for plants relatives aren (Arenga pinnata), almost all named after or under the name Bone like “pua Bone” (Chrysolcarpus), “Bone ana” (Corypha utan) all of which are in one family in taxonomic even

in the same section (UHI and Dransfield, 1985).

Knowledge about the utilization of herbs as medicines and maintenance of healthy owned by Timorese especially that profession as a shaman or an expert in traditional medicine. They could show the herbs used in the treatment, concocted and giving and recover on patients and the fairly high success rate. More than 50% of the medicinal plants after the plant is traced further as a source of raw materials of modern medicine or potentially as medicine.

The utilization of materials and materials for daily needs can be seen from the presence of webbing tools, building materials, music, cooking and a variety of other purposes. While knowledge of artificial dye obtained from hereditary ancestors by using sources that are around them. Although not all the tinting process is done while still in the form of yarn, but in general the coloring is done before the process of weaving. The coloring is done using "Ru Dao leaf of the plant *Indigofera* sp. to get the color Indigo and henna leaves (*Lawsonia inermis*), areca nut (*Areca catechu*), tree roots and "Ka'bo" (from the family *Fabaceaceae*) to get the red, while the yellow color can be obtained using turmeric (*Curcuma domestica*) and leaves a "Menkude" or noni (*Morinda citrifolia*).

The following local knowledge and wisdom in this traditional can be inserted inside a class X Biology learning materials so that students get added value and is no stranger to its own. Besides all this material can make students aware of the cultural and natural wealth in the vicinity so they moved to safeguard and conserve nature and their culture.

For learning Biology-based local wisdom of Timor, the researchers developed an approach in which Observe, learn, Discuss and actually, which is part of the contextual learning. Four (4) phases in the approach can be outlined as follows:

- Observe, that students are asked to observe and pay attention to the environment by the topic or subject matter to be studied. In this stage, the students are asked observation noted the relevant things that attract and grow and raises questions as well as critical skap students.
- Learn, next in the class, all the things that they have observed is studied further by looking for answers from the teacher, or sharing fellow friends. At this stage it is expected students can decipher what they observe and connect him with the material being studied
- Discussion of the next step, namely the sharing between friends they are discussing with the guidance of the teacher to look for possibilities of answers from the phenomena that they observe and learn. This stage is expected to cultivate an attitude of cooperation between students and respect other people's opinions as well as trying to find the best of the many possible answers then take the essence that they can learn
- The actualization, namely the stage action of which he had learned, develop it according to the circumstances, conditions and time to be able to do in everyday life and use in the context of science, technology and environment of the community.

Materials for classification of living beings and biodiversity in this approach with students expected to see, learn and discuss the biodiversity of animals and plants that exist around them and apply the technique of preserving and protecting the biological diversity as part of the daily actualization in any of their actions. A suitable Learning Model is Direct Instruction or direct learning where students are given background information about the classification and biodiversity from the global level to local, then the teacher asked students to pay attention to the environment around them and begin guiding students' understanding of the material and provide feedback. Student feedback is conditioned in discussing with teachers and fellow students to achieve the optimal results of reasoning and knowledge form the intact. Although tend to Center on teacher but at the moment of observation and discussion students will more actively involved so that an understanding of the material to be formed from his own observations and constructed by students.

For material Science environment, and Ecosystem models that are considered suitable for the learning process is the Problem Based Investigation where students, oriented to the problems of the environment and the ecosystem residence, then organizing the students to see and study the environment, the issues in their environment, how the formation of ecosystems and how the care of ecosystems, then do a simple investigation team to get answers to these questions and presented before the class so that they can analyze and evaluate problems and answers are obtained. From the model of learning is expected of students obtain the material intact and contextually appropriate with everyday environments and seek solutions to problems that occur in their environment.

From the above models, approaches and strategies of teaching remains turned over to the teacher as well as the situation and condition of class. The approach is merely a reference for teachers in carrying out the study of biology with ethnic-based learning tool for this purpose so that Timor of learning is that students can participate

in constructed (constructivism), said it did not know to its surroundings (questioning), discover new knowledge (enquiries), learning (learning community), making modeling (modeling), and perform the actual assessment (authentic assessment). All this is to be achieved by the contextual learning, which in the end will make the learning process the students become active, creative and fun. Furthermore this learning process of the students gets knowledge they can use so the footing being in his environment.

Contextual learning is applied will be harmonious with the newly proclaimed 2013 curriculum and will be forced by the Government. Currently some schools already but have not yet applied the example can be assessed the feasibility and success of the curriculum of 2013. High school in Kupang alone has not yet implemented a curriculum of 2013, although few schools and teachers have been getting guidance Curriculum implementation and dissemination of 2013. Curriculum for 2013, the recommended method is to apply a Scientific Method is enriched with Inquiry Learning, Problem-based Approach and project-based Approaches.

There are three (3) main learning component in the curriculum of 2013 are: 1) The attitude that is obtained through the activities of “receiving, running, cherish, appreciate, and practice”. 2) Knowledge gained through the activities of “Remembering, understanding, applying, analyzing, Evaluating, Creating, as well as. 3) Skills acquired through observe, ask yourself, try, others are allegorical and Created “. Furthermore there are 5 (five) learning that will pass measures namely: observe, ask yourself, collect information, associate (information processing), and communicate, or customarily abbreviated with 5 M.

4. Conclusions and Suggestion

4.1 Conclusions

From the results of the research there are:

(1) 4 core competencies (KI) and 23 basic Competence (KD) for Senior high school Biology Class learning X curriculum based on 2013. Of the 23 KD there is 10 (ten) KD can be inserted with the local wisdom of Timor and relevant material i.e. biodiversity, World plants sub material Classification of plants, ecosystems, and Materials Science in the environment.

(2) The concepts of local wisdom relevant Timor integrated into the curriculum of senior high school Biology class X, among them: local wisdom about saving the environment, ceremonial nature and environment care, Philosophical life “Atoni Pah Meto”, clean water trapping, knowledge classification of plants, animals, knowledge of traditional medicines and health care utilization, properties of materials for the manufacture of traditional tools.

4.2 Suggestion

Further suggestion was proposed by researches is the can inserting local wisdom to material teaching. In biology, the need of textbooks, student worksheets and media based on the local knowledge are the essential elements in order to bring students getting the wisdom of traditional knowledge and values that exist in the surrounding community. As result, students are not leaved out from their cultural roots

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